Prairie River 2015-2022 Report

Prepared by Brian Gunderman

Introduction

The physical characteristics of the Prairie River watershed and the fisheries management history for the river through 2014 were summarized by Gunderman (2015). The purpose of the current report is to document additional fish and aquatic habitat surveys that were completed during 2015 and 2016 and to document the StreamCheck analyses that were performed in 2021-2022.

Materials and Methods

In 2015, a barge-style streamshocker (two probes) was used to collect fish at two stations while moving in an upstream direction. The station boundaries in 2015 were the same as in 2012-2014. The Bowers Road station began 30 feet downstream of an old bridge and extended 800 feet upstream to the Bowers Road culvert. The Orland Road station began 300 feet downstream of the Orland Road crossing and extended 800 feet upstream. The 2015 sampling occurred at Orland Road on July 27 and at Bowers Road on July 28. Total lengths were recorded for all fish captured. Fish habitat and riparian bank condition within each sampling station were assessed using the methods outlined by Wills et al. (2005). Scale samples were collected from Brown Trout that were 4 inches or larger. Brown Trout smaller than 4 inches were assumed to be young-of-year (YOY) fish. Weights for all fish species were calculated using the length-weight regression coefficients compiled by Schneider et al. (2000b). Weighted average length and weighted age composition for Brown Trout were calculated using the formulas provided by Schneider (2000).

Fish species captured during the Prairie River surveys were divided into three thermal categories based on field studies and laboratory temperature preferenda and critical thermal maxima as described by Lyons et al. (2009). Warmwater species had temperature preferenda (if known) greater than or equal to 71.6 F, thermal maxima (if known) of greater than or equal to 91.4 F and were classified as warmwater in all or nearly all field studies. Coldwater species had temperature preferenda less than or equal to 68.0 F, thermal maxima less than or equal to 87.8 F, and were designated coldwater in all or nearly all field studies. “Species classified as transitional either had intermediate values for laboratory preferenda and tolerances, or met the warmwater criteria for some attributes and the coldwater criteria for others.” [Lyons et al. 2009]

Onset Hobo temperature loggers were deployed at seven locations within the Prairie River watershed in 2015 (Figure 1; Tables 1-2). Most of the loggers were deployed during June 22-23, but the Bowers Road and Parham Road loggers were not deployed until July 20. The loggers were retrieved in early November 2015. Temperature loggers also were deployed at three sites during May 18-October 19, 2016 (Table 1).

July mean water temperatures (JMTs) were calculated for each logger deployment site and compared to the thermal classifications in the Water Withdrawal Assessment Tool (WWAT). Mean weekly temperature ranges during the month of July were calculated to assess temperature fluctuations at each site. (The range for each week [i.e., July 1-7, July 8-14, July 15-21, and July 22-28] was determined by subtracting the lowest temperature for the week from the highest temperature. The mean weekly temperature range was the average of these values.) Mean water temperatures during the hottest week of July also were calculated and compared to the incipient lethal temperature for Brown Trout. Air

temperature data from the National Oceanic and Atmospheric Administration station in Three Rivers were used to select the hottest seven-day period for each sampling year.

In 2021-2022, Prairie River data were analyzed using the Michigan Department of Natural Resources' (DNR) StreamCheck program to assess if the fish and temperature data supported the existing thermal classification in the WWAT. StreamCheck was run using three scenarios (Table 3). In each scenario, we used the three most recent years of fish and temperature data that were available.

Results

Six Brown Trout were captured at the Bowers Road station in 2015. The total length range was 8.5-10.2 inches, and all of the Brown Trout were yearlings (age 1). The mean length for yearling Brown Trout at Bowers Road was 9.4 inches which is 3.6 inches above the statewide average. Ten additional fish species were collected at Bowers Road (Table 4). Creek Chub (n = 117) was by far the most abundant species, followed by Rainbow Darter (n = 19) and Blacknose Dace (n = 17). By number, the catch consisted of 3% coldwater, 83% transitional, and 13% warmwater species. By calculated weight, the catch was composed of 21% coldwater, 78% transitional, and 1% warmwater species.

