Stantec

Memo

To:	Kelly Perrine Vermillion River Watershed Joint Powers Organization	From:	Anna Varian Minneapolis, MN
Project/File:	Vermillion 2025 Fish Monitoring 2277	Date:	December 3rd, 2025

Reference: Vermillion 2025 Fish Monitoring

Background

The Vermillion River and its tributaries support 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 across these streams. The VRWJPO has collected annual biological data since 2009 to support various 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) analyzed the dataset to determine an appropriate sampling frequency for future monitoring. Recommendations included the development of sentinel sites, monitored every two years, and the remaining sites would be monitored approximately once every three years. These criteria were used to develop a monitoring rotation for a six-year period, beginning in 2016 (Table 1). Following input from the Minnesota Department of Natural Resources (MnDNR) and the Minnesota Pollution Control Agency (MPCA), the rotation was updated to align with each agency's planned monitoring efforts. This technical memo provides a summary and analysis of the fish community monitoring from this year, Year 10 of the data collection rotation (Table 1).

Reference: Vermillion 2025 Fish Monitoring

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

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		
A3	**Backpack**	**X**		**X**		**X**		**X**		**X**	
A4	Backpack			X			X			X	
A5	**Backpack**	**X**	*	**X**		**X**		**X**	*	**X**	
A6	Backpack		X			X			X		
A7	**Backpack**	**X**		**X**		**X**		**X**		**X**	
A8	**Barge**		**X**		**+**	*	**X**		**X**		**X**
A9	Barge	X	*	X		X			X		
A12	**Backpack**		**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	
14-1	**Backpack**		**X**		**X**		**X**		**X**		**X**
14-2	Backpack	X		X		X			X		

Note: Sentinel sites in bold. Orange cells indicate that Stantec conducted monitoring in 2025. The remaining 2025 sites were surveyed by the DNR.

X : Sites identified in planned rotation for the specific monitoring year
* : DNR monitoring sites as part of their stated monitoring every three years.
+ *: Barge sites not accessible in 2019; added to 2020 Rotation*

2025 Monitoring Sites

Four sites were monitored for the fish community in 2025 (Table 2; Figure 1). Three backpack sites (A15, 13-1, 14-1) and one barge site (A14) were surveyed by Stantec on September 3rd and 4th, 2025. The timing of these surveys coincided with the standard sampling period from previous fish community surveys in the Vermillion River Watershed. Stantec acquired the necessary special permit for fish surveys from the MnDNR (Attachment A) prior to conducting field surveys. Summary data from the 2025 field surveys performed by Stantec will be provided to the MnDNR as required under the terms of the permit.

Historically established site reach lengths were used for 2025 monitoring. All stream fish collections followed the methods outlined in the MPCA Development of a Fish-Based Index of Biological Integrity for Minnesota's Rivers and Streams (2014) and the MPCA Standard Operating Procedures for electrofishing (Rev. Feb. 2009). Each site was fished from the downstream point to the upstream point of the reach. 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 four sites surveyed by Stantec in the 2025 Vermillion River Stream Fish Monitoring project.

Site	Stream Classification	Reach Length (ft)	Survey Method	Sample Date	Total Species	Total Abundance
A14	Southern Streams	1,225	Barge	9/04/2025	14	405
A15	Southern Headwater	540	Backpack	9/03/2025	9	364
13-1	Southern Coldwater	500	Backpack	9/04/2025	11	243
14-1	Southern Headwater	550	Backpack	9/03/2025	8	358

Monitoring Results

A total of 1,370 fish were collected across the four sites surveyed in 2025. Total catch abundance ranged from 243 fish at site 13-1 to 405 fish at site A14 (Table 2). The total number of species caught at each site ranged from 8 to 14. The highest abundance of any species caught was white sucker (*Catostomus commersonii*), with 319 individuals (23.3% of total catch abundance for all sites). Other species with high survey abundance (% of total abundance in parentheses) included 208 creek chub (*Semotilus atromaculatus*) (15.2%), 168 green sunfish *(Lepomis cyanellus)* (12.3%), and 167 johnny darter (*Etheostoma nigrum*) (12.2%).

