CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 10-6-2023 FILE REF: Sherwood WWTF

TO: Nicole Krueger, Limit Calculator; Trevor Moen, Compliance Engineer

FROM: Andrew Hudak, Stream Biologist; Kristi Minahan, Water Quality Standards; Diane Figiel, Limit Calculator Coordinator

SUBJECT: Unnamed Tributary to Kankapot Creek (3000135), & Sherwood WWTF, Calumet Co.

Overview of issue

On September 13, 2022, Andrew Hudak and Andrew Gilsdorf conducted a stream assessment on the receiving waters downstream from the Sherwood WWTF. The receiving water is in NR 104 as Limited Aquatic Life (LAL) in two segments (generally corresponding with Seg. 1 & 2, below): "Drainage tributary from Sherwood STP downstream to wetland" and "Wetland receiving above tributary," which is presumed to mean the extent of wetland from Kessler Rd. to Elm Rd. A memo from Mike Reif in December 2004 recommended classifying the stream as Limited Forage Fish (LFF) from above the outfall downstream to Hwy 10 (farther downstream from Elm Rd.). In the 2017 permit memo, limits had been based on LAL all the way to the Fox River.

Currently facility planning is underway with the facility to support a 20-year plan, and appropriate classification of the receiving waters is needed. Specifically, there were questions on the location of the wetland indicated in code, whether or not the wetland is channelized and supports fish, and whether LAL or LFF are appropriate classifications for portions of the stream.

Note that Robinhood Drive crosses the two unnamed tributaries three times, making locational differentiation somewhat confusing. Robinhood Drive crosses UNT 3000135 twice, and UNT 126900 once.

Summary of recommendations and Site Observations

- **Segment 1: Unnamed Tributary (UNT) WBIC 3000135 from Sherwood WWTF Outfall to confluence with UNT WBIC 126900 (Seg. 2)**
  - Codified designated use: LAL (currently in NR 104)
  - Classification used for previous permit issuance: LAL
  - Previous stream class recommendations: 2004 Memo- Mike Reif recommended LFF
  - Modeled Natural Community: Macroinvertebrate
  - New recommended Natural Community and Designated Use: Warm Transition Headwater NC; Limited Forage Fish DU (this would require a code update and a Use Attainability Analysis)

- **Segment 2: UNT WBIC 126900 from confluence with Seg. 1 (near railroad tracks) to Elm Rd.**
  - Codified designated use: LAL-Wetland
  - Classification used for previous permit issuance: LAL
  - Previous stream class recommendations: 2004 Memo- Mike Reif recommended LFF
  - Modeled Natural Community: Cold-Transitional Headwater
  - New recommended NC & DU: Retain LAL-Wetland

- **Segment 2US (upstream of Seg 2; this segment is not in line with the effluent path): UNT WBIC 126900 from headwater downstream to confluence with Seg 1 (by railroad)**
  - Codified designated use: Not codified as LAL or LFF, and does not fit specified LAL or coldwater categories; therefore defaults to Warmwater

- Classification used for previous permit issuance: NA
- Previous stream class recommendations: 2004 Memo- Mike Reif recommended LFF
- Modeled Natural Community: Cold-Transitional Headwater
- New recommended NC & DU: Warm Transition Headwater NC; Warmwater Forage Fish DU

- **Segment 3: UNT WBIC 126900 from Elm Rd. to confluence with Fox River**
  - Codified designated use: Not in code as LAL or LFF, and does not fit specified LAL or coldwater categories; therefore defaults to Warmwater
  - Classification used for previous permit issuance: LAL
  - Previous stream class recommendations: 2004 Memo-Mike Reif recommended Limited Forage Fish (LFF) from above the outfall downstream to Hwy 10.
  - Modeled Natural Community: Cold-Transitional Headwater
  - New recommended NC & DU: Warm Transition Headwater NC; Warmwater Forage Fish DU

No additional monitoring is needed.

