

To: Travis Thiel  
Vermillion River Watershed Joint  
Powers Organization

From: Katie Kemmitt  
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File: Vermillion 2021 Fish Monitoring

Date: December 13, 2021

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**Reference: 227704306 Vermillion 2021 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 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 DNR and the MPCA. This technical memo provides a summary and analysis of the fish community monitoring from this year, Year 6 of the data collection rotation (Table 1).

**Table 1: Sampling rotation for all 18 monitoring sites in the watershed.**

| Site | Method   | Year 1:<br>2016 | Year 2:<br>2017 | Year 3:<br>2018 | Year 4:<br>2019 | Year 5:<br>2020 | Year 6:<br>2021 |
|------|----------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| A2   | Backpack |                 | X               |                 |                 | X               |                 |
| A3   | Backpack | X               |                 | X               |                 | X               |                 |
| A4   | Backpack |                 |                 | X               |                 |                 | X               |
| A5   | Backpack | X               | *               | X               |                 | X               |                 |
| A6   | Backpack |                 | X               |                 |                 | X               |                 |
| A7   | Backpack | X               |                 | X               |                 | X               |                 |
| A8   | Barge    |                 | X               |                 | +               | *               | X               |

| Site | Method   | Year 1:<br>2016 | Year 2:<br>2017 | Year 3:<br>2018 | Year 4:<br>2019 | Year 5:<br>2020 | Year 6:<br>2021 |
|------|----------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| A9   | Barge    | X               | *               | X               |                 | X               |                 |
| A12  | Backpack |                 | X               |                 | X               | *               | X               |
| A13  | Backpack |                 | *               | X               |                 | *               | X               |
| A14  | Barge    | X               |                 |                 | +               | X               |                 |
| A15  | Backpack | X               |                 |                 | X               |                 |                 |
| 13-1 | Backpack |                 | X               |                 | X               |                 |                 |
| 13-2 | Backpack |                 |                 | X               |                 |                 | X               |
| 13-4 | Backpack |                 | X               |                 |                 | X               |                 |
| 13-5 | Barge    |                 |                 | X               |                 |                 | X               |
| 14-1 | Backpack |                 | X               |                 | X               |                 | X               |
| 14-2 | Backpack | X               |                 | X               |                 | X               |                 |

**Note:** Sentinel sites in bold.

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

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

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

## 2021 MONITORING SITES

Seven sites were monitored for the fish community in 2021 (Table 1, Figure 1). Five backpack sites (A4, A12, A13, 13-2, and 14-1) and two barge sites (A8 and 13-5) were surveyed by Stantec between August 25<sup>th</sup> and September 2<sup>nd</sup>, 2021. 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 A) prior to conducting field surveys. Summary data from the 2021 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 2021 monitoring. All stream fish collections followed the methods outlined in the Minnesota Pollution Control Agency's (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 seven sites in the 2021 Vermillion River stream fish monitoring project.**

| Site | Sampler | Stream Classification | Reach Length (ft) | Survey Method | Sample Date | Total Species | Total Abundance |
|------|---------|-----------------------|-------------------|---------------|-------------|---------------|-----------------|
| A4   | Stantec | Warmwater             | 492               | Backpack      | 08/31/21    | 9             | 279             |
| A8   | Stantec | Coldwater             | 1,120             | Barge         | 08/25/21    | 9             | 164             |

| Site | Sampler | Stream Classification | Reach Length (ft) | Survey Method | Sample Date | Total Species | Total Abundance |
|------|---------|-----------------------|-------------------|---------------|-------------|---------------|-----------------|
| A12  | Stantec | Coldwater             | 1,250             | Backpack      | 08/31/21    | 9             | 292             |
| A13  | Stantec | Coldwater             | 925               | Backpack      | 09/02/21    | 10            | 211             |
| 13-2 | Stantec | Coldwater             | 525               | Backpack      | 08/31/21    | 10            | 261             |
| 13-5 | Stantec | Coldwater             | 1,450             | Barge         | 08/25/21    | 12            | 286             |
| 14-1 | Stantec | Warmwater             | 500               | Backpack      | 09/02/21    | 7             | 186             |

