SID Update

Bancroft Creek Watershed 2022

The purpose of Cycle 2 stressor identification (SID) work is to perform SID in a way that supports Cycle 2 watershed restoration and protection efforts, with an emphasis on meeting local partner needs, protection of biotic integrity, and identifying changes in biotic condition. Cycle 2 SID work will provide sharper focus in adding value to local partner implementation planning efforts. The SID staff will seek to strengthen local partnerships and provide scientific analyses and recommendations in a format and timeframe that is most useful to local partners.

Bancroft Creek Watershed was identified for Cycle 2 SID work via conversations with local partners and professional judgement from the Minnesota Pollution Control Agency (MPCA) staff. Factors that lead to selection included:

- Potential future implementation projects.
- Limited chemistry data in the upper part of the watershed.
- Bancroft Creek Watershed is upstream of Fountain Lake and the City of Albert Lea; both are priorities as Fountain Lake has high recreational value and is impaired for nutrients and Albert Lea has a long history of flooding issues.

Goals for Cycle 2 SID work in Bancroft Creek Watershed included:

- Summarize current chemical, biological, and physical conditions and identify changes between Cycle 1 (2009) and Cycle 2 (2019).
- Identify stressors and pollutant sources that are currently impacting biological communities and/or threaten future biological condition.
- Identify any “hot spots” or areas contributing a disproportionate amount of a pollutant.
- Identify and prioritize restoration areas.
- Provide value to local planning efforts.

This SID update document summarizes biological condition and provides monitoring highlights and stressor conclusions for Bancroft Creek Watershed.

Biological Communities

Fish and macroinvertebrate communities in the Bancroft Creek Watershed are impaired and do not meet standards. Stations 09CD075, 09CD082, 09CD085, and 09CD093 were deferred (not assessed) in Cycle 1 assessment (2011) due to channelization; all stations were subsequently assessed in 2018 following adoption of the tiered aquatic life uses (TALU) framework, which provides a mechanism to assess modified water resources. Station 09CD093 (AUID -549) was impaired for fish and

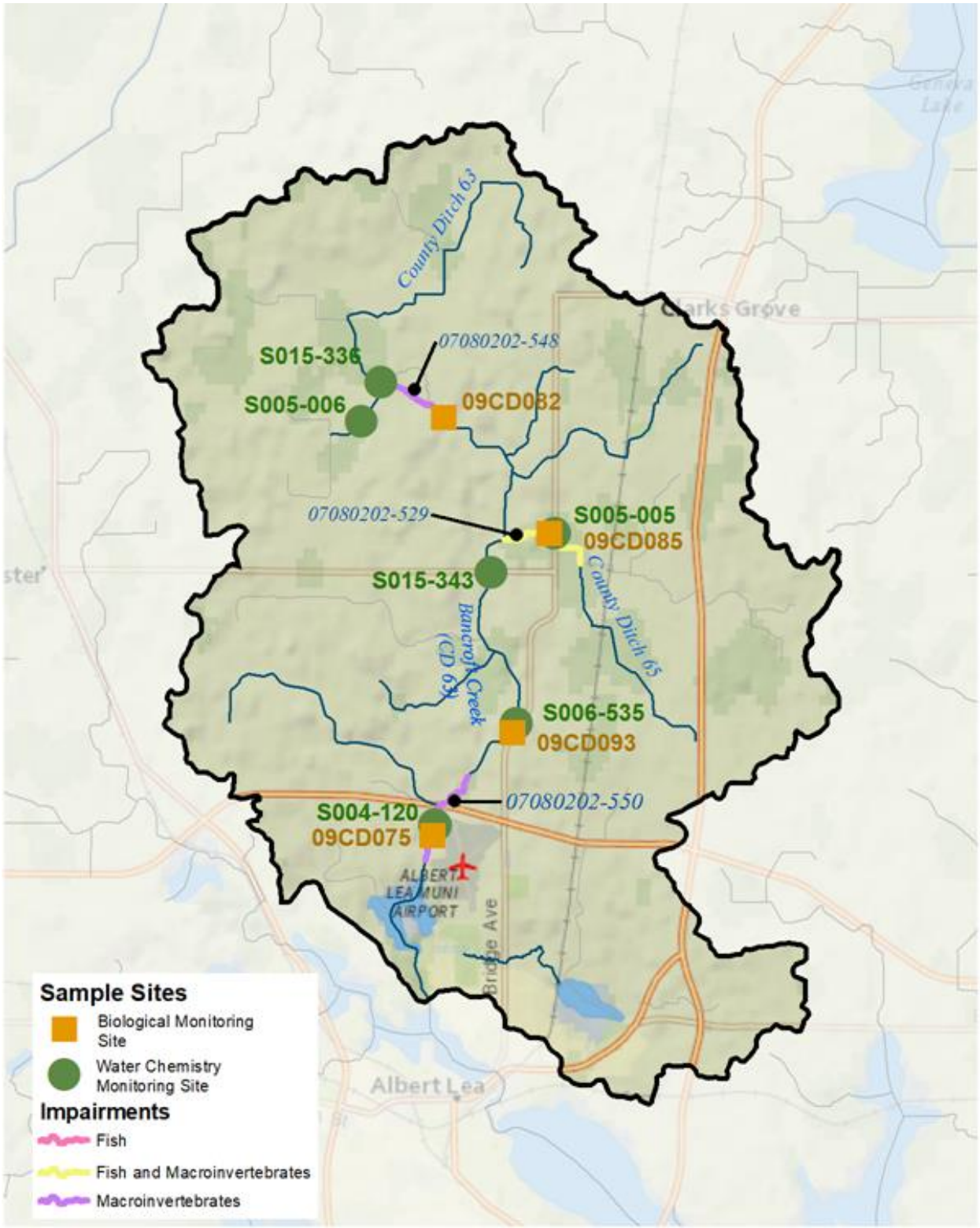
macroinvertebrates following the 2018 assessment, but both impairments were approved for de-listing in Cycle 2 assessment (2021) due to recent attainment of the standard. Stations 09CD075 (AUID -550) and 09CD082 (AUID -548) are impaired for macroinvertebrates, and station 09CD085 (AUID -529) is impaired for fish and macroinvertebrates. Station 09CD093 was the only station sampled for fish and macroinvertebrates in Cycle 2 (Table 1, Figure 1).

Fish index of biological integrity (FIBI) scores and macroinvertebrate index of biological integrity (MIBI) scores improved between Cycle 1 and Cycle 2 at station 09CD093, thus leading to the de-listings mentioned above. Station 09CD093 is in the Low Gradient fish class (modified use threshold of 15) and Southern Forest Streams GP macroinvertebrate class (modified use threshold of 30). Both fish and macroinvertebrate scores were above the modified use threshold in Cycle 2; it's important to note that the middle portion of Bancroft Creek (AUID -549) is modified use and therefore assessed against lower IBI standards than the upper and lower portions (AUIDs -548 and -550) which are general use and assessed against higher IBI thresholds. Abundant fish species in Cycle 2 included blacknose dace, fathead minnow, and bigmouth shiner; amphipods dominated the macroinvertebrate sample. Decreases in tolerant species, increases in intolerant species, and more even distribution of taxa and functional groups contributed to the increases in FIBI and MIBI scores.

Table 1: Fish and macroinvertebrate IBI scores in Bancroft Creek Watershed.

Waterbody	AUID	Biological Stations	Biological Impairment	Class	FIBI	Year	MIBI	Year
County Ditch 65	529	09CD085	Fish, Macroinvertebrates	2Bg	27.3	2009	30.2	2009
Bancroft Creek (County Ditch 63)	548	09CD082	Macroinvertebrates	2Bg	57.9	2009	33.8	2009
					59.3	2009		
Bancroft Creek (County Ditch 63)	549	09CD093		2Bm	15.1	2009	27.3	2009
					23.5	2019	40.2	2019
Bancroft Creek (County Ditch 63)	550	09CD075	Macroinvertebrates	2Bg	-	-	31.1	2009

Figure 1: Bancroft Creek Watershed monitoring stations and biological impairments.



Monitoring Highlights

Stream Temperature

Several instantaneous (point) measurements were collected throughout the watershed over the last decade (2011 through 2020), and stream temperatures ranged from 1.1°C to 23°C (73 samples). There were zero values greater than 30°C (daily average warmwater standard); temperature is adequate to support warmwater biota.

TSS

Total suspended solids (TSS) samples were collected across the watershed as part of SID in 2019, with a goal to sample various flow conditions and establish a range of TSS concentrations (Figure 2). Concentrations ranged from 1 – 30 mg/L (average of 10.1 mg/L), and zero of the twenty-eight samples exceeded the warmwater TSS standard (65 mg/L). In general, TSS concentrations were low across the watershed and increased moving downstream. It's important to note that although TSS concentrations are low, sediment is still impacting biology via habitat loss and degradation from an abundance of fine substrate and embeddedness (see habitat section below).

Nitrate

Nitrate samples were collected across the watershed as part of SID in 2019, with a goal to sample various flow conditions and establish a range of nitrate concentrations (Figure 3). Concentrations ranged from 3.1 – 13 mg/L (average of 7.6 mg/L), and three (11%) of the twenty-eight samples were above 10 mg/L. Station S005-005 was the only station with nitrate concentrations above 10 mg/L, and was always higher than the other stations sampled; the watershed area upstream of station S005-005 stands out as a priority area for nitrate reduction. In general, nitrate concentrations are moderate – elevated across the watershed and nitrate tolerant macroinvertebrates are abundant.

TP

Total phosphorus (TP) samples were collected across the watershed as part of SID in 2019, with a goal to sample various flow conditions and establish a range of TP concentrations. Concentrations ranged from 0.041 – 0.448 mg/L (average of 0.119 mg/L), and five (18%) of the twenty-eight samples exceeded the river eutrophication standard for the South Region (0.15 mg/L). Each station had at least one exceedance, and most occurred during elevated flow conditions. In general, concentrations were low during low flow conditions. In addition to elevated TP concentrations, low DO (see DO section below) and elevated chlorophyll-a have been documented in the watershed; four chlorophyll-a exceedances occurred during Cycle 1 sampling in 2009 at stations S005-005 (County Ditch 65) and S005-006 (Judicial Ditch 21).

DO

DO ranged from 4.8 mg/L to 10.1 mg/L across the watershed during early morning DO surveys in 2019. Early morning DO surveys were conducted on 7/23/19, 8/2/19, and 8/30/19 to characterize conditions and identify low DO. One exceedance (8%) of the warmwater DO standard (5 mg/L) was identified in the upper portion of the watershed (station S015-336). DO surveys were also conducted in 2020 in the lower portion of Bancroft Creek (station S006-535); all three samples were above the standard. Field work in 2021 identified low DO (2.4 mg/L) in County Ditch 65 at the 255th Street crossing (Figure 4). There were also several instantaneous (point) measurements collected throughout the watershed over the last decade (2011 through 2020), and one (1%) was below 5 mg/L. Fish low DO index scores and probability of meeting the DO standard were better than the statewide median, while most macroinvertebrate low DO metrics (low DO index score, % low DO intolerant, % low DO tolerant) were worse than the statewide median.

Habitat

MPCA Stream Habitat Assessment (MSHA) scores at station 09CD093 were similar between Cycle 1 and Cycle 2; Cycle 2 scores were 38 and 45. Most sub-category scores (Land Use, Riparian, Substrate, Cover, and Channel Morphology) were similar between Cycle 1 and Cycle 2; the highest score in Cycle 2 had increases in Substrate, Cover, and Channel Morphology scores. A habitat example from biological monitoring in 2019 can be seen in Figure 5. Although station 09CD093 was de-listed (fish and macroinvertebrates) following Cycle 2 assessment, habitat is poor with limited cover and coarse substrate, and associated embeddedness issues. Also, macroinvertebrate and fish metrics from deferred Cycle 1 stations not sampled in Cycle 2 are indicative of habitat stress. These stations have elevated burrowers and legless individuals, reduced clingers, limited riffle species, and are dominated by tolerant species. Often times this type of metric response is associated with lack of coarse substrate and/or woody debris, fine substrate, embeddedness, channelization, etc.

Fish Passage

Low flow conditions and a perched culvert were documented in 2021 on County Ditch 65; both have the potential to negatively impact fish migration (Figure 6). Station 09CD085 had zero migratory fish species in 2009.

Flow Alteration

The Bancroft Creek watershed is dominated by ditch systems. Channelization is often associated with poor habitat, an abundance of fine substrate, excess nutrients and productivity, altered DO regimes (low DO and high DO flux), and minimal flow time periods (Figures 4, 5, and 6). Tile drainage is also common in these landscapes and typically a large source of the nitrogen load.

Figure 2: 2019 TSS concentrations (mg/L, brown box plots) and TP concentrations (mg/L, purple box plots) in Bancroft Creek Watershed. The red lines represent the warmwater TSS standard (65 mg/L) and river eutrophication standard for the South Region (0.15 mg/L).

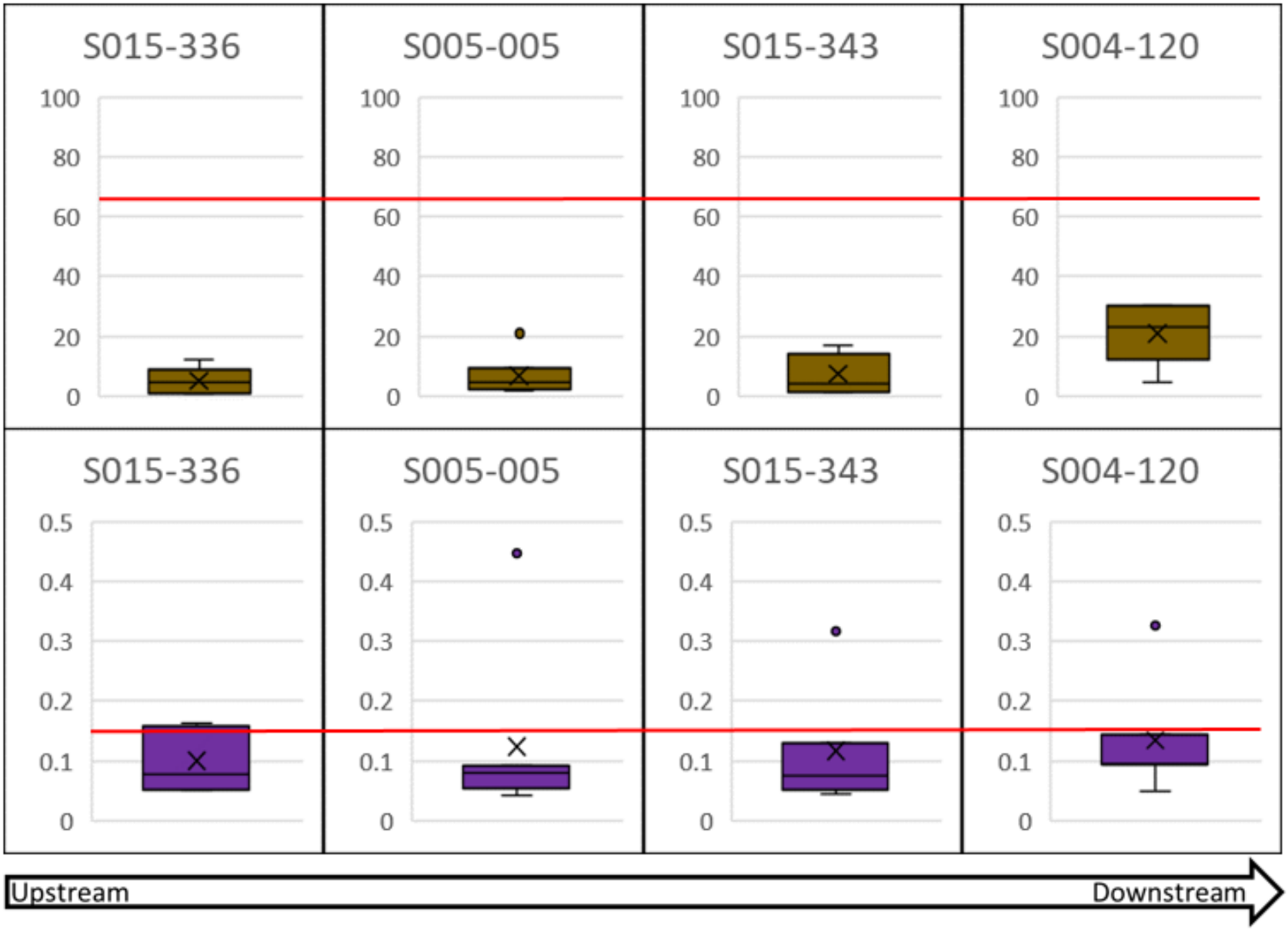


Figure 3: Land cover, feedlots (AU), and 2019 nitrate concentrations (mg/L) in Bancroft Creek Watershed. The red line in the box plots represents the nitrate drinking water standard (10 mg/L). In general, nitrate concentrations at station S005-005 were consistently higher than other stations in the watershed. The DNR WHAF tool was used to help create this map.

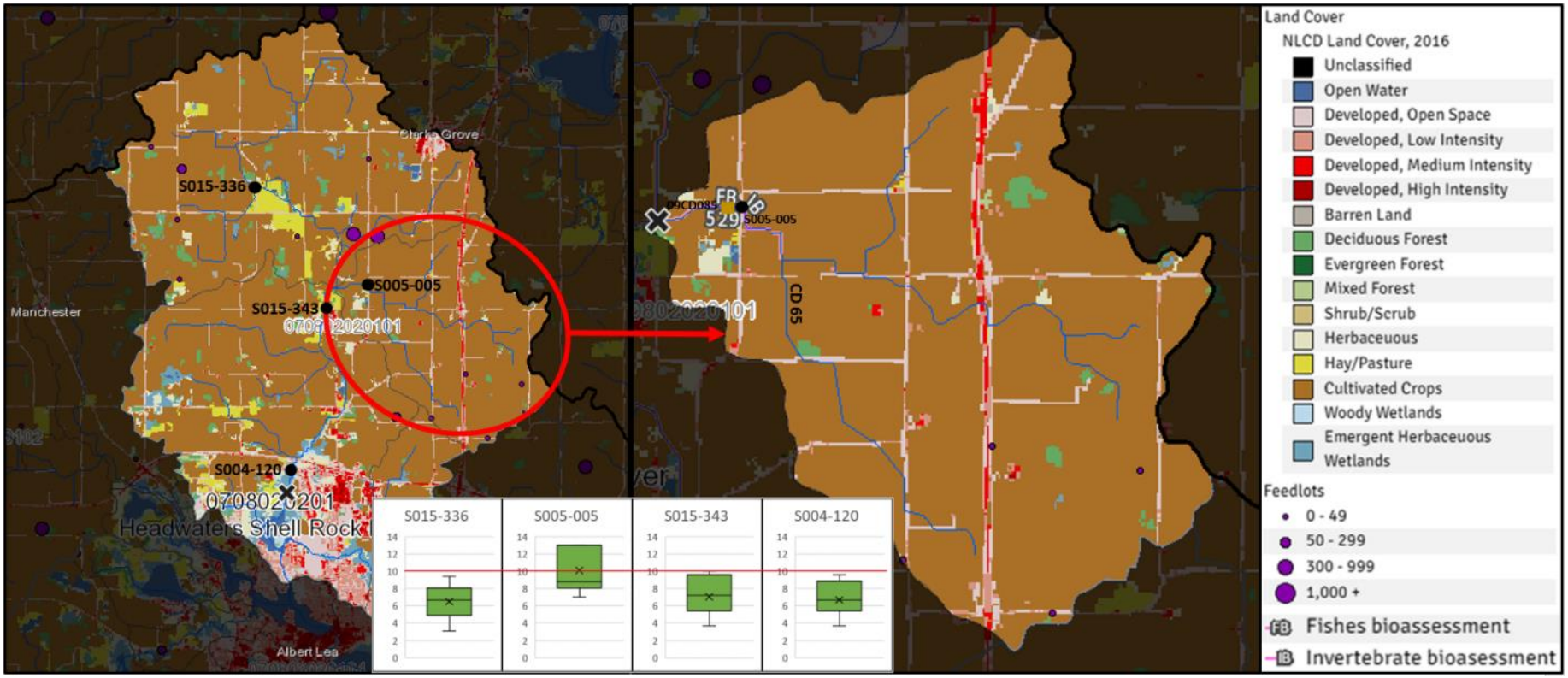


Figure 4: Eutrophic conditions and low DO (2.4 mg/L) were documented on County Ditch 65 (just upstream of stations S005-005 and 09CD085) in July 2021.

Figure 5: Habitat example from biological monitoring station 09CD093 in Bancroft Creek Watershed in 2019.

Figure 6: Low flow conditions (left) and a perched culvert (right) documented in 2021 on County Ditch 65; both have the potential to negatively impact fish migration. The perched culvert is located just upstream of AUID -529 at the 255th Street crossing.

Stressors Summary

- Elevated nitrate, poor habitat, fish passage, and flow alteration are stressing the biology in the Bancroft Creek Watershed (Table 2), while stream temperature and total suspended solids (TSS) are not currently stressors and eutrophication and dissolved oxygen (DO) are inconclusive.
- Flow alteration is a major source of stress and is contributing directly or indirectly to all stressors in the Bancroft Creek Watershed. Nitrate and habitat stressors in particular are impacted by flow alteration through tile drainage and channelization. The Bancroft Creek Watershed is dominated by ditch systems. Channelization is often associated with poor habitat, an abundance of fine substrate, excess nutrients and productivity, altered DO regimes (low DO and high DO flux), and minimal flow time periods (Figures 4, 5, and 6). Tile drainage is also common in these landscapes and typically a large source of the nitrogen load.
- Nitrate concentrations at station S005-005 (County Ditch 65) are consistently higher than other stations in the watershed; this drainage area is a good location to prioritize nitrogen reduction and may provide an opportunity to document change due to its small size.
- Low flow conditions and a perched culvert were documented in 2021 on County Ditch 65; both have the potential to negatively impact fish migration (Figure 5).
- Although inconclusive stressors at this time, eutrophication and low DO may be impacting biology in certain parts of the watershed during certain years (e.g. low flow years); reducing nutrient loading in Bancroft Creek Watershed is an important step for improving biological communities.
- Although TSS is not currently a stressor, sediment is impacting biology via habitat loss and degradation from an abundance of fine substrate and embeddedness.
- Overall, reducing nitrate and phosphorus loading, improving in-stream habitat, ensuring proper connectivity for fish migration, and addressing flow alteration related issues (e.g. poor habitat,

fine substrate, nitrogen rich tile water, etc.) are critical for the health of fish and macroinvertebrate communities in the Bancroft Creek Watershed.

Table 2: Summary of stressors in the Bancroft Creek Watershed (• = stressor, ○ = inconclusive stressor, blank = not a stressor, NE = not evaluated).

Waterbody	AUID	Biological Stations	Biological Impairment	Class	Stressors							
					Temperature	Nitrate	Eutrophication	DO	TSS	Habitat	Fish Passage	Flow Alteration
County Ditch 65	529	09CD085	Fish, Macroinvertebrates	2Bg		●	○	○		●	●	●
Bancroft Creek (County Ditch 63)	548	09CD082	Macroinvertebrates	2Bg		●	○	○		○	NE	●
Bancroft Creek (County Ditch 63)	549	09CD093		2Bm	NE	NE	NE	NE	NE	NE	NE	NE
Bancroft Creek (County Ditch 63)	550	09CD075	Macroinvertebrates	2Bg		●	○	○		●	NE	●

For more information

For more information, go to https://www.pca.state.mn.us/water/watersheds/shell-rock-river.

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CLEAN WATER LAND & LEGACY AMENDMENT