

DATE: 4-24-2023 FILE REF: Forest Junction 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: Plum Creek (WBIC 125100), & Forest Junction SD, Calumet Co.

### Overview of issue

Forest Junction Sanitary District discharges to Plum Creek, WBIC 125100, which joins the Fox River to Green Bay. Its permit reissue date is 3/31/2023. Staff were asked to do a site visit and fish survey prior to reissuance to determine the appropriate classifications for the receiving waters. The facility has been getting permit limits based on Limited Aquatic Life (LAL), but its receiving water is not in NR 104 as an LAL or Limited Forage Fish (LFF). They have phosphorus limits based on the Fox River TMDL. [Note that NR 104 does list two tributaries to Plum Cr for Holland SD as LAL (portions of WBICs 125500 and 5021641) but does not include Plum Creek itself (WBIC 125100), which is receiving Forest Junction discharges.]

A 2015 fish survey found 18 fish, all tolerant headwater species at Man-Cal Rd. Eighteen fish is not enough to do a natural community verification, but demonstrates an existing fish community (i.e., not a macroinvertebrate classification). The facility used to be a seasonal discharge and is now a continuous discharge. Increased flow to the stream may support a broader fish community than previously.

### Summary of recommendations

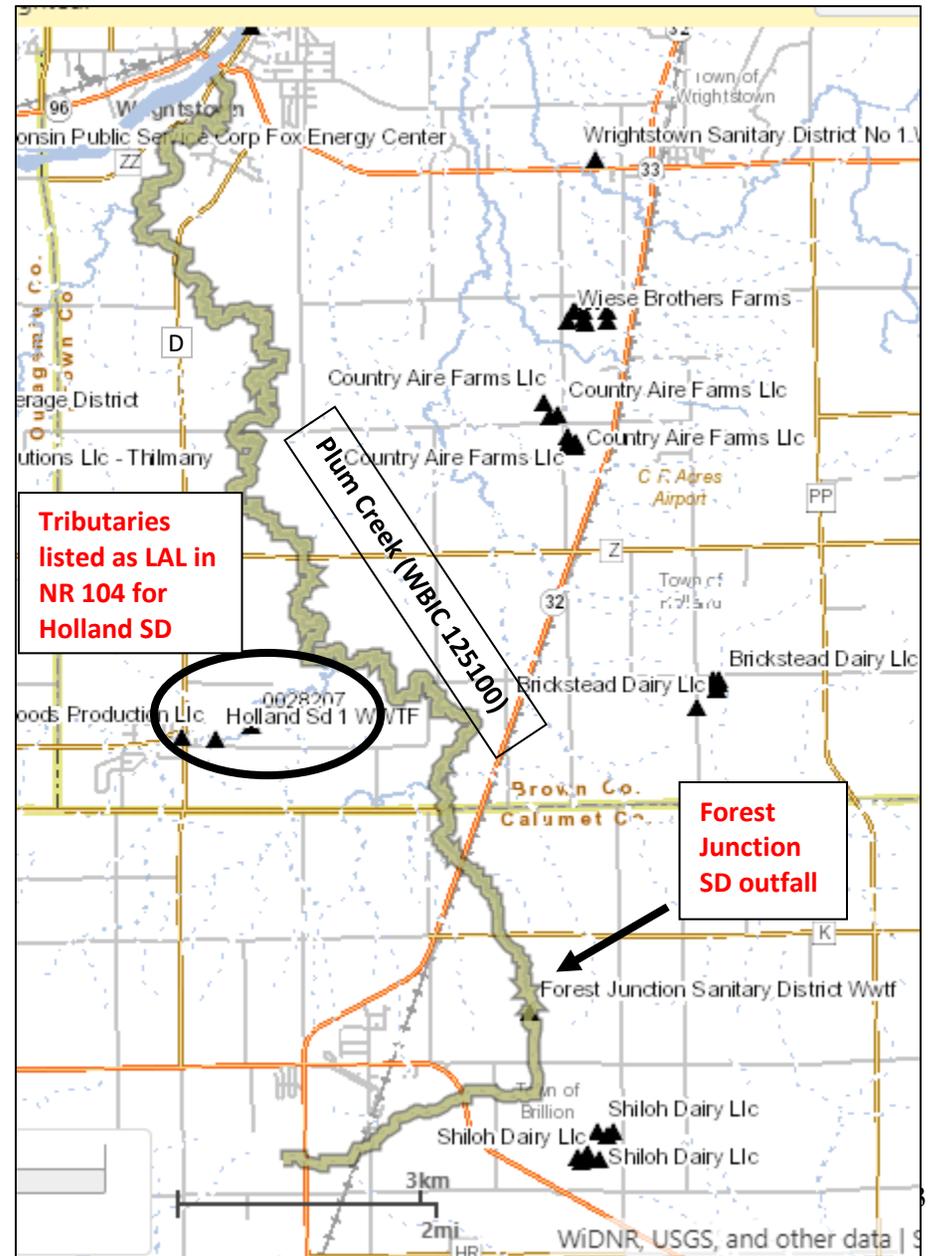
- **Segment 1: Plum Creek (WBIC 125100) from its headwaters to Forest Junction SD outfall:** The stream at this location (Rusch Rd) was dry at the date of survey. No upstream survey could be completed.
  - *Codified designated use:* Not listed specifically in code, so is considered Warmwater
  - *Classification used for previous permit issuance:* LAL
  - *Previous stream class recommendations:* None
  - *Modeled Natural Community:* Macroinvertebrate
  - *New recommended Natural Community and Designated Use:* Macroinvertebrate NC and LAL DU (LAL due to naturally low flow)
- **Segment 2: Plum Creek (WBIC 125100) Forest Junction SD Outfall to confluence with Unnamed Trib WBIC 125600 just north of Man-Cal Rd (a.k.a. CTH KK and the county line)**
  - *Codified designated use:* Not listed specifically in code, so is considered Warmwater
  - *Classification used for previous permit issuance:* LAL
  - *Previous stream class recommendations:* The 2003 proposal recommended LAL from the outfall to the confluence of streams with Plum Cr at SWQ T21N R20E S31.
  - *Modeled Natural Community:* Macroinvertebrate
  - *New recommended NC & DU:* Warm Transition Headwater NC and LFF DU (due to naturally low flow and limited habitat)
- **Segment 3: Plum Creek (WBIC 125100) from confluence with UNT (WBIC 125600) to the confluence of UNT (125200) downstream of CTH D**
  - *Codified designated use:* Not listed specifically in code, so is considered Warmwater
  - *Classification used for previous permit issuance:* LAL