Forty Brown Trout were collected at the Orland Road station in 2015. The total length range was 2-15 inches, and seven fish exceeded the minimum size limit of 10 inches (Figure 2). Five year classes were represented in the catch (Figure 3). Yearlings (n = 19) and YOYs (n = 13) dominated the sample, and only two trout were age 3 or older. The mean growth index for age 0-2 Brown Trout was +1.6, which is indicative of above average growth (Figure 4). Eleven additional fish species were collected at Orland Road (Table 5). Rainbow Darter (n = 34) and Creek Chub (n = 32) were the most common non-trout species at this site. By number, the catch consisted of 25% coldwater, 48% transitional, and 27% warmwater species. By calculated weight, the catch was composed of 52% coldwater, 42% transitional, and 6% warmwater species.

While the various habitat parameters have varied from 2012-2015, there were no clear indications of directional change (Table 6). Bank stability may have improved at Orland Road, as the percentage of banks rated as poor or very poor declined and reached its lowest level in 2015. However, this pattern needs to be interpreted with caution as bank stability ratings are judgment calls based on visual estimates. Despite efforts to standardize the process, there is inherent subjectivity and different people may classify the same bank as fair or poor.

In 2015, the JMTs for the sites on the Prairie River main stem ranged from 64.8 F at Prairie River Road to 66.1 F at McKale Road (Table 7). Water temperatures were colder in the two tributaries than in the main stem. During the hottest week in 2015, the highest mean water temperature was observed at McKale Road (68.2 F). The 2016 JMTs for the Prairie River main stem sites varied from 65.2 F at Bowers Road to 66.5 F at Parham Road (Table 8). The highest mean temperature recorded during the hottest week of 2016 was 68.9 F at Parham Road. During both years, mean weekly temperature ranges were highest near the headwaters and declined in a downstream direction.

The StreamCheck fish community rating for the Orland Road station was "cold" in all three years (Table 9). The Bowers Road fish community rating was inconsistent across sampling years. Of the nine thermal classifications based on water temperatures, two were cold and the rest were cold transitional.

Analysis and Discussion

As observed in previous years, the 2015 survey showed more natural recruitment of Brown Trout at Orland Road than at Bowers Road. The strong 2014 year class continued to dominate the Brown Trout population, as evidenced by the high percentage of the catch composed of yearlings in 2015 (Figure 3). Warmwater species composed a small percentage of the total fish biomass at both sampling stations.

The incipient lethal temperature for Brown Trout is 76.5 F (Elliott 1981; Elliott 2000). This is the maximum temperature that Brown Trout can tolerate for a seven-day period. In the Prairie River watershed, mean water temperatures during the hottest weeks in 2015 and 2016 were over 7 degrees F below the incipient lethal temperature at all monitoring locations. Brown Trout growth occurs when water temperatures are between 39 F and 67 F (Elliott 1993). Mean July water temperatures were below 67 F at all temperature logger sites in 2015 and 2016. Mean lengths at age for Brown Trout in 2015 were substantially above statewide averages. Thus, water temperatures generally do not appear to be limiting growth of trout in the Prairie River.

The current thermal classification for WWAT water management area 20781 (i.e., sub-watershed A in Figure 1) is warm. However, the StreamCheck analyses using water temperature and fish community weight data indicate that Prairie River water management area 20781 is a cold-transitional system. The Michigan Department of Natural Resources – Fisheries Division has contacted Michigan Department of Environment, Great Lakes, and Energy (EGLE) to initiate the reclassification review process.

The Lower Prairie River sub-watershed (sub-watershed C) is classified as a cool stream in the WWAT. In the drought year of 2012, the JMTs in this stream reach were indicative of a warm stream. During 2013-2015, the JMTs were indicative of a cold transitional system. The last fish community sampling in this sub-watershed was completed in 1992. Compared to the 2011-2015 sampling at Bowers Road and Orland Road, the 1992 electrofishing efforts in the lower river yielded relatively high species diversity and relatively low catch rates for Brown Trout. The existing thermal classification for the Lower Prairie River sub-watershed should remain until new fish community data are available for StreamCheck analyses.

The County No. 10 Drain watershed (sub-watershed B) currently is classified as warm in the WWAT. Fish data are lacking for this system. The 2012 temperature data support the warm classification; however, the 2015 temperature logger data indicate the stream is cold transitional. Additional fish and temperature data are needed before considering changes to the thermal classification of this sub-watershed.