Site overview maps

Map 1. General flow path of effluent from outfall north to Fox River, indicated by red dashed line.

Map 2. Yellow dots indicate fish survey stations F1 and F2 (dot represents downstream end of survey, at start of station). Orange dots indicate photo locations P1-P4. The wetland extends from Kessler Road to Elm Road.

Fish survey results

Stream - Site	10057233 Robinhood Dr. DS WWTF	10043709 US Robinhood Drive- West	10043709 US Robinhood Drive- West	10017503 STH 10	
Fish Species	2022	2022	2015	2015	Total
Brook Stickleback	7	4	31	4	46
Central Mudminnow		17	127	16	160
Creek Chub	31	38	8	67	144
Fathead Minnow	19	10	3	3	35
Iowa Darter		1			1
Southern Redbelly Dace		2			2
White Sucker				2	2
Totals	57	72	169	92	390
# species	3	6	4	5	

The intermittent Fish IBI (used for warm-transition headwaters) was used to score each of the fish surveys shown in the table above.

- Segment 1 (1st column, SWIMS Station 10057233, at point F1 on Map 2) scored 30 (Poor) in 2022.
- Segment 2US (2nd & 3rd column, SWIMS Station 10043709, at point F2 on Map 2) scored 90 (Excellent) in 2022 and 40 (Fair) in 2015. At this site, an Iowa darter was found in 2022, which is an intolerant species.
- Segment 3 at STH 10 (4th column, SWIMS Station 10017503, no segment # in this memo and not shown on Map 2) scored 30 (Poor) in 2015.

This watershed is highly impacted by nonpoint sources, degraded habitat, and bank erosion, so poor-fair scores are not uncommon.

Habitat survey results

- Habit surveys were not conducted.
- In Segment 1, while flow is sufficient, habitat limits the potential of the stream, resulting in an LFF recommendation (see Discussion). However, a quantitative habitat survey would likely be needed to support a Use Attainability Analysis and code change to LFF.
- Segment 2US contained adequate flow and habitat to support a full fish community. Habitat consisted of mostly run with improved width to depth ratios. These resulted in habitat availability along the stream margins and adequate overhanging vegetation as cover for fish.
- Segment 2 (wetland) did not contain a defined channel with suitable flow to establish stream morphology and habitat. Diffuse flow through this wetland accumulates organic matter and sediment limiting cover for fish and impacting dissolved oxygen concentrations.
- In Segment 3, flows though a defined channel resumes and stream morphology returns. Habitat in this segment is significantly impacted by non-point source impacts leading to severely eroded banks, deposition of fine sediment, and width to depth ratios.

Discussion

Note: Recommendations from this site visit are shown at the top of this memo.

- Segment 1: UNT 3000135- This segment of stream is entirely channelized. A fish survey was conducted in the reach. 57 individual fish comprising 3 different species were documented in the channel. Habitat was generally limited, without riffle/run sequences, and was comprised of sand and silt with occasional coarse woody debris. Some portions of the segment were shaded and some were unshaded. Shaded stream corridors lacked vegetation and were well defined. Un-shaded portions of the stream were highly vegetated and were generally impeded by dense vegetation limiting habitat and the ability to conduct a fish survey in that reach (downstream of the fish survey extent). This segment has been verified as a warm-transitional headwater natural community. Limited forage fish (LFF) is the recommended designated use for this segment due to habitat limitations. However, a quantitative habitat survey would likely be needed to support a Use Attainability Analysis and code change to LFF.
- UNT 126900 from its headwaters downstream to USH 10- This long segment of stream is highly diverse.
    - Segment 2US: There is a well-defined stream just upstream of Robinhood Drive (toward the headwaters of this WBIC, before the confluence with WBIC 3000135) that comprised a well-developed fish community where 72 individuals were captured representing 6 different species in 2022 (an Excellent FIBI score).
    - Segment 2: As the stream flows north downstream of Robinhood Drive, it enters a large wetland complex near Kessler Rd. where the stream was historically dredged and straightened prior to 1938. However, there is no longer a well-defined channel through this reach.
    - Segment 3: The stream channel begins to form approximately 150 meters upstream of Elm Rd. A well-defined stream channel is established from Elm Rd downstream to STH 10 and on down to the confluence of the Fox River. In 2015, numerous fish and habitat stations were sampled throughout this segment. Habitat scores were fair to good. While the number of observed species was consistent with those throughout the watershed, the number of individuals captured of these species were higher than expected. The presence of an environmentally sensitive species upstream in segment 2US is encouraging that addressing non-point source impacts to this stream and improving fish passage can restore and improve fish diversity. A warmwater designated use is expected to be fully attainable as these improvements continue.

For purposes of permit reissuance, because the code currently lists Segs. 1 and 2 as LAL, permit limits based on LAL through the end of Elm Rd. could be retained until the code is updated. If the code is updated to LFF in the future, permit limits may need to be protective of LFF in the immediate receiving water. However, in this permit reissuance, it is important to be protective of the downstream waters using a Warmwater designated use starting at Elm Road, instead of the current practice of extending LAL-based limits to the Fox River, which is not supported in code or protective of the fish community.

Recommended code updates to NR 104

- We recommend revising the LAL listing for segment 1, which currently reads as "Drainage tributary from Sherwood STP downstream to wetland," to be revised to LFF for "Sherwood WWTF outfall to the confluence with unnamed tributary WBIC 126900". However, a quantitative habitat survey would likely be needed to support a Use Attainability Analysis and code change to LFF.
- The LAL listing that reads "Wetland receiving above tributary" could either be kept in the code and revised for clarity to read "Wetland from confluence with unnamed tributary WBIC 3000135 to Elm

Rd." or could be removed from the code, since an upstream portion (Seg. 1) will have a more stringent LFF listing, so an LAL listing for the downstream wetland would not be likely to affect permit limits.

Attachments

- Photos
- Natural Community Verification Report

Photo Location #1. Looking upstream on Segment 1 (WBIC 3000135). Fish were sampled upstream from the location of this photo (F1 on Map 2), closer to the discharge in the wooded area, which had less instream vegetation.

Photo Location #2. Segment 2 (WBIC 126900). Looking upstream of Kessler Rd, near the edge of the wetland looking toward the more channelized area.

Photo Location #3. WBIC 126900 Looking upstream of Elm Rd. toward the wetland.

Photo Location #4. Segment 2US (UNT to Kankapot Cr., WBIC 126900), taken at Fish Station 1 looking upstream of Robinhood Dr. in 2015.

Natural Community Verification Report

Waterbody Name (WBIC): UNNAMED SINGLE-LINE STREAM T21N-R18E-S36 (126900)

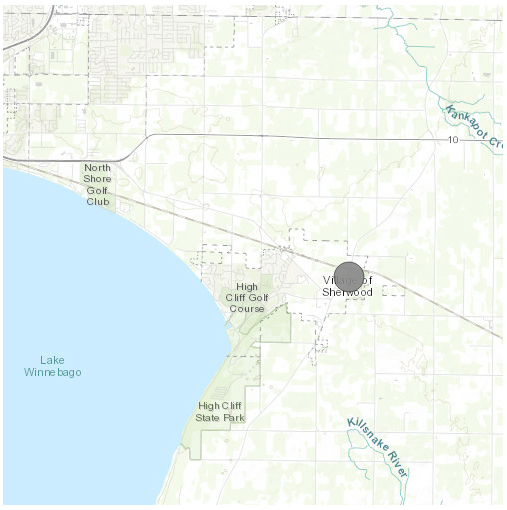
Swims Station ID: 10043709

Survey Sequence Number: 515098610

This NC Verification Report was run on UNT to Kankapot creek 10 meters upstream Robinhood drive, (10043709), located in CALUMET County with fish Survey Sequence Number 515098610 sampled on September 13, 2022. The Natural Community for this station was verified by Andrew Hudak on February 23, 2023.