## MONITORING RESULTS

A total of 1,679 fish were collected across the seven sites that were surveyed in 2021. Total catch abundance ranged from 164 fish at site A8 to 292 fish at site A12 (Table 2). The total number of species caught at each site ranged from 7-12. Seven species were caught at 14-1 and 12 species were caught at 13-5. The highest abundance of any species caught was white suckers, with 593 individuals (37% of total catch abundance for all sites). Other species with high survey abundance (% of total abundance in parentheses) included 276 green sunfish (16.4%), 273 brown trout (16.3%), and 184 johnny darters (11%). All other species comprised less than 10% of the total catch. White suckers and green sunfish were collected at all seven monitoring sites. Johnny darters, central mudminnows, and largemouth bass were collected at six sites, while bluegills and brown trout were collected at 5 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 seven sites monitored in 2021 are from two different stream IBI categories including Southern Headwater Streams (A4 and 14-1) and Southern Coldwater Streams (A8, A12, A13, 13-2, 13-5). The 2021 IBI scores are presented in Table 3.

Detailed fish abundance and IBI metric scores are provided in Attachments B and C.

**Table 3: IBI score summary for 2021 fish community monitoring sites.**

| Site | Stream Classification | MPCA IBI Category  | Sample Years <sup>1</sup> | Avg IBI | Min  | Max  | 2021 IBI | IBI Threshold |
|------|-----------------------|--------------------|---------------------------|---------|------|------|----------|---------------|
| A4   | Warmwater             | Southern Headwater | 6                         | 67.2    | 52.2 | 75.0 | 67.2     | 55            |
| A8   | Coldwater             | Southern Coldwater | 11                        | 47.6    | 39.1 | 59.1 | 51.4     | 50            |
| A12  | Coldwater             | Southern Coldwater | 11                        | 45.7    | 37.6 | 53.5 | 51.4     | 50            |
| A13  | Coldwater             | Southern Coldwater | 12                        | 40.7    | 22.7 | 54.8 | 54.8     | 50            |
| 13-2 | Coldwater             | Southern Coldwater | 5                         | 53.1    | 33.2 | 71.5 | 33.2     | 50            |
| 13-5 | Coldwater             | Southern Coldwater | 5                         | 46.7    | 37.2 | 61.0 | 55.4     | 50            |
| 14-1 | Warmwater             | Southern Headwater | 5                         | 56.4    | 43.0 | 66.2 | 66.2     | 55            |

<sup>1</sup>Includes 2021 monitoring year

## DISCUSSION

### Southern Headwaters

Two of the 2021 monitoring sites (A4 and 14-1) are considered southern headwater streams by MPCA for IBI scoring. Site A4 is located on an unnamed tributary to the Vermillion River. This site was established in 2009 and there are six years of monitoring data which include 2009-2012, 2018, and 2021 (Table 3, Figure 1). Site A4 had historically received excellent IBI scores in the lower 60s and mid-70s; however, it scored below the general use threshold for the first time in 2018 with an IBI score of 52.2. The lower score in 2018 was due to a high proportion of very tolerant taxa (VeryTolerant\_TxPct), a limited number of sensitive taxa (Sensitive), and a moderate proportion of detritivore species (Detritivore\_TxPct) scores. The 2021 IBI score for A4 was 67.2, the third highest IBI score of the six years of monitoring data.

Site 14-1 is located on Middle Creek and was established in 2014. There are five years of monitoring data including 2014, 2015, 2017, 2019, and 2021 (Table 3, Figure 1). The monitoring in 2017 was the first event after the creek was connected to the re-meandered reach. Site 14-1 received moderate IBI scores in the upper 50s and lower 60s preceding the re-meander project; however, it scored low in 2017 following the re-meander with an IBI score of 43. The IBI score has increased recently to 55.9 and 66.2 in 2019 and 2021, respectively.

The total fish abundance from these two southern headwater reaches monitored in 2021 was 279 fish at A4 and 186 fish at 14-1. Both sites received high scores for the percent generalist feeder taxa (GeneralistFeeder\_TxPct), percent short-lived individuals (ShortLived\_Pct), and percent serial spawner individuals (SerialSpawner\_Pct), with low metric scores for the percent very tolerant taxa, sensitive taxa, and percent detritivorous taxa. Site A4 scored a 4.2 for percent of sensitive taxa while site 14-1 scored zero. The detailed total fish catch data and individual metric score information for the southern headwater stream sites are provided in Attachment B.