The Burr Oak County Line Drain sub-watershed (sub-watershed D) is classified as a cool stream in the WWAT. Logger data for 2013-2015 indicate that this creek is a cold stream with water temperatures that are suitable for Brown Trout. No recent fish community data are available for this creek.

Management Recommendations

Fisheries Division already has initiated the reclassification process for water management area 20781. Division staff will provide data to EGLE as necessary throughout the reclassification review process. Fish community and concurrent temperature logger data should be collected in the Burr Oak County Line Drain within the next five years as this creek may be serving as a thermal refuge and possibly provides spawning and nursery habitat for Brown Trout. Additional fish and temperature sampling could be conducted in the Lower Prairie River sub-watershed or the County No. 10 Drain sub-watershed. However, those sub-watersheds currently are lower priorities and sampling is unlikely to occur within the

next five years. The existing Type 4 trout stream regulations for the Prairie River are appropriate and should be retained.

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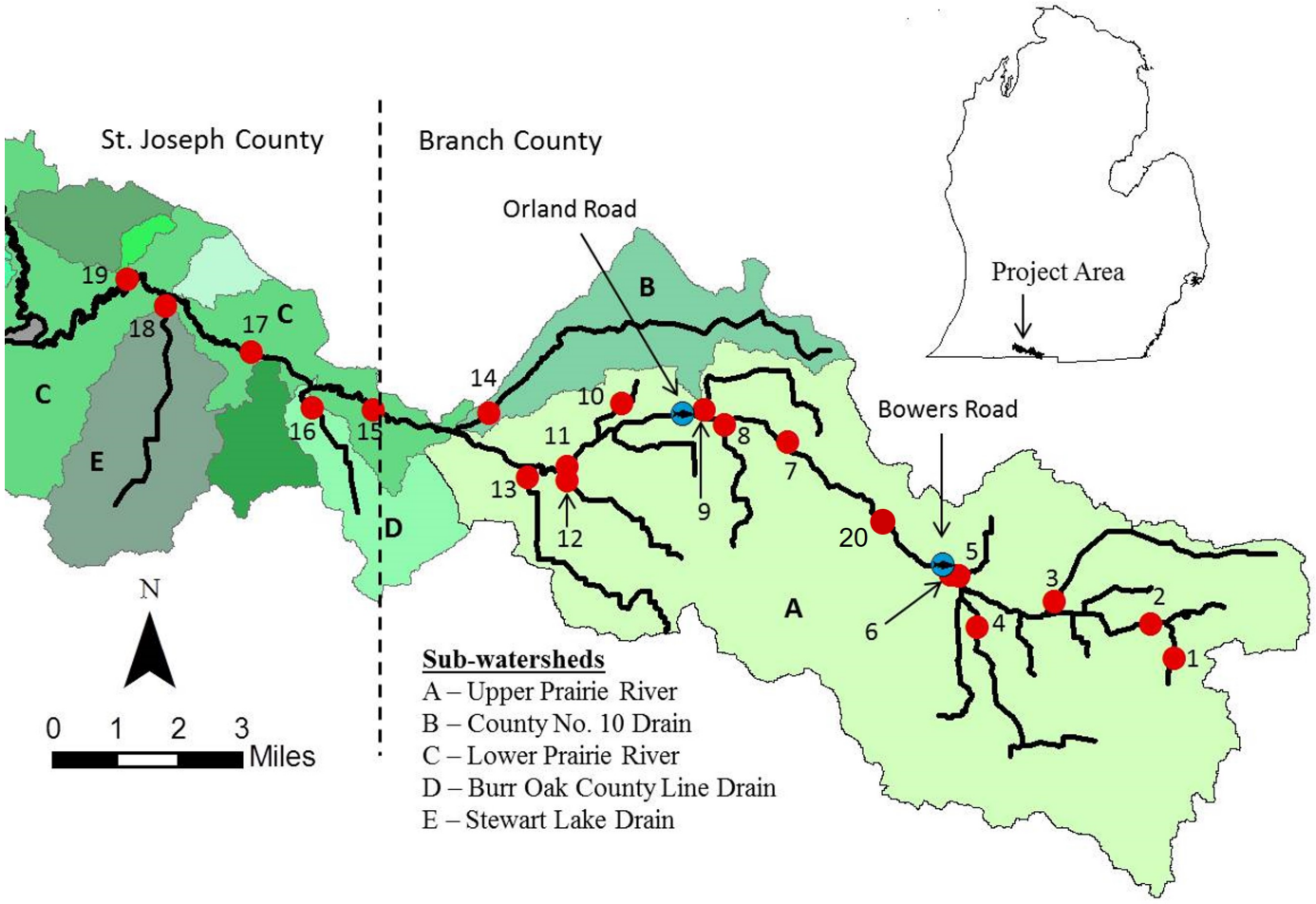

