

# SUMMARY OF PRAIRIE CREEK WATERSHED ASSESSMENT MONTCALM AND IONIA, MICHIGAN

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## INTRODUCTION

The Prairie Creek watershed is located in southeastern Montcalm County in Evergreen Township and northeastern Ionia County in Ronald and Ionia Townships.

**DESCRIPTION:** It originates southeast of the Sheridan in a primarily rural area with low density residential use. It then flows south into Ionia County and veers west towards the city of Ionia where it joins the Grand River just east of Ionia. Michigan Department of Environmental Quality (MDEQ) field staff surveyed road/stream crossings within the watershed to quickly assess the health of the watershed. The survey combined both qualitative and quantitative assessment of Prairie Creek and its tributaries and provided a basis upon which to identify any potential sources of non point source pollution negatively affecting the watershed. In total, 48 road/stream crossing locations were surveyed during the assessment of the Prairie Creek Watershed. Refer to the Road Stream Crossings Inventory for a summary of the survey locations conducted during October of 2004, as well as survey location maps. Site identification codes were developed using four letter identifiers for the subwatershed followed by the two digit site location number. Sites were numbered successively from the mouth to the headwaters.

## METHODS

The DEQ's stream crossing watershed survey procedure was developed as a quick screening tool to assess general water quality and possible pollutant sources, causes and problems within the watershed. The survey procedure provides standardized visual assessments that can be conducted by DEQ staff or trained volunteers. Only observations that can be made from the road stream crossings are recorded; recording "educated guesses" or suspicions is prohibited. Because this assessment is based on visual observations, designed to be conducted quickly and by many different types of people and knowledge backgrounds, the survey results are only qualitative in nature.

A minimum of 30% of the road stream crossings within a watershed are to be surveyed with attention given to balanced geographical coverage and assessment across major land use changes and possible pollutant sources. Surveys are always conducted in one general direction (either upstream to downstream OR downstream to upstream), and the attempt is made to keep the surveyors and weather conditions consistent to limit bias and subjectivity between surveyors. This survey was conducted from the upstream to downstream direction and was completed in one day by two DEQ field staff. The right and left bank designations are always assigned based on looking downstream at each road stream crossing location.

### **At each survey location the following stream conditions are visually assessed:**

- Weather and any event conditions
- Culvert/bridge conditions
- Channel conditions (width, depth, high water mark, riffles, pools, natural, maintained, recovering)
- Stream appearance (color, turbidity, algae, aquatic plants, trash, oil sheen, bacteria, foam)

- Substrate composition (boulder, gravel, silt, sand, unknown)
- In-stream Cover (undercut banks, overhanging vegetation, woody debris, pools, boulders, plants)
- Stream corridor (riparian vegetation type and width, bank erosion, canopy cover, adjacent land use)
- Potential Pollutant Sources (source and pathway identification)

**At each survey location the following stream conditions are directly measured:**

- Water temperature
- Dissolved oxygen content
- pH
- flow velocity
- latitude and longitude coordinates (GPS)

In addition each site was photo-documented with a digital picture taken in the downstream direction, upstream direction and of the road crossing. Refer to the DEQ's *Stream Crossing Watershed Survey Procedure* for further information and a complete description of the above conditions.

## OBSERVATIONS

### **Water Temperature, pH, and Dissolved Oxygen**

Survey locations were assessed in the order of upstream sites (in the headwaters) to downstream sites (towards the mouth). 48 locations were measured for temperature, DO, and pH. pH values ranged from 7.10 to 9.10, which were not outside of the normal range for streams within Michigan. Overall the average temperature was 48.71°F. Normal stream temperatures capable of supporting a coldwater fishery with few diseases are below 57°F. Walleye, northern pike and some trout are adapted to temperatures between 57° to 58°F while temperatures over 58°F are characteristic of fish communities characterized by bass, crappie, bluegill, carp and sucker with occurrence of fish disease high. The cool fall temperatures in Prairie Creek are comfortable for many species. The average dissolved oxygen content is 9.35 ppm; it varies from 13.08 ppm at station PC-30 to a measurement of 1.08 ppm at PC-35 where tributary is stagnant. The dissolved oxygen requirement for native bass and crappie growth and well-being is 5 ppm and for trout it is at least 5 ppm. Given the relatively high average oxygen content at most locations, Prairie Creek is a comfortable environment for aquatic life. Refer to Figure 1, which depicts the temperature and pH levels at all locations and Figure 2 for only main stem measurements.