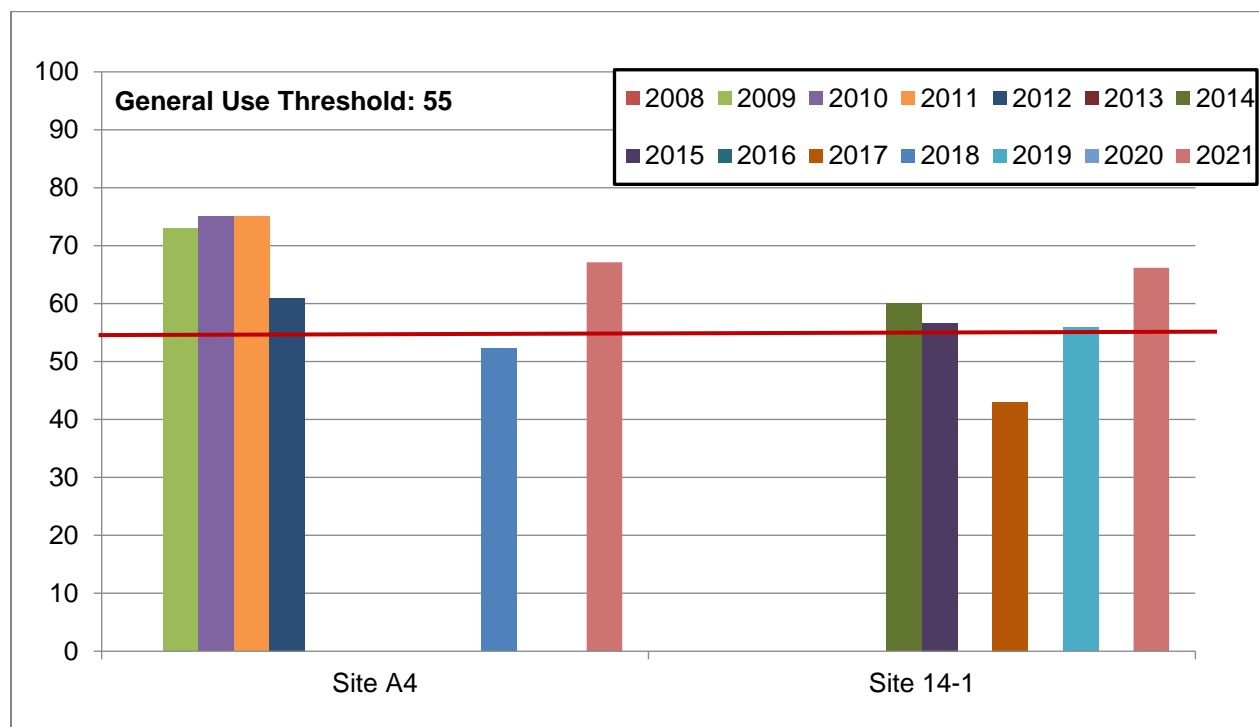
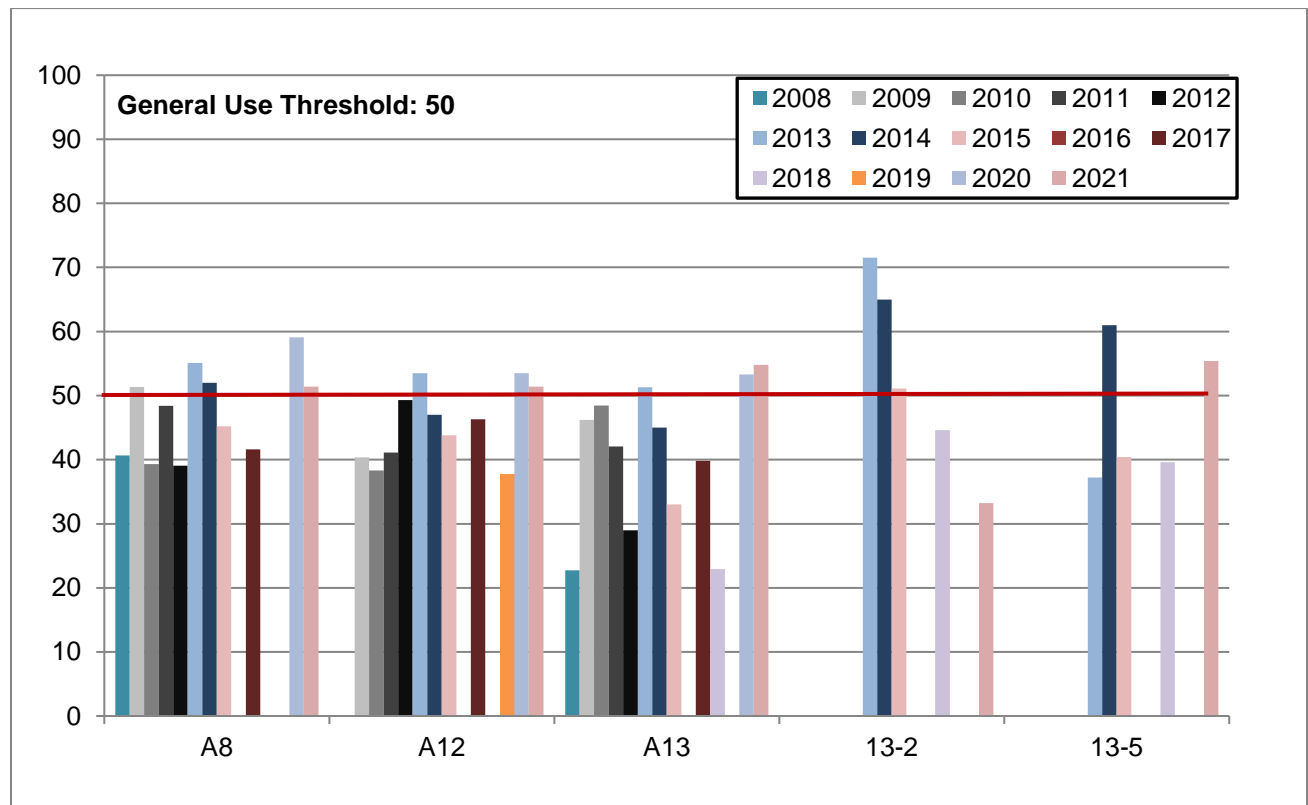


Figure 1: IBI Scores from Southern Streams.

## Coldwater Streams

There were five coldwater stream sites monitored in 2021. Sites 13-2 and 13-5 have 5 years of monitoring data, A8 and A12 have 11 years, and A13 has 12 years. A comparison of IBI scores across monitoring years for the coldwater sites monitored in 2021 are provided in Figure 2. The coldwater sites within the Vermillion River Watershed have mainly received IBI scores below the general use threshold of 50. In 2021, four of the five coldwater sites monitored had IBI scores over the threshold of 50 (Table 3), which is one of the best yearly results for the monitoring program. Site 13-2 was the only site below the threshold of 50 and had its lowest score of 33.2 in the 5 years of monitoring. There are no native coldwater species within the Vermillion River Watershed, and as a result, all coldwater sites receive low metric scores for the two metrics linked to native coldwater species (percent native coldwater individuals, ColdwaterNative\_Pct; and Percent Native Coldwater Taxa, ColdwaterNative\_TxPct). Low to zero scores for these two native coldwater species metrics are one of the factors limiting the potential for higher IBI scores at the Vermillion River Watershed coldwater monitoring sites.



**Figure 2: IBI Scores from Southern Coldwater Streams.**

The metrics that have resulted in moderate to high scores for coldwater sites in the Vermillion River Watershed to-date include percent herbivore individuals (Herbivore\_Pct), percent detritivorous taxa, and tolerant taxa richness (specific to coldwater streams, TolerantColdwater). These metrics have a negative response relationship, meaning that a low number of these species or individuals collected as part of the total abundance caught at a site result in higher metric scores. As the presence of these taxa or individuals increases within the total abundance, the metric score decreases. Coldwater sites in the Vermillion River Watershed at times have had a low number of the species and individuals counted by these metrics, which has resulted in high scores for these metrics.

Some coldwater sites have also received occasional high scores for the percent sensitive individuals metric (specific to coldwater streams, SensitiveColdwater\_Pct). Taxa included in this metric are specific to coldwater streams. For Vermillion River Watershed sites, high scores are tied to a high percentage of brown trout in the total fish abundance. While brown trout are not native to this watershed, they are a sensitive coldwater species. If brown trout comprise a large portion of the total catch abundance, it can result in high scores for the percent sensitive individuals metric. Brown trout were collected from all five of the coldwater sites monitored in 2021 and accounted for approximately 22% of the total abundance caught across all coldwater sites. In 2021, rainbow trout were collected from four sites. Rainbow trout are counted in the percent sensitive individuals metric and are a non-native coldwater species. Rainbow trout have been collected at most sites over the span of the monitoring program.

The percent sensitive individuals exhibited wide variation across the five coldwater sites monitored in 2021, ranging from 7-42% of the total catch abundance at each site. The highest percentage of sensitive individuals were caught at A12 and A13. These sites are both located on the South Branch of the Vermillion River and have often exhibited the highest total number and percentage of brown trout in the total catch abundance. Even with the relatively moderate to high percentage of brown trout within the total catch abundance in 2021, the sites mainly received moderate to poor scores for the percent sensitive individuals metric. Essentially, there were some brown and rainbow trout at the sites, but they did not comprise a large enough percentage to result in a high score for this metric. Out of a total of 14.3 points, all five sites received under half of the points for this metric with site A12 scoring the highest with 6.7 points and site 13-2 scoring the lowest with 2.9.

All coldwater sites received moderate to high scores for the percent detritivore taxa metric. In 2021, the metric scores ranged from 7.6 to 13.3 with an average metric score of 10.76. The species counted in this metric that are typically observed at the sites include black bullhead, common carp, fathead minnow, and white sucker, and other less commonly observed minnow and shiner species. For this metric, the scores increase when detritivores are not present and decrease where there are high number of detritivores collected. The years when sites score higher for this metric are due to a low number of detritivores present within the total site catch. While white suckers continue to be a commonly collected species at most monitoring sites, the presence of other minnow and shiner detritivore species has seemed to decrease recently. For example, there were no coldwater sites where fathead minnows were collected in 2021. By comparison, in 2015, the total number of fathead minnows collected was 98 individuals and they were found at ten of the eleven coldwater sites monitored that year. The reason for the decrease in fathead minnow collections is not known and could be tied factors such altered habitat conditions or decreased recruitment success. When reviewing the 2020 monitoring data with the Minnesota DNR biologist for the area, it was suggested that predation could be a mechanism influencing the decrease in the presence of fathead minnows and other similar species. Brown trout total abundance was up in 2021 across the five sites compared to their previous monitoring year and the population appears to be doing well across the watershed. Brown trout are efficient predators and may be reducing the abundance of minnow and shiner species in some areas of the watershed.

Three IBI metrics did not demonstrate any variability at the sites in 2021, including percent herbivore individuals (Herbivore\_Pct), percent native coldwater individuals (ColdwaterNative\_Pct), and Percent Native Coldwater Taxa (ColdwaterNative\_TxPct). These same metrics have rarely exhibited variation for the coldwater sites across all 12 monitoring years. This lack of variability indicates that these three metrics have minimal impact on observed community differences across sites or years, and therefore minimal to no influence on the variability of IBI scores. No species counted in the percent herbivore individuals metric have been collected at any monitoring sites, so all sites get the maximum score due to the inverse relationship scoring for this metric. Species counted in the percent native coldwater individuals and percent native coldwater taxa metrics have never been collected in the watershed. The sites have always received a zero score for percent native coldwater individuals. The percent native coldwater taxa metric is adjusted based on watershed drainage area, and as a result, some points are given to sites lower in the watershed with larger drainage areas. All sites have the same drainage area

each monitoring year (this condition does not change) and there have been no native taxa collected so the metric scores are the same each monitoring event.

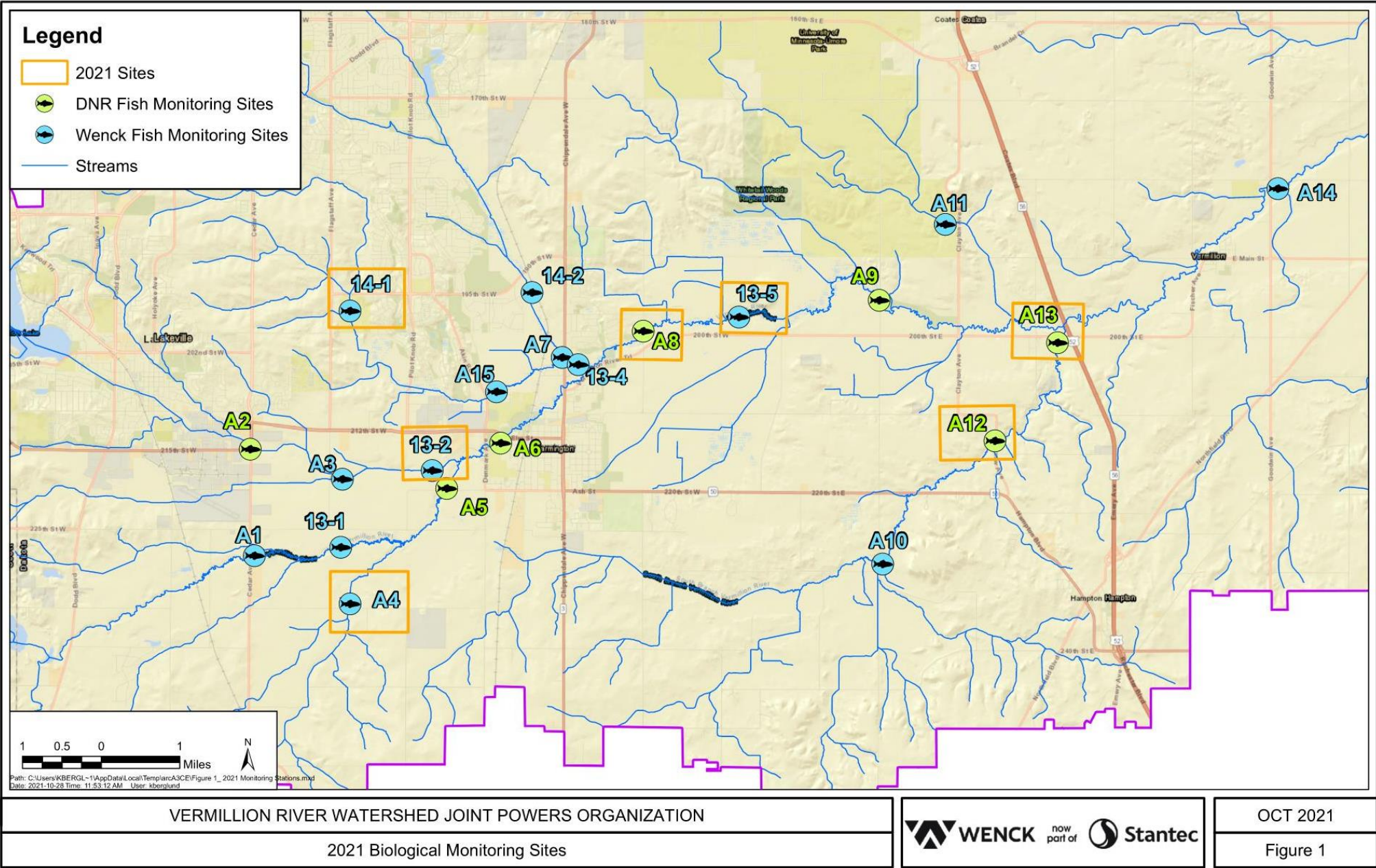
Metrics that demonstrated the most significant variability among sites in 2021 were metrics related to sensitive species, tolerant taxa, and pioneer species. Specifically, coldwater sensitive individuals comprised 7-42% of the total fish abundance, pioneer individuals (Pioneer\_Pct) comprised 10-62% of the total fish abundance, and tolerant taxa (specific to coldwater streams, TolerantColdwater) ranged from two to three of a given site's observed taxa. These differences in community composition are the main factors that influenced the differences in IBI scores for the sites in 2021. Some species can influence multiple metrics suggesting their presence have increased impacts on IBI scores. Conversely, when these species are not present during a monitoring year the score for multiple metrics are also impacted. The total fish catch data and individual metric score information for all coldwater sites from 2021 is provided as Attachment C.

The coldwater fish communities in the Vermillion River are also comprised of species that do not exhibit metric-specific characteristics (i.e., coldwater tolerance) and do not directly impact individual metrics. However, because the IBI metrics are community percentage based, these species have an indirect influence on metric scores and make up part of the total community composition. Indirect taxa or individuals buffer the extremes of a metric score by reducing a positive metric's ability to score higher or limiting negative metrics to score lower. The more indirect individuals or taxa at a given site, the more buffering that occurs. In 2021, the percentage of indirect individuals exhibited large variation with these individuals comprising as little as 1% of the total catch abundance at A12 to a high of 18% of the catch abundance at A8. The number of indirect taxa varied from two taxa at site A12 to four taxa at sites A13 and 13-5.

In conclusion, four coldwater metrics have been observed to fluctuate among the years within a given site or between sites during a sampling year. These metrics include percent sensitive individuals (specific to coldwater streams), tolerant taxa (specific to coldwater streams), percent detritivore taxa, and percent pioneer individuals. As described within this summary, specific changes in the presence of species within the annual catch influences these four metrics. When sensitive species comprise a higher total percentage of the catch at a site, combined with a decrease in the presence of tolerant, pioneer, or detritivore individuals or species, the total IBI scores at a monitoring site increase. In 2021, 4 of the 5 monitored coldwater sites (A8, A12, A13, 13-5) exceeded the general use threshold. Site A13 received its highest score for the monitoring program.



Figure 1: 2021 Fish Monitoring Stations





# Attachment A: DNR Special Survey Permit

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Issuance of this permit does not exempt you from compliance with pertinent laws, ordinances, and regulations, including Executive Orders that limit public activities. Permittees should not assume that DNR issuing a permit allows them to conduct their work and they should consult the Minnesota Department of Employment and Economic Development, who will make the determination if an activity is exempt or not.



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. 32503**  
**(Fisheries Research)**  
**Date: 11 August 2021**

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

Jeff Madejczyk or designee  
Wenck Associates, Inc.  
1800 Pioneer Creek Center  
Maple Plain, MN 55359

to collect fish by backpack and barge electrofishing from the Vermillion River and its tributaries (including North Creek and South Creek) in Dakota County **August – September 2021** (up to 5 sampling days total) for the purpose of fish community monitoring. 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 disposed 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](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](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](https://www.dnr.state.mn.us/permits/invasive_species/prohibited_regulated.html) 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.

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.**

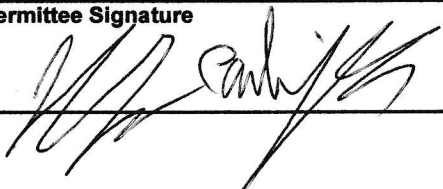
A report detailing collection activities (species, numbers, and collection sites) will be submitted to MN DNR - Fisheries by **31 January of each year**. A copy of any report or publication resulting from this research will be provided to the Division of Fish and Wildlife upon its completion.

This permit is valid from date of issuance through **31 December 2021**, but may be revoked at any time.

MELISSA TREML  
Fisheries Research Manager



***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     |
|---|------------------------------------|----------|
|  | Senior Associate<br>Lead Biologist | 08/12/21 |

**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 B: Warmwater Southern Stream Sites – Fish Abundance Data and IBI Metric Comparisons

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| Species           | Abundance     |                |
|-------------------|---------------|----------------|
|                   | A4<br>8/31/21 | 14-1<br>9/2/21 |
| Bluegill          | 0             | 1              |
| Brook Stickleback | 7             | 2              |
| Brown Trout       | 0             | 0              |
| Central Mudminnow | 6             | 29             |
| Creek Chub        | 0             | 72             |
| Fathead Minnow    | 1             | 0              |
| Green Sunfish     | 65            | 6              |
| Hybrid Sunfish    | 2             | 0              |
| Iowa Darter       | 42            | 0              |
| Johnny Darter     | 21            | 48             |
| Largemouth Bass   | 40            | 0              |
| Rainbow Trout     | 0             | 0              |
| White Sucker      | 95            | 28             |
| Total Catch       | 279           | 186            |
| Species Total     | 9             | 7              |

| Metric Name               | Metric Description   | A4    | 14-1  |
|---------------------------|--|-------|-------|
| Detritivore_TxPct         | Percent detritivorous taxa   | 9.3   | 11.9  |
| FishDELT_Pct <sup>1</sup> | Percent of individuals with deformities, eroded fins, lesions, or tumors | 0.0   | 0.0   |
| GeneralistFeeder_TxPct    | Percent generalist feeder taxa   | 16.2  | 12.6  |
| Sensitive                 | Percent of taxa that are sensitive                                       | 4.2   | 0.0   |
| ShortLived_Pct            | Percent short-lived individuals  | 13.7  | 16.5  |
| SerialSpawner_Pct         | Percent serial spawner individuals                                       | 16.6  | 16.6  |
| VeryTolerant_TxPct        | Percent very tolerant taxa   | 7.2   | 8.6   |
| Total IBI Score           |  | 67.15 | 66.23 |
| General Use IBI Threshold |  | 55.0  | 55.0  |