Figure 1.–Sampling locations and select sub-watersheds (letters) within the Prairie River watershed. Dots with fish indicate locations where electrofishing was conducted during 2012-2015. Solid dots indicate sites where temperature loggers were deployed during 2012-2016. See Table 1 for 2015-2016 temperature logger deployment information. See Table 2 for temperature logger site descriptions.

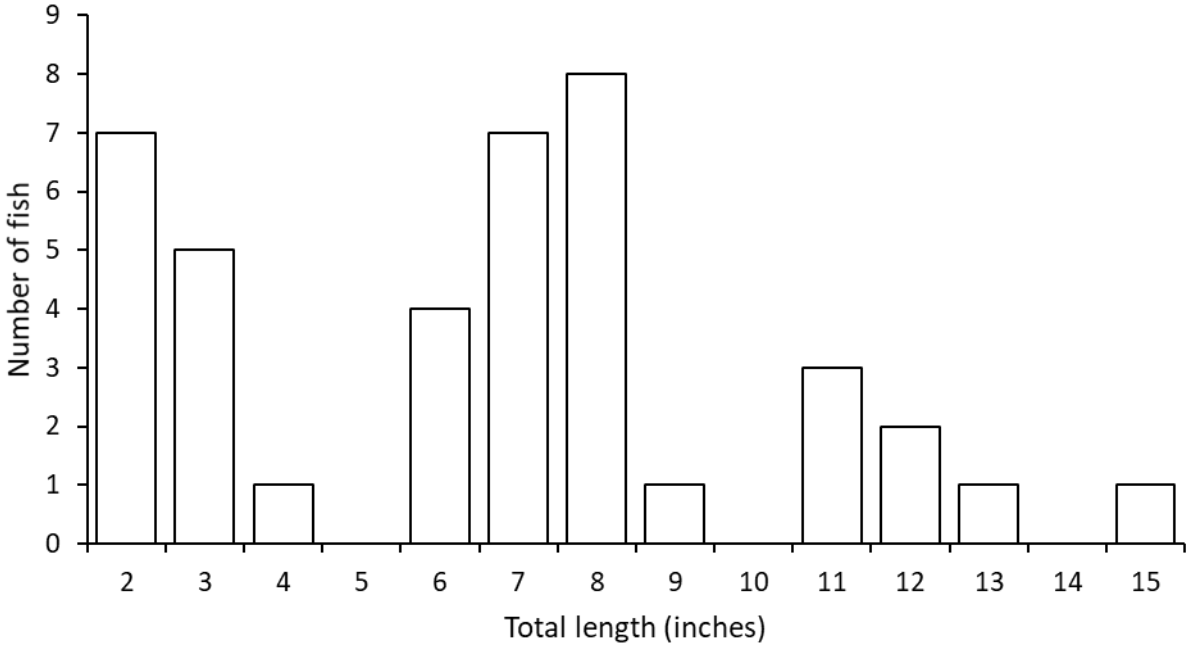

Figure 2.–Length frequency distribution for Brown Trout captured in the Prairie River at the Orland Road sampling station on July 27, 2015.

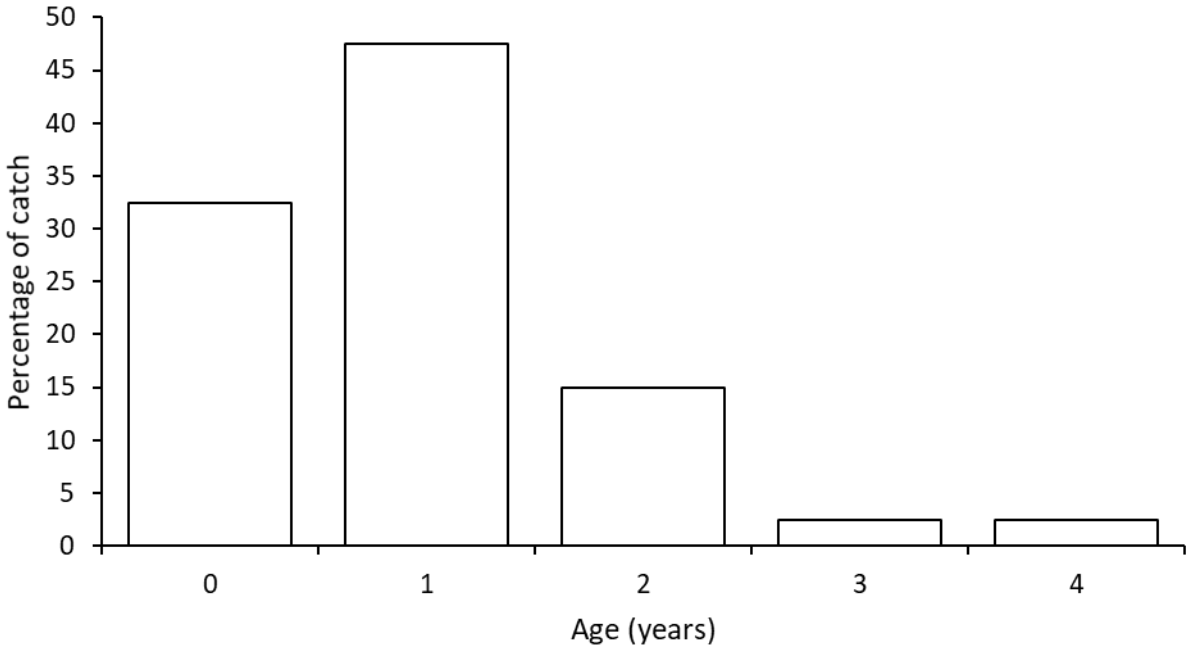

Figure 3.–Age frequency distribution for Brown Trout captured in the Prairie River at the Orland Road sampling station on July 27, 2015.

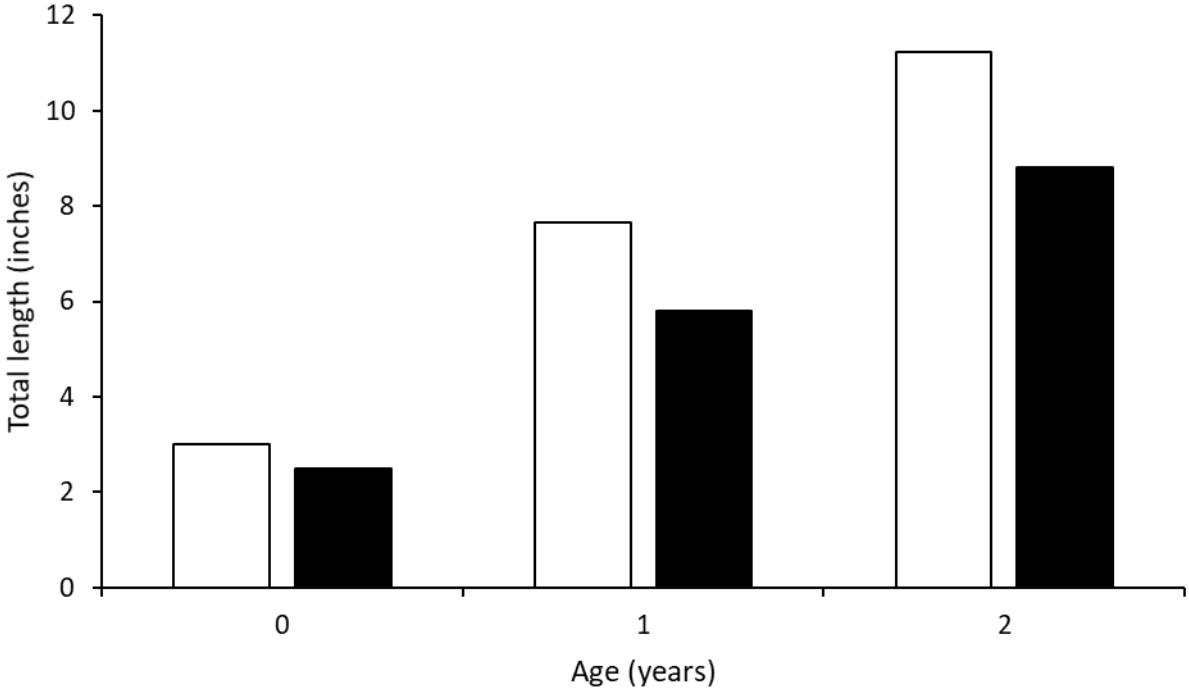

Figure 4.–Mean lengths at age for Prairie River Brown Trout (hollow bars) compared to statewide average lengths (solid bars). Brown Trout were captured at the Orland Road sampling station on July 27, 2015. Statewide average lengths are from Schneider et al. (2000a).

Table 1.–Temperature logger sites in the Prairie River watershed during 2015-2016. For each deployment, the deployment date, retrieval date, and recording interval are noted. See Figure 1 for site locations.

Site #	Stream	Nearest road crossing	Deployment date	Retrieval date	Recording interval
6	Prairie River	Bowers Road	7/20/15	11/5/15	15 minutes
7	Prairie River	Parham Road	7/20/15	11/5/15	15 minutes
11	Prairie River	Prairie River Road	6/23/15	11/10/15	1 hour
17	Prairie River	Middle Colon Road	6/22/15	11/10/15	1 hour
19	Prairie River	McKale Road	6/22/15	11/10/15	1 hour
14	County No. 10 Drain	Carpenter Road	6/23/15	11/10/15	1 hour
16	Burr Oak County Line Drain	Burr Oak Road	6/22/15	11/10/15	1 hour
6	Prairie River	Bowers Road	5/18/16	10/19/16	15 minutes
20	Prairie River	Snow Prairie Road	5/18/16	10/19/16	15 minutes
7	Prairie River	Parham Road	5/18/16	10/19/16	15 minutes

Table 2.–Temperature logger deployment sites in the Prairie River watershed during 2012-2016. See Figure 1 for site locations.

Site #	Stream	Nearest road crossing	Sub-watershed
1	Kinderhook No. 2 Drain	Southern Road	A
2	Prairie River	Walker Road	A
3	County No. 59 Drain	Block Road	A
4	Lanes Drain	Booth Road	A
5	Weaver Drain	Rubley Road	A
6	Prairie River	Bowers Road	A
7	Prairie River	Parham Road	A
8	County No. 25 Drain	Cemetery Road (adjacent)	A
9	Bethel & Bronson No. 4 & 1 Drain	Kosmerick Road	A
10	Bronson No. 12 Drain	Bawden Road	A
11	Prairie River	Prairie River Road	A
12	Sutter & Pinney Drain	Prairie River Road	A
13	Blosser Drain	Douglas Road	A
14	County No. 10 Drain	Carpenter Road	B
15	Prairie River	St. Joseph Road	C
16	Burr Oak County Line Drain	Burr Oak Road	D
17	Prairie River	Middle Colon Road	C
18	Stewart Lake Drain	Cowles Road	E
19	Prairie River	McKale Road	C
20	Prairie River	Snow Prairie Road	A

Table 3. – Data inputs for the Prairie River StreamCheck evaluation.

Scenario #	Fish data source	Temperature data source	Caveats
1	Bowers Road 2013-2015	Bowers Road 2014-2016	2015 temperature data did not start until July 20
2	Orland Road 2013-2015	Parham Road 2014-2016	2015 temperature data did not start until July 20
3	Orland Road 2013-2015	Prairie River Road 2013-2015	2015 temperature data did not start until June 23

Table 4.–Numbers, calculated weights, and thermal classifications for fish species collected at the Bowers Road electrofishing station on the Prairie River on July 28, 2015. Thermal classifications are from Lyons et al. (2009).

Species	Number	% by number	Calculated weight	% by weight	Thermal classification
Creek Chub	117	60.6	4.6	52.3	Transitional
Rainbow Darter	19	9.8	0.0	0.5	Warmwater
Blacknose Dace	17	8.8	0.3	3.0	Transitional
Central Mudminnow	12	6.2	0.1	0.9	Transitional
White Sucker	8	4.1	1.9	21.4	Transitional
Johnny Darter	7	3.6	0.0	0.2	Transitional
Brown Trout	6	3.1	1.8	20.9	Coldwater
Green Sunfish	3	1.6	0.0	0.5	Warmwater
Bluntnose Minnow	2	1.0	0.0	0.1	Warmwater
Grass Pickerel	1	0.5	0.0	0.1	Warmwater
Bluegill	1	0.5	0.0	0.1	Warmwater
Total	193		8.8		

Table 5.–Numbers, calculated weights, and thermal classifications for fish species collected at the Orland Road electrofishing station on the Prairie River on July 27, 2015. Thermal classifications are from Lyons et al. (2009).

Species	Number	% by number	Calculated weight	% by weight	Thermal classification
Brown Trout	40	25.2	8.8	52.0	Coldwater
Rainbow Darter	34	21.4	0.1	0.8	Warmwater
Creek Chub	32	20.1	1.6	9.3	Transitional
White Sucker	20	12.6	4.7	27.7	Transitional
Blacknose Dace	10	6.3	0.2	0.9	Transitional
Central Mudminnow	7	4.4	0.1	0.4	Transitional
Hornyhead Chub	5	3.1	0.5	2.7	Warmwater
Johnny Darter	4	2.5	0.0	0.1	Transitional
Grass Pickerel	3	1.9	0.2	1.2	Warmwater
River Chub	2	1.3	0.4	2.4	Transitional
Northern Hog Sucker	1	0.6	0.2	1.4	Transitional
Bluegill	1	0.6	0.2	1.1	Warmwater
Total	159		17.0		

Table 6.–Aquatic habitat parameters for the Bowers Road and Orland Road sampling stations on the Prairie River during 2012-2015. Habitat surveys were conducted according to the protocols described by Wills et al. (2005).

Site	Year	Mean wetted width (ft)	Mean depth (ft)	Discharge (cfs)	Bank stability (% rated as poor or very poor)	Loose gravel (% of measurements)	Single logs with diameter > 6 inches (lineal ft)	Log jams, brush deposits, and stumps (ft^2)
Orland	2012	---	---	4.3	---	---	---	---
Bowers	2013	21.6	1.36	23.4	54	38.5	30	764
Orland	2013	22.7	1.46	36.3	35	9.2	18	117
Bowers	2014	19.1	0.97	6.4	75	5.7	54	207
Orland	2014	21.7	1.21	11.0	23	6.2	42	783
Bowers	2015	21.2	1.40	17.0	73	21.5	42	441
Orland	2015	23.7	1.38	29.5	8	10.8	36	405

Table 7.–July mean water temperatures, mean weekly temperature ranges in July, and mean water temperatures during the hottest week (July 25-31) at various sites within the Prairie River watershed in 2015. All temperatures are in degrees Fahrenheit.

Site #	Stream	Nearest road crossing	July mean water temperature	Mean weekly temperature range in July	Mean water temperature during hottest week
6	Prairie River	Bowers Road	64.9*	---	64.7
7	Prairie River	Parham Road	65.0*	---	64.9
11	Prairie River	Prairie River Road	64.8	10.0	66.4
17	Prairie River	Middle Colon Road	65.1	7.4	67.0
19	Prairie River	McKale Road	66.1	8.0	68.2
14	County No. 10 Drain	Carpenter Road	63.6	11.7	64.8
16	Burr Oak County Line Drain	Burr Oak Road	61.1	12.0	61.7

* Temperature loggers were not deployed until July 20. Mean water temperature reported is for July 20-July 31.

Table 8.–July mean water temperatures, mean weekly temperature ranges in July, and mean water temperatures during the hottest week (July 20-26) at various sites within the Prairie River watershed in 2016. All temperatures are in degrees Fahrenheit.

Site #	Stream	Nearest road crossing	July mean water temperature	Mean weekly temperature range in July	Mean water temperature during hottest week
6	Prairie River	Bowers Road	65.2	14.7	66.6
7	Prairie River	Parham Road	66.5	9.1	68.9
20	Prairie River	Snow Prairie Road	66.0	11.0	68.2

Table 9.–StreamCheck thermal classification results for Prairie River water temperature and fish community weight data collected during 2013-2016. (CT = cold transitional)

Station	13 Fish	13 Temp	14 Fish	14 Temp	15 Fish	15 Temp	16 Temp
Bowers Rd	Cold	---	Warm	Cold	CT	CT	CT
Orland Rd	Cold	---	Cold	---	Cold	---	---
Parham Rd	---	---	---	Cold	---	CT	CT
Prairie River Rd	---	CT	---	CT	---	CT	---