The Natural Community was modeled *Cold Transition Headwater* and is now Verified as *Warm Transition Headwater* .

Survey location

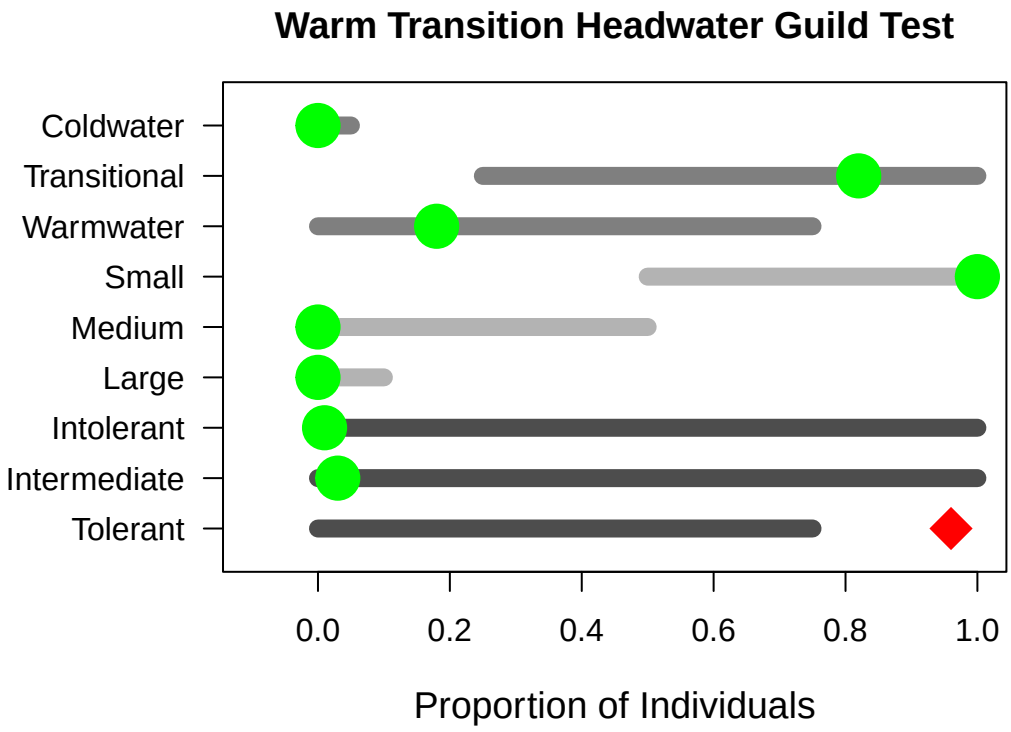


Fish captured

Species	Count
BROOK STICKLEBACK	4
CENTRAL MUDMINNOW	17
CREEK CHUB	38
FATHEAD MINNOW	10
IOWA DARTER	1
SOUTHERN REDBELLY DACE	2

Guild percentages

Thermal	Percent.Indiv.	Size	Percent.Indiv.	Tolerance	Percent.Indiv.
Coldwater	0	Small	100	Intolerant	1
Transitional	82	Medium	0	Intermediate	3
Warmwater	18	Large	0	Tolerant	96



Comments from WR Biologist:

Based on fish community, warm transition headwater is verified NC.

Natural Community Verification Report

Waterbody Name (WBIC): UNNAMED SINGLE-LINE STREAM T20N-R19E-S29 (3000135)

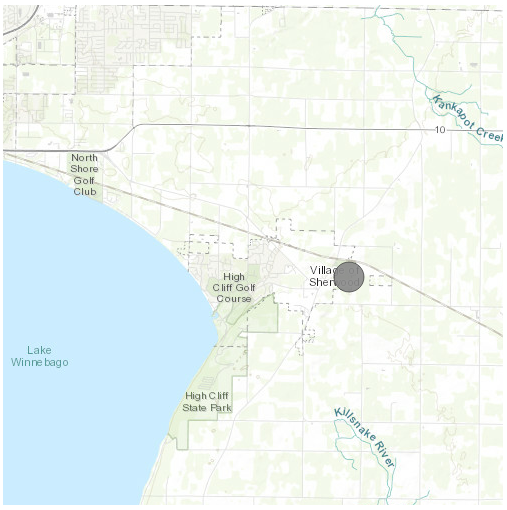
Swims Station ID: 10057233

Survey Sequence Number: 515098619

This NC Verification Report was run on UNT to Kankapot creek US Robinhood Drive (East), (10057233), located in CALUMET County with fish Survey Sequence Number 515098619 sampled on September 13, 2022. The Natural Community for this station was verified by Andrew Hudak on February 23, 2023.

The Natural Community was modeled *missing in FM database* and is now Verified as *Warm Transition Headwater* .

Survey location

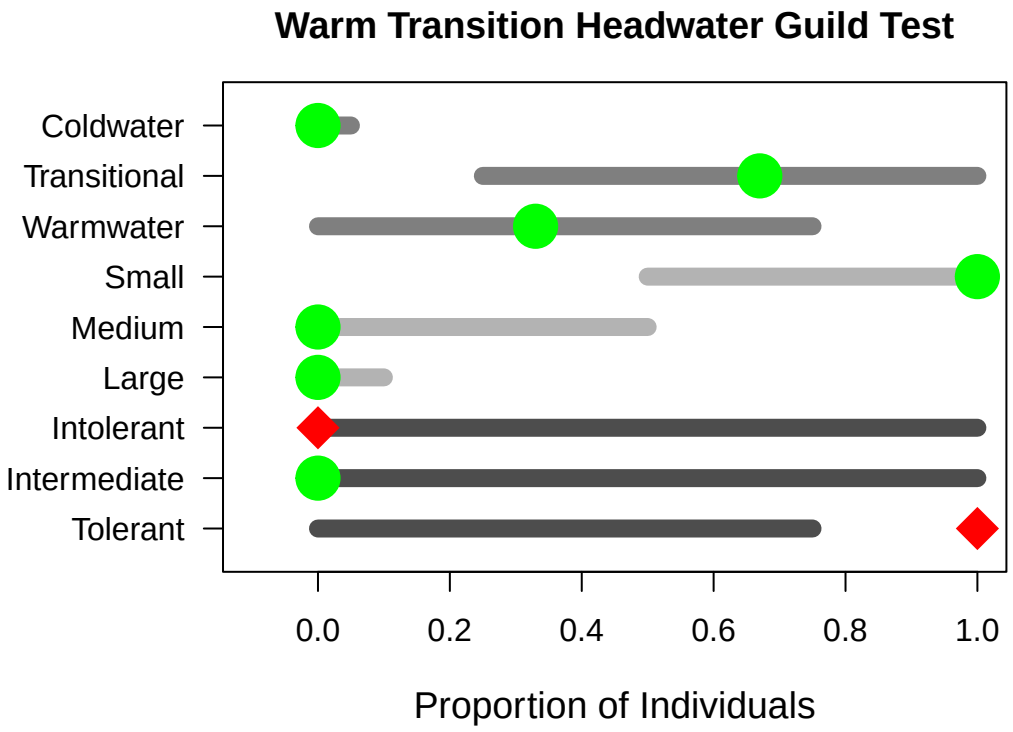


Fish captured

Species	Count
BROOK STICKLEBACK	7
CREEK CHUB	31
FATHEAD MINNOW	19

Guild percentages

Thermal	Percent.Indiv.	Size	Percent.Indiv.	Tolerance	Percent.Indiv.
Coldwater	0	Small	100	Intolerant	0
Transitional	67	Medium	0	Intermediate	0
Warmwater	33	Large	0	Tolerant	100



Comments from WR Biologist: