Technical Memo

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To: Mark Zabel, Vermillion River Watershed Joint Powers Organization
Travis Thiel, Vermillion River Watershed Joint Powers Organization

From: Jeff Madejczyk, Wenck Associates, Inc.

Date: February 8th, 2021

Subject: Vermillion River Watershed 2020 Fish Community Monitoring Results Summary

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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, Inc. (Wenck) has partnered 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 provided a summary and analysis of the fish community monitoring from Year 5 of the rotation for data collected in 2020, as identified in Table 1.

Table 1: Sampling rotation for all 19 monitoring sites in the watershed.

Site	Method	Year 1: 2016	Year 2: 2017	Year 3: 2018	Year 4: 2019	Year 5: 2020	Year 6: 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	

Site	Method	Year 1: 2016	Year 2: 2017	Year 3: 2018	Year 4: 2019	Year 5: 2020	Year 6: 2021
A8	Barge		X		✖	*	X
A9	Barge	X	*	X		X	
A12	Backpack		X		X	*	X
A13	Backpack		*	X		*	X
A14	Barge	X			✖	XX	
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.
XX *: Site A14 moved from 2019 to 2020 due to high water*
✖ *: barge sites not accessible in 2019; added to 2020 Rotation*

2020 Monitoring Sites

There were eight monitoring sites scheduled for assessment in 2020 following the schedule shown in Table 1 (marked with a single X). However, based on adjustments from the 2019 monitoring season (carrying forward two barge sites that were not accessible) and monitoring conducted by the DNR, there were more sites monitored in 2020 than planned in the rotation. Site A14 was not accessible in 2019 due to high water conditions so it was added to the rotation in 2020. The DNR conducted sampling at their routine monitoring sites in 2020 and have now indicated that they will monitor these sites every three years. This includes sites A2, A5, A6, A8, A9, A12, and A13. Three of the seven DNR sites were planned for the 2020 monitoring year and a fourth site, A8, would have been carried forward from 2019, similar to site A14, as it was not accessible due to high water conditions.

There are four backpack sites that were surveyed by Wenck along with the A14 barge site and the seven DNR sites, for a total of 12 sites monitored in 2020. All sites were visited between August 26th and September 14th. The timing of these surveys coincides with the standard sampling period from previous fish community surveys in the Vermillion River Watershed. Wenck acquired the required special permit for fish surveys from the MnDNR (Attachment A) prior to conducting field surveys. Summary data from the 2020 field surveys performed by Wenck will be provided to the MnDNR as required under terms of the permit.

All 2020 sites were existing monitoring reaches, following survey locations from past years. All stream fish collections followed the methods outlined in the MPCA warmwater Index of Biotic Integrity (IBI) report, as well as the MPCA Standard Operating Procedures for electrofishing (Rev. Feb. 2009). Each site was fished beginning from the downstream point of the reach and proceeded in an upstream direction to the upstream point of the reach. All habitats within the channel were sampled with the electrofishing unit and all fish were netted. Due to the relatively narrow width of most of the stream reaches, it was possible to effectively sample all available in-stream habitats. All fish collected were identified, sorted, counted, and released. The electrofishing method and sample dates for each reach are presented in Table 2. Due to COVID-19 safety protocols implemented by the State of Minnesota, the DNR used the Double Backpack method for the barge sites utilizing two backpack electrofishing units on the wider stream sites (typically monitored with the barge setup) to maintain safe distancing.

Table 2: Sample reach information for the six sites in the 2020 Vermillion River stream fish monitoring project.

Site	Sampler	Stream Classification	Reach Length (ft)	Survey Method	Sample Date	Total Species	Total Catch
A2	DNR	Coldwater	1,200	Backpack	09/10/20	10	187
A3	Wenck	Coldwater	525	Backpack	08/25/20	6	61
A5	DNR	Coldwater	1,025	Backpack	09/10/20	12	168
A6	DNR	Coldwater	1,100	Backpack	09/10/20	10	118
A7	Wenck	Coldwater	500	Backpack	08/28/20	12	143
A8	DNR	Coldwater	1,120	Double Backpack	09/11/20	10	83
A9	DNR	Coldwater	900	Double Backpack	09/11/20	10	24
A12	DNR	Coldwater	1,250	Backpack	09/14/20	9	198
A13	DNR	Coldwater	925	Backpack	09/14/20	10	178
A14	Wenck	Warmwater	1,225	Barge	08/28/20	12	91
13-4	Wenck	Coldwater	500	Backpack	08/25/20	9	79
14-2	Wenck	Warmwater	525	Backpack	08/25/20	6	24

Monitoring Results

There were 1,354 fish collected across the 12 sites monitored in 2020. Total catch ranged from a low of 24 fish at sites A9 and 14-2 to a high of 198 fish at A12 (Table 2). Total species caught amongst the sites was fairly consistent, with ten of the sites having between nine and twelve species collected. There were two sites with only six species collected at sites A9 and 14-2. The most numerous fish collected in 2020 was brown trout, with 357 individuals, which equated to 26.4 percent of the total catch. Other species with a total catch of significance included 230 white suckers (17%), 206 green sunfish (15.2%), and 190 bluegills (14%). All other species comprised less than ten percent of the total catch. Green sunfish and white suckers were collected at all 12 monitoring sites. Central

mudminnows and northern pike were collected at 11 sites, while bluegills, johnny darters, and largemouth bass were collected at 10 sites. Brown trout were collected from nine of the 12 monitoring sites, including one warmwater site A14.

Fish collection data were submitted to the MPCA for 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 twelve sites monitored in 2020 are from two different stream IBI categories including Southern Streams (A14 & 14-2) and Southern Coldwater Streams (A2, A3, A5, A6, A7, A8, A9, A12, A13, 13-4). The 2020 IBI scores are presented in Table 3.

Table 3: IBI score summary for 2020 fish community monitoring sites.

Site	Stream Classification	MPCA IBI Category	Sample Years[1]	Avg IBI	Min	Max	2020 IBI	IBI Threshold
A2	Coldwater	Southern Coldwater	9	39.3	32.9	44.5	44.5	50
A3	Coldwater	Southern Coldwater	11	49.6	31.2	66.0	51.6	50
A5	Coldwater	Southern Coldwater	12	39.5	27.9	54.7	54.7	50
A6	Coldwater	Southern Headwater	*9*	37.2	28.3	43.9	43.9	50
A7	Coldwater	Southern Coldwater	*8*	37.9	24.8	45.2	42.5	50
A8	Coldwater	Southern Coldwater	*10*	47.2	39.1	59.1	59.1	50
A9	Coldwater	Southern Coldwater	*12*	41.0	29.4	55.0	46.9	50
A12	Coldwater	Southern Coldwater	*10*	45.1	37.6	53.5	53.5	50
A13	Coldwater	Southern Coldwater	*11*	39.4	22.7	53.3	53.3	50
A14	Warmwater	Southern Streams	*10*	41.5	31.4	54.6	54.6	45
13-4	Coldwater	Southern Coldwater	*3*	43.4	35.7	49.9	44.6	50
14-2	Warmwater	Southern Streams	4	37.8	33.0	46.1	46.1	45

[1]Includes 2020 monitoring year

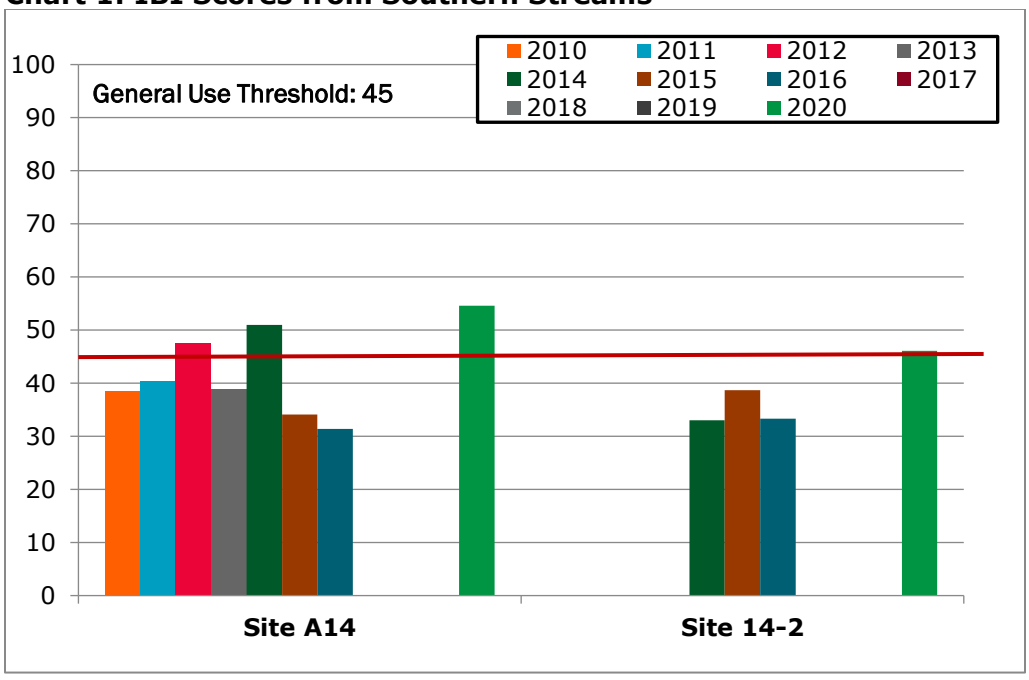
Discussion

Southern Headwaters

Two of the 2020 monitoring sites were in the Southern Headwaters category. Site A14 is located on the main stem of the Vermillion River, with the downstream end of the monitoring reach located immediately upstream of Goodwin Avenue. This site was established in 2008 and there are ten years of monitoring data. Site 14-2 is located on North Creek, downstream of 195th Street. This site was established in 2014 to provide a new monitoring location in the upper reaches of the North Creek watershed. Site 14-2 is located along a previous channel remeander project. There are four years of monitoring data collected from site 14-2. IBI scores from site A14 have been variable over the years with three years scoring above the 45 general use threshold, but most years scoring below the threshold in the 30's (Chart 1). IBI scores at Site 14-2 have been in the mid-30s for the three previous monitoring years, but the site scored 46.1 in 2020, the first year scoring above the 45 general use threshold. In 2020, both site A14 and 14-2 had the highest observed IBI score to date for all monitoring years (see Table 3 and Chart 1).

The total catch from these two Southern Headwater reaches monitored in 2020 was variable with only 24 fish collected at site 14-2 compared to 91 fish collected at site A14. Site A14 received high metric scores for the Percent of Detritivore Taxa, Percent of Tolerant Taxa, and Percent of Short-Lived Taxa, with low metric scores for the Percent of Tolerant Individuals, Percent of Sensitive Taxa, and Percent from the Dominant Two Taxa. Site 14-2 received high metric scores for the Percent of Short-Lived Taxa, Percent of Detritivore Taxa, and Percent of Sensitive Taxa, with low metric scores for the Percent Tolerant Individuals, Dominant Two Taxa, and Percent of Mature Fish Less Than 2 Years Old. All three of these metrics scored zero total points for site 14-2 in 2020. The total fish catch data and individual metric score information for the Southern Stream sites are provided as Attachment B.

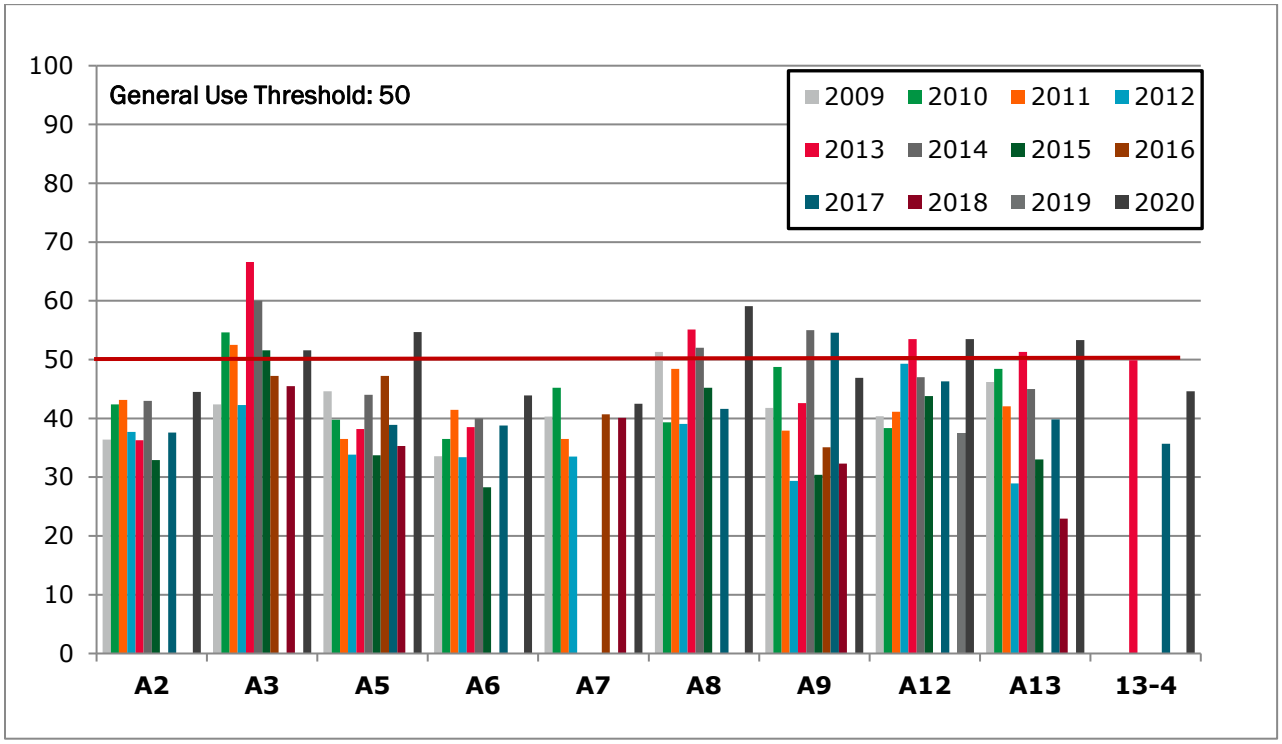
Chart 1: IBI Scores from Southern Streams



Coldwater Streams

There were ten coldwater sites monitored in 2020, with as few as three years of monitoring data at site 13-4 compared to 12 years of monitoring data at sites A5 and A9. In 2020, six of the ten coldwater sites monitored received the highest observed IBI score to date for all monitoring years, including sites A2, A5, A6, A8, A12, and A13 (see Table 3). A comparison of IBI scores across monitoring years for the coldwater sites monitored in 2020 are provided in Chart 2. The coldwater sites within the Vermillion River Watershed have mainly received IBI scores below the general use threshold of 50 (see Chart 2). In 2020, there were five coldwater sites with IBI scores over the general use threshold of 50, which is one of the best yearly results for the monitoring program. 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 Taxa and Percent Native Coldwater Individuals). 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.

Chart 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, Percent Detritivore Taxa, and Tolerant Coldwater Taxa Richness. These metrics have a negative response relationship, meaning that a low number of these species or individuals collected as part of the total catch at a site results in higher metric scores. As the presence of these taxa or individuals increases within the total catch, 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 metric scores for the Percent Sensitive Individuals metric. For Vermillion River Watershed sites, high scores for this metric are tied to a high percentage of brown trout in the total catch. While brown trout are not a native coldwater species, they are a sensitive species, and when brown trout comprise a large portion of the total catch, it can result in high scores for the Percent Sensitive Individuals metric. Brown trout were collected from eight of the 10 coldwater sites monitored in 2020 and accounted for approximately 29% of the total catch across all coldwater sites. The total brown trout catch in 2020 across all sites was one of the highest from all the years of the monitoring program. In 2020, there were also rainbow trout collected from seven sites which are also a counted in the Percent Sensitive Individuals metric. Rainbow trout were collected at the most sites during all years of the monitoring program.

The percent of sensitive individuals collected exhibited wide variation across the ten coldwater sites monitored in 2020. At four sites, sensitive individuals comprised less than five percent of the total catch, while at four other sites, sensitive individuals comprised between 35 and 60 percent of the total catch, with the highest percentages at sites A3 and A12. These sites are on South Creek and the South Branch of the Vermillion River, respectively and have often been the sites with the highest total number as well as percentage of brown trout in the total catch. Even with the relatively high percentage of trout within the total catch in 2020, the sites mainly received moderate to poor scores for the Percent Sensitive Individuals metric. Essentially, there were some trout present within the catch, 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, three sites received over half of the points for this metric including A3, A12 and A13. These sites had trout comprise 54%, 61%, and 48% (respectively) of the site total catch which resulted in the high metric scores.

The other seven sites received a metric score of less than five out of 14.3 points which was due to sensitive individuals such as trout only comprising between 3% and 35% of the total catch. Site A3 did have sensitive individuals comprise 35% of the total catch which would seem to be a relatively significant percentage. However, this metric is corrected for watershed area and A2 is within the upper most reaches of the South Creek watershed. The natural progression of coldwater streams would be for small, narrow coldwater streams in the upper reaches of the watershed to have the most trout and sensitive coldwater individuals. Then as you progress downstream in a watershed, sites with larger drainage areas would be expected to have more warmwater inputs and as a result lower numbers sensitive coldwater species such as trout would be expected to be present. Therefore, a site in the upper reaches of the watershed, such as A2, needs to have a higher percentage of trout than a site in the lower portion of the watershed, such as A8 or A9, to receive the same metric score.

One metric where all coldwater sites received moderate to high scores was for the Percent Detritivore Taxa. In 2020, the metric scores ranged from 7.3 to 14.3 with an average metric score of 10.53. The species that are counted in this metric that are typically observed at the sites include black bullhead, common carp, fathead minnow, and white sucker, with other less commonly observed minnow and shiner species also counted in this metric. This metric is driven by an inverse relationship meaning the metric scores increase when detritivores are not present and metric scores 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 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 was only one coldwater site where fathead minnows were collected in 2020, site A9. 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 catch was up in 2020 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. A permanent decrease in the presence of these detritivore species will result in increased metric scores for the coldwater sites in the watershed.

Three IBI metrics did not demonstrate any variability at the sites in 2020, including Percent Herbivore Individuals, Percent Native Coldwater Individuals, and Percent Native Coldwater Taxa. These same metrics have rarely exhibited variation for the coldwater sites across all 12 monitoring years. This 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. For the Herbivore metric, these species have not been collected, so all sites get the max score due to the inverse relationship scoring for this metric. For the Native metrics, these species have also never been collected in the watershed, so the sites have always received a zero score for the Percent Native Coldwater Individuals metric. The 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 did demonstrate the most significant variability among sites in 2020 were metrics related to sensitive species, tolerant taxa, and pioneer species. Specifically, Coldwater Sensitive individuals comprised 3 – 61%, Pioneer individuals comprised 7-46% of the total catch, and Tolerant Coldwater taxa ranged from two to four of a given site taxa. These differences in community composition are the main factors that influenced the differences in IBI scores for the sites in 2020. 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 the all coldwater sites from 2020 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), therefore, do not directly impact individual metrics. However, because the IBI metrics are community percentage based (i.e. % of the community individuals or % of the community taxa), these species do have an indirect influence on metric scores and make up part of the total community percentage. 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 2020, the percentage of indirect individuals exhibited large variation with these individuals comprising as little as three percent of the catch at site A12 to a high of 42 percent of the catch at sites A2, A6, and A7. The number of indirect taxa varied from two taxa at site A3 to six taxa at site A6.

In general, 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

Coldwater Sensitive Individuals, Coldwater Tolerant Taxa Richness, 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 and it is combined with a decrease in the presence of tolerant, pioneer, or detritivore individuals or species, then the total IBI scores at a monitoring site increase. In 2020, this was observed across the coldwater sites as five of the ten sites scored over the IBI general use threshold of 50 and there were also five coldwater sites that received the highest IBI score for the monitoring program.

2020 Fish Monitoring Stations

Legend

- 2020 Sites
- DNR Fish Monitoring Sites
- Wenck Fish Monitoring Sites
- Streams

A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15
14-1 14-2 13-1 13-2 13-4 13-5

1 0.5 0 1 Miles

N

Path: L:\1305\18\Figure 1_ 2020 Monitoring Stations.mxd
Date: 2/9/2021 Time: 3:01:10 PM User: BerKA1064

VERMILLION RIVER WATERSHED JOINT POWERS ORGANIZATION

2020 Biological Monitoring Sites

WENCK now part of Stantec

JAN 2021

Figure 1

DNR Special Survey Permit

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.

DEPARTMENT OF NATURAL RESOURCES

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. 29796
(Fisheries Research)
Date: 15 July 2020

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 2020** (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). 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.

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 2020**, 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

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)
Kevin Stauffer, Area Fisheries Supervisor, Lake City
(e-mail kevin.stauffer@state.mn.us; phone 651-345-3365 x229)
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)

Warmwater Southern Stream Sites – Fish Data and IBI Metric Comparisons

Species	A14	14-2
Black Crappie	2	0
Bluegill	7	0
Brown Trout	9	0
Central Mudminnow	5	1
Fathead Minnow	1	0
Green Sunfish	32	12
Hybrid Sunfish	3	0
Iowa Darter	4	3
Johnny Darter	3	0
Largemouth Bass	1	0
Northern Pike	2	2
Rainbow Trout	0	1
White Sucker	22	5
Total Catch	**91**	**24**
Species Total	**12**	**6**

Metrics	Description	A14	14-2
BenInsect-TolTxPct	Percent Benthic Insectivore Taxa (excludes tolerant species)	5.2	5.2
DetNWQTxPct	Percent Detritivorous Taxa	11.5	11.5
DomTwoPct	Combined Relative Abundance of the Two Most Abundant Taxa	4.7	0
FishDELTPct	Percent of Individuals with Deformities, Eroded Fins, Lesions, or Tumors	0	0
SrtLvd	Number of Short-lived Taxa	10.4	12.5
TolTxPct	Percent Tolerant Taxa	9.5	7.7
MatureAge<2_Pct	Percent of Early Maturing Individuals	7.0	0
TolPct	Percent of Tolerant Individuals	1.5	0
Senstv_TxPct	Percent of Sensitive Taxa	4.6	9.2
	Total IBI Score	**54.6**	**46.1**
	General Use IBI Threshold	**45.0**	**45.0**

Coldwater Sites – Fish Data and IBI Metric Comparisons

Species	A2	A3	A5	A6	A7	A8	A9	A12	A13	13-4
Black Bullhead	1	0	0	6	43	0	0	1	0	0
Black Crappie	0	0	1	0	0	1	0	0	0	0
Bluegill	66	9	20	30	38	4	2	0	1	13
Brown Trout	65	33	35	5	4	9	0	117	80	0
Central Mudminnow	23	3	27	2	9	6	0	1	6	10
Common Carp	0	0	0	9	0	0	2	0	0	0
Fathead Minnow	0	0	0	0	0	0	1	0	0	0
Golden Shiner	0	0	0	0	0	0	1	0	0	0
Green Sunfish	15	11	3	15	20	9	6	11	45	27
Hybrid Sunfish	0	0	0	0	4	0	0	0	0	0
Iowa Darter	2	0	0	0	6	0	0	1	6	2
Johnny Darter	1	0	23	1	2	7	1	3	6	9
Largemouth Bass	6	1	1	5	14	3	1	0	4	10
Northern Pike	7	0	6	15	1	1	3	4	5	2
Pumpkinseed	0	0	2	0	0	0	0	0	0	0
Rainbow Trout	0	0	3	0	0	3	1	3	5	3
Spottail Shiner	0	0	6	0	0	0	0	0	0	0
Tadpole Madtom	0	0	0	0	1	0	0	0	0	0
White Sucker	1	4	41	30	1	40	6	57	20	3
Total Catch	**187**	**61**	**168**	**118**	**143**	**83**	**24**	**198**	**178**	**79**
Species Total	**10**	**6**	**12**	**10**	**12**	**10**	**10**	**9**	**10**	**9**
Coldwater Sensitive Fish Count	65	33	38	5	4	12	1	120	85	3
Coldwater Sensitive Percent	35%	54%	23%	4%	3%	14%	4%	61%	48%	4%
Cold Tolerant Taxa Richness Count	3	2	2	4	4	2	3	3	2	2
Detritivore Taxa Count	2	1	1	3	2	1	3	2	1	1
Detritivore Taxa Percent	20%	17%	8%	30%	17%	10%	30%	22%	10%	11%
Pioneer Count	16	11	26	16	22	16	8	14	51	36
Pioneer Percent	9%	18%	15%	14%	15%	19%	33%	7%	29%	46%
Indirect Impact Individuals	81	10	36	50	60	9	7	5	16	27
Indirect Impact Individuals %	43%	16%	21%	42%	42%	11%	29%	3%	9%	34%
Indirect Impact Taxa	4	2	6	3	5	4	4	2	4	4
Indirect Impact Taxa %	40%	33%	50%	30%	42%	40%	40%	22%	40%	44%

Metrics	Description	A2	A3	A5	A6	A7	A8	A9	A12	A13	13-4
CWSensitivePct_10DrgArea	Percent Sensitive Individuals (specific to coldwater streams)	4.4	8.0	4.2	2.3	1.0	4.9	3.6	9.6	7.8	1.7
CWTol_10DrgArea	Tolerant Taxa Richness (specific to coldwater streams)	4.6	7.8	8.5	3.7	2.9	9.8	7.3	5.5	8.2	8.7
FishDELTPct	Percent of Individuals with Deformities, Eroded Fins, Lesions, or Tumors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HerbvPct	Percent Herbivorous Individuals	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3	14.3
NativeColdPct	Percent Native Coldwater Individuals	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NativeColdTXPct_10DrgArea	Percent Native Coldwater Taxa	1.7	2.5	3.9	5.1	3.6	6.5	6.9	3.3	3.5	4.4
PioneerPct	Percent Pioneer Individuals	12.1	9.6	10.3	10.8	10.3	9.3	5.6	12.5	6.9	2.5
SdetTxPct_10DrgArea	Percent Detritivore Taxa	7.4	9.4	13.5	7.3	10.4	14.3	9.1	8.3	12.6	13.0
Total IBI Score		**44.5**	**51.6**	**54.7**	**43.5**	**42.5**	**59.2**	**46.9**	**53.5**	**53.3**	**44.6**
General Use IBI Threshold		**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**	**50**