- *Previous stream class recommendations:* None
  - *Modeled Natural Community:* Cool-Warm Headwater
  - *New recommended NC & DU:* NC: Cool-Warm Headwater. DU: Warmwater
- **Segment 4: Plum Creek (WBIC 125100) from confluence with UNT (WBIC 125200) to the mouth of the Fox River**
    - *Codified designated use:* Not listed specifically in code, so is considered Warmwater
    - *Classification used for previous permit issuance:* LAL
    - *Previous stream class recommendations:* None
    - *Modeled Natural Community:* Cool-Warm Mainstem
    - *New recommended NC & DU:* NC: Cool-Warm Mainstem. DU: Warmwater

A future fish survey at Rusch Rd (Segment 1) is recommended during the early season while flow may be present. Another fish survey is also recommended in the future at CTH K (Segment 2) to confirm Warm Transition Headwater stream. Extensive work is happening in the Plum Creek watershed through the implementation of the Lower Fox TMDL, the Plum Creek 9 Element Plan, and the Area Of Concern (AOC) program, to establish best management practices for cropping and water storage on the landscape, so it would be helpful to evaluate improvements and potential for fish communities. As Non-Point sources of pollution are addressed, additional monitoring may be necessary to inform whether LFF or Warmwater is appropriate for Segment 2.

*(cont.)*

Site overview maps



## Site observations

- **Segment 1: Plum Creek (WBIC 125100) from its headwaters to Forest Junction SD outfall:**
  - The stream at Rusch Rd was dry at the date of survey. No upstream survey could be completed. Naturally low flow is expected at a site like this in this location, as there is very little groundwater baseflow in the area; flows are all driven by surface runoff.
  
- **Segment 2: Plum Creek (WBIC 125100) Forest Junction SD Outfall to confluence with Unnamed Trib WBIC 125600 just north of Man-Cal Rd (a.k.a. CTH KK and the county line)**
  - This segment of stream is minimally diverse. The bed and bank are well defined in this reach at the bottom of a deep ravine, though a wide, shallow channel results in shallow (<1”) runs throughout this section during base flow.
  