### **Substrate**

Substrate was observed and quantified for both the upstream and downstream stretch at each survey location. In all, 96 substrate observations were recorded at 48 locations. Substrate type is important when considering habitat suitability for desired species within the system (i.e. trout and other fish species). Cobble and gravel substrate with a low degree of embeddedness are the most suitable for reproduction in many fish species and is important for macro invertebrates as well. Evidence of silt and sand dominated

substrate could indicate problems within the watershed such as erosion and sedimentation. Among the survey locations within the Prairie Creek Watershed, 6 sites were dominated (50 to 100% covered) by sand, 63 were dominated silt, detritus or muck, and 7 sites were dominated by gravel (note: some sites had equal amounts of sand and silt and some substrate observations were prohibited). Refer to Figure 3 for a graph depicting the substrate composition for those survey locations located along the main stem of Prairie Creek.

### **In-Stream Cover**

The presence of in-stream cover was assessed at each location for both the upstream and downstream stretches. In-stream cover, such as overhanging vegetation, undercut banks, deep pools, boulders, plant cover and large woody debris provide habitat for macro invertebrates and aquatic organisms such as amphibians and fish. Of the 96 observations made, 98% of the sites had overhanging vegetation and woody debris, 58% had woody debris, and 22% had boulders. Some sites also had undercut banks, deep pools, and aquatic plant cover. Refer to Table 1 for a summary of the in-stream cover observations made at each survey location.

### **Physical Appearance**

The physical appearance of the stream at each survey location was assessed based on the presence or absence of aquatic plants, floating algae, filamentous algae, bacterial slimes, turbidity, oil sheen, foam and/or trash. In all, 96 sites were assessed for physical appearance; observations were recorded and rated as either present or abundant. No oil sheens were observed at any of the sites. Filamentous algae was observed at 46% of the sites, aquatic plants were at 38%, turbidity was at 21%, and floating algae was at 13 % of the sites. There were also instances of trash, bacterial slime, foam, and oil sheen. Refer to Table 2 for a summary of the physical appearance observations made for each survey location.

### **Stream Corridor**

The width of riparian vegetation was assessed at each survey location for the both the right and left banks of the upstream and downstream stretches. The presence of riparian vegetation reduces the amount of surface water runoff to streams, provides a filter strip for nutrients within runoff waters, provides overhanging vegetation for stream habitat, provides a source of woody debris, stabilizes stream banks against erosion and determines the availability of sufficient stream canopy cover for temperature regulation. 48 survey locations were assessed, resulting in 96 observations of riparian vegetation width recorded. The observations fell into four width categories: 38% had less than 10 feet, 30% had between 10 and 30 feet, 12% had between 30 and 100 feet and 20% had greater than 100 feet of riparian vegetation. The streamside land cover, estimated bank erosion and percent stream canopy were evaluated at each of the 48 survey locations for both the upstream and downstream stretches. In all, 96 observations were made for each of the above listed characteristics. Of the survey locations, 26% were recorded as having streamside land cover predominantly shrubs, 22% predominantly grasses, and 52% were dominated by trees. In general, vegetation such as grasses and shrubs and residential and

agricultural land uses, are associated with narrow riparian widths. More extensive riparian vegetation is usually associated with forests and old fields. Bank erosion was a slight problem within this subwatershed. Refer to Table 3 for the distribution of riparian width and vegetation observations made for both the right and left bank at each survey location.

Stream canopy cover is important for providing shade and maintaining cool temperatures within the stream. Cooler temperatures also helps keep dissolved oxygen levels from depleting, an important habitat requirement for many fish species and other aquatic organisms. Of the 96 observations made, 17 had less than 25% cover, 43 had between 25 and 50% cover and 6 had over 50% cover.

### **Adjacent Land Uses**

Adjacent land uses were recorded at each survey location for both the upstream and downstream stretches as well as both the right and left banks. Because the entire section of stream that can be seen from the road crossing is evaluated, multiple land uses can be recorded for each site. Land uses within the watershed play an important role in nutrient input, erosion, and in-stream conditions that affect water quality, quantity and habitat. The most common adjacent land uses in the Prairie Creek Sub watershed were shrub/old field, forest, and cropland. Maintained lawn, pasture, impervious surfaces and disturbed ground were also common land uses. Refer to Attachment B, Table 4 and Figures 4 for a summary of all the adjacent land uses recorded within the watershed.

### **Potential pathways of non-point source pollution**

During the completion of the road stream crossing surveys, field staff also evaluated the *potential* for non point source pollution. This assessment focuses on the severity of potential pollutant *inputs*, not pollutant *impacts*. As part of this evaluation process field staff look for 1.) a possible pollutant source, 2.) a potential pathway to the water body and 3.) potential severity of the input. Because each potential source was given a ranking of slight, moderate and high for severity, the values recorded were weighted before they were summed for each category (Refer to Figure 5). Observations recorded as slight were considered to be the basis for comparison, therefore observations recorded as moderate were multiplied by 1.5 and observations recorded as high were multiplied by 2. In Prairie Creek, the potential non point source pollution from transportation was the most serious while crops, grazing, and urban/residential runoff were also considered possible sources of NPS pollution. Refer to Table 5 for a summary of the non point source pollution observations identified for each survey location.

## **RESULTS**

Stations in along Prairie Creek are denoted by PC prefixes. Refer to Attachment C for site photos and to Attachment D for site survey forms. The following conditions and comments were recorded on the survey forms:

**PC-01:** Tributary to Prairie Creek

Water temperature was 50° F, pH was 7.46, and the DO was recorded as 6.92 ppm. Silt appeared to dominate the substrate with lesser amounts of sand also present. Overhanging vegetation and deep pools were available for in-stream cover. Some upstream aquatic plants and filamentous algae and abundant downstream filamentous algae were observed. Little riparian vegetation width was available. grasses made up the land cover. Adjacent land uses included cropland and impervious surfaces. Potential non point source pollution (NPS) was categorized as slight for transportation and moderate for crops. Comments were: *Agricultural ditch; poor armoring causing some erosion problems*

**PC-02:** Tributary to Prairie Creek

Water temperature was 49° F, pH was 7.49, and the DO was recorded as 5.15 ppm. Substrate observations were prohibited. Overhanging vegetation was available for in-stream cover. Some aquatic plants were observed. Moderate riparian vegetation width was available. shrubs and grasses made up the land cover. Adjacent land uses included shrub/old field, cropland, and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for crops, transportation, and urban/residential runoff. Comments were: *Thick vegetative cover*

**PC-03:** Prairie Creek

Water temperature was 51° F, pH was 7.63, and the DO was recorded as 8.37 ppm. Silt appeared to dominate the substrate with lesser amounts of sand and gravel also present. Overhanging vegetation was available for in-stream cover. Some aquatic plants and abundant filamentous algae were observed. Moderate riparian vegetation width was available. grasses made up the land cover. Adjacent land uses included forest and cropland. Potential non point source pollution (NPS) was categorized as moderate for crops. Comments were: *Abundance of filamentous algae*

**PC-04:** Tributary to Prairie Creek

Water temperature was 52° F, pH was 7.81, and the DO was recorded as 8.83 ppm. Silt appeared to dominate the substrate. Overhanging vegetation was available for in-stream cover. Some aquatic plants and upstream filamentous algae were observed. Little riparian vegetation width was available. shrubs and grasses made up the land cover. Adjacent land uses included forest, pasture, and animal feeding operations. Potential non point source pollution

(NPS) was categorized as slight for transportation and urban/residential runoff, moderate for crops, and high for grazing. Comments were: *Intence amount of unrestricted cattle upstream on Staines Road; cattle have complete access to stream and have eliminated riparian vegetation as well as caused significant erosion problems; no address*

**PC-05:** Tributary to Prairie Creek

Water temperature was 50° F, pH was 7.85, and the DO was recorded as 8.51 ppm. Sand and silt appeared to dominate the substrate with lesser amounts of gravel also present. Overhanging vegetation, boulders, aquatic plant cover, and woody debris were available for in-stream cover. Abundant aquatic plants upstream and some downstream were observed. Abundant riparian vegetation width was available. trees and shrubs made up the land cover. Adjacent land uses included shrub/old field and forest. Potential non point source pollution (NPS) was categorized as slight for transportation. Comments were: *Abundance of duckweed on upstream side*

**PC-06:** Tributary to Prairie Creek

Water temperature was 49° F, pH was 7.68, and the DO was recorded as 8.21 ppm. Silt appeared to dominate the substrate with lesser amounts of sand and gravel also present. Overhanging vegetation, deep pools, and woody debris were available for in-stream cover. Some upstream aquatic plants were observed. Moderate riparian vegetation width was available. shrubs made up the land cover. Adjacent land uses included shrub/old field and cropland. Potential non point source pollution (NPS) was categorized as moderate for crops and slight for transportation. Comments were: *Low flow; small pool*

**PC-07:** Tributary to Prairie Creek

Water temperature was 49° F, pH was 7.87, and the DO was recorded as 9.63 ppm. Sand, silt, and gravel appeared to dominate the substrate. Overhanging vegetation was available for in-stream cover. Some upstream aquatic plants were observed. Variable riparian vegetation width was available. shrubs made up the land cover. Adjacent land uses included shrub/old field, forest, and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for crops, transportation, and urban/residential runoff. Comments were: *Downstream side has some minor erosion issues surrounding culvert*

**PC-08: Tributary to Prairie Creek**

Water temperature was 50° F, pH was 7.93, and the DO was recorded as 9.47 ppm. Substrate observations were prohibited. Overhanging vegetation, deep pools, boulders, and woody debris were available for in-stream cover. Some downstream turbidity was observed. Variable riparian vegetation width was available. shrubs made up the land cover. Adjacent land uses included shrub/old field, cropland, and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for urban/residential runoff and moderate for crops and transportation. Comments were: *Large pool on downstream side not from a perch*

**PC-09: Tributary to Prairie Creek**

Water temperature was 49° F, pH was 7.84, and the DO was recorded as 9.42 ppm. Silt appeared to dominate the substrate with lesser amounts of sand also present. Undercut banks, overhanging vegetation, and deep pools were available for in-stream cover. Some downstream, filamentous algae, turbidity, and foam were observed. Moderate to abundant riparian vegetation width was available. trees made up the land cover. Adjacent land uses included shrub/old field, forest, cropland, maintained lawn, and impervious surfaces. Potential non point source pollution (NPS) was categorized as slight for crops and moderate for transportation. Comments were: *Low flow upstream; large pool from perch on downstream side*

**PC-10: Tributary to Prairie Creek**

Water temperature was 50° F, pH was 7.61, and the DO was recorded as 4.64 ppm. Silt appeared to dominate the substrate. Overhanging vegetation, aquatic plant cover, and woody debris were available for in-stream cover. Abundant aquatic plants upstream and some downstream were observed. Moderate riparian vegetation width was available. shrubs and grasses made up the land cover. Adjacent land uses included cropland and impervious surfaces. Potential non point source pollution (NPS) was categorized as slight for transportation and moderate for crops. Comments were: *Abundance of duckweed*

**PC-11: Prairie Creek**

Water temperature was 52° F, pH was 7.92, and the DO was recorded as 10.99 ppm. Sand appeared to dominate the substrate with lesser amounts of silt and gravel also present. Overhanging vegetation and woody debris were available for in-stream cover. Some downstream aquatic plants and filamentous algae were observed. Moderate to abundant riparian vegetation

width was available. grasses made up the land cover. Adjacent land uses included shrub/old field and cropland. Potential non point source pollution (NPS) was categorized as slight for transportation and crops. Comments were: *Prairie Creek maintains agricultural ditch features*

**PC-12: Prairie Creek**

Water temperature was 52° F, pH was 8.03, and the DO was recorded as 11.64 ppm. Silt appeared to dominate the substrate with lesser amounts of sand, gravel, and boulders also present. Overhanging vegetation, boulders, and woody debris were available for in-stream cover. Some Downstream filamentous algae were observed. Variable riparian vegetation width was available. trees and shrubs made up the land cover. Adjacent land uses included shrub/old field, forest, cropland, impervious surfaces, and disturbed grous. Potential non point source pollution (NPS) was categorized as moderate for crops. Comments were: *No specific comments were recorded for this site*

**PC-13: Prairie Creek**

Water temperature was 51° F, pH was 7.63, and the DO was recorded as 10.16 ppm. Silt appeared to dominate the substrate with lesser amounts of sand also present. Overhanging vegetation, deep pools, and woody debris were available for in-stream cover. Some upstream aquatic plants and downstream turbidity were observed. Moderate to abundant riparian vegetation width was available. trees and shrubs made up the land cover. Adjacent land uses included shrub/old field, forest, and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for transportation and urban/residential runoff. Comments were: *Stream has become significantly wider and larger; culverts upstream are slightly obstructed with woody debris*

**PC-14: Bacon Creek**

Water temperature was 50° F, pH was 7.51, and the DO was recorded as 3.56 ppm. Silt appeared to dominate the substrate. Overhanging vegetation, boulders, aquatic plant cover, and woody debris were available for in-stream cover. Abundant aquatic plants and some downstream turbidity were observed. Moderate to abundant riparian vegetation width was available. trees and shrubs made up the land cover. Adjacent land uses included shrub/old field, forest, and cropland. Potential non point source pollution (NPS) was categorized as slight for transportation and crops. Comments were: *Abundance of duckweed upstream; upstream appears to be somewhat of a wetland*

**PC-15: Bacon Creek**

Water temperature was 53° F, pH was 8.00, and the DO was recorded as 10.73 ppm. Silt appeared to dominate the substrate with lesser amounts of sand and gravel also present. Overhanging vegetation, deep pools, aquatic plant cover, and woody debris were available for in-stream cover. Abundant aquatic plants upstream and some downstream were observed. Abundant riparian vegetation width was available. trees and shrubs made up the land cover. Adjacent land uses included shrub/old field and cropland. Potential non point source pollution (NPS) was categorized as slight for transportation and crops. Comments were: *Uprooted tree on upstream side held up by a fence post? Large pool on downstream side*