<sup>1</sup>metric included based on conceptual importance, scored discretely

## Attachment C: Coldwater Sites – Fish Abundance Data and IBI Metric Comparisons

| Species           | Abundance     |                |               |                 |                 |
|-------------------|---------------|----------------|---------------|-----------------|-----------------|
|                   | A8<br>8/25/21 | A12<br>8/31/21 | A13<br>9/2/21 | 13-2<br>8/31/21 | 13-5<br>8/25/21 |
| Bigmouth Shiner   | 1             |                |               |                 | 3               |
| Black Bullhead    |               |                |               | 1               |                 |
| Blacknose Dace    |               |                | 1             |                 |                 |
| Bluegill Sunfish  | 5             | 2              |               | 2               | 2               |
| Brook Stickleback |               |                | 1             |                 |                 |
| Brown Trout       | 15            | 121            | 70            | 51              | 16              |
| Central Mudminnow |               | 1              | 2             | 2               | 8               |
| Common Carp       | 1             |                |               |                 |                 |
| Creek Chub        |               | 12             |               | 1               | 5               |
| Green Sunfish     | 5             | 20             | 9             | 161             | 10              |
| Iowa Darter       |               |                | 3             |                 | 1               |
| Johnny Darter     | 11            | 52             | 22            |                 | 30              |
| Largemouth Bass   | 22            | 1              | 6             | 12              | 43              |
| Northern Pike     | 3             |                |               | 2               | 1               |
| Rainbow Trout     |               | 1              | 1             | 1               | 4               |
| White Sucker      | 101           | 82             | 96            | 28              | 163             |
| Total Catch       | 164           | 292            | 211           | 261             | 286             |
| Species Total     | 9             | 9              | 10            | 10              | 12              |

| Metric Name                         | Metric Description   | A8    | A12   | A13   | 13-2  | 13-5  |
|-------------------------------------|--|-------|-------|-------|-------|-------|
| SensitiveColdwater_Pct <sup>2</sup> | Percent sensitive individuals (specific to coldwater streams)            | 4.1   | 6.7   | 5.6   | 2.9   | 3.8   |
| TolerantColdwater <sup>2</sup>      | Tolerant taxa (specific to coldwater streams)                            | 7.1   | 8.2   | 8.3   | 5.1   | 7.2   |
| FishDELT_Pct <sup>4</sup>           | Percent of individuals with deformities, eroded fins, lesions, or tumors | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| Herbivore_Pct <sup>3</sup>          | Percent herbivorous individuals  | 14.3  | 14.3  | 14.3  | 14.3  | 14.3  |
| ColdwaterNative_Pct <sup>1</sup>    | Percent native, coldwater individuals                                    | 0.0   | 0.0   | 0.0   | 0.0   | 0.0   |
| ColdwaterNative_TxPct <sup>2</sup>  | Percent native, coldwater taxa   | 6.5   | 3.3   | 3.5   | 2.6   | 6.6   |
| Pioneer_Pct                         | Percent pioneer individuals  | 11.8  | 6.8   | 10.5  | 0     | 10.2  |
| DetritivoreMinor_TxPct <sup>2</sup> | Percent detritivore (at least 5% of diet) taxa                           | 7.6   | 12.0  | 12.6  | 8.3   | 13.3  |
| Total IBI Score                     |  | 51.39 | 51.40 | 54.80 | 33.22 | 55.40 |
| General Use IBI Threshold           |  | 50    | 50    | 50    | 50    | 50    |

<sup>1</sup>metric value transformed (log<sub>10</sub> +1)

<sup>2</sup>metric scoring adjusted for watershed area

<sup>3</sup>metric scored discretely

<sup>4</sup>metric included based on conceptual importance, scored discretely