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 four sites monitored in 2025 are from three different stream IBI categories

including Southern Coldwater Streams (13-1), Southern Streams (A14), and Southern Headwater Streams (A15 and14-1). The 2025 IBI scores are presented in Table 3. Detailed fish abundance and IBI metric scores are provided in Attachments B, C, and D.

Table 3: IBI score summary for 2025 fish community monitoring sites.

Site	MPCA IBI Category	Sample Years[1]	Avg IBI	Min	Max	2025 IBI	IBI Threshold[2]
A14	Southern Streams	12	42.8	31.4	54.6	47.3	45
A15	Southern Headwater	7	70.2	57.1	75.7	57.1	55
13-1	Southern Coldwater	7	38.9	34.0	45.0	34.5	50
14-1	Southern Headwater	7	55.8	43.0	66.2	55.3	55

[1] Includes 2025 monitoring year

[2] IBI scores above the threshold meet water quality standards and IBI scores below the threshold do not meet water quality standards

Discussion

The discharge at the nearest gage station on the Vermillion River near Empire, MN (05345000) was between 48 and 51 cubic feet per second (cfs) during the surveys. These discharges are slightly higher than the daily medians for this time of year, which are between 42 and 45 cfs.

Southern Headwater Streams

Two of the 2025 monitoring sites are classified as Southern Headwater Streams. Site A15 is located on Middle Creek, a tributary to the Vermillion River. This site was established in 2010 and there are seven years of monitoring data. Historically, IBI scores at this site range from 57.1 to 75.7. This year's score of 57.1 is the lowest recorded but remains above the general use threshold of 55 (Figure 2). Over the past five years, scores have shown a steady decline: initially in the mid-70s, then dropping into the 60s, and now at 57.1. However, other sites have experienced declines in scores, only to rebound again a few years later. The lowest scoring metric was sensitive taxa richness, meaning a low number of species sensitive to anthropogenic disturbances were found. The highest scoring metrics were percent generalist feeder and percent serial spawner individuals. Total abundance in 2025 was higher than in recent years and dominated by central mudminnows (*Umbra limi*), a species considered very tolerant of human disturbances.

Site 14-1 is also on Middle Creek further upstream from Site A15. This site was established in 2014 and there are seven years of monitoring data. IBI scores have ranged from 43.0 to 66.2 and average 55.8. This year's score was 55.3, in line with the average scores and similar to the most recent score of 53.7 in 2023. This score is slightly above the general use threshold of 55 (Figure 2). Similar to site A15 the lowest scoring metric was sensitive taxa richness. The highest scoring metrics were percent short lived individuals and

Reference: Vermillion 2025 Fish Monitoring

percent serial spawner individuals. In 2025 eight different species were captured which is about average for this site and 358 fish were captured which is above average. Creek chubs (*Semotilus atromaculatus*) and johnny darters were the most common species captured.

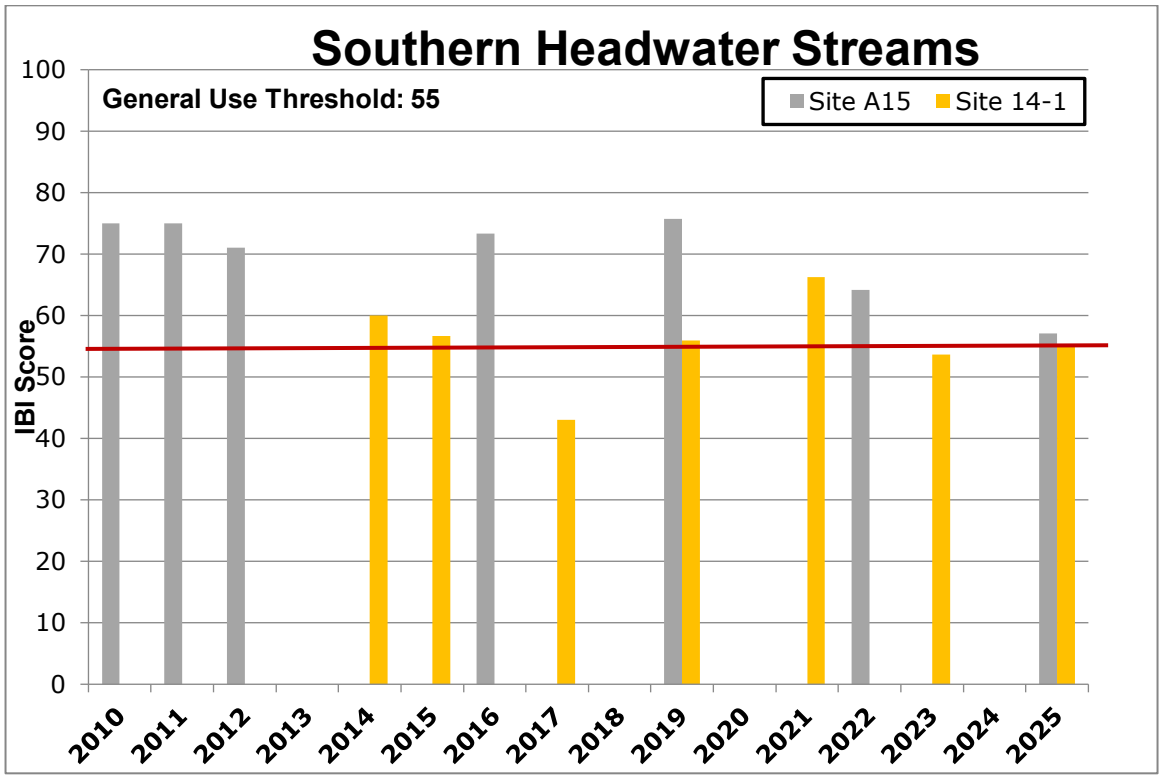


Figure 1: IBI Scores for Southern Headwater Streams.

Reference: Vermillion 2025 Fish Monitoring

Southern Coldwater Streams

One of the 2025 monitoring sites is classified by the MPCA as a Southern Coldwater Stream for IBI scoring. Site 13-1, located on the Vermillion River, has been surveyed seven times since 2013. This year's IBI score was 34.5, slightly below its long-term average of 38.9 (Figure 2) and close to the average for all Southern Coldwater sites within the Vermillion River Watershed. This site has consistently scored below the general use threshold. Eleven species were captured during the survey, an increase compared to recent years, though all were previously documented at this site. Green sunfish numbers were higher than in previous surveys. No trout were captured, and trout have never been recorded at this site, resulting in a metric score of zero for native coldwater individuals. Similarly, the percentage of coldwater-sensitive species adjusted for drainage area also scored low. The highest-scoring metric was the percentage of herbivorous individuals. Overall, species tolerant of human disturbance dominated the catch, with 92% of individuals classified as tolerant or very tolerant.

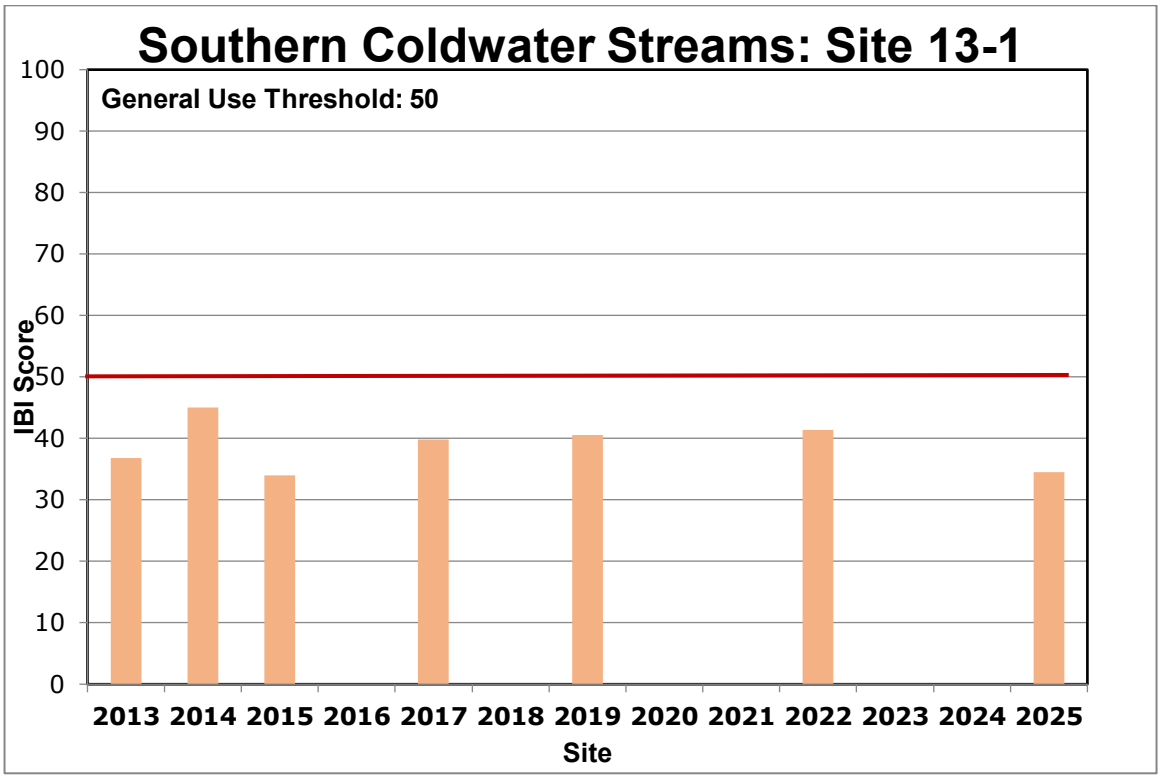


Figure 2: IBI Scores for Southern Coldwater Streams.

Southern Streams

Site A14 is the furthest downstream site on the Vermillion River. Established in 2008, it has 12 years of monitoring data. The IBI score was 47.6, slightly above this site's long-term average of 42.8, exceeding the general use threshold, and comparable to the previous survey (Figure 3). The lowest scoring metric was percent tolerant taxa. This metric has a negative response relationship, meaning a higher number of tolerant species collected at a site results in a lower metric score. This metric also scored low during the last survey. Additionally, percent benthic insectivore taxa (excluding tolerant species) also scored low, while percent detritivorous taxa scored the highest.

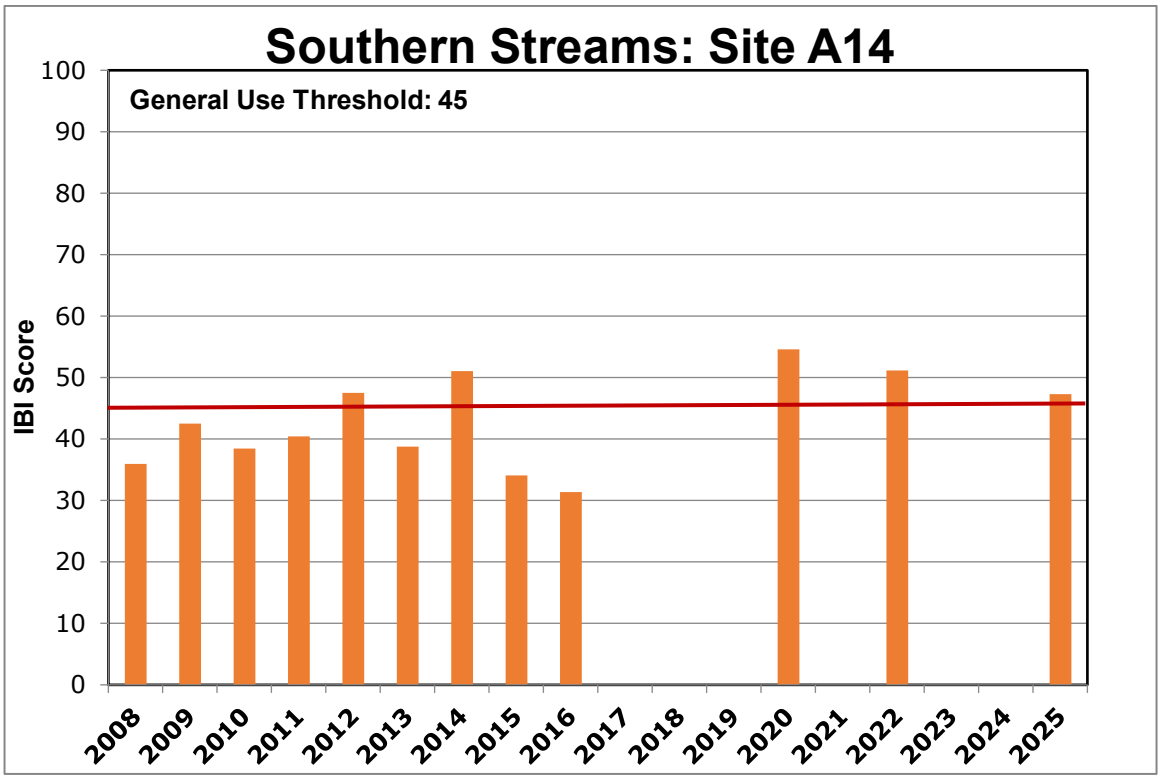


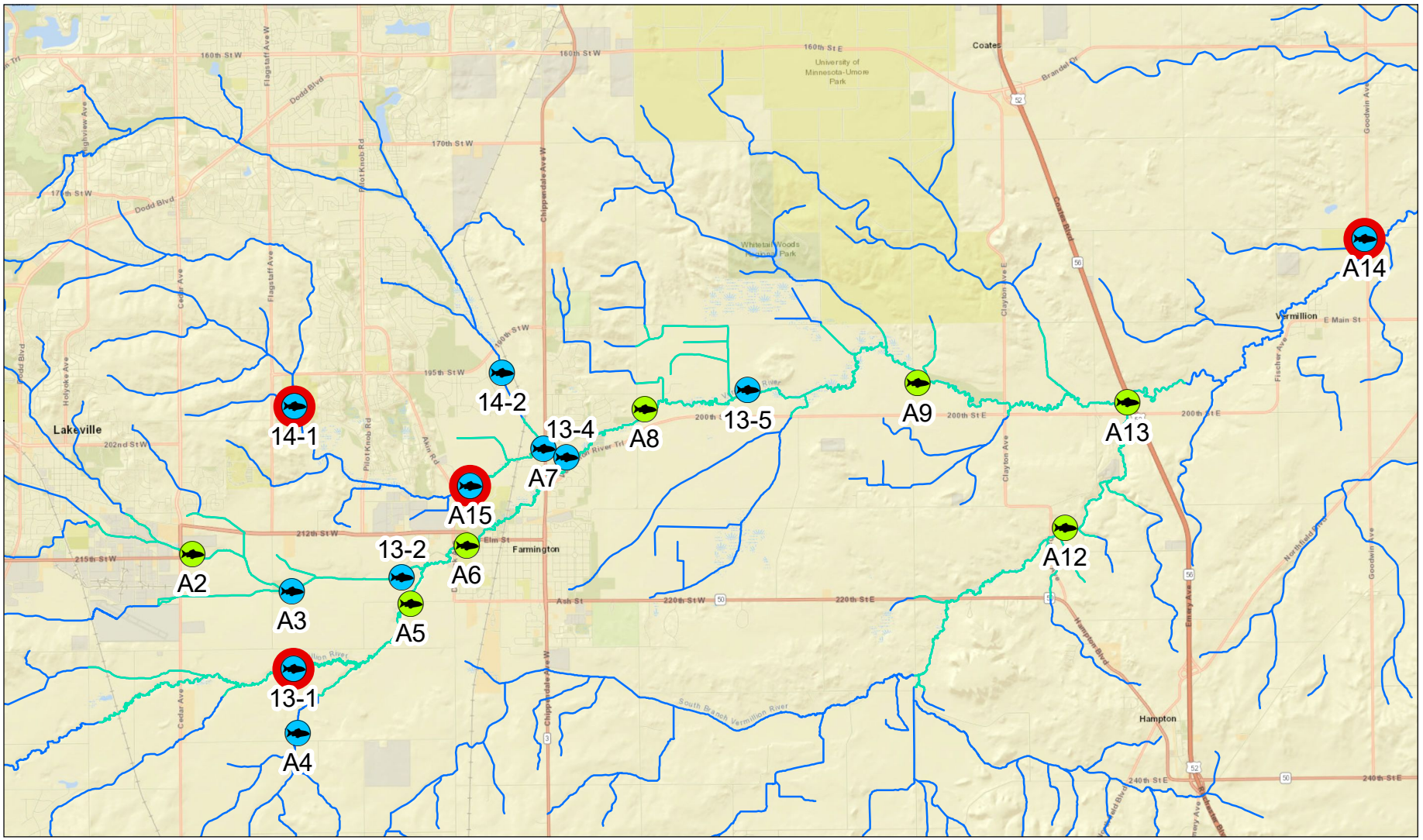
Figure 3: IBI Scores for Southern Streams.

Reference: Vermillion 2025 Fish Monitoring

Conclusion

The 2025 fish community monitoring results offer important insight into the ecological condition of the Vermillion River Watershed. Most sites maintained IBI scores near or above their respective general use thresholds or their long-term average. However, the declining scores at A15 and persistently low scores at coldwater sites highlight ongoing challenges for sensitive taxa and coldwater species. Historically, coldwater sites within the watershed have scored below the general use threshold, and this pattern persisted in 2025, with Site 13-1 again scoring low. The absence of native coldwater species remains the primary factor limiting IBI scores at these sites. The dominance of tolerant species at multiple sites suggests continued influence from watershed stressors. These findings reinforce the importance of long-term biological monitoring to track changes and identify emerging concerns.

Attachments: Figure 1. 2025 Fish Monitoring Stations
Attachment A. DNR Special Survey Permit
Attachment B. Southern Headwater Stream Sites – Fish Abundance Data and IBI Metric Scores
Attachment C. Southern Coldwater Stream Sites – Fish Abundance Data and IBI Metric Scores
Attachment D. Southern Stream Sites - Fish Abundance Data and IBI Metric Scores





Legend

- Stantec Monitoring Sites
- DNR Monitoring Sites
- 2025 Stantec Survey Sites
- Designated Trout Streams
- Streams

N

0 0.85 1.7 Miles

(At original document size of 8.5x11)
1:102,826

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,

Stantec

Prepared by AV on 2025-04-10

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

Figure No.
1

Title
2025 Fish Monitoring Sites

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Attachment A: Minnesota Department of Natural Resources Sampling Permit

Issuance of this permit does not exempt you from compliance with all applicable federal, tribal, state, and local laws, rules, and regulations 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

SPECIAL PERMIT NO. 36897
(Fisheries Research)
Date: 29 May 2025

TO WHOM IT MAY CONCERN:
Permission is hereby granted to:

Anna Varian or designee
Stantec Consulting Services, Inc.
2080 Wooddale Dr. Suite 100
Woodbury, MN 55125

to collect fish by backpack and barge electrofishing from the Vermillion River and its tributaries in Dakota County, particularly near Farmington, MN, **August – September 2025** 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).

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).
- ***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). 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).
- ***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).

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 landowners or trustees including the 11 federally recognized Tribes within Minnesota's borders, National Park Service, U.S. Fish and Wildlife Service, or County. 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 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 October 2025**, but may be revoked at any time.