- **Segment 3: Plum Creek (WBIC 125100) from confluence with UNT (WBIC 125600) to the confluence of UNT (125200) downstream of CTH D**  
*and*
- **Segment 4: Plum Creek (WBIC 125100) from confluence with UNT (WBIC 125200) to the mouth of the Fox River**
  - Sites in these segments were not surveyed in 2022, however, a targeted watershed assessment was completed in 2015 that included fish and quantitative habitat assessments throughout these segments.
  - The watershed of Plum Creek is dominated by agricultural land use that significantly influences the fish community and habitat. The fish community is dominated by species tolerant to environmental degradation. Segment 4 is influenced by the proximity of the Fox River which bolsters the fish community and IBI scores. Segment 4 also experiences significant deposition of sediment and is prone to frequent blue-green algae blooms impacting water quality. Due to the flashy nature of this stream, fish often congregate in pools isolated between shallow to sometimes dry riffles during low flow times of the year. The habitat scores rated fair to good throughout. The Macroinvertebrate IBI rated from poor to fair and the HBI indicated significant organic loading is impacting the water quality conditions. The stream is highly entrenched in areas and severe bank erosion exists due to the flashy flow regime.

*(cont.)*

**Fish survey results**

- 2022 Fish Survey Results Segment 2- Upstream CTH K- 9/8/2022
  - The fish community is minimally diverse and tolerant, comprising 42 individuals of two species, Creek Chub and Brook Stickleback. This verifies as a Warm Transition Headwater Natural Community with an IBI score of 10 (using the small Stream IBI), which is rated as poor.

| Species           | Count |
|-------------------|-------|
| BROOK STICKLEBACK | 10    |
| CREEK CHUB        | 32    |

- 2015 Fish Survey Results Segment 2- Upstream Man-Cal Rd- 6/4/2015
  - The fish community is minimally diverse and tolerant, comprising only 18 individuals. Based on fewer than 25 individual fish captured, a natural community verification and IBI should not be calculated. However, the species captured are indicative of a warm transition headwater. The results are similar to the 2022 survey completed at CTH K.

| Species           | Count |
|-------------------|-------|
| BROOK STICKLEBACK | 10    |
| CREEK CHUB        | 3     |
| FATHEAD MINNOW    | 5     |

- 2015 Fish Survey Results Segments 3 and 4 Downstream of confluence of Trib (WBIC 125600)

| WBIC   | Waterbody Name | Station | Station Name | Score | Rating    | Verified Natural Community |
|--------|----------------|---------|--------------|-------|-----------|----------------------------|
| 125100 | Plum Creek     | 1       | 53201        | 70    | Excellent | CWMS                       |
| 125100 | Plum Creek     | 2       | 53511        | 60    | Fair      | CCHW                       |
| 125100 | Plum Creek     | 4       | 10016599     | 50    | Fair      | CWHW                       |
| 125100 | Plum Creel     | 6       | 10043676     | 30    | Poor      | MAC                        |
| 125100 | Plum Creel     | 5       | 10015580     | 30    | Poor      | CWHW                       |
| 125100 | Plum Creek     | 3       | 10016874     | 50    | Fair      | CWHW                       |

### **Habitat survey results**

- The quantitative habitat score in segment 2 was (50) at Man-Cal Rd in 2015, which is rated as Good. However, at Man-Cal Rd, the stream is still limited by flow and habitat. There are significant nonpoint source issues leading to bank erosion and deposition of fine sediment. However, it is likely that even with improvements to these human impacts it may still be naturally limited and obtain poor fish IBI scores within segment 2.
- The quantitative habitat scores in Segment 3 and 4 ranged from (40-57) in 2015 and rated Fair to Good. Sites in these segments continue to be heavily impacted by non-point source issues. Bank erosion, deposition of fines, and lack of fish cover all significantly depress the scores throughout these segments.

### **Discussion**

Segments 1 and 2 of Plum Creek near Forest Junction SD are small and minimally diverse. A well-defined channel exists. The increased flow contribution from the continuous discharge operation from Forest Junction has at minimum provided adequate flows to sustain a limited forage fish community below the discharge. Above the discharge, the stream is highly dependent on overland flow and is seasonally intermittent limiting available habitat for fish and other aquatic life. It should be noted that below the discharge, as the stream flows north, there are limited surface water contributions other than the Forest Junction SD until the confluence of WBIC 125600. Without the discharge from Forest Junction SD, segment 2 may be seasonally intermittent during hot and dry periods making it difficult for a limited forage fish community to be sustained year-round. The survey from 2022 confirms that Segment 2 is a highly transitional segment of stream that transitions from macroinvertebrate (LAL) above the outfall to a Warm Transitional Headwater (LFF) downstream to UNT WBIC 125600 where it then transitions to warmwater.

In addition, Plum Creek in its entirety is highly influenced from non-point sources of pollution in the form of suspended sediment and nutrients. Significant bank erosion and degraded habitat also factor into the fish community degradation throughout the system.

Segment 2 should clearly not be considered LAL, as it is already supporting an existing fish community. As work is completed to address non-point sources of pollution in the watershed and return storage capacity to the system, the stream reaches near Forest Junction should be able to support, at minimum, a limited warm transitional headwater (LFF) community of fishes and other aquatic life.

If ch. NR 104 is updated, Segment 1 could be added to the code as LAL based on naturally low flow, and LFF may be appropriate for Segment 2. However, a Use Attainability Analysis would be required to support these code changes. Segment 3 and 4 should not be considered LAL or LFF.

*(cont.)*

**Photos**

Plum Creek looking downstream from CTH K (2022)



Plum Creek at Man-Cal Road (2015)



# Natural Community Verification Report

Waterbody Name (WBIC): PLUM CREEK (125100)

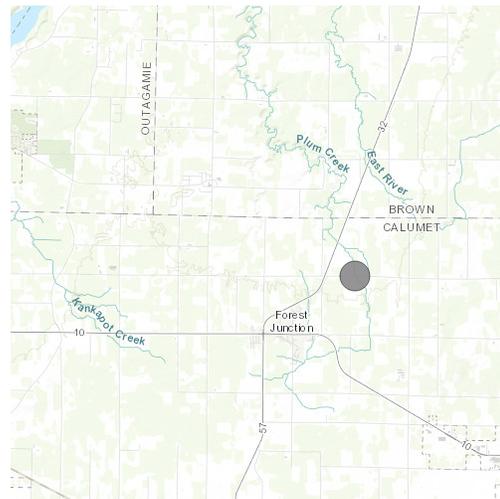
Swims Station ID: 10057232

Survey Sequence Number: 515098618

This NC Verification Report was run on Plum Creek @ CTH K, (10057232), located in CALUMET County with fish Survey Sequence Number 515098618 sampled on September 8, 2022. The Natural Community for this station was verified by Mike is the Best on February 23, 2023.

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

Survey location



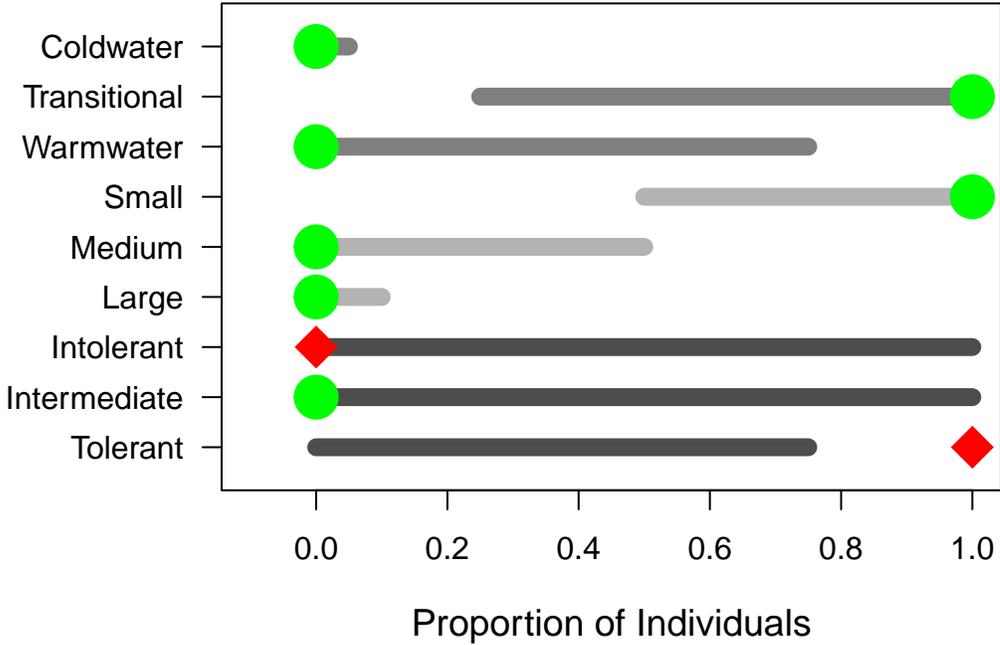
Fish captured

| Species           | Count |
|-------------------|-------|
| BROOK STICKLEBACK | 10    |
| CREEK CHUB        | 32    |

Guild percentages

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

### Warm Transition Headwater Guild Test



Comments from WR Biologist: