

Pomme de Terre River Watershed

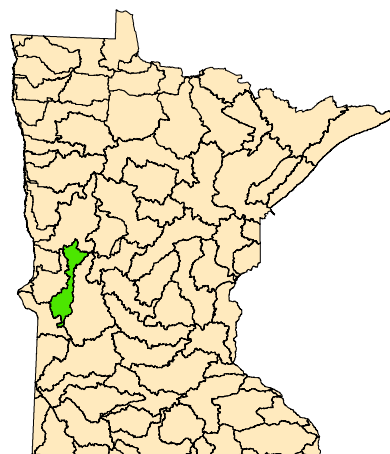
Stressor Identification Update

February 2024

Purpose

The Minnesota Pollution Control Agency (MPCA) conducts biological monitoring on select streams and lakes in each of the State's 80 major watersheds on a 10-year cycle. Biological water monitoring is essential to determining whether lakes and streams meet water quality standards designed to ensure that waters are fishable and swimmable. When lakes and streams do not meet Index of Biological Integrity (IBI) standards as measured by the fish and bug communities present in the water, this indicates the physical and/or chemical conditions of the water body are not conducive to healthy aquatic biological communities. The stressor identification (SID) process investigates which physical and/or chemical conditions are responsible for impaired fish and bug communities. SID work was completed for major watersheds following their initial monitoring and assessment in Cycle 1 (C1). The purpose of Cycle 2 (C2) SID work is to support follow-up watershed restoration and protection strategy (WRAPS) efforts, local water planning and implementation efforts, and identify changes in biotic condition.

Figure 1. Pomme de Terre River



The Pomme de Terre River Watershed (Figure 1) has many opportunities for recreation like fishing and canoeing/kayaking (Figure 2). Identifying impairments and stressors helps guide where to implement restoration best management practices and how to protect and preserve healthy streams.

What have we learned about stream health and stressors in the Pomme de Terre River Watershed?

Overall, in the Pomme de Terre River Watershed, the health of the fish and macroinvertebrate communities did not significantly change from 2007 to 2017/2018. Of chemical parameters in the watershed, "Only nitrate-nitrogen showed a statistically significant change" increasing approximately 11% annually (MPCA 2020). The magnitude of flows in the watershed have also increased, and at a higher rate than precipitation increases (DNR 2019).

Figure 2. Pomme de Terre River Watershed



Much of the watershed is low gradient with surrounding wetlands. Wetlands comprise 23.8% of the upper section of the watershed (DNR 2019). Such conditions can result in low dissolved oxygen (DO) waters

downstream from contributing wetlands and limited reoxygenation from flatter sections of streams. Therefore, it is natural to see low DO in some reaches in the watershed. However, the amount of eutrophication occurring is concerning and not part of the natural cycle. A biological survey of wetlands in the watershed showed the majority had large changes to the plant communities, which indicates the wetlands are also not at optimum health (MPCA 2019).

Investigation of stressors for C2 began in 2019 and shows the stressors identified in C1 have remained present in the watershed including DO, eutrophication, nitrate, total suspended solids (TSS), habitat, altered hydrology, and connectivity.

Habitat is a stressor in all the biologically impaired reaches in the watershed. TSS, eutrophication, and altered hydrology are also major stressors in the watershed. Habitat, altered hydrology, and TSS are connected as increased flows stemming from altered hydrology can result in greater delivery of TSS which can smother fish and bug habitat. The Minnesota Department of Natural Resources (DNR) found unexpected sedimentation below Drywood Lake, and wetland biologists found unexpected sediment below the Morris Dam. Both dams would be expected to be a sink for sediment. Decreasing stream erosion and nutrient inputs to the watershed are important to improving water quality.

For additional information on the updated conditions of the watershed, see the [Pomme de Terre River Watershed-Minnesota Basin: Water Assessment and Trends Update](#).

Part 1: Pomme de Terre River Watershed SID Summary Results

Biological impairments assessed in 2009 and [SID reporting](#) in 2012 of the Pomme de Terre River Watershed included the Pomme de Terre River, Drywood Creek, and an unnamed tributary.

Cycle 2 Biological Impairment Summary

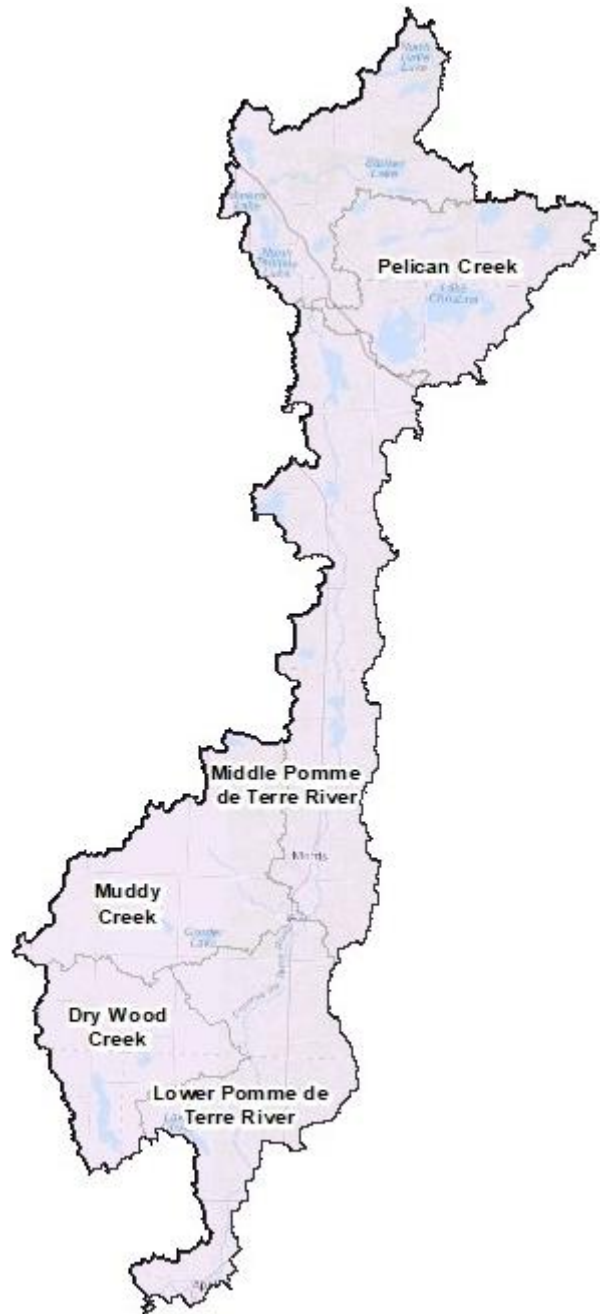
- Seven new biological impairments were identified during C2 assessment.
 - County Ditch 22, Judicial Ditch 2, and four unnamed creeks were added to the impaired waters list.
- A fish impairment was added to Pelican Creek, but the macroinvertebrate community is no longer considered impaired. New and better information resulted in an impairment correction.
- Impairments on the Pomme de Terre River, Drywood Creek, and an unnamed creek (-540) from C1 were reaffirmed. There was no new information available on the unnamed creek (-515).

Cycle 2 Stressor Identification: Areas of focus

The Pomme de Terre River Watershed is a mid-sized watershed and the SID process focused on several areas to gain additional information. The following list of subwatersheds and their impaired streams were studied during the SID process (data collection, analysis, and report writing) in 2019 through 2023 and are further detailed in this summary report (Figure 3). Data analysis is available upon request. Streams were selected for SID based on impairment status, previous SID work in 2008 through 2012, and local stakeholder input. Some streams had older impairments that needed additional information to understand stressor connections, while some were new impairments. The amount of information collected in each subwatershed was variable depending on the information needed.

- Pelican Creek Subwatershed
 - Pelican Creek (07020002-506)
- Middle Pomme de Terre Subwatershed
 - Pomme de Terre River (07020002-563)
 - Pomme de Terre River (07020002-562)
 - Unnamed Creek (07020002-540)
- Drywood Creek Subwatershed
 - Drywood Creek (07020002-556)
 - County Ditch 22 (07020002-515)
 - Unnamed Creek (07020002-534)
- Muddy Creek Subwatershed
 - Unnamed Creek (07020002-576)
- Lower Pomme de Terre Subwatershed
 - Pomme de Terre River (07020002-501)
 - Unnamed creek (07020002-547)
 - Judicial Ditch 2 (07020002-549)
 - Unnamed creek (07020002-551)

Figure 3. Map of Pomme de Terre subwatersheds discussed in report.