JOHN HOXMEIER
Fisheries Research Supervisor

John Hoxmeier
Digitally signed by John Hoxmeier
Date: 2025.05.29 13:52:27 -05'00'

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 Digitally signed by Varian, Anna Date: 2025.05.30 08:15:50 -05'00'	Senior Environmental Scien	5/30/25

cc: **Division of Fish and Wildlife**
TJ DeBates, East Metro Area Fisheries Supervisor, St. Paul
(e-mail timothy.debates@state.mn.us; phone 651-259-5770)

Brian Nerbonne, Regional Fisheries Manager, St. Paul
(e-mail 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; phone 651-259-5838)

Attachment B: Southern Headwater Stream Site – Fish Abundance Data and IBI Metric Scores

Species	Abundance	
	A15	14-1
Brook Stickleback	62	4
Central Mudminnow	106	21
Creek Chub	47	111
Fathead Minnow	46	21
Green Sunfish	27	34
Iowa Darter	26	
Johnny Darter	17	130
Largemouth Bass	3	5
White Sucker	30	32
Total Catch	364	358
Species Total	9	8

Metric Name	Metric Description	Score	
		A15	14-1
DetNWQTxPct	Relative Abundance of Detritivorous Species	9.3	8.4
GeneralTxPct	Relative Abundance of Trophic Generalist Species	12.0	9.9
SLvdPct	Relative Abundance of Short-lived Individuals	10.5	15.5
VtolTxPct	Relative Abundance of Very Tolerant Species	7.2	6.0
SSpnPct	Relative Abundance of Serial Spawning Individuals	14.0	15.4
Sensitive	Taxa Richness of Sensitive Species	4.2	0.0
	Total IBI Score	57.1	55.3
	General Use IBI Threshold	55	

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

Species	Abundance
	13-1
Black Bullhead	10
Brook Stickleback	5
Central Mudminnow	14
Creek Chub	45
Green Sunfish	68
Iowa Darter	7
Johnny Darter	4
Largemouth Bass	2
Northern Pike	6
White Sucker	81
Yellow Perch	1
Total Catch	243
Species Total	11

Metric Name	Metric Description	Score
		13-1
CWSensitivePct_10DrgArea[1]	Percent Sensitive Individuals (specific to coldwater streams)	0.3
CWTol_10DrgArea	Tolerant Taxa Richness (specific to coldwater streams)	5.4
NativeColdTXPct_10DrgArea[1]	Percent Native Coldwater Taxa	3.2
NativeColdPct[2]	Percent Native Coldwater Individuals	0.0
HerbvPct[3]	Percent Herbivorous Individuals	14.3
SdetTxPct_10DrgArea	Percent Detritivore Taxa	9.5
PioneerPct	Percent Pioneer Individuals	1.8
	Total IBI Score	34.5
	General Use IBI Threshold	50

[1] Metric scoring adjusted for watershed area
[2] Metric value transformed ($\log_{10}+1$)
[3] Metric scored discreetly

Attachment D: Southern Stream Site – Fish Abundance Data and IBI Metric Scores

Species	Abundance
	A14
Bigmouth Shiner	65
Black Bullhead	1
Blacknose Dace	14
Bluegill Sunfish	36
Brook Stickleback	7
Brown Trout	17
Central Mudminnow	4
Creek Chub	5
Green Sunfish	39
Johnny Darter	16
Largemouth Bass	21
Northern Pike	2
Rainbow Trout	2
White Sucker	176
Total Catch	405
Species Total	14

Metric Name	Metric Description	Score
		A14
MA<2Pct	Percent of Early Maturing individuals	9.4
DetNWQTxPct	Percent Detritivorous Tax	12.5
SensitiveTxPct	Percent of Sensitive Taxa	4.0
SLvd	Number of short-lived Taxa	8.3
TolTxPct	Percent Tolerant Taxa	6.1
TolPct	Percent of Tolerant Individuals	0.0
DomTwoPct	Combined Relative Abundance of the Two Most Abundant Taxa	4.7
BenInsect-TolTxPct	Percent Benthic Insectivore Taxa (excludes tolerant species)	2.2
	Total IBI Score	47.3
	General Use IBI Threshold	45