**PC-16: Bacon Creek**

Water temperature was 51° F, pH was 8.30, and the DO was recorded as 11.29 ppm. Silt appeared to dominate the substrate. Undercut banks, overhanging vegetation, deep pools, and woody debris were available for in-stream cover. Some upstream foam was observed. Moderate to abundant riparian vegetation width was available. trees made up the land cover. Adjacent land uses included shrub/old field, forest, and cropland. Potential non point source pollution (NPS) was categorized as slight for transportation and streambank erosion. Comments were: *Some slight streambank erosion*

**PC-17: Tributary to Prairie Creek**

Water temperature was 55° F, pH was 7.86, and the DO was recorded as 5.37 ppm. Silt appeared to dominate the substrate. Overhanging vegetation, aquatic plant cover, and woody debris were available for in-stream cover. Abundant upstream aquatic plants were observed. Little riparian vegetation width was available. shrubs and grasses made up the land cover. Adjacent land uses included cropland. Potential non point source pollution (NPS) was categorized as moderate for crops. Comments were: *Abundance of duckweed upstream*

**PC-18: Tributary to Prairie Creek**

Water temperature was 52° F, pH was 7.96, and the DO was recorded as 9.72 ppm. Substrate observations were prohibited. Overhanging vegetation and woody debris were available for in-stream cover. No aquatic plants, floating algae, filamentous algae, bacterial slime, turbidity, oil sheen, foam, or trash were observed. Moderate to abundant riparian vegetation width was available. trees and shrubs made up the land cover. Adjacent land uses included shrub/old field and forest. Potential non point source pollution

(NPS) was categorized as slight for transportation. Comments were: *Thick vegetative cover*

**PC-19:** Tributary to Prairie Creek

Water temperature was 44° F, pH was 7.47, and the DO was recorded as 10.61 ppm. Silt appeared to dominate the substrate with lesser amounts of sand also present. Overhanging vegetation, aquatic plant cover, and woody debris were available for in-stream cover. Some turbidity and downstream aquatic plants were observed. Little to moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included forest and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for transportation. Comments were: *No specific comments were recorded for this site*

**PC-20:** Prairie Creek

Water temperature was 52° F, pH was 8.13, and the DO was recorded as 11.87 ppm. Silt appeared to dominate the substrate with lesser amounts of sand, gravel, and boulders also present. Overhanging vegetation, deep pools, boulders, and woody debris were available for in-stream cover. Some foam and downstream turbidity were observed. Variable riparian vegetation width was available. shrubs made up the land cover. Adjacent land uses included shrub/old land, forest, maintained lawn, and disturbed ground. Potential non point source pollution (NPS) was categorized as slight for transportation, riparian vegetation removal, and urban/residential runoff. Comments were: *Possibility for residential runoff problems judging by neighborhood*

**PC-21:** Prairie Creek

Water temperature was 45° F, pH was 7.64, and the DO was recorded as 9.89 ppm. Silt appeared to dominate the substrate with lesser amounts of sand also present. Overhanging vegetation, deep pools, and woody debris were available for in-stream cover. Some upstream turbidity and downstream filamentous algae were observed. Moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included forest. Potential non point source pollution (NPS) was categorized as slight for transportation. Comments were: *No specific comments were recorded for this site*

**PC-22:** Tributary to Prairie Creek

Water temperature was 42° F, pH was 7.53, and the DO was recorded as 4.32 ppm. Silt appeared to dominate the substrate. Overhanging vegetation and

woody debris were available for in-stream cover. Some floating algae and turbidity were observed. Little to moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included forest and cropland. Potential non point source pollution (NPS) was categorized as slight for transportation, streambank erosion, and hydrology. Comments were: *Some moderate streambank erosion*

**PC-23:** Tributary to Prairie Creek

Water temperature was 47° F, pH was 7.10, and the DO was recorded as 10.64 ppm. Sand appeared to dominate the substrate with lesser amounts of silt also present. Overhanging vegetation, aquatic plant cover, and woody debris were available for in-stream cover. Some aquatic plants were observed. Little to moderate riparian vegetation width was available. trees and shrubs made up the land cover. Adjacent land uses included shrub/old field, forest, and cropland. Potential non point source pollution (NPS) was categorized as slight for transportation. Comments were: *No specific comments were recorded for this site*

**PC-24:** Tributary to Prairie Creek

Water temperature was 44° F, pH was 7.89, and the DO was recorded as 11.68 ppm. Silt appeared to dominate the substrate. Overhanging vegetation, aquatic plant cover, and woody debris were available for in-stream cover. Some aquatic plants and floating algae were observed. Little to moderate riparian vegetation width was available. shrubs made up the land cover. Adjacent land uses included shrub/old field, forest, and impervious surface. Potential non point source pollution (NPS) was categorized as slight for transportation. Comments were: *Culvert not in line with stream on upstream side*

**PC-25:** Tributary to Prairie Creek

Water temperature was 43° F, pH was 7.99, and the DO was recorded as 11.38 ppm. Silt appeared to dominate the substrate. Overhanging vegetation and woody debris were available for in-stream cover. No aquatic plants, floating algae, filamentous algae, bacterial slime, turbidity, oil sheen, foam, or trash were observed. Little to moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included forest. Potential non point source pollution (NPS) was categorized as slight for transportation. Comments were: *Upstream culverts completely out of alignment with stream*

**PC-26:** Tributary to Prairie Creek

Water temperature was 41° F, pH was 7.98, and the DO was recorded as 10.33 ppm. Silt appeared to dominate the substrate. Overhanging vegetation, aquatic plant cover, and woody debris were available for in-stream cover. Some floating algae, filamentous algae, and upstream turbidity were observed. Little to moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included shrub/old field, forest, and pasture. Potential non point source pollution (NPS) was categorized as slight for transportation and grazing. Comments were: *No specific comments were recorded for this site*

**PC-27:** Prairie Creek

Water temperature was 45° F, pH was 8.00, and the DO was recorded as 10.82 ppm. Silt appeared to dominate the substrate. Undercut banks, overhanging vegetation, and woody debris were available for in-stream cover. Some filamentous algae and turbidity were observed. Moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included shrub/old field and forest. Potential non point source pollution (NPS) was categorized as slight for transportation. Comments were: *No specific comments were recorded for this site*

**PC-28:** Tributary to Prairie Creek

Water temperature was 43° F, pH was 7.99, and the DO was recorded as 10.95 ppm. Sand and silt appeared to dominate the substrate with lesser amounts of gravel also present. Overhanging vegetation and woody debris were available for in-stream cover. Some filamentous algae were observed. Moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included forest. Potential non point source pollution (NPS) was categorized as slight for transportation. Comments were: *One very old culvert and one newer one; both are partially obstructed and no water is flowing through the new one.*

**PC-29:** Prairie Creek

Water temperature was 45° F, pH was 8.01, and the DO was recorded as 10.73 ppm. Silt appeared to dominate the substrate with lesser amounts of sand and boulders also present. Overhanging vegetation and woody debris were available for in-stream cover. Some filamentous algae were observed. Little to moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included forest and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for

transportation. Comments were: *No specific comments were recorded for this site*

**PC-30: Prairie Creek**

Water temperature was 49° F, pH was 8.22, and the DO was recorded as 13.08 ppm. Silt appeared to dominate the substrate with lesser amounts of boulders also present. Overhanging vegetation, boulders, and woody debris were available for in-stream cover. Abundant filamentous algae were observed. Little to moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included shrub/old field and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for transportation. Comments were: *Lots of sand buildup on the bridge: able to enter stream during rain.*

**PC-31: Prairie Creek**

Water temperature was 39° F, pH was 8.13, and the DO was recorded as 11.07 ppm. Silt appeared to dominate the substrate with lesser amounts of sand, gravel, and boulders also present. Overhanging vegetation, boulders, and woody debris were available for in-stream cover. Some filamentous algae were observed. Little to moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included forest and pasture. Potential non point source pollution (NPS) was categorized as slight for transportation and moderate for grazing and hydrology. Comments were: *Some evidence of moderate streambank erosion*

**PC-32: Tributary to Prairie Creek**

Water temperature was 49° F, pH was 7.98, and the DO was recorded as 9.64 ppm. Silt appeared to dominate the substrate. Overhanging vegetation and woody debris were available for in-stream cover. Some turbidity, upstream aquatic plants, and downstream filamentous algae were observed. Little to moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included shrub/old field, forest, pasture, cropland, and impervious surfaces. Potential non point source pollution (NPS) was categorized as slight for crops, grazing, and transportation. Comments were: *Alignment is extremely off upstream; one culvert is completely obstructed, no water flowing.*

**PC-33: Prairie Creek**

Water temperature was 49° F, pH was 9.01, and the DO was recorded as 11.27 ppm. Silt appeared to dominate the substrate with lesser amounts of gravel and boulders also present. Overhanging vegetation, boulders, and woody debris were available for in-stream cover. Some filamentous algae were observed. Little to moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included shrub/old field, forest, and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for transportation and urban/residential runoff. Comments were: *No specific comments were recorded for this site*

**PC-34: Tributary to Prairie Creek**

Water temperature was 57° F, pH was 7.45, and the DO was recorded as 6.59 ppm. Silt appeared to dominate the substrate. Overhanging vegetation was available for in-stream cover. Some filamentous algae were observed. Little riparian vegetation width was available. grasses made up the land cover. Adjacent land uses included shrub/old field, pasture, and cropland. Potential non point source pollution (NPS) was categorized as slight for grazing and transportation. Comments were: *Cattle have unrestricted access to downstream side of the stream.*

**PC-35: Tributary to Prairie Creek**

Water temperature was 48° F, pH was 7.51, and the DO was recorded as 1.08 ppm. Substrate observations were prohibited. Overhanging vegetation and aquatic plant cover were available for in-stream cover. Abundant aquatic plants, filamentous algae, and turbidity and some floating algae were observed. Little to moderate riparian vegetation width was available. trees and grasses made up the land cover. Adjacent land uses included shrub/old field, pasture, and cropland. Potential non point source pollution (NPS) was categorized as slight for crops, grazing, and transportation. Comments were: *Water is stagnant and covered with duckweed; unable to see bottom*

**PC-36: Tributary to Prairie Creek**

Water temperature was 51° F, pH was 7.18, and the DO was recorded as 9.27 ppm. Substrate observations were prohibited. Overhanging vegetation and woody debris were available for in-stream cover. Some turbidity, upstream filamentous algae, and downstream floating algae were observed. Little riparian vegetation width was available. trees and shrubs made up the land cover. Adjacent land uses included pasture, cropland, and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for

crops, grazing, and transportation. Comments were: *No specific comments were recorded for this site*

**PC-37:** Tributary to Prairie Creek

Water temperature was 50° F, pH was 7.89, and the DO was recorded as 11.18 ppm. Silt appeared to dominate the substrate. Overhanging vegetation and woody debris were available for in-stream cover. Abundant filamentous algae, upstream aquatic plants, and upstream bacterial slime and some downstream bacterial slime were observed. Little riparian vegetation width was available. trees made up the land cover. Adjacent land uses included shrub/old field, cropland, and maintained lawn. Potential non point source pollution (NPS) was categorized as moderate for crops and transportation and high for urban/residential runoff. Comments were: *Some areas of moderate road erosion to upstream side of road; lots of bacterial scum downstream side with high impact from residential lawn with no buffer.*

**PC-38:** Tributary to Prairie Creek

Water temperature was 49° F, pH was 8.12, and the DO was recorded as 11.59 ppm. Silt appeared to dominate the substrate. Overhanging vegetation and aquatic plant cover were available for in-stream cover. Abundant aquatic plants and filamentous algae and some upstream floating algae were observed. Little riparian vegetation width was available. grasses made up the land cover. Adjacent land uses included shrub/old field, pasture, cropland, and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for crops, grazing, and transportation and high for urban/residential runoff. Comments were: *No buffer on upstream side from fertilized lawn; abundant aquatic plants and algae*

**PC-39:** Tributary to Prairie Creek

Water temperature was 52° F, pH was 7.75, and the DO was recorded as 11.94 ppm. Silt appeared to dominate the substrate with lesser amounts of gravel and boulders also present. Overhanging vegetation, boulders, and woody debris were available for in-stream cover. Abundant floating algae and some upstream aquatic plants were observed. Little to moderate riparian vegetation width was available. trees and grasses made up the land cover. Adjacent land uses included shrub/old field and cropland. Potential non point source pollution (NPS) was categorized as slight for crops and transportation. Comments were: *No specific comments were recorded for this site*

**PC-40:** Tributary to Prairie Creek

Water temperature was 51° F, pH was 7.79, and the DO was recorded as 9.09 ppm. Silt appeared to dominate the substrate. Overhanging vegetation and woody debris were available for in-stream cover. Some aquatic plants, filamentous algae, and downstream turbidity were observed. Little riparian vegetation width was available. shrubs made up the land cover. Adjacent land uses included shrub/old field and cropland. Potential non point source pollution (NPS) was categorized as slight for transportation and moderate for crops. Comments were: *No specific comments were recorded for this site*

**PC-41:** Tributary to Prairie Creek

Water temperature was 52° F, pH was 7.90, and the DO was recorded as 9.45 ppm. Silt appeared to dominate the substrate. Overhanging vegetation and aquatic plant cover were available for in-stream cover. Some upstream filamentous algae, upstream turbidity, downstream aquatic plants, and downstream bacterial slime and abundant downstream filamentous algae were observed. Little riparian vegetation width was available. grasses made up the land cover. Adjacent land uses included shrub/old field, pasture, and cropland. Potential non point source pollution (NPS) was categorized as slight for transportation, intensive feeding operations, and crops and high for grazing. Comments were: *Cattle have unrestricted access to upstream side of the stream; bacterial slime on upstream side near culvert; Address: 3530 Cooper*

**PC-42:** Tributary to Prairie Creek

Water temperature was 51° F, pH was 7.93, and the DO was recorded as 10.68 ppm. Silt appeared to dominate the substrate. Overhanging vegetation and woody debris were available for in-stream cover. Some filamentous algae and upstream aquatic plants were observed. Little to moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included shrub/old field, pasture, and cropland. Potential non point source pollution (NPS) was categorized as slight for transportation and high for grazing. Comments were: *No specific comments were recorded for this site*

**PC-43:** Tributary to Prairie Creek

Water temperature was 54° F, pH was 7.11, and the DO was recorded as 2.45 ppm. Silt appeared to dominate the substrate with lesser amounts of sand also present. Overhanging vegetation was available for in-stream cover. No aquatic plants, floating algae, filamentous algae, bacterial slime, turbidity, oil sheen, foam, or trash were observed. Little to moderate riparian vegetation

width was available. grasses made up the land cover. Adjacent land uses included shrub/old field, cropland, and impervious surfaces. Potential non point source pollution (NPS) was categorized as slight for crops and transportation. Comments were: *Low flow; minor erosion issues on downstream side surrounding culvert*

**PC-44:** Tributary to Prairie Creek

Water temperature was 46° F, pH was 7.92, and the DO was recorded as 10.82 ppm. Silt appeared to dominate the substrate with lesser amounts of sand, gravel, and boulders also present. Overhanging vegetation, boulders, and woody debris were available for in-stream cover. Some downstream filamentous algae were observed. Variable riparian vegetation width was available. trees and grasses made up the land cover. Adjacent land uses included forest, maintained lawn and impervious surface. Potential non point source pollution (NPS) was categorized as slight for transportation and urban/residential runoff. Comments were: *No specific comments were recorded for this site*

**PC-45:** Prairie Creek

Water temperature was 47° F, pH was 7.94, and the DO was recorded as 11.32 ppm. Gravel appeared to dominate the substrate with lesser amounts of silt, sand, and boulders also present. Overhanging vegetation and boulders were available for in-stream cover. Some filamentous algae were observed. Variable riparian vegetation width was available. trees and shrubs made up the land cover. Adjacent land uses included shrub/old field, forest, pasture, and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for transportation, grazing, and urban/residential runoff. Comments were: *Animals are fenced out*

**PC-46:** Prairie Creek

Water temperature was 46° F, pH was 7.96, and the DO was recorded as 10.95 ppm. Gravel appeared to dominate the substrate with lesser amounts of sand, and boulders also present. Overhanging vegetation, deep pools, boulders, and woody debris were available for in-stream cover. Some filamentous algae were observed. Moderate to abundant riparian vegetation width was available. trees made up the land cover. Adjacent land uses included forest and maintained lawn. Potential non point source pollution (NPS) was categorized as slight for transportation and urban/residential runoff. Comments were: *Good substrate; pool riffle, combination*

**PC-47: Prairie Creek**

Water temperature was 46° F, pH was 8.00, and the DO was recorded as 10.92 ppm. Gravel appeared to dominate the substrate with lesser amounts of silt, sand, and boulders also present. Overhanging vegetation, deep pools, boulders, and woody debris were available for in-stream cover. Some downstream foam was observed. Little to moderate riparian vegetation width was available. trees made up the land cover. Adjacent land uses included forest, maintained lawn, and disturbed land. Potential non point source pollution (NPS) was categorized as slight for transportation, development/construction, and urban/residential runoff. Comments were: *Manmade dam on downstream side; not impounding water but creati*

**PC-48: Prairie Creek**

Water temperature was 46° F, pH was 7.98, and the DO was recorded as 10.43 ppm. Gravel and sand appeared to dominate the substrate with lesser amounts of silt also present. Overhanging vegetation, deep pools, boulders, and woody debris were available for in-stream cover. Some filamentous algae and downstream foam were observed. Moderate to abundant riparian vegetation width was available. trees made up the land cover. Adjacent land uses included shrub/old field, forest, maintained lawn, and impervious surfaces. Potential non point source pollution (NPS) was categorized as slight for transportation, rurban/residential runoff, and recreational NPS. Comments were: *Stream flows past some industrial park atea in Ionia; fishing pier on downstream side; manmade riffle on downstream*

The majority of the impacts to the stream in this area seem to result from transportation erosion or erosion due to the road stream crossing (sand/gravel roads, road washout) and crop related sources. Erosion and pollution due to grazing and urban/residential runoff were also common possible sources.