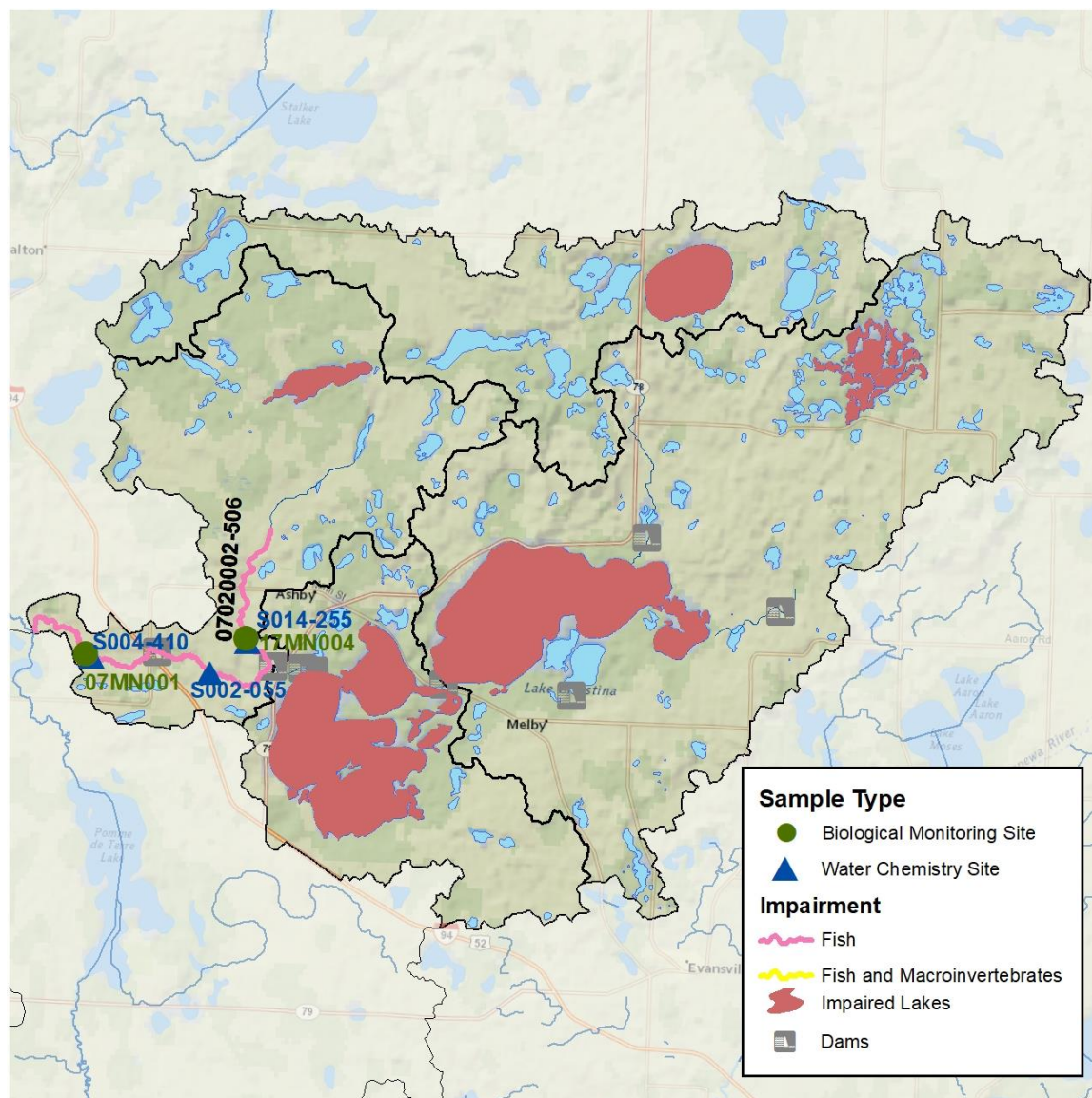
Part 2: Cycle 2 Stressor Identification Stream Reaches

Pelican Creek Subwatershed

Biological Community Summary

Pelican Creek (07020002-506) is one of the main tributaries to the Pomme de Terre River and is designated as impaired for aquatic life use due to the poor fish community condition (Figure 4). The fish community was sampled in 2007 and 2017 at site 07MN001 and additionally at site 17MN004 in 2017 and 2018. Fish scores were highest in the lower part of the reach with IBI scores ranged from 57 to 62 at site 07MN001 and 0 to 40 at site 17MN004. Only four fish were collected in 2017. More fish and more species were present in 2017 at site 07MN001, but the score was lowered by more tolerant taxa, less sensitive taxa, and more short-lived individuals in 2017. New information has led to the previous macroinvertebrate impairment designation to be corrected and is no longer listed as impaired for macroinvertebrates.

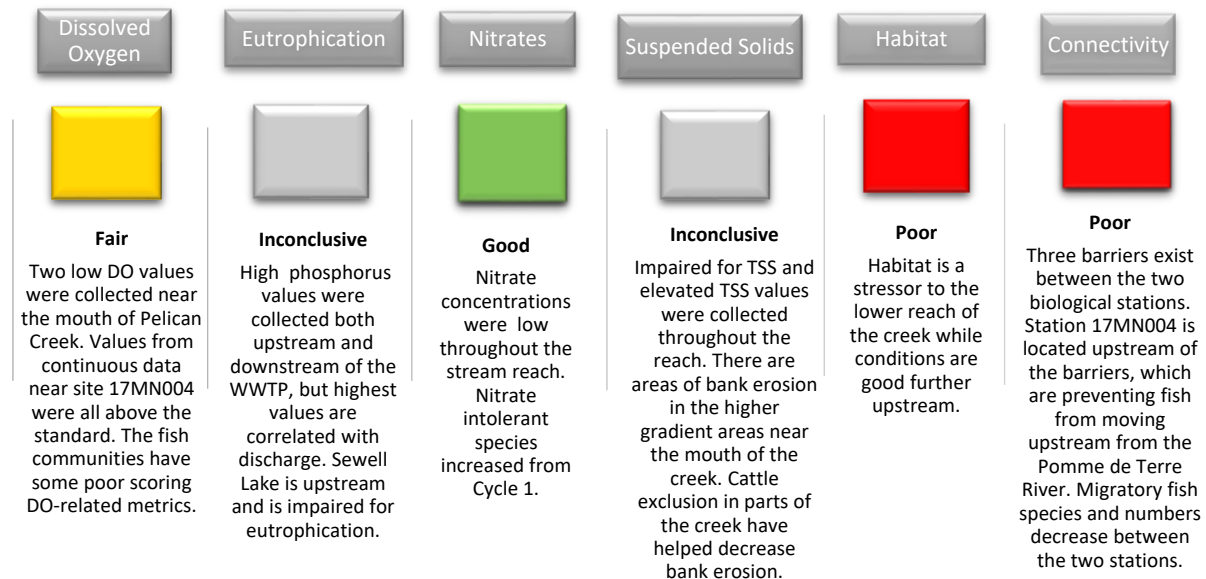
Figure 4. Pelican Creek Subwatershed



What stressors are of concern?

SID work was not completed in Pelican Creek during C1 SID. The goal of C2 SID work was to gather and analyze the biological and chemical data to determine the likely cause of stress to the impaired fish community. Lack of habitat and connectivity were the identified stressors, while TSS, DO, and eutrophication were fair or inconclusive and could potentially have a negative impact on aquatic life (Figure 5).

Figure 5. Biological stressor determinations for Pelican Creek from 2022. Red boxes indicate poor conditions and therefore a stressor to aquatic life. Yellow boxes indicate fair conditions that are potentially a secondary stressor. Grey boxes indicate inconclusive stressors. Green boxes indicate good conditions that are not stressing aquatic life.



Summary of stream health in Pelican Creek

Biological and water chemistry information throughout Pelican Creek identified habitat and connectivity as stressors with potential stress coming from DO, eutrophication, and TSS.

- Connectivity is a significant issue in Pelican Creek. Station 17MN004 is located upstream of three migration barriers, which are preventing fish from moving upstream from the Pomme de Terre River; the dam that is part of the Pelican Creek Marsh Development upstream of CR4 (Figure 7), the two perched culverts upstream of I-94 (Figure 6), and the culvert at 320th St (Figure 8).

Figure 6. Perched culverts on Pelican Creek



Figure 7. Dam on Pelican Creek (8/29/19)



- Lack of habitat is an issue in the lower part of the creek. DNR found the channel at upper site 17MN004 to be stable with a good MPCA Stream Habitat Assessment (MSHA) score. MSHA scores were fair downstream at 07MN001. Factors limiting the habitat condition were a lack of riparian zone, a lack of channel development and lack of shade.
- DO, eutrophication, and TSS all had some values that exceeded standards. Further DO monitoring lower in the reach, phosphorus monitoring near the Ashby Wastewater Treatment Plant (WWTP), and further bank erosion investigation would help to understand and mitigate effects.
- MPCA wetland biologists found plants in the fresh meadow wetland community surrounding site 17MN004 to be high quality (Figure 31). This area should be a priority for protection.

Figure 8. Velocity barrier from culvert



Figure 9. Site 17MN004 (9/14/18)

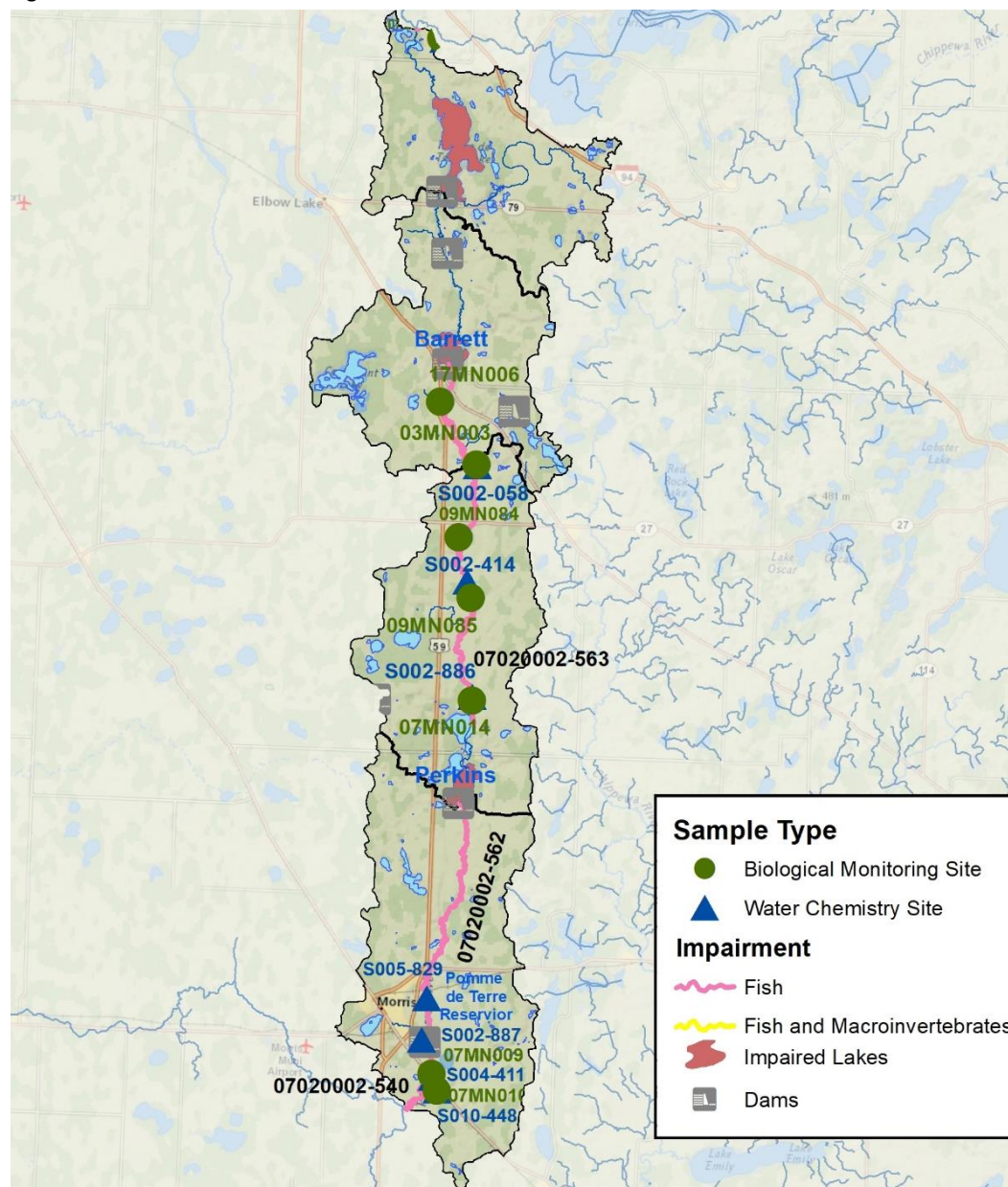


Middle Pomme de Terre River Subwatershed

Biological Community Summary of the Middle Pomme de Terre

Two middle reaches of the Pomme de Terre River (07020002-562 and -563) are designated as impaired for aquatic life use based on the poor fish community (Figure 10). Reach -562 extends from Perkins Lake to Muddy Creek and -563 reaches from Barrett Lake to North Pomme de Terre Lake. Reach -563 is where the biological fish impairment begins on the Pomme de Terre River as the upstream reaches are supporting for aquatic life. The FIBI score was highest at station 07MN009 (42) after a five-point increase from 2007. FIBI scores decreased to 24 at two of the three sites that were resampled in C2 (03MN003 and 07MN014). Station 07MN014 had a 14-point drop in FIBI score since 2007. The biggest changes were increases in general and tolerant species.

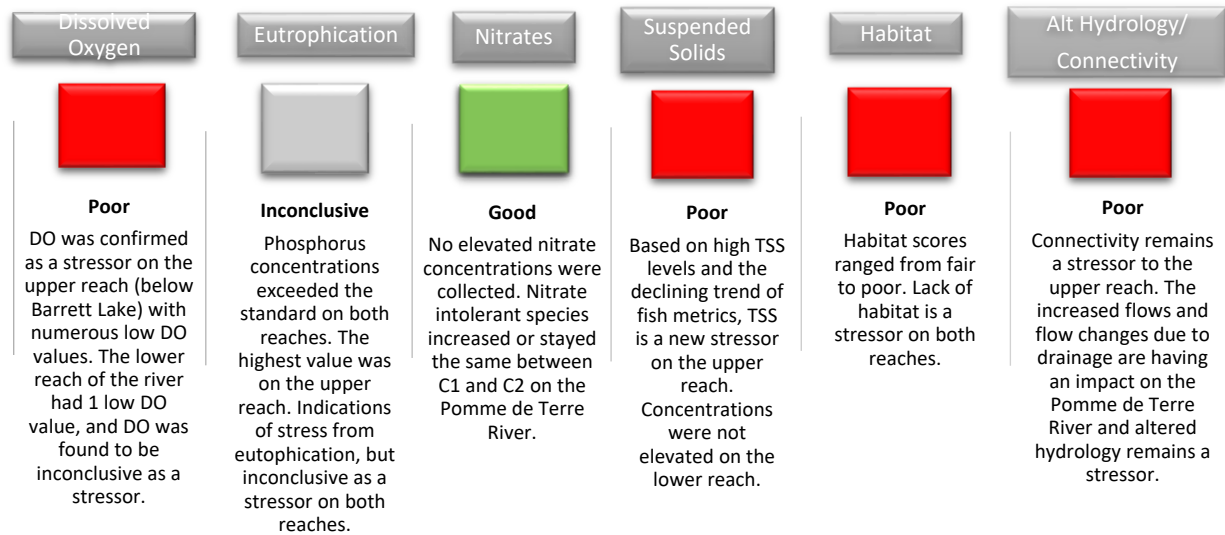
Figure 10. The Middle Pomme de Terre River Subwatershed



What stressors are of concern?

SID work was completed in the middle reaches of the Pomme de Terre River during C1 SID. Stressors identified during C1 were DO, lack of habitat, altered hydrology, and connectivity (Figure 31). The middle reaches of the river were identified as a priority for further SID investigation. C2 SID work added TSS as a stressor.

Figure 11. Biological stressor determinations for Middle Pomme de Terre River from 2022. Red boxes indicate poor conditions and therefore a stressor to aquatic life. Green boxes indicate good conditions that are not stressors to aquatic life. Grey boxes indicate inconclusive stressors.



Summary of stream health in the Middle Pomme de Terre

Additional biological and water chemistry information along the Pomme de Terre River identified TSS as a new stressor with potential stress from eutrophication.

- The Pomme de Terre River is low gradient and surrounded by wetlands (Figure 12). A low DO value of 0.44 mg/L was collected downstream of a wetland complex. Three plant surveys were done on wetlands along the two reaches and were found to have poor plant communities that have shifted toward tolerant species.
- Elevated phosphorus and DO values were collected on both reaches. Reach -562 is downstream of Perkins Lake which is impaired for nutrients. Chlorophyll-a values were near the river eutrophication standard (RES) on both reaches.
- Just over 5% of the samples exceeded the TSS standard. Rainfall can create very high TSS levels, with a recorded value in 2015 of 2,570 mg/L on the reach -563. On average, inorganic solids (sediment) made up the majority of the suspended solids.

Figure 12. Pomme de Terre River near site 17MN006 (8/1/17).



- Limiting the habitat scores were a lack of riffles, channel development (site 03MN003 also lacked any pools), a lack of depth variability, and lack of cover. A DNR survey at site 07MN014 found the pools to be narrower than the riffles (DNR 2018).
- The Barrett Lake dam was modified in 2006 for fish passage (Figure 31). The Perkins dam is a partial barrier. The Crissy Lake dam is a full barrier in Morris. Migratory fish species and numbers decrease upstream of the Crissy and Perkins dams. There was an increase in migratory fish downstream of the dams in C2 since species have had more time to move up into the Pomme de Terre River after the Appleton Dam was removed. Connectivity continues to be a stressor to reach -563
- Flows have increased in the watershed. From 1936-2017, the number of days per year with high flows on the river increased (DNR 2019). Sites on these reaches were not able to be sampled in July 2017 due to high flows.

Figure 13. Barrett Lake dam (DNR).



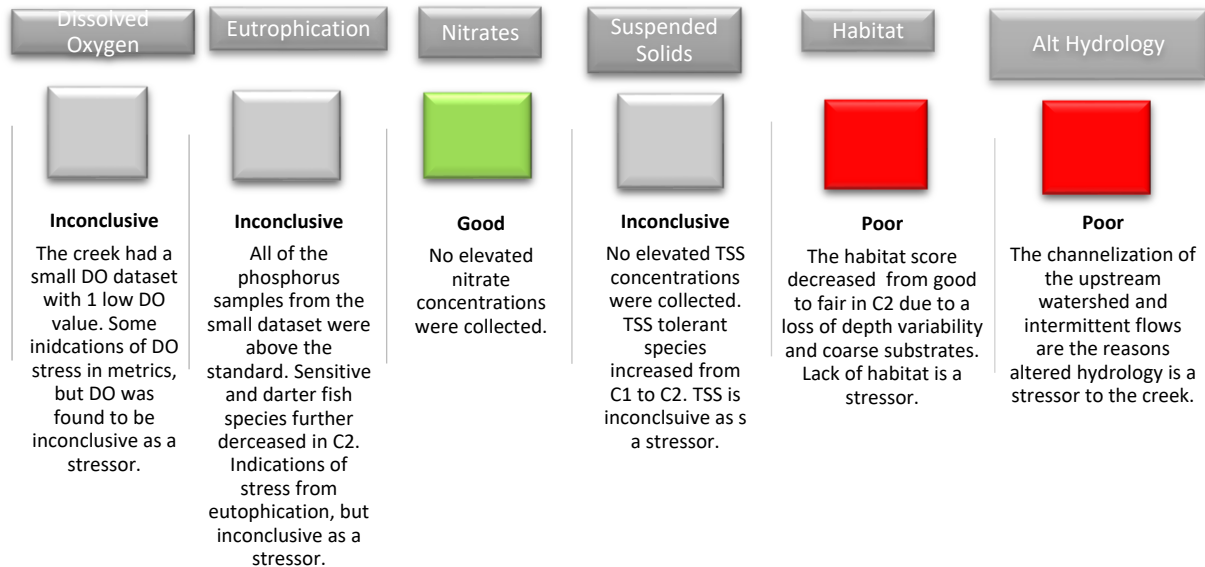
Biological Community Summary of tributaries to the Middle Pomme de Terre

An unnamed tributary (07020002-540) is a new impairment in C2 due to the poor condition of both the fish and macroinvertebrate communities. The fish impairment was deferred during C1 because the reach is altered, and macroinvertebrates were not able to be sampled in C1. The fish score was lowered between 2007 and 2016 from 47 to 32. An increase in very tolerant fish species (fathead minnows and carp) and short-lived species led to the lowered IBI score. The macroinvertebrate community was comprised of 97% tolerant species. Macroinvertebrates were not able to be sampled in 2007 because the creek was dry. The IBI score in 2016 was 20.

What stressors are of concern to tributaries in the Middle Pomme de Terre?

SID work was completed on the tributary, with lack of habitat and altered hydrology being identified as stressors, while DO, TSS, and eutrophication were inconclusive as stressors (Figure 14).

Figure 14. Biological stressor determinations for Middle Pomme de Terre River tributaries from 2022. Red boxes indicate poor conditions and therefore a stressor to aquatic life. Green boxes indicate good conditions that are not stressing aquatic life. Grey boxes indicate inconclusive stressors.



Summary of stream health to tributaries in the Middle Pomme de Terre

- Additional monitoring of phosphorus, diurnal DO and chlorophyll-a would help determine eutrophication stress.
- Limiting the habitat scores on the creek were a lack of riffles, channel development, a lack of depth variability, and lack of flow variability.
- The upstream watershed of the creek has been heavily altered. During the drier of 2007, the creek had intermittent flow in July 2007 (Figure 15) and was dry in August 2007. Altered hydrology exacerbates low flow conditions during drier years.
- A beaver dam impoundment was suspected to be present during the fish and invert sample in 2016, further altering the flow of the creek.

Figure 15. Parts of the creek were dry in July 2007 (7/11/07).

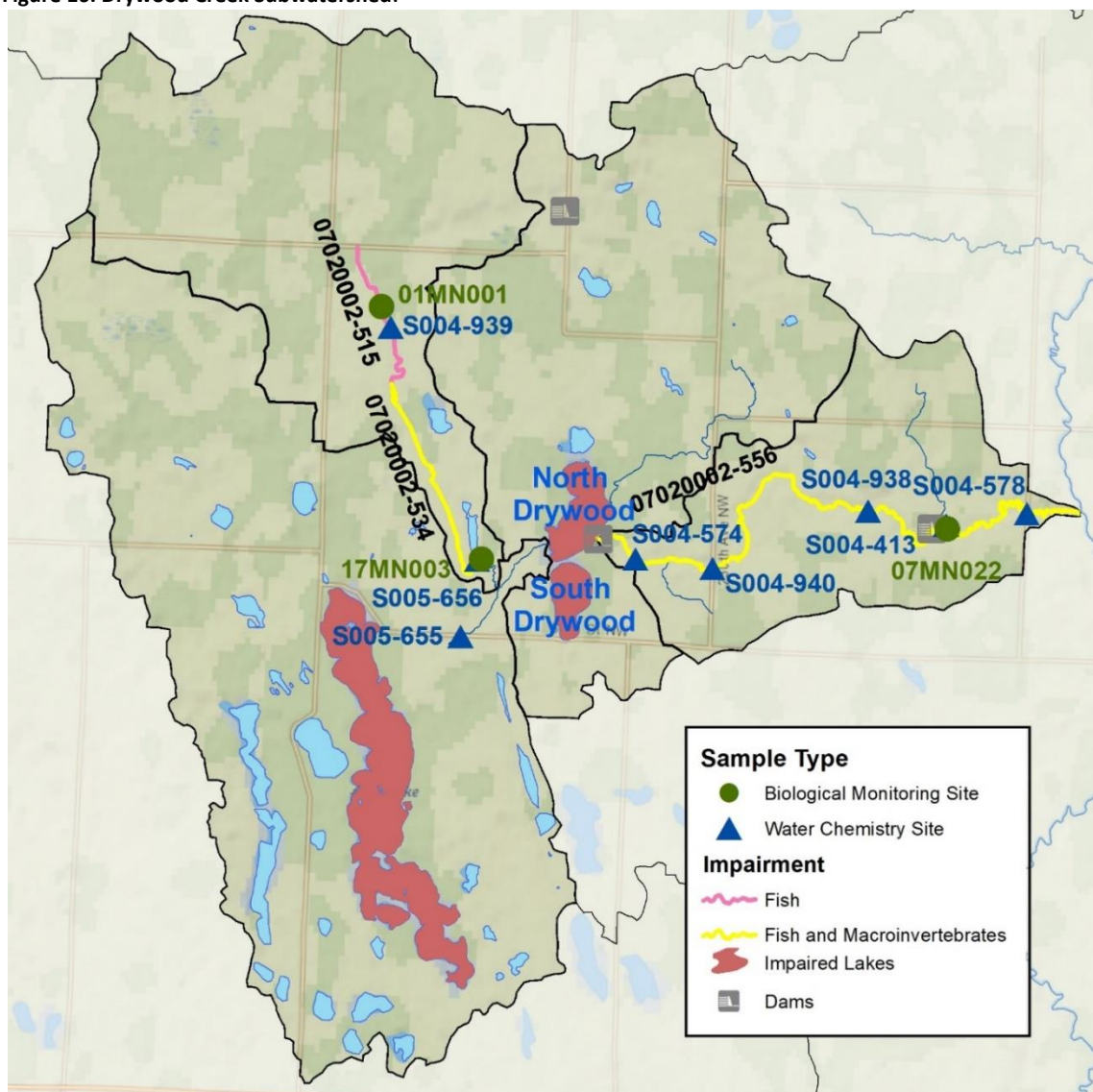


Drywood Creek Subwatershed

Biological Community Summary

Drywood Creek (07020002-556) is a 10.12-mile reach that is impaired for aquatic life based on both the fish and macroinvertebrate communities scoring poorly (Figure 31). Reaches 07020002-515 and 07020002-534 are unnamed creeks that are tributaries to Drywood Creek. They are also impaired for both communities. The fish community was sampled in 2007, 2008, and 2017 at site 07MN022 with the fish IBI score increasing each time. The macroinvertebrate IBI score also increased from 2007 to 2017, but the 2017 score (28) was slightly lower than in 2008 (30). The fish score at site 01MN001 was zero in both 2001 and 2016 on reach -515. Inverts were not sampled in 2007 at site 01MN001 because the ditch was dry. Site 17MN003 was sampled for the first time in 2017 with a resulting fish IBI score of 47. The score was lowered by the lack of sensitive fish and the presence of short lived and serial spawner species. The macroinvertebrate score at site 17MN003 was 5.9 with 8 out of 10 metrics scoring zero.

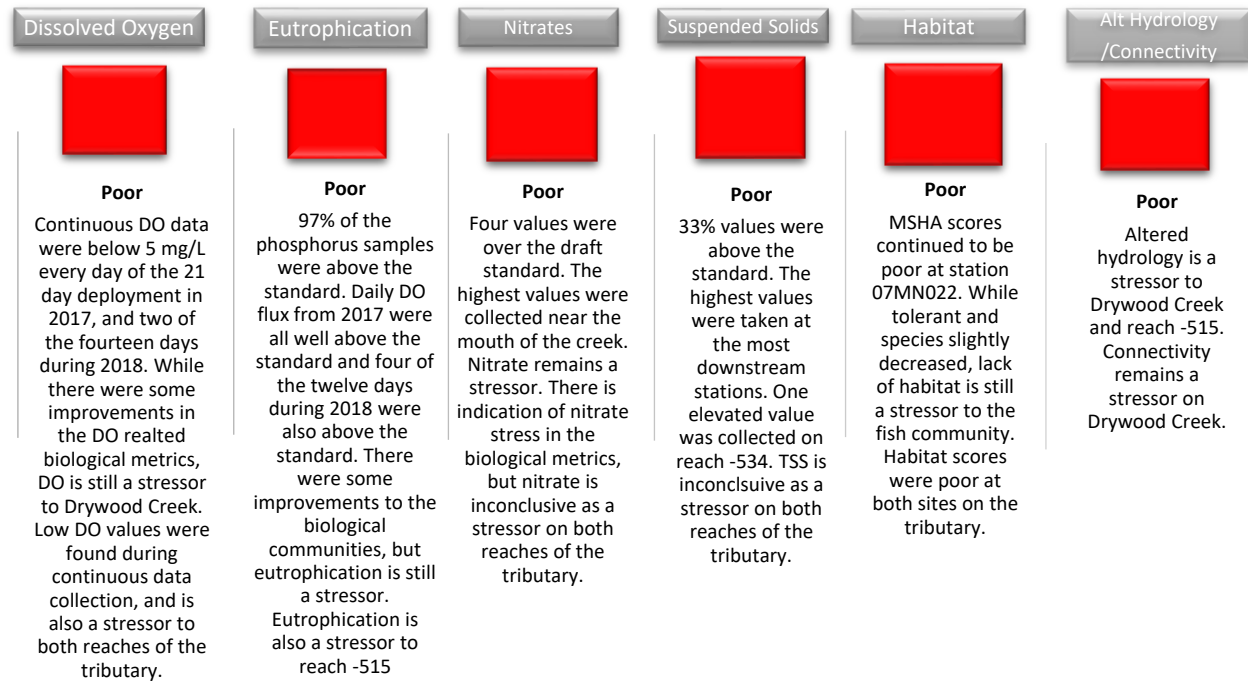
Figure 16. Drywood Creek Subwatershed.



What stressors are of concern?

SID work was completed in Drywood Creek during C1 SID. Low DO, eutrophication, nitrate, lack of habitat, high TSS, and altered hydrology were identified as stressors to the biological community during C1. Investigation of stressors in C2 work confirmed the same stressors are still present (Figure 17).

Figure 17. Biological stressor determinations for Drywood Creek from 2022. Red boxes indicate poor conditions and therefore a stressor to aquatic life.



Summary of stream health in Drywood Creek

Additional biological and water chemistry information throughout Drywood Creek confirmed stressors identified in C1.

- Low DO values were present on Drywood Creek and the reaches of the tributary. Reach -534 flows through a number of wetlands. A plant survey was done on a wetland along Drywood Creek and was found to have poor plant communities that have shifted toward tolerant species. A disturbed wetland cannot optimally help protect stream water quality.
- The number of macroinvertebrates that are tolerant to nitrate increased from 37% in 2007 to 51% in 2017 in Drywood Creek.
- Paired nitrate values were collected after a rainfall in 2019 with a value of 3 mg/L in reach -515 and a value of 10 mg/L from a tile drain leading into the ditch.

- Habitat conditions were poor on Drywood Creek and the tributary. Limiting the habitat were bank erosion (Figure 18), embeddedness of coarse substrates, and a lack of channel development and lack of depth variability. A sedimentation survey by the DNR showed “Both the reach and riffle pebble counts were comprised of 100% silt during the 2018 resurvey at site 07MN022. This composition was different than the 2009 survey that showed a mixture of silts, sands, and gravel sized particles” (DNR 2022).

Figure 18. Bank erosion on Drywood Creek



- Drywood Creek is impaired for Turbidity. Site 07MN022 had signs of improvement in the fish community from C1 to C2, but TSS is still a stressor. “...Heavily grazed pastures between Dry Wood Lake and station 08MN087 are sources of fine sediment from sheet, rill, and gully erosion” (DNR 2021).
- Drywood Creek is downstream of North and South Drywood Lakes, which are both impaired for nutrients. Phosphorus was also elevated on Artichoke Lake. Longitudinal phosphorus values collected in 2020 were highest downstream of Artichoke Lake (1.11 mg/L), downstream of Drywood Lake (1.85 mg/L), and near the mouth of reach -534 (1.08 mg/L). Phosphorus concentrations decreased downstream of Drywood Lake but then increased near the mouth of the creek (Figure 19).

Figure 19. Phosphorus values in the Drywood Creek Watershed



- The upper section of Drywood Creek was modified and some of the tributaries are channelized. While the biology shows a trend of improvement with metrics, altered hydrology is still a contributing stressor. Reach -515 is entirely channelized.
- A constructed riffle downstream of station 08MN087 is acting as a fish barrier to the most upstream station (08MN087) (Figure 20). Connectivity is still a stressor to Drywood Creek but there is no longer a fish migration barrier upstream of station 07MN022.

Figure 20. Fish barrier on Drywood Creek (DNR)

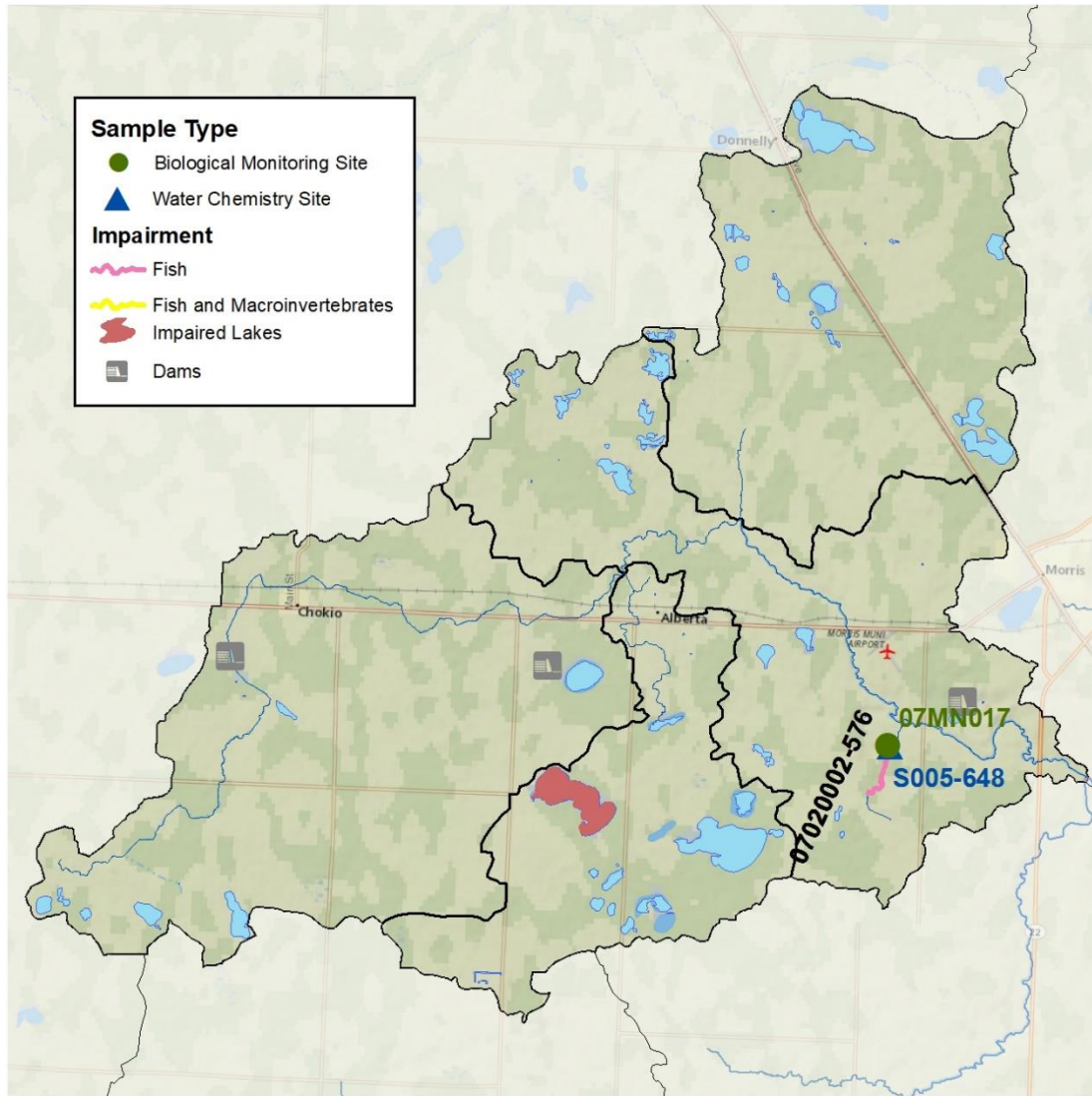


Muddy Creek Subwatershed

Biological Community Summary

An unnamed tributary to Muddy Creek (07020002-576) is a 1.37-mile reach that is impaired for aquatic life based on the poor fish community (Figure 21). The fish score at site 07MN017 was 20 in 2007 and dropped to 0 in 2016. Only one species (four brook sticklebacks) were collected in 2016, a sharp decline from the four species and 703 fish collected in 2007. The score was lowered by the lack of nontolerant minnow species and headwater species. The stream was dry in 2007 and too low in 2016 to sample macroinvertebrates.

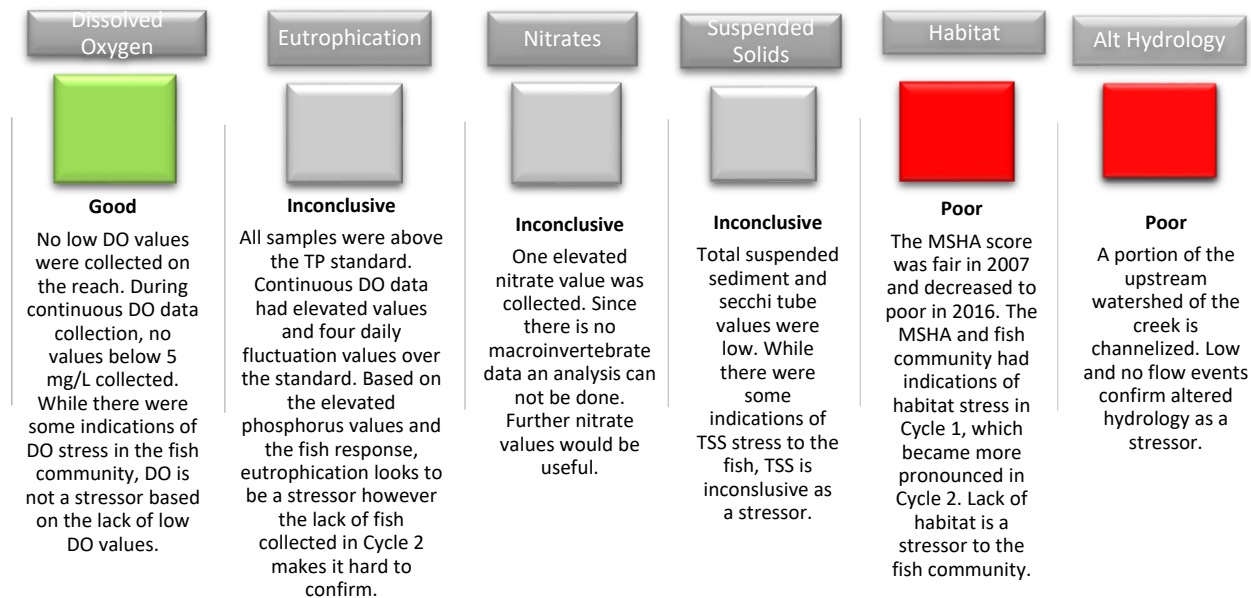
Figure 21. Map of Muddy Creek Subwatershed.



What stressors are of concern?

SID work was not completed on the unnamed creek during C1 SID. The goal of C2 SID work was to gather and analyze the biological and chemical data to determine the likely cause of stress to the impaired fish community. Lack of habitat and altered hydrology were the identified stressors, while eutrophication, nitrate, and TSS were inconclusive and could potentially have a negative impact on aquatic life (Figure 22).

Figure 22. Biological stressor determinations for Muddy Creek from 2022. Red boxes indicate poor conditions and therefore a stressor to aquatic life. Grey boxes indicate inconclusive stressors. Green boxes indicate good conditions that are not stressing aquatic life.



Summary of stream health in Muddy Creek

Additional biological and water chemistry information throughout the unnamed creek identified habitat and altered hydrology as stressors with potential stress coming from eutrophication and TSS.

- The decrease in the habitat score at station 07MN017 was due to the loss of depth variability, flow variation, and loss of a pool along the reach. Excess sediment was deposited near the tributary (Figure 23), an indication of a high sediment load.
- The creek was completely dry in August of 2007 and was too low in August 2016 to collect a macroinvertebrate sample. The fish sample during 2016 was collected after the attempted macroinvertebrate sample, which helps explain why the fish community was so low. The low flow and no flow events are indicative that altered hydrology is a stressor to the fish community.
- Phosphorus values and diurnal DO flux exceeded the eutrophication standard. A high value of 0.592 mg/L was collected in 2019. Fish data during normal flows would be helpful to determine impacts.

Figure 23. Sediment at site 07MN017 (9/13/2019).

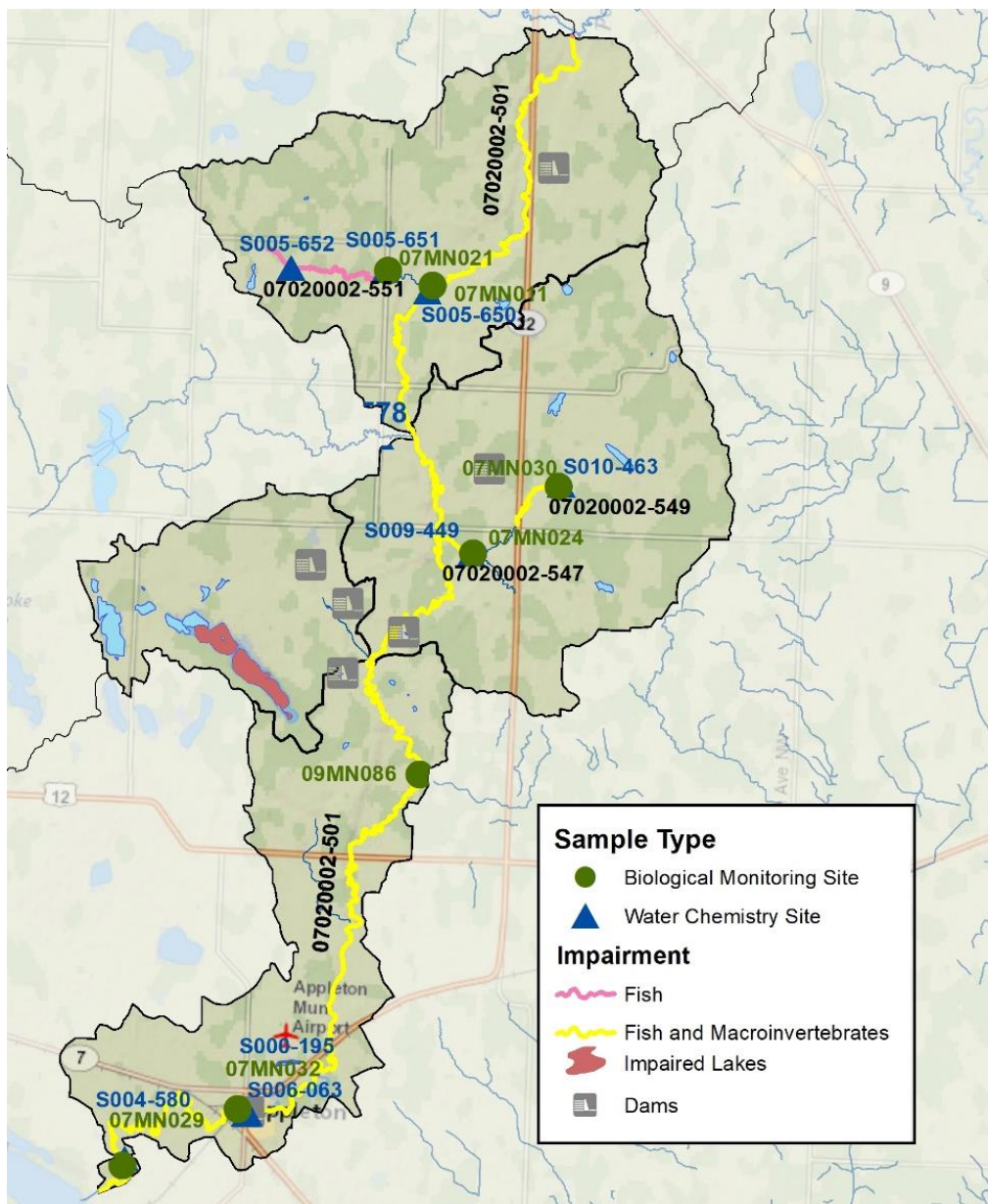


Lower Pomme de Terre River Subwatershed

Biological Community Summary of the Lower Pomme de Terre

The downstream reach of the Pomme de Terre River (-501) is a 48.37-mile reach that is impaired for aquatic life based on the poor macroinvertebrate and fish communities (Figure 24). The six fish visits had similar FIBI scores in 2007, with the downstream site scoring lowest. Three of the sites were resampled during C2 in 2017 and 2018. The visits at site 07MN011 had similar scores. The fish score at 07MN032 was increased by 10 points in 2018 due to the fish community being more diverse than in 2007. The fish score at the most downstream station decreased slightly. Three of the sites were also resampled for macroinvertebrates. Scores decreased at all three sites. The largest drop in IBI scores (33 to 17) was at the upstream station 07MN011. Predator, Trichoptera, and taxa count scores all decreased.

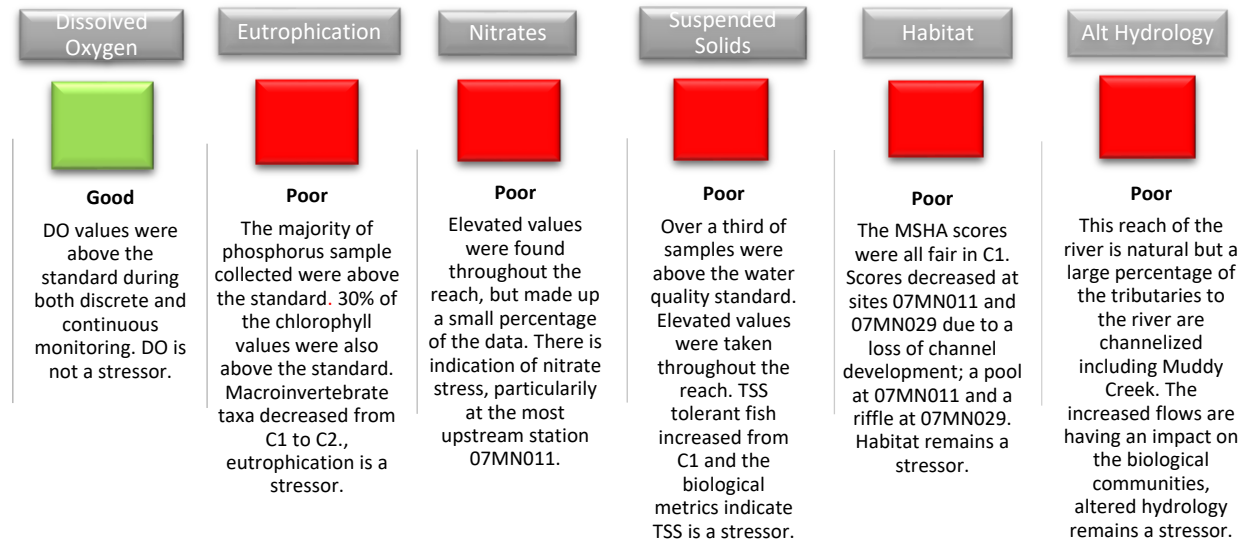
Figure 24. Map of the Lower Pomme de Terre River Subwatershed.



What stressors are of concern?

SID work was completed in the downstream reach of the Pomme de Terre River during C1 SID. Nitrate, lack of habitat and altered hydrology were identified as stressors to the biological community during C1. Eutrophication and TSS were found to be new stressors during C2 (Figure 25).

Figure 25. Biological stressor determinations for the lower Pomme de Terre River from 2022. Red boxes indicate poor conditions and therefore a stressor to aquatic life. Green boxes indicate good conditions that are not a stressor to aquatic life.



Summary of stream health in the Lower Pomme de Terre

Eutrophication, nitrate, TSS, lack of habitat, and altered hydrology are stressors on the Pomme de Terre River.

- The decrease in the habitat score at station 07MN011 was due to the loss of channel development and loss of a pool along the reach. The increase at station 07MN032 was due to an increase in cover for the biological communities. The slight decrease in score at station 07MN029 was due to the loss of the riffle in the reach (Figure 26).
- A nitrate value of 11 mg/L was collected near the mouth of the Pomme de Terre River in 2016 after over an inch of rain.
- Eutrophication is also an issue on the Pomme de Terre and the tributary with elevated TP and chlorophyll-a.
- TSS concentrations were highest on the Pomme de Terre River near Appleton with a high value of 460 mg/L collected in 2015.

Figure 26. Excess sedimentation at site 07MN029.



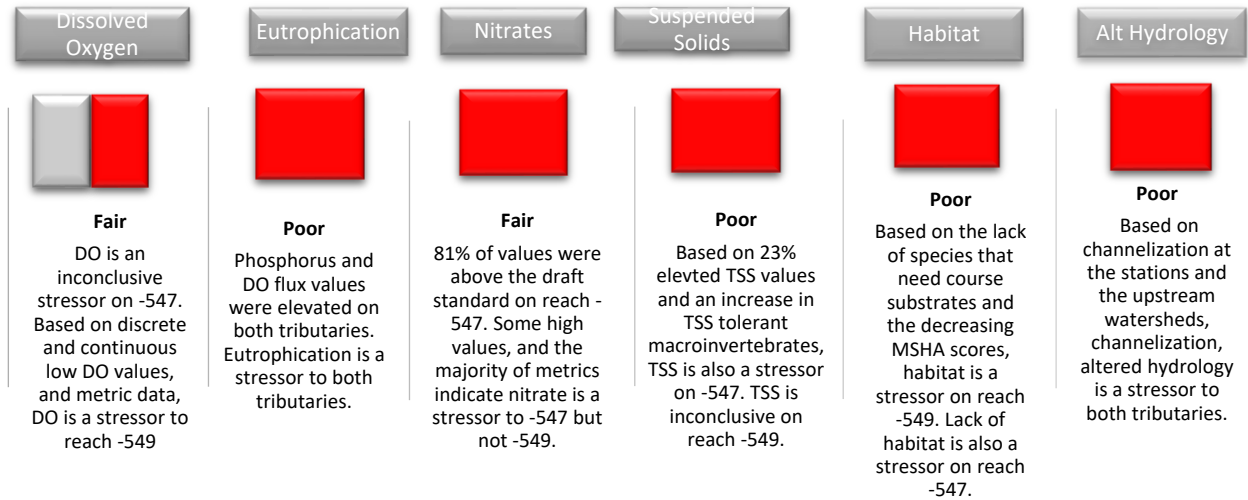
Biological Community Summary of the Lower Pomme de Terre tributaries

Reaches 07020002-547 and 07020002-549 are tributaries to the Pomme de Terre River that are impaired for fish and macroinvertebrates. The FIBI at site 07MN030 on Judicial Ditch (JD) 2 (-549) was 0 and 1.3 during two visits in 2007 and increased to 29.6 in 2016. The fish score at site 07MN024 (-547) was 0 in 2007 and increased to 17.7 in 2018. No macroinvertebrate samples were taken in 2007 due to both tributaries being dry. The macroinvertebrate sample in 2016 at site 07MN030 had an IBI score of 5.6 and the sample at site 07MN024 in 2017 was 4.7. Reach 07020002-551 was listed as impaired for aquatic life due to the fish community in 2012 and SID was completed in C1.

What stressors are of concern to tributaries in the Lower Pomme de Terre?

SID work was not completed on JD 2 and the unnamed creek during C1 SID. The goal of C2 SID work was to gather and analyze biological and chemical data to determine the likely cause of stress to the impaired fish and macroinvertebrate communities (Figure 27).

Figure 27. Biological stressor determinations for the Lower Pomme de Terre River tributaries from 2022. Red boxes indicate poor conditions and therefore a stressor to aquatic life. Grey boxes indicate inconclusive stressors.



Summary of stream health to tributaries in the Lower Pomme de Terre

SID data collection was completed on the two tributaries in 2019 and 2020; DO, eutrophication, nitrate, TSS, lack of habitat and altered hydrology were identified as stressors.

- The habitat score at site 07MN030 decreased from C1 due to an increase in bank erosion and embeddedness of coarse substrates.
- No buffer along the stream at site 07MN030 (Figure 28), sediment will enter the ditch with any rainfall on the field or if the ditch floods into the field.
- The tributary had a high TSS value of 296 mg/L on reach -547 in 2017.
- A nitrate value of 29 mg/L was collected on the reach -547 in June 2017 and a value of 30 mg/L was collected on reach -549 in May of 2019.

Figure 28. No buffer at site 07MN030 (5/23/2019).



- While there is a nice buffer at site 07MN024, just over a mile upstream (Hwy 59) is a pasture with eroding banks (Figure 29), which is a source of sediment.
- Both reaches have been channelized, and the upstream watershed to station 07MN030 is also channelized.
- Readings were below the DO standard of 5 mg/L during continuous data collection on JD 2 (-549). Eutrophication is likely driving low DO values on the ditch, with algal growth (Figure 30) and elevated daily DO flux. Seven of 18 daily fluctuations exceeded the standard of 5 mg/L (Figure 31).

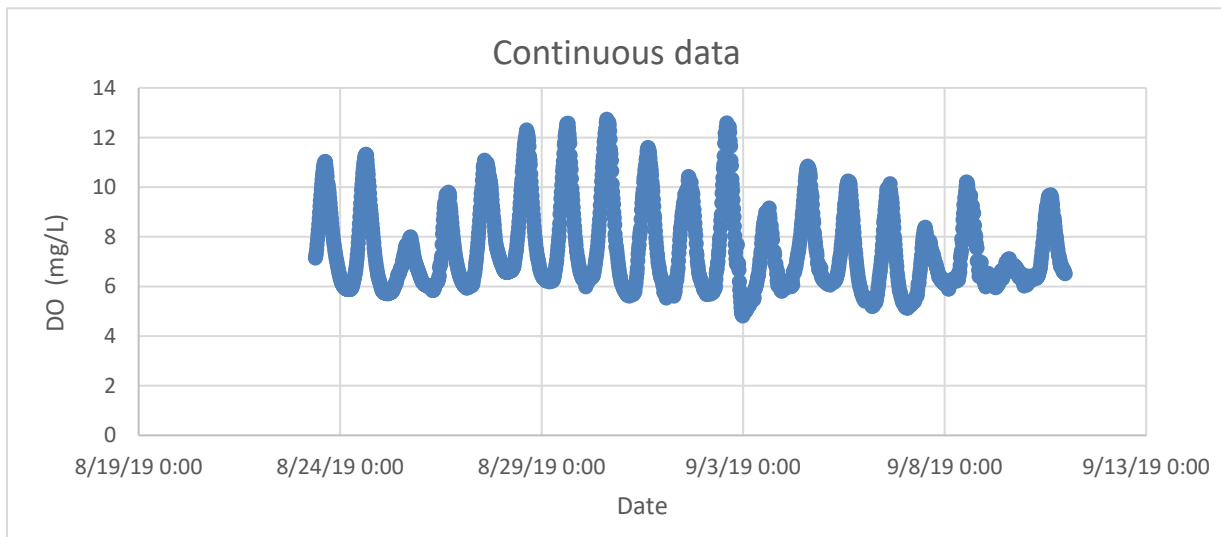
Figure 29. Eroding banks upstream of 07MN024.



Figure 30. Algal growth at station 07MN030 (8/23/2019).



Figure 31. Continuous data at station 07MN030.



Watershed Summary using the [DNR Stream Components](#)

The five major elements of a healthy stream system are stream connections, hydrology, stream channel assessment, water chemistry and stream biology. If one or more of the components are unbalanced, the stream ecosystem may fail to function properly. The stream component framework is used below to summarize the Pomme de Terre River system.

Stream biology- Twelve streams in the watershed have biological impairments: five fish impairments and seven impairments for fish and macroinvertebrates. The Pomme de Terre River is supporting aquatic life upstream of Barrett Lake.

Wetland biology- Five wetlands were monitored along Drywood Creek and the Pomme de Terre River; four had poor wetland vegetation conditions and one had a fair condition.

Stream chemistry- DO is a stressor on Drywood Creek (-556) and the middle Pomme de Terre River (-563), TSS is a stressor on all three reaches of the Pomme de Terre River (-501, -562, and -563) and Drywood Creek, and nutrients are a stressor to Drywood Creek and the lower Pomme de Terre River (-501). Pelican Creek (-506), Drywood Creek, and the lower Pomme de Terre River are impaired for sediment. Drywood Creek is also impaired for DO.

Hydrology- Flows in the Pomme de Terre River and its tributaries are increasing from both tile drainage and increased precipitation. Sites on the Pomme de Terre mainstem were not able to be sampled in July 2017 due to high flows. Reaches -515, -540, -547, -549, -576, have experienced low or no flow events. Water appropriations have increased in the watershed (DNR). Flow much higher during 2017 invert sampling compared to 2007. Flow was lower during 2017 fish sampling period than it was during 2007 sampling (USGS)

Stream Channel Assessment- The DNR found Pelican Creek to have a stable channel and good floodplain connectivity at site 17MN004. “The direct impacts from over grazing activity are profound enough to cause stream channel instability and channel alteration far beyond what the system is capable of assimilating” on Drywood Creek (DNR). The DNR found that sites along Drywood Creek widened between C1 and C2.

Stream connectivity- Fish barriers are stressors on Pelican Creek (-506), Drywood Creek (-556), and the Pomme de Terre River.

Conclusion and Recommendations

Summary of Stressors The stressors for the biological impairments in the Pomme de Terre River Watershed are listed in Table 1. The most common stressors in the watershed were habitat, altered hydrology, eutrophication, and DO.

Table 1. Stressors in the Pomme de Terre River Watershed

Stream Name	AUID	Stressors	Dissolved Oxygen	Eutrophication	Nitrate	Suspended Solids	Habitat	Altered Hydrology	Connectivity
		Aquatic Life Impairment							
Cycle 2 SID									
Pelican Creek	07020002-506	Fish	---	0	---	0	●	---	●
Pomme de Terre River	07020002-563	Fish	●	0	---	●	●	●	●
Pomme de Terre River	07020002-562	Fish	0	0	---	---	●	●	---
Unnamed Creek	07020002-540	Fish, Macroinvertebrates	0	0	---	0	●	●	---
Drywood Creek	07020002-556	Fish, Macroinvertebrates	●	●	●	●	●	●	●
Unnamed Creek	07020002-515	Fish, Macroinvertebrates	●	●	0	0	●	●	---
Unnamed Creek	07020002-534	Fish, Macroinvertebrates	●	0	0	0	●	●	---
Unnamed Creek	07020002-576	Fish	---	0	0	0	●	●	---
Pomme de Terre River	07020002-501	Fish, Macroinvertebrates	---	●	---	●	●	●	---
Unnamed Creek	07020002-547	Fish, Macroinvertebrates	0	●	●	●	●	●	---
Judicial Ditch 2	07020002-549	Fish, Macroinvertebrates	●	●	---	0	●	●	---
Cycle 1 SID									
Unnamed Creek	07020002-551	Fish	N/A	N/A	●	N/A	---	●	N/A

For more information

WRAPS updates and necessary TMDLs will follow the completion of the SID process. For more information, go to <https://www.pca.state.mn.us/watershed-information/pomme-de-terre-river> or search for “Pomme de Terre River Watershed” on the MPCA website.

Details and specific monitoring information related to the SID analysis of this report is available from the contact person below. Biological and chemistry data can be found at [Surface Water \(state.mn.us\)](#)

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