Harrop-Procter Watershed Protection Society

Harrop, Slater, Procter and Narrows Creeks 2025 Streamflow & Water Quality Monitoring Results

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Know Your Drainage

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Acronyms

- CFU……Colony Forming Units
- FEC……Filtration Exemption Criteria
- GCDWQ…… Guidelines for Canadian Drinking Water Quality
- HPCC……Harrop-Procter Community Cooperative
- HPWPS……Harrop-Procter Watershed Protection Society
- KEI……Kootenay-Columbia Environmental Innovations Ltd.
- MX2001……A model of sensor which measures water level
- NTU……Nephelometric Turbidity Unit
- QHR……Qualified Hydrometric Reviewer
- RISC……Resources Information Standards Committee
- SG……Staff Gauge
- SWTO…… Surface Water Treatment Objectives

Executive Summary

The Harrop-Procter Watershed Protection Society (HPWPS) continued monitoring streamflow and water quality in Harrop, Slater, Narrows, and Procter Creeks throughout the 2025 monitoring season to support community watershed protection and inform forest management. Monitoring focused on streamflow timing and magnitude, and key water quality parameters, including turbidity, coliforms, specific conductivity, and pH.

Streamflow conditions during 2025 followed a coherent seasonal pattern across all four creeks, characterized by a gradual spring rise, a moderate freshet, and a steady recession into summer and fall low-flow conditions. The timing of freshet was consistent with historical observations; however, return to low flows occurred earlier than average, consistent with reduced winter snowpack. Peak flows were lower than those observed during wetter years, resulting in limited flow-related impacts such as flooding, channel instability, or sustained sediment transport. However, interpretation of freshet magnitude at Narrows and Procter Creeks remains constrained by historical data gaps caused by sensor failures in prior years.

Turbidity results indicate that all four creeks exceeded 1 NTU at times during periods of elevated flow, which is typical for regional surface waters during spring runoff. The frequency and magnitude of turbidity exceedances were low, with few samples above 2 NTU and no sustained or extreme turbidity events observed. These results are consistent with the subdued freshet conditions experienced in 2025.

Coliform monitoring showed low E. coli concentrations across all sites. One isolated E. coli result exceeding 20 CFU/100 mL was recorded at Harrop Creek in August 2025, with concentrations returning to low or non-detectable levels in subsequent samples. No exceedances were observed at Slater, Narrows, or Procter Creeks. Harrop Creek consistently exhibited higher fecal and total coliform concentrations than the other sites which is consistent with a pattern observed across multiple monitoring years.

Specific conductivity and pH data collected during the 2025 monitoring season are considered unreliable and were not used for interpretive purposes. Because it is highly unlikely that four independent watersheds would experience identical directional changes in water chemistry over the same time frame, these trends are attributed to instrumentation drift or calibration issues rather than true watershed-scale responses. As a result, the specific conductivity and pH datasets for 2025 are not considered representative of actual water conditions and are disregarded in the assessment of watershed water quality.

Overall station performance during the 2025 monitoring season was good. Discrete discharge measurements aligned well with continuous discharge calculations, supporting confidence in the hydrographs presented in this report. Use of Onset water level sensors minimized diurnal fluctuation and resulted in a largely complete dataset across sites. Slater Creek experienced periodic ice and leaf litter accumulation at the grizzly grate, which required data correction and reduced confidence during affected periods.

Based on the 2025 results, several targeted improvements are recommended to strengthen future monitoring. These include:

- reducing coliform sampling to focus effort during summer and fall,
- reassessing the value and quality assurance requirements of specific conductivity and pH monitoring,
- increasing low-flow discharge measurements where improved resolution is needed, and
- modifying infrastructure at Slater Creek to reduce data quality impacts from debris accumulation.

Collectively, these actions are expected to improve data reliability, reduce post-processing effort, and ensure that monitoring resources remain focused on the most informative metrics for long-term watershed stewardship.

Background

Kootenay-Columbia Environmental Innovations Ltd. (KEI) was retained by the Harrop-Procter Watershed Protection Society (HPWPS) to conduct streamflow (i.e., discharge)

monitoring at Harrop Creek, Slater Creek, Narrows Creek and Procter Creek starting in the spring of 2020, and report on water quality metrics sampled by HPWPS's board members. Water quality samples were analyzed using desktop water quality instruments owned by HPWPS or by Passmore Laboratories.

The HPWPS is a sister organization of Harrop-Procter Community Cooperative (HPCC), which manages forests within the monitored watersheds and runs a sawmill utilizing the harvested timber. HPCC's mandate is to "practice socially and environmentally progressive forestry that protects local watersheds while creating sustainable jobs in our community." The HPWPS's mandate is to ensure "that the Community Forest's day-to-day operations are undertaken with water protection and other ecological values in mind." HPWPS provides oversight and input into community forest management. It also undertakes education, outreach and research.

Harrop and Narrows Creeks have been monitored for their water quality and discharge since 2002, while Procter and Slater Creeks began being monitored in the spring of 2021. The monitoring aligns with the HPWPS and HPCC's mandates and is intended to ensure that both organizations have the information they need to fulfill their mandates.

As of 2023, Living Lakes Canada (LLC), a water stewardship non-governmental organization, has offered additional assistance to ensure that the data collected at Harrop and Procter Creeks is of the best quality possible. To do this, Living Lakes Canada has offered to compensate KEI for any additional site visits and flow measurements over the contract between KEI and HPWPS to collect the best possible data at those two sites. In return, the data from those sites is made available through the Columbia Basin Water Hub, a free database created and managed by LLC.

Study Objectives and Scope

Based on KEI's roles and responsibilities, its objectives were to collect, analyze, and report on discharge data in line with the BC Hydrometric Resources Information Standards Committee (RISC) standards. The discharge data is presented in this report and is provided alongside a comprehensive spreadsheet containing each calculation used to calculate the discharge data.

KEI also presents the water quality data for the four creeks in the scope, including:

- specific conductivity,
- pH,
- turbidity,

- verified E. coli,
- fecal (thermotolerant) coliforms, and
- total coliforms.

Results and Discussion

The following sections will display the streamflow and water quality results of the 2025 monitoring season. The importance and purpose of each monitoring metric are outlined, and all trends observed in the data are discussed.

Since many of the residents of Harrop and Procter villages rely on surface water for their consumption, all aspects of the water quality will be discussed compared to the Drinking Water Treatment Objectives for Surface Water in BC (SWTO). The SWTO includes standards for untreated source water and treated water. The SWTO is limited to monitoring microbiological parameters such as bacteria (coliforms), protozoa and viruses in addition to turbidity. When comparison is needed outside the SWTO's scope, the Guidelines for Canadian Drinking Water Quality (GCDWQ) will be referenced.

Referencing the water quality samples collected by the HPWPS board members and analyzed either by themselves or by an accredited lab is in no way meant to be used to make decisions on the potability of drinking water. To determine the potability of drinking water, the first step is to consult with Interior Health and follow their source-specific requirements for determining water potability. This analysis aims to observe general water quality and quantity trends over the long term only.

Streamflow Analysis

To illustrate streamflow conditions recorded in 2025, the following hydrographs were produced:

- **Annual Hydrographs Comparison** – Displays hydrographs from all four creeks overlaid to compare the timing and relative magnitude of flows during 2025.
- **Annual Hydrographs Comparison (Low Flow)** – Presents the same data with a reduced vertical scale to allow closer examination of low-flow conditions.
- **Annual Hydrographs for Each Creek** – Shows 2025 daily average discharge (red) alongside discrete discharge measurements collected throughout the year.
- **Annual Hydrographs (Low Flow)** – Displays the same data as above, with a zoomed scale to emphasize low-flow periods.

Timing and Magnitude of Freshet

The timing and magnitude of freshet are best assessed using the annual hydrograph for each site. In these plots, the 2025 calculated daily average discharge is shown in red, overlaid on the historical daily median discharge. Shaded bands indicate the historical minimum and maximum recorded flows (light blue) and the 25th to 75th percentile range (dark blue), based on all available historical data.

At both Harrop and Slater Creeks, the onset of freshet occurred at approximately the same time as observed historically, beginning in late April to early May. While freshet magnitude through May and early June was generally near average, a return to low-flow conditions occurred earlier than typical. This earlier-than-average decline is consistent with reduced snowpack conditions during the 2025 winter, as confirmed by snow water equivalent data from the Red Fish snow pillow Figure 1.

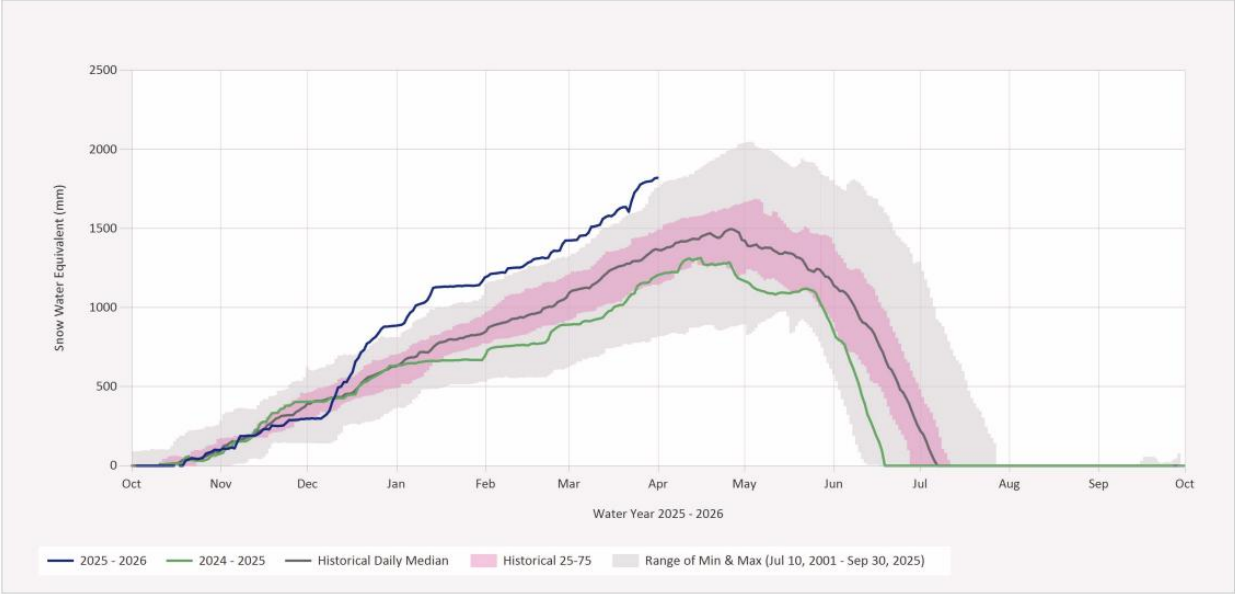


Figure 1: Snow Water Equivalent at Red Fish Snow Pillow (2025 Melt in Green)

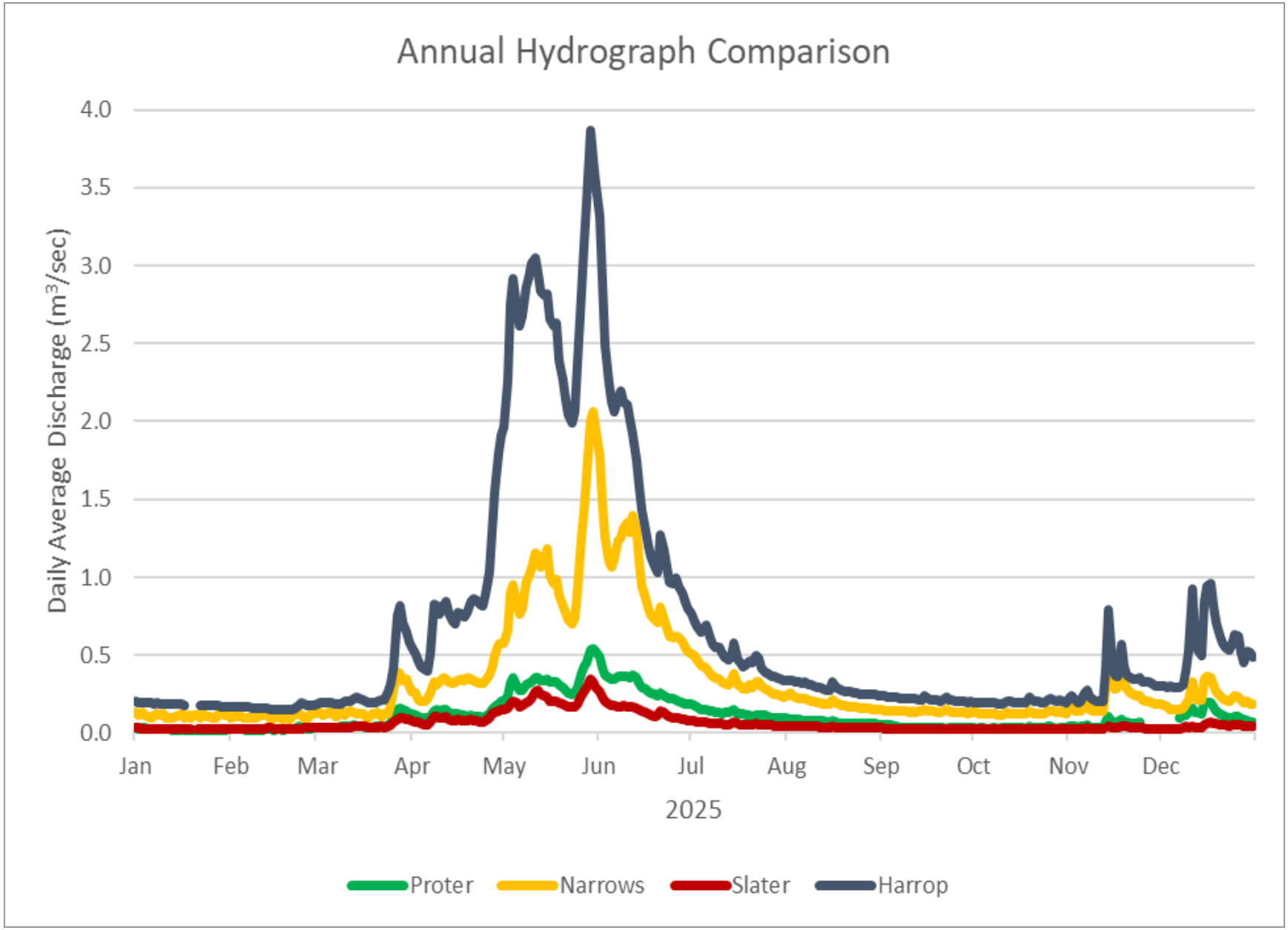
This pattern is less evident at Narrows and Procter Creeks, likely due to gaps in historical freshet data caused by past MX2001 sensor failures. Loss of data during key freshet periods in previous years has resulted in artificially low historical discharge values for June and July at these sites, limiting the reliability of comparisons between 2025 and historic freshet conditions.

