

To:	Travis Thiel Vermillion River Watershed Joint Powers Organization	From:	Dendy Lofton, PhD Anna Varian Grace Neumiller Minneapolis
Project/File:	Vermillion 2023 Fish Monitoring 227706002	Date:	December 21 <sup>nd</sup> , 2023

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**Reference: Vermillion 2022 Fish Monitoring**

## **Background**

The Vermillion River and the tributaries within its watershed contain a diverse mix of warmwater and coldwater streams. In 2008, the Vermillion River Watershed Joint Powers Organization (VRWJPO) developed a biological monitoring plan to assess the fish and macroinvertebrate communities from coldwater and warmwater streams within the watershed. The VRWJPO has been collecting annual biological data since 2009 to support a variety of efforts within the watershed including the Watershed Restoration and Protection Strategy (WRAPS) and current Watershed Management Plan. Annual data was collected at most sites across the watershed from 2009 through 2015. Wenck Associates, now part of Stantec Consulting Services (Stantec), partnered with the VRWJPO to conduct the fish community monitoring over this time. This dataset established the baseline characteristics of the fish community within the watershed.

In 2016, Wenck (now Stantec) conducted an analysis of the fish community dataset for the VRWJPO with the intent of determining the appropriate sampling frequency for future biological monitoring efforts. The final monitoring recommendations included the development of sentinel sites throughout the watershed, which would be monitored one time every two years, and then the remaining sites in the watershed would be monitored approximately one time every three years. These criteria were used to develop a monitoring rotation for a six-year period (Table 1). The first year of the monitoring rotation was 2016. After initial development of the monitoring rotation, the VRWJPO received input from both the Minnesota Department of Natural Resources (MnDNR) and the Minnesota Pollution Control Agency (MPCA) regarding the planned monitoring schedule of each agency within the watershed. Based on this input, the monitoring rotation was updated to include the monitoring efforts to be conducted by the VRWJPO along with the monitoring efforts by the MnDNR and the MPCA. This technical memo provides a summary and analysis of the fish community monitoring conducted by Stantec this year, which is Year 8 of the data collection rotation (Table 1).

Reference: Vermillion 2023 Fish Monitoring

**Table 1: Sampling rotation for all 18 monitoring sites in the watershed by year (yr).**

Site	Method	Yr 1: 2016	Yr 2: 2017	Yr 3: 2018	Yr 4: 2019	Yr 5: 2020	Yr 6: 2021	Yr 7: 2022	Yr 8: 2023	Yr 9: 2024	Yr 10: 2025
A2	Backpack		X			X			X		
<b>A3</b>	<b>Backpack</b>	X		X		X		X		X	
A4	Backpack			X			X			X	
<b>A5</b>	<b>Backpack</b>	X	+	X		X		X		X	
A6	Backpack		X			X			X		
<b>A7</b>	<b>Backpack</b>	X		X		X		X		X	
<b>A8</b>	<b>Barge</b>		X		-	*	X		X		X
A9	Barge	X	+	X		X			X		
<b>A12</b>	<b>Backpack</b>		X		X	*	X		X		X
A13	Backpack		+	X		*	X			X	
A14	Barge	X			-	X		X			X
A15	Backpack	X			X			X			X
13-1	Backpack		X		X			X			X
13-2	Backpack			X			X			X	
13-4	Backpack		X			X			X		
13-5	Barge			X			X			X	
<b>14-1</b>	<b>Backpack</b>		X		X		X		X		X
14-2	Backpack	X		X		X			X		

**Note:** Sentinel sites in bold. Orange cells indicate that sites where Stantec conducted monitoring in 2023. The remaining 2023 sites were surveyed by the MnDNR.

X : Sites identified in planned rotation for the specific monitoring year

+: Unplanned sampling by MPCA/MnDNR

\* : MnDNR monitoring sites in 2020 as part of their stated monitoring every three years.

- : Barge sites not accessible in 2019; added to 2020 Rotation

**Reference:** Vermillion 2023 Fish Monitoring

## 2023 Monitoring Sites

Three sites were monitored for fish community in 2023 (Table 2, Attachment A). Three backpack sites (13-4, 14-1, 14-2) were surveyed by Stantec on August 29<sup>th</sup> and 30<sup>th</sup> 2023. The timing of these surveys coincided with the standard sampling period from previous fish community surveys in the Vermillion River Watershed. Stantec acquired the required special permit for fish surveys from the MnDNR (Attachment B) prior to conducting field surveys. Summary data from the 2023 field surveys performed by Stantec has been provided to the MnDNR as required under terms of the permit.

Historically established site reach lengths were used for 2023 monitoring. All stream fish collections followed the methods outlined in the MPCA warmwater Index of Biotic Integrity (IBI) report and the MPCA Standard Operating Procedures for electrofishing (Rev. Feb. 2009). Each site was fished beginning at the downstream point of the reach and proceeding in an upstream direction to the most upstream point of the reach. Due to the relatively narrow width of most of the stream reaches targeted for surveys, it was possible to effectively sample all available in-stream habitats. All fish collected were identified, sorted, counted, and released. The survey method and sample dates for each reach are presented in Table 2.

**Table 2: Sample reach information for the three sites in the 2023 Vermillion River stream fish monitoring project.**

Site	Sampler	Stream Classification	Reach Length (ft)	Survey Method	Sample Date	Total Species	Total Abundance
13-4	Stantec	Coldwater	525	Backpack	8/29/2023	12	480
14-1	Stantec	Warmwater	500	Backpack	8/30/2023	8	173
14-2	Stantec	Warmwater	500	Backpack	8/29/2023	8	92

## Monitoring Results

A total of 745 fish were collected across the three sites surveyed in 2023. Total catch abundance ranged from 92 fish at site 14-2 to 480 fish at site 13-4 (Table 2). The total number of species caught at each site ranged from 8 to 12. Eight species were captured at sites 14-1 and 14-2, and twelve species were captured at site 13-4. The highest abundance of any species caught was white suckers (*Catostomus commersonii*), with 289 individuals (38.8% of total catch abundance for all sites). Other species with high survey abundance (% of total abundance in parentheses) included 160 fathead minnow (*Pimephales promelas*) (21.5%), 110 johnny darter (*Etheostoma nigrum*) (14.8%), 87 creek chub (*Semotilus atromaculatus*) (11.7%), and 21 largemouth bass (*Micropterus salmoides*) (2.8%). central mudminnow (*Umbra limi*), fathead minnow, green sunfish (*Lepomis cyanellus*), largemouth bass, and White Sucker were captured at all three sites, while brook stickleback (*Culaea inconstans*), Iowa darter (*Etheostoma exile*), johnny darter, and northern pike (*Esox lucius*) were captured at two of the three sites. Fish data were submitted to the MPCA for Index of Biological Integrity (IBI) score calculation. The MPCA has assisted the VRWJPO with IBI score calculation for the biological monitoring program since 2011. The stream sites in the Vermillion River Watershed are all within the southern region of the state based on the IBI protocol for Minnesota. The three

**Reference: Vermillion 2023 Fish Monitoring**

sites monitored in 2023 are from three different stream IBI categories including Southern Coldwater Streams (13-4), Southern Headwater Streams (14-2), and Southern Streams (14-2). The 2023 IBI scores are presented in Table 3.

Detailed fish abundance and IBI metric scores are provided in Attachments C, D, and E.

**Table 3: IBI score summary for 2023 fish community monitoring sites.**

Site	Stream Classification	MPCA IBI Category	Sample Years <sup>1</sup>	Avg IBI	Min	Max	2023 IBI	IBI Threshold <sup>2</sup>
13-4	Coldwater	Southern Coldwater	4	39.4	27.5	49.9	27.5	50
14-1	Warmwater	Southern Headwaters	6	55.9	43.0	66.2	53.7	55
14-2	Warmwater	Southern Streams	5	38.5	33.0	46.1	41.4	45

<sup>1</sup> Includes 2023 monitoring year

<sup>2</sup> IBI scores above the threshold meet water quality standards and IBI scores below the threshold do not meet water quality standards

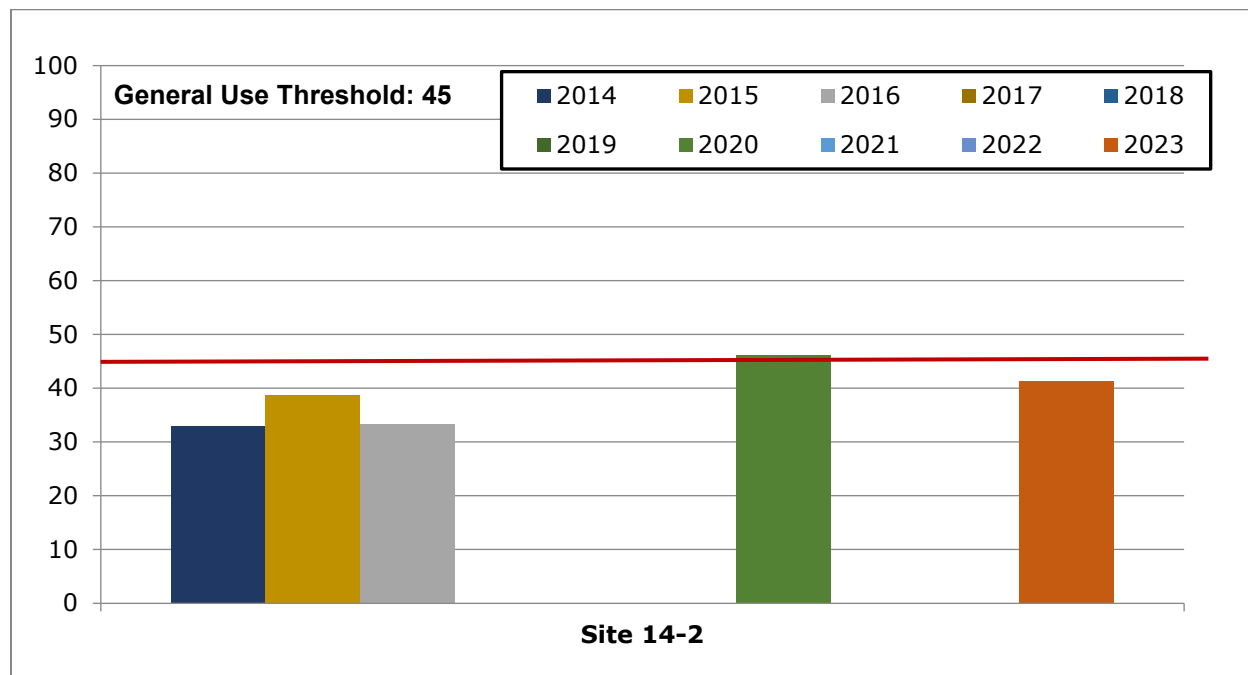
## Discussion

Central Minnesota including Dakota County and the Vermillion River watershed experienced severe drought conditions during the summer of 2023. Discharge at the nearest gage station on the Vermillion River near Empire, MN (05345000) during the survey event was roughly half the median discharge recorded at this station for the last 79 years and similar to the observed discharge during the 2022 sampling event. How the drought may have affected IBI scores is difficult to discern and may have affected sites differently based on watershed size, human impacts, or other factors.

**Reference: Vermillion 2023 Fish Monitoring**

## Southern Streams

Site 14-2 was the only 2023 monitoring site classified as Southern Streams. This site is located on North Creek, downstream of 195<sup>th</sup> Street West within a re-meandered section of stream. This site was established in 2014 and there are five years of monitoring data. Site 14-2 did not meet the general use threshold of 45 with a score of 41.4 (Figure 1). Of the five years sampled this site has exceeded the threshold only once (Figure 1). The highest scoring metric was percent of early maturing individuals (MA<2Pct). This metric is a negative response metric meaning that low numbers of early maturing individuals resulted in high metric scores. Metric scores of zero were scored for percent tolerant individuals (TolPct) and combined relative abundance of the two most abundant taxa (DomTwoPct) indicating a high number of individuals tolerant to degraded water quality and a sample dominated by only two taxa.



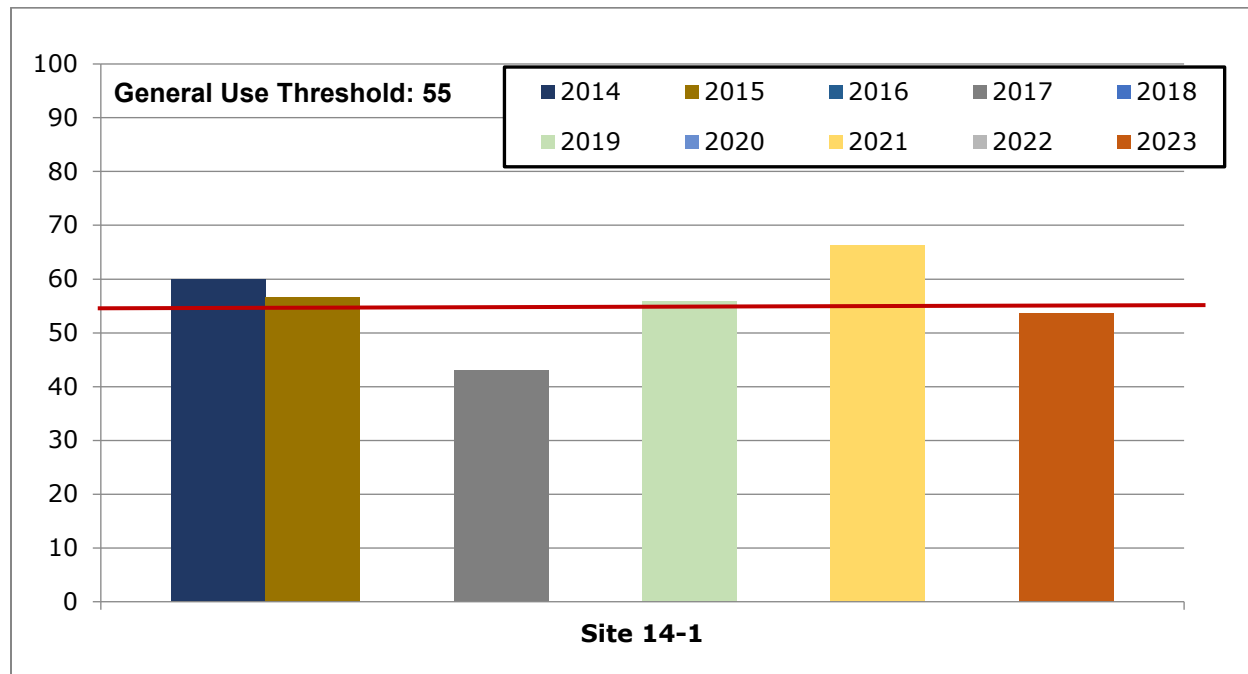
**Figure 1: IBI Scores for Southern Streams.**

## Southern Headwater Streams

One of the 2023 monitoring sites is classified as Southern Headwater Streams. Site 14-1 is on Middle Creek south of 195<sup>th</sup> St West. This site was established in 2014 and there are six years of monitoring data. Site 14-1 has had IBI scores above the threshold four out of six years, this year it fell just under the threshold with a score of 53.7 (Figure 2). The lowest scoring metric was number of sensitive taxa (Sensitive) with a score of 0. Percent serial spawner (SSpnPct) and percent short lived individuals (SlvdPct)

**Reference:** Vermillion 2023 Fish Monitoring

were high scoring metrics. These metrics are negative response metrics meaning that low numbers of serial spawners and short-lived individuals resulted in high metric scores.



**Figure 2: IBI Scores for Southern Headwater Streams.**

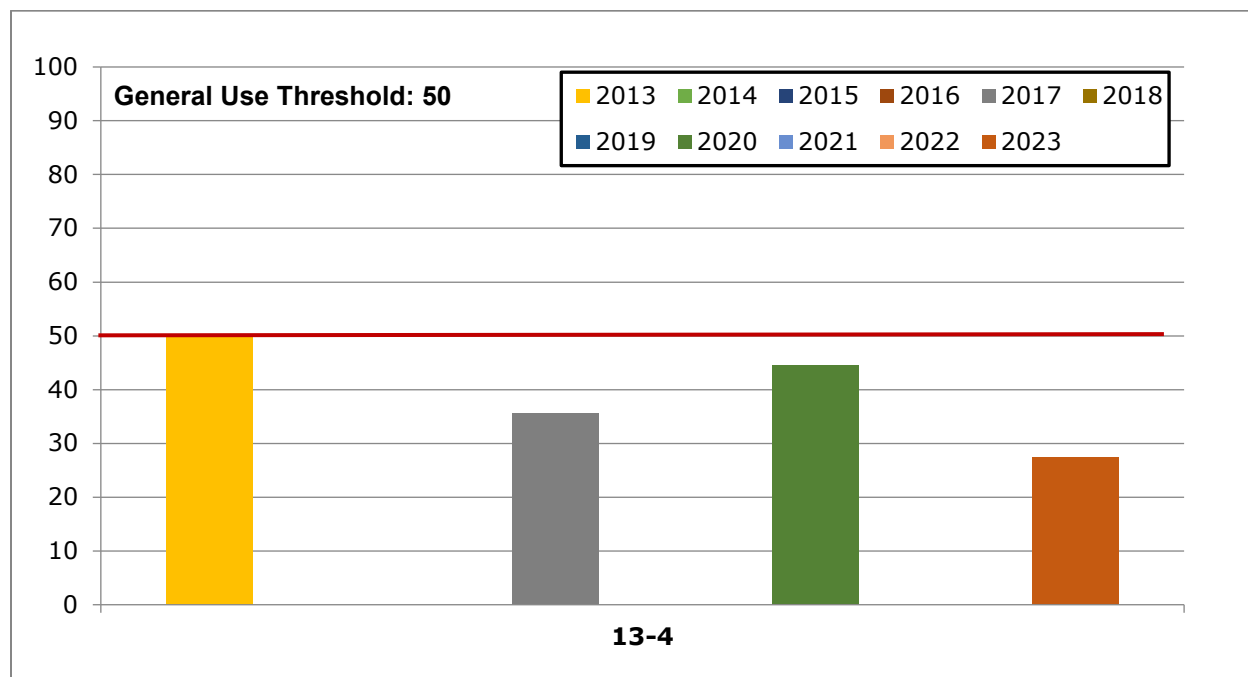
### Southern Coldwater Streams

One of the 2023 monitoring sites is classified as Southern Coldwater Streams by MPCA for IBI scoring. Site 13-4 is located on North Creek near the confluence of the Vermillion River and has been surveyed four times since 2013. The IBI score is 27.5, this is the fourth lowest score for a Southern Coldwater Stream sampled during this study. The IBI scores for site 13-4 have been variable throughout the years (Figure 3). The proximity of this site to the Vermillion River, a larger river, may explain some variability. Fish residing in large river systems tend to roam, and the species assemblage you find at this site each year may vary due to this roaming. The low score for 2023 is due to low scores in the percent native coldwater taxa (NativeColdPct) and percent pioneer individuals (PioneerPct) metrics. Comparing 2023 metric scores to 2013 when this site scored at the general use threshold, the decrease in overall IBI score is primarily due to decreased scores in percent pioneer individuals (PioneerPct) and the number of tolerant taxa specific to coldwater streams (adjusted for drainage area) (CWTol\_10DrgArea). Both of these metrics are negative response metrics meaning high numbers of pioneer individuals and tolerant coldwater taxa lead to lower scores.

One 11-inch brown trout (*Salmo trutta*) was sampled this year. As with IBI scores in the past at these Southern Coldwater Stream sites, an absence of native coldwater fish species is the primary factor limiting

**Reference: Vermillion 2023 Fish Monitoring**

the potential for higher IBI scores. Brown trout were the only trout species sampled in 2023 and only one was sampled. Brown trout are not native to North America, but they are a sensitive coldwater species and have been stocked in coldwater streams across the Midwest for angling opportunities. The lack of native brook trout (*Salvelinus fontinalis*) and sculpin (*Cottus sps*) will always limit the IBI scores.



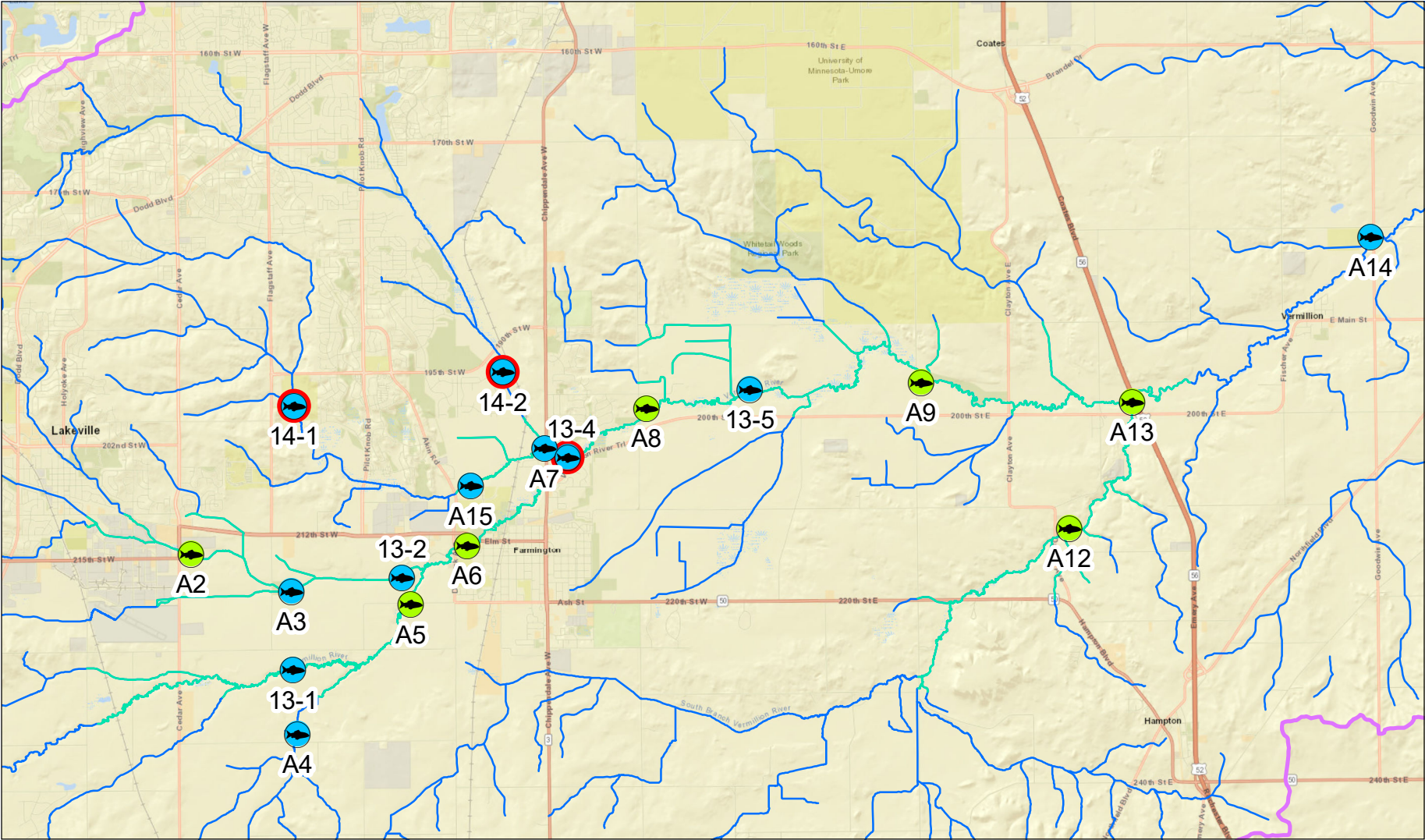
**Figure 3: IBI Scores for Southern Coldwater Streams.**

All three sites sampled in 2023 scored below the general use threshold and lower than their last sample event. The Vermillion watershed was within a severe drought during 2023 sampling, it is unknown how this may affect scores; however, low scores were also seen in 2018 but the watershed was only considered abnormally dry during that season. Sites 14-1 and 14-2 are both upstream of site 13-4 and had lower IBI scores this year than at their last sampling event. Whatever watershed stressor may have caused the decrease in IBI scores upstream may have compounded downstream leading to a more drastic decrease in IBI scores at site 13-4.

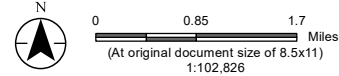
Attachments: Attachment A. 2023 Fish Monitoring Stations  
Attachment B. DNR Special Survey Permit  
Attachment C. Southern Stream Sites – Fish Abundance Data and IBI Metric Scores  
Attachment D. Southern Headwater Stream Sites – Fish Abundance Data and IBI Metric Scores  
Attachment E. Southern Coldwater Stream Sites – Fish Abundance Data and IBI Metric Scores



C:\Users\avarian\Documents\Fish Surveys\Vermlion\Report\VermlionReport.mxd Revised: 2023-12-20 By: avarian



- Legend**
- Stantec Monitoring Sites
  - DNR Monitoring Sites
  - 2023 Sites Surveyed by Stantec
  - Designated Trout Streams
  - Streams
  - Vermillion Watershed



- Notes**
1. Coordinate System: NAD 1983 2011 StatePlane Minnesota South FIPS 2203 Ft US
  2. Data Sources: Stantec
  3. Background: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors,



Prepared by AV on 2023-12-15

Client: Vermillion River Watershed Joint Powers Organization  
Project: Vermillion River Fish Sampling

Figure No.  
**1**  
Title  
**2023 Fish Monitoring Sites**



**Issuance of this permit does not exempt you from compliance with all applicable federal, state, and local laws when conducting the work authorized by this permit.**



**STATE OF MINNESOTA  
DEPARTMENT OF NATURAL RESOURCES  
Division of Fish and Wildlife – Section of Fisheries  
500 Lafayette Road  
St. Paul, MN 55155-4020  
PH: (651) 259-5236  
e-mail: [fisheries.permits@state.mn.us](mailto:fisheries.permits@state.mn.us)**

**SPECIAL PERMIT NO. 35563  
(Fisheries Research)  
Date: 24 May 2023**

**TO WHOM IT MAY CONCERN:**

Permission is hereby granted to:

Dendy Lofton and Anna Varian or designee  
Stantec Consulting Services, Inc.  
733 South Marquette Avenue, Suite 1000  
Minneapolis, MN 66502

to collect fish by backpack and barge electrofishing from the Vermillion River and its tributaries in Dakota County, particularly near Farmington, MN, **August – September 2023** for the purpose of fish community monitoring. See attached map for specific site locations. Work performed under this permit will be coordinated with the area fisheries office.

**All equipment should be thoroughly decontaminated before and after being used in other waterbodies.**

Fish may be held temporarily in aerated holding tanks, identified, weighed, and measured prior to release at the site of collection. A minimal number of fish may be preserved on site, transported, and possessed as voucher specimens. Any dead or moribund fish shall be removed from the water and disposed of properly.

Fish may not be sold, bartered, or converted to private use. No endangered or threatened species may be collected without a separate permit from the DNR's Endangered Species Coordinator ([List of Endangered and Threatened Species](https://www.dnr.state.mn.us/ets/index.html) <https://www.dnr.state.mn.us/ets/index.html>).

A copy of this permit shall be carried while sampling.

**Condition #1 - Applies to All Permits for Work in Any State Water**

- Always use caution so you do not introduce aquatic invasive species into any water body. A list of known Infested Waters with species present is available at [MN Infested Waters List](http://www.dnr.state.mn.us/invasives/ais/infested.html) (<http://www.dnr.state.mn.us/invasives/ais/infested.html>).
- **Before starting** work under this permit, you should decontaminate all equipment that has been used in any other waters in Minnesota or other locations (see Decontamination Protocols described in Condition # 4 below for equipment used in infested waters).
- **Before leaving** the water access, you must:
  - **Clean** off all aquatic plants and animals
  - **Drain** water from equipment, including watercraft and livewells, and transport equipment with drain plugs open or removed.

**Condition #2 - Applies to All Permits for Live Transport**

- Live specimens may be transported only if your permit allows and only in tap, bottled, or ground water that you bring to the collection site. Do not use surface water.
- If it is critical to transport small amounts of surface water, then you must obtain a separate [Water Transport Permit](https://www.dnr.state.mn.us/invasives/ais_watersampling.html) ([https://www.dnr.state.mn.us/invasives/ais\\_watersampling.html](https://www.dnr.state.mn.us/invasives/ais_watersampling.html)). This is a self-issue permit.

### **Condition #3 - Applies to Collection or Possession of Prohibited Invasive Species**

- State laws and rules prohibit the possession and transportation of prohibited invasive species without an additional permit. Lists of prohibited and regulated invasive species, and permit application information can be found at: Prohibited and Regulated Invasive Species ([https://www.dnr.state.mn.us/permits/invasive\\_species/prohibited\\_regulated.html](https://www.dnr.state.mn.us/permits/invasive_species/prohibited_regulated.html)).
- **If you find a new infestation** of an aquatic invasive species, note the location and take a photo or keep the specimen in a sealed container, and call the DNR Aquatic Invasive Species Specialist for your region ([https://www.dnr.state.mn.us/permits/invasive\\_species/prohibited\\_regulated.html](https://www.dnr.state.mn.us/permits/invasive_species/prohibited_regulated.html)).

### **Condition #4 - Applies to Cleaning Equipment When Working in Infested Waters**

- Waders, hip boots, other footwear, hook and line (angling), trot lines, hand-held dip nets, backpack electrofishing, and scuba equipment used in infested waters must be cleaned and decontaminated before they are used in any other water body. Tags are not required on this equipment.
- All other traps, nets, and gear used in infested waters **must be tagged** with *Infested Waters Only* tags supplied by DNR and not used in uninfested waters. Tags must be attached to equipment in a manner that prohibits their removal without cutting the tag.
- Watercraft do not need to be tagged, but must be fully decontaminated after work is completed in infested waters, and must not be left in infested waters overnight.
- You must decontaminate tagged equipment using methods specific to the aquatic invasive species present in the water body. Always use caution so you do not introduce additional aquatic invasive species into any water body. The following procedures are required before the tagged equipment may be used in uninfested waters or other types of infested waters:
  - **zebra mussel** – rinse with 140 degree F water at the point of contact for at least 10 seconds, or 120 degrees F for at least 2 minutes, or freeze for at least 48 hours;
  - **faucet snail** – rinse with 140 degree F hot water for at least one minute;
  - **spiny waterflea** – equipment must be thoroughly dry for at least 24 hours;
  - **New Zealand mudsnail** - rinse with 120 degree F hot water for at least one minute; and
  - **Eurasian watermilfoil, flowering rush, starry stonewort, brittle naiad** – remove all plant parts.
- All tagged gear must also be decontaminated after completion of each field season.

### **Condition #5 - Applies to Work in Both Infested and Uninfested Waters**

#### **Option 1**

- The permittee may use one set of gear provided:
  - Gear used under this permit shall be used first in uninfested waters, then tagged and used in infested waters; and
  - Gear is decontaminated before moving from one type of infested water to another; and
  - Gear is decontaminated upon final use in infested waters.

#### **Option 2**

- The permittee working alternately in infested and uninfested waters shall have two sets of gear – one for infested waters that must be tagged as described above in Condition #4 and one for uninfested waters. Gear that is not required to be tagged for use in infested waters (such as waders and scuba equipment) must be decontaminated completely before being used in an uninfested water body.
- Gear tagged for use in infested waters and gear used in infested waters that has not yet been completely decontaminated must be transported or stored in a way that ensures physical separation from gear for use in uninfested waters. If infested and uninfested gear are carried in the same compartment of a vehicle, then at least one of the types of gear should be contained in such a way that prohibits physical contact between the sets of gear (for example, using a plastic drum or tub). Permittees should take care to wipe up any excess water that drips off infested waters gear. When working at the access of an uninfested water body, equipment used in infested waters must remain secured in the vehicle. Note that this does not permit tags to be removed and the previously tagged gear used in any uninfested waters.

### **Condition #6 - Intellectual Property Rights**

- Samples collected under this permit and any portions or derivatives thereof shall not be sold, assigned, transferred, or otherwise distributed from the custody of the permittee (i.e., shall not be shared with any other person or entity) without prior approval from the MNDNR, unless it is for the purposes of laboratory analyses specified in the study design and the laboratory collaborator does not retain any samples or portions or derivatives thereof after completing the analyses.
- Permittee shall not file any patent application directly covering any samples.
- Permittee may retain the entire right, title, and interest throughout the world to any invention derived or otherwise originating from the samples. With respect to any subject invention in which the permittee retains title, MNDNR will have a nonexclusive, nontransferable, perpetual, irrevocable, royalty free license to practice or have practiced the invention for its governmental purposes. MNDNR shall also have the right to claim royalties resulting from any such invention.

This permit is only for sampling on State property and waters, unless the permittee has explicit permission from the land owners; including the National Park Service, U.S. Fish and Wildlife Service, or County. A separate permit is needed from the Division of Parks and Trails to collect within a State Park. On Minnesota border waters, this permit applies only to the territorial waters of the State of Minnesota. A copy of this permit shall be carried while sampling.

**The Area Fisheries Supervisor and Regional Enforcement Manager must be notified by e-mail, preferably 7-10 days in advance of sampling (see e-mail addresses in red below). A hard copy of the notifications shall be attached to the year-end activity report. Your letter of application does not constitute advance notification of your intent to sample.**

A report detailing collection activities (species, numbers, and collection sites) will be submitted to MN DNR - Fisheries by **31 January of each year**. A copy of any report or publication resulting from this research will be provided to the Division of Fish and Wildlife upon its completion.

This permit is valid from date of issuance through **31 December 2023**, but may be revoked at any time.

JOHN HOXMEIER  
Fisheries Research Supervisor



***I hereby certify that I have read and understand the provisions of this permit and understand that this permit is not valid unless it is signed by me.***

Permittee Signature	Title	Date
Varian, Anna <small>Digitally signed by Varian, Anna Date: 2023.06.05 09:38:29 -05'00'</small>	Environmental Scientist	6/5/23

cc: **Division of Fish and Wildlife**

TJ DeBates, East Metro Area Fisheries Supervisor, St. Paul  
(e-mail [timothy.debates@state.mn.us](mailto:timothy.debates@state.mn.us); phone 651-259-5770)  
Kevin Stauffer, Area Fisheries Supervisor, Lake City  
(e-mail [kevin.stauffer@state.mn.us](mailto:kevin.stauffer@state.mn.us); phone 651-299-4032)  
Brian Nerbonne, Regional Fisheries Manager, St. Paul  
(e-mail [brian.nerbonne@state.mn.us](mailto:brian.nerbonne@state.mn.us); phone 651-259-5789)

**Division of Enforcement**

Capt. Jason Peterson, Regional Enforcement Manager, St. Paul  
(e-mail [jason.r.peterson@state.mn.us](mailto:jason.r.peterson@state.mn.us); phone 651-259-5838)

## Attachment C: Southern Stream Sites – Fish Abundance Data and IBI Metric Scores

Species	Abundance
	14-2
Brook Stickleback	6
Central Mudminnow	1
Fathead Minnow	1
Green Sunfish	4
Iowa Darter	11
Largemouth Bass	1
Northern Pike	1
White Sucker	67
<b>Total Catch</b>	92
<b>Species Total</b>	8

Metric Name	Metric Description	Score
		14-2
TolTxPct	Percent Tolerant taxa	4.9
TolPct	Percent of Tolerant Individuals	0.0
SLvd	Number of Short-lived Taxa	8.3
SensitiveTxPct	Percent of Sensitive Taxa	3.5
MA<2Pct	Percent of Early Maturing Individuals	12.5
DomTwoPct	Combined Relative Abundance of the Two Most Abundant Taxa	0.0
DetNWQTxPct	Percent Detritivorous Taxa	8.3
BenInsect-TolTxPct	Percent Benthic Insectivore Taxa (excludes tolerant species)	3.9
FishDELTpct <sup>1</sup>	Percent of Individuals with Deformities, Eroded Fins, Lesions, or Tumors	0.0
Total IBI Score		41.4
General Use IBI Threshold		45

<sup>1</sup> Metric is a negative adjustment applied (if applicable) after calculating the composite score

## Attachment D: Southern Headwater Stream Sites – Fish Abundance Data and IBI Metric Scores

Species	Abundance
	14-1
Brook Stickleback	9
Central Mudminnow	4
Creek Chub	87
Fathead Minnow	14
Green Sunfish	8
Johnny Darter	21
Largemouth Bass	3
White Sucker	27
<b>Total Catch</b>	173
<b>Species Total</b>	8

Metric Name	Metric Description	Score
		14-1
VtolTxPct	Relative Abundance of Very Tolerant Species	6.0
DetNWQTxPct	Relative Abundance of Detritivorous Species	8.4
GeneralTxPct	Relative Abundance of Trophic Generalist Species	9.9
Sensitive	Taxa Richness of Sensitive Species	0.0
SSpnPct	Relative Abundance of Serial Spawning Individuals	14.9
FishDELTpct <sup>1</sup>	Percent of Individuals with Deformities, Eroded Fins, Lesions, or Tumors	0.0
SLvdPct	Relative Abundance of Short-lived Individuals	14.5
Total IBI Score		53.7
General Use IBI Threshold		55

<sup>1</sup> Metric is a negative adjustment applied (if applicable) after calculating the composite score

## Attachment E: Southern Coldwater Stream Sites – Fish Abundance Data and IBI Metric Comparisons

Species	Abundance
	13-4
Bigmouth Shiner	8
Black Bullhead	2
Bluegill Sunfish	3
Brown Trout	1
Central Mudminnow	11
Fathead Minnow	145
Green Sunfish	1
Iowa Darter	3
Johnny Darter	89
Largemouth Bass	17
Northern Pike	5
White Sucker	195
<b>Total Catch</b>	480
<b>Species Total</b>	12

Metric Name	Metric Description	Score
		13-4
CWSensitivePct_10DrgArea <sup>1</sup>	Percent Sensitive Individuals (specific to coldwater streams)	1.1
FishDELTpct <sup>2</sup>	Percent of Individuals with Deformities, Eroded Fins, Lesions, or Tumors	0.0
SdetTxPct_10DrgArea	Percent Detritivore Taxa	5.5
PioneerPct	Percent Pioneer Individuals	1.6
NativeColdTXPct_10DrgArea	Percent Native Coldwater Taxa	4.4
NativeColdPct <sup>3</sup>	Percent Native Coldwater Individuals	0.0
HerbvPct <sup>4</sup>	Percent Herbivorous Individuals	14.3
CWTol_10DrgArea	Tolerant Taxa Richness (specific to coldwater streams)	0.6
Total IBI Score		27.5
General Use IBI Threshold		50

<sup>1</sup> Metric scoring adjusted for watershed area

<sup>2</sup> Metric is a negative adjustment applied (if applicable) after calculating the composite score

<sup>3</sup> Metric value transformed ( $\log_{10}+1$ )

<sup>4</sup> Metric scored discretely