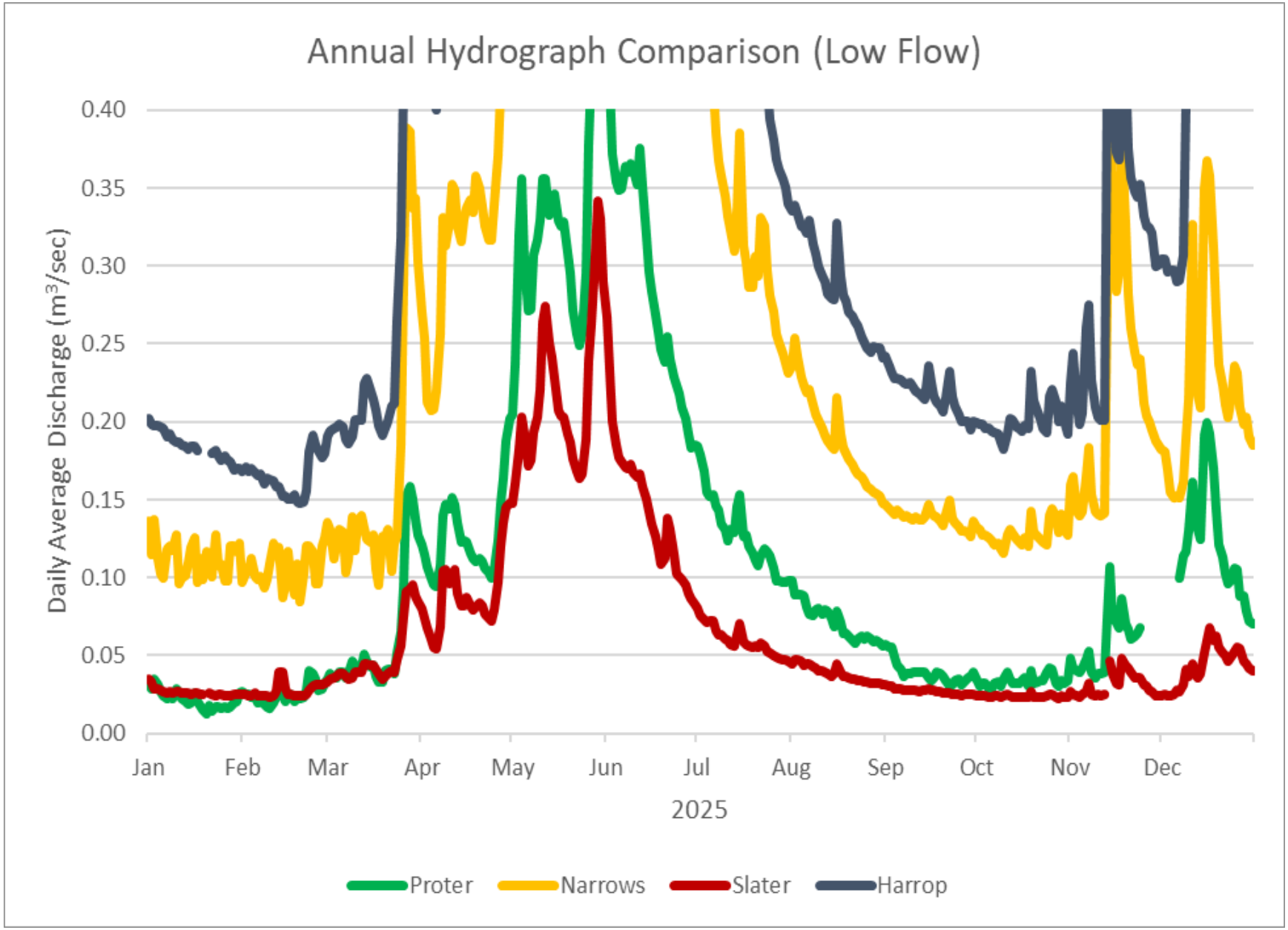
Timing and Magnitude of Low-Flows

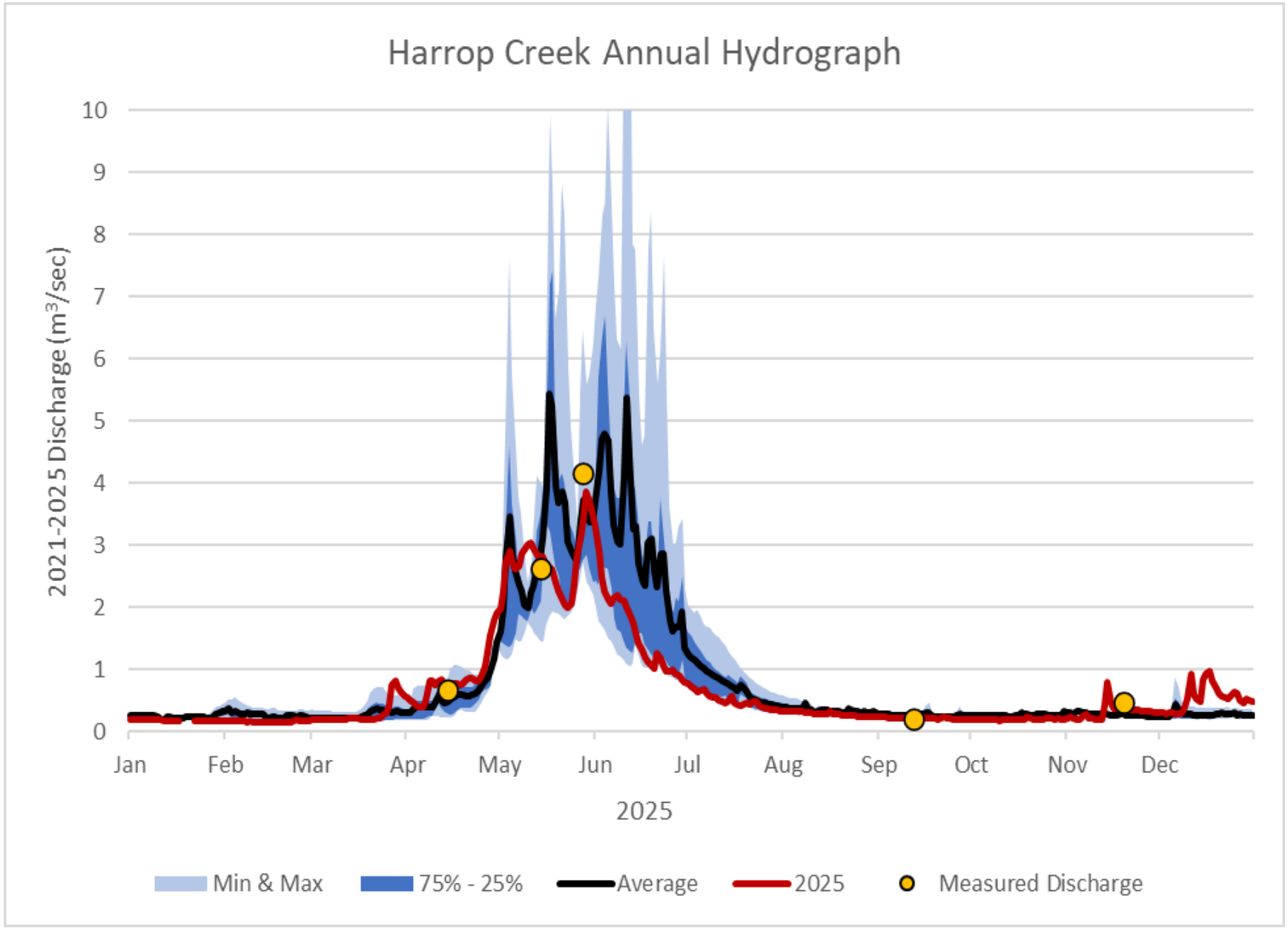
Low-flow conditions across the four creeks followed a broadly consistent pattern. Flows were generally near historical averages from July through September, followed by a notably dry fall that produced some of the lowest flows on record at all sites. These

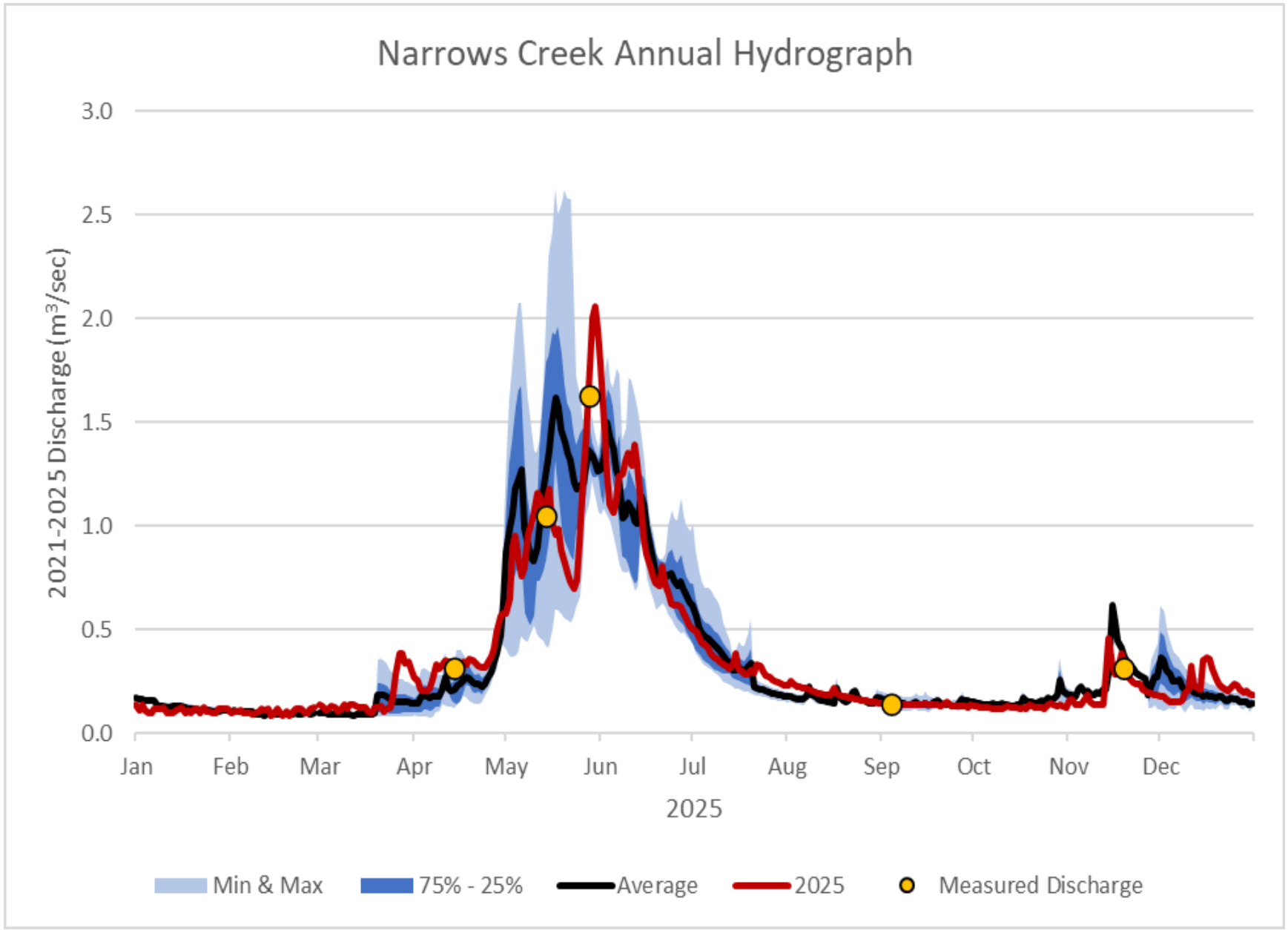
conditions were subsequently interrupted by elevated flows in late November and December, associated with unusually warm air temperatures and precipitation falling as rain rather than snow.

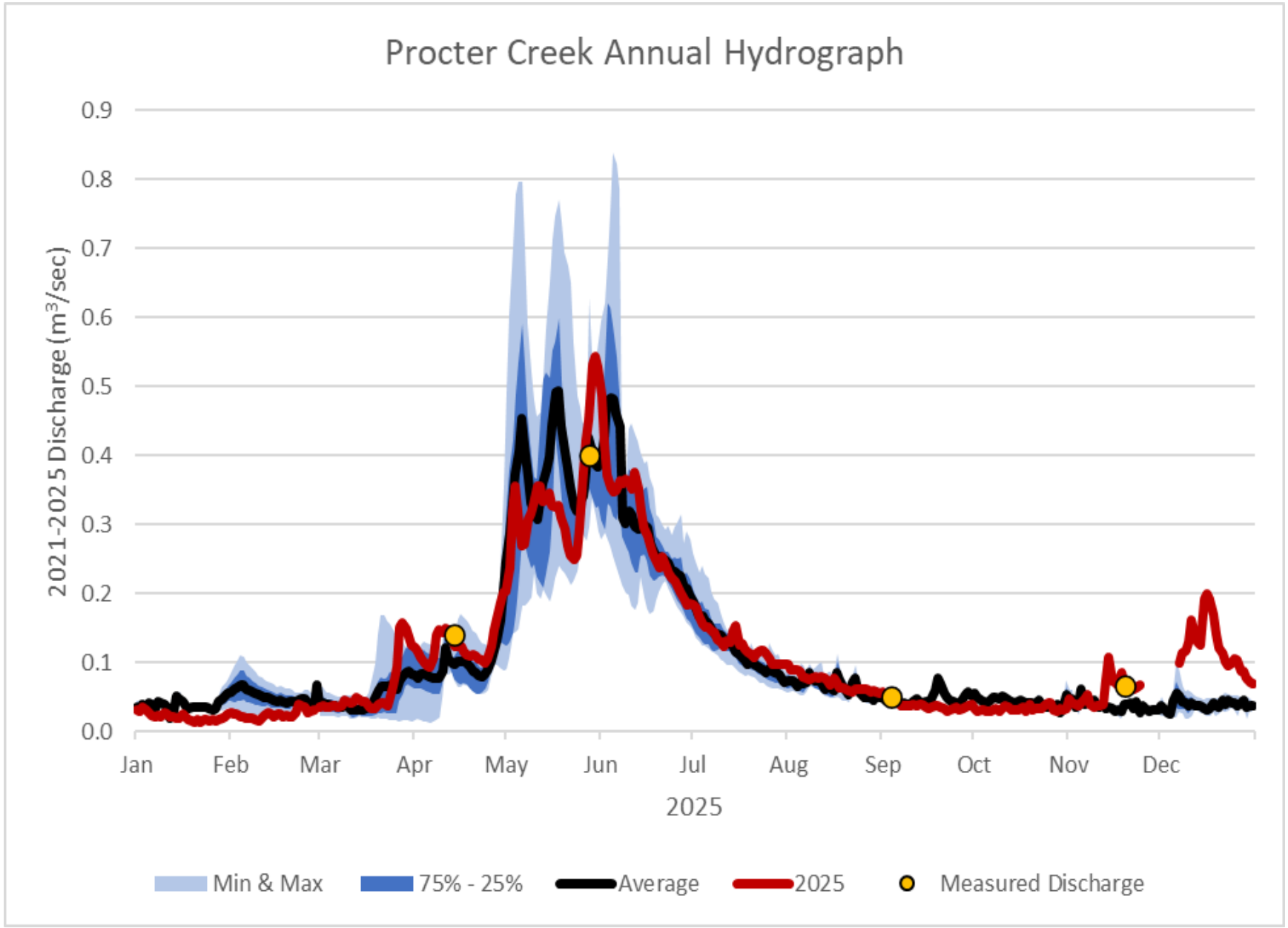
Interpretation of historical low-flow conditions is constrained by data losses associated with past MX2001 failures. In addition, the monitoring program budgets for a limited number of discharge measurements, which limits confidence in the lower portion of the stage-discharge relationship. Despite this, the low-flow discharge measurements collected in 2025 aligned well with calculated continuous discharge, resulting in moderate confidence in the low-flow calculated discharge at all four creeks.

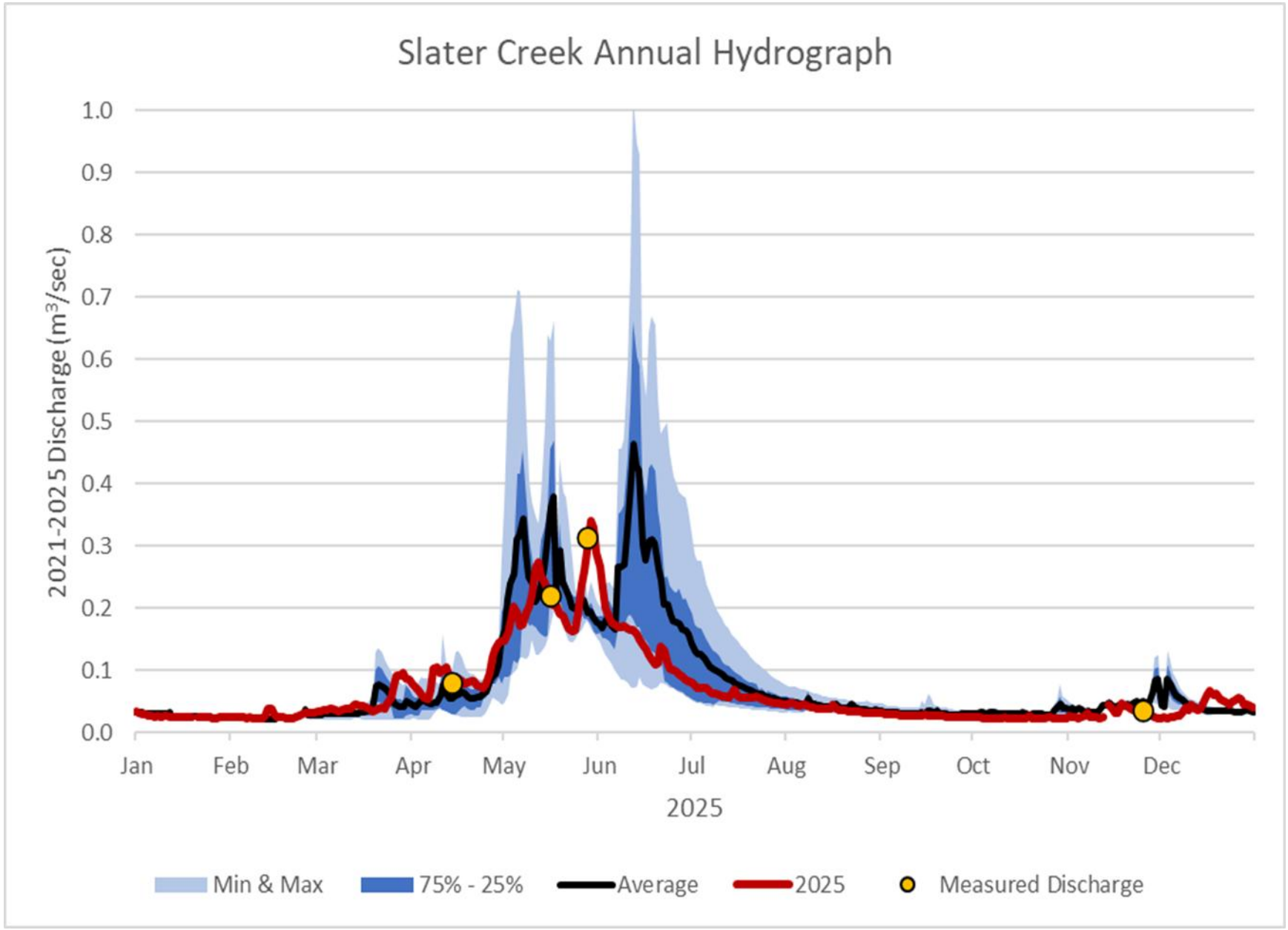

Annual Hydrograph Comparison
Daily Average Discharge (m³/sec)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Proter
Narrows
Slater
Harrop

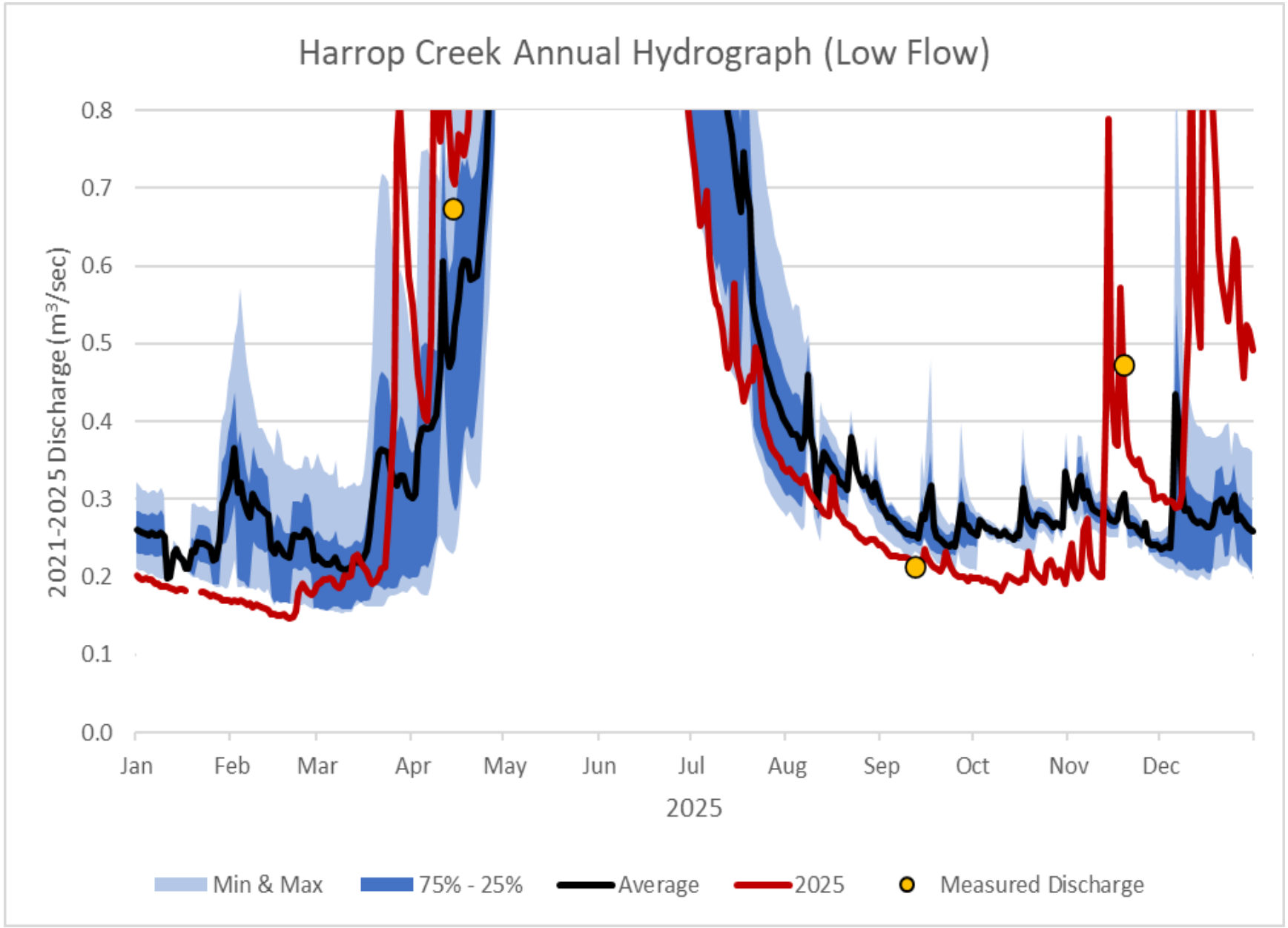

Annual Hydrograph Comparison (Low Flow)
Daily Average Discharge (m³/sec)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Proter
Narrows
Slater
Harrop

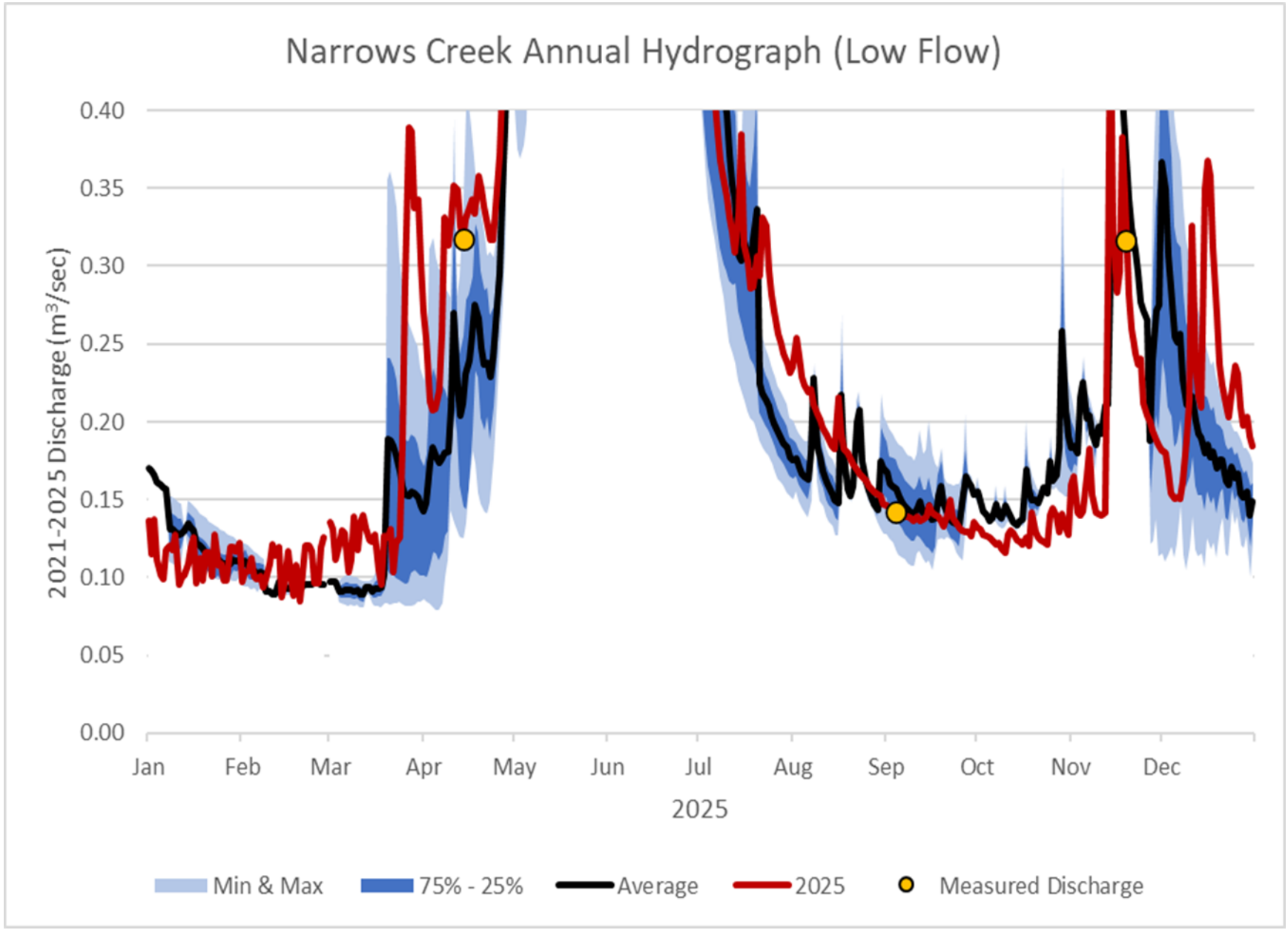

Harrop Creek Annual Hydrograph
2021-2025 Discharge (m³/sec)
10
9
8
7
6
5
4
3
2
1
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Min & Max
75% - 25%
Average
2025
Measured Discharge

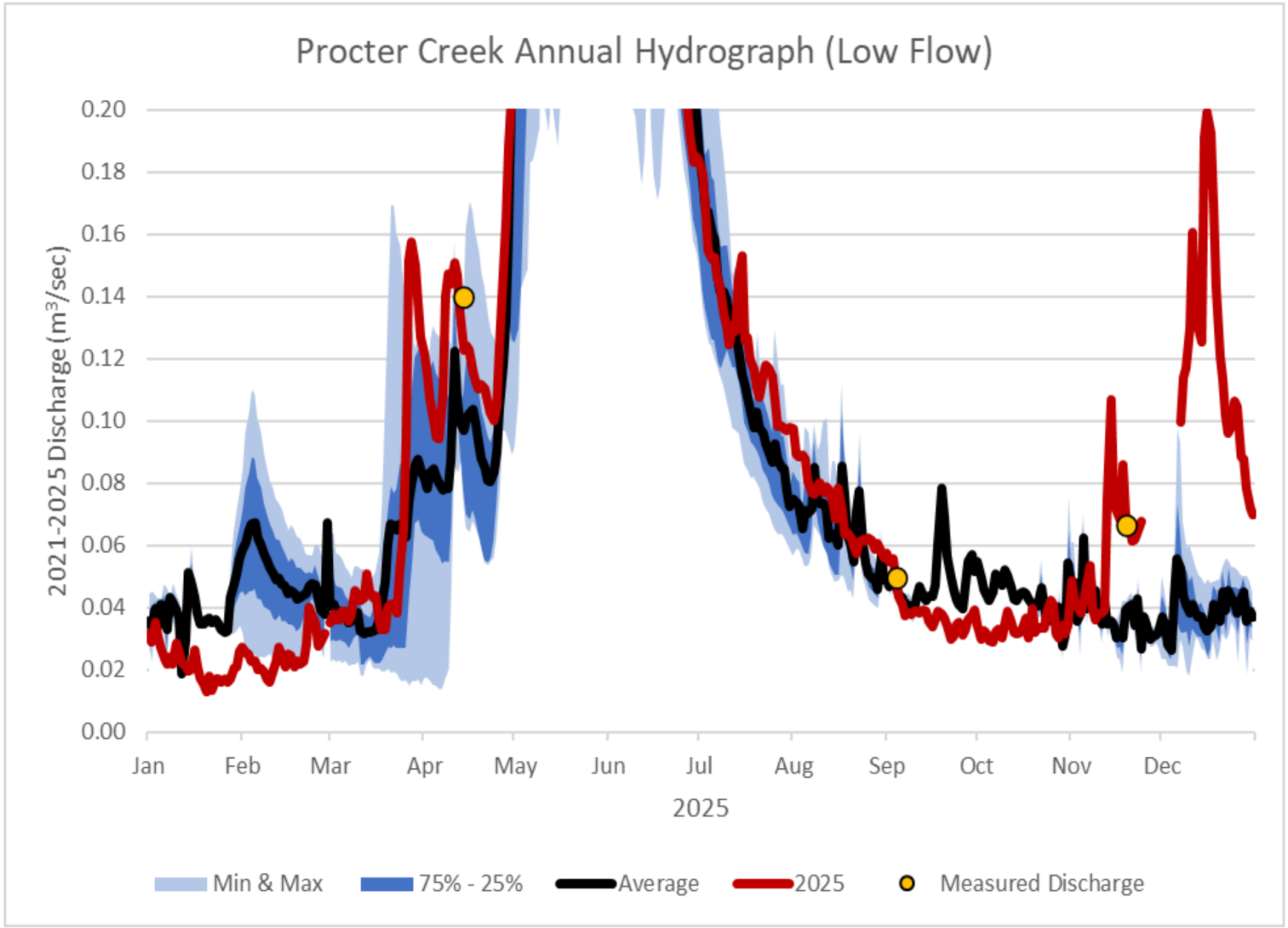

Narrows Creek Annual Hydrograph
3.0
2.5
2.0
1.5
1.0
0.5
0.0
2021-2025 Discharge (m³/sec)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Min & Max
75% - 25%
Average
2025
Measured Discharge

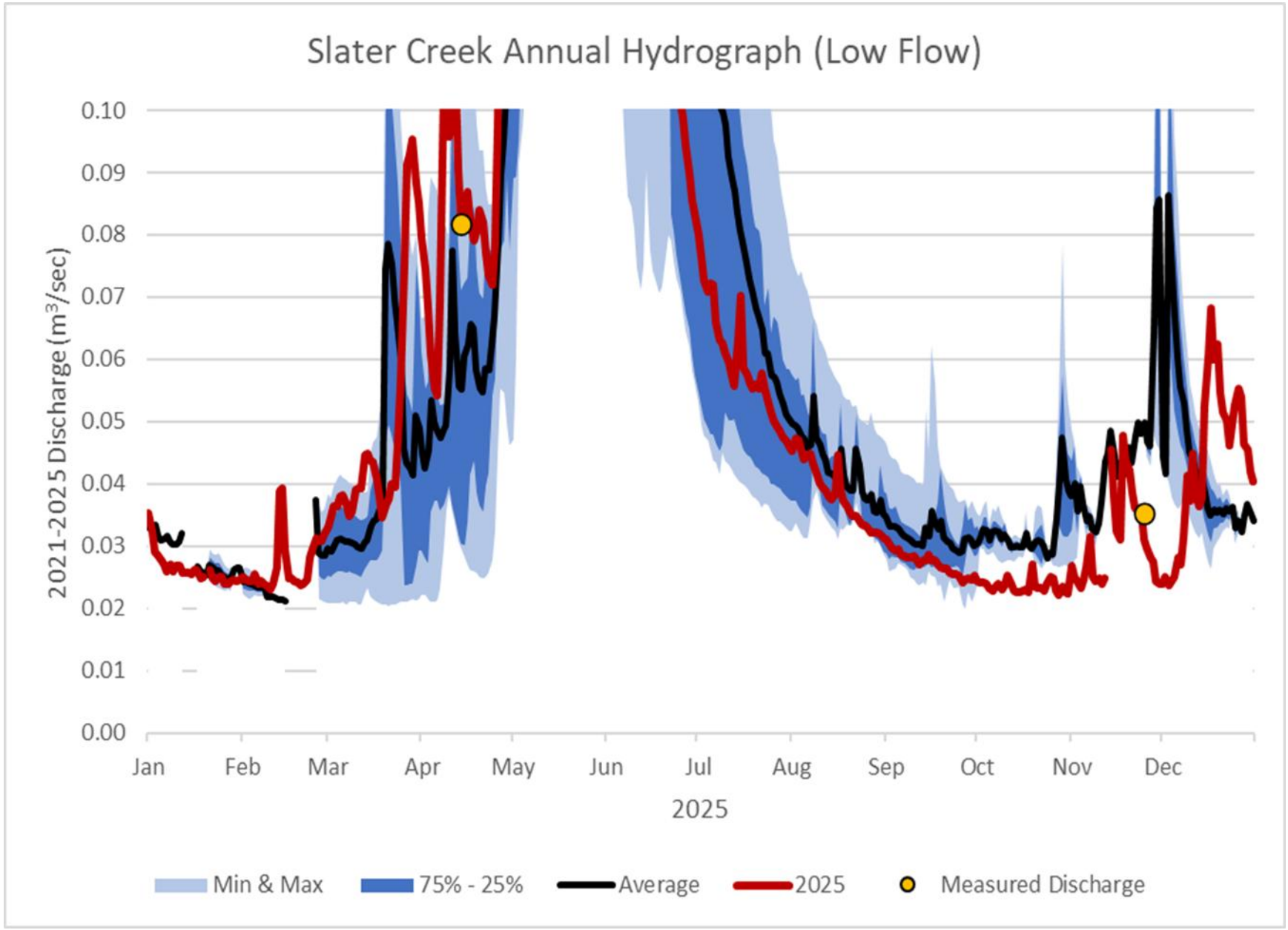

Procter Creek Annual Hydrograph
2021-2025 Discharge (m³/sec)
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Min & Max
75% - 25%
Average
2025
Measured Discharge


Slater Creek Annual Hydrograph
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
2021-2025 Discharge (m³/sec)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Min & Max
75% - 25%
Average
2025
Measured Discharge


Harrop Creek Annual Hydrograph (Low Flow)
2021-2025 Discharge (m³/sec)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Min & Max
75% - 25%
Average
2025
Measured Discharge


Narrows Creek Annual Hydrograph (Low Flow)
2021-2025 Discharge (m³/sec)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Min & Max
75% - 25%
Average
2025
Measured Discharge


Procter Creek Annual Hydrograph (Low Flow)
2021-2025 Discharge (m³/sec)
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Min & Max
75% - 25%
Average
2025
Measured Discharge


Slater Creek Annual Hydrograph (Low Flow)
2021-2025 Discharge (m³/sec)
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Min & Max
75% - 25%
Average
2025
Measured Discharge

Turbidity

Turbidity is a commonly monitored water quality parameter as it indicates potential pathogens in the water, provides a surface area upon which bacteria can grow, and negatively impacts water treatment by decreasing the effectiveness of UV and chlorine disinfection and prematurely clogging filters (B.C. Ministry of Forests and Range, 2010) (BC Ministry of Health, 2012). Additionally, turbidity is cost-effective to monitor. Because of the value of turbidity data and ease of monitoring, the dataset collected by HPWPS's board members for the 2024 monitoring periods is of excellent value for analyzing water quality in all four creeks.

The SWTO sets the requirements for the treatment of surface water, including turbidity. While the villages of Harrop and Procter do not treat their water, the standards can be useful for comparison to the current untreated source water but cannot be extrapolated to determine potability. The SWTO notes that for treated water, turbidity "is generally acceptable [in source water] when less than 1 NTU [nephelometric turbidity unit]"(BC Ministry of Health, 2012). Turbidity becomes visible when greater than 5 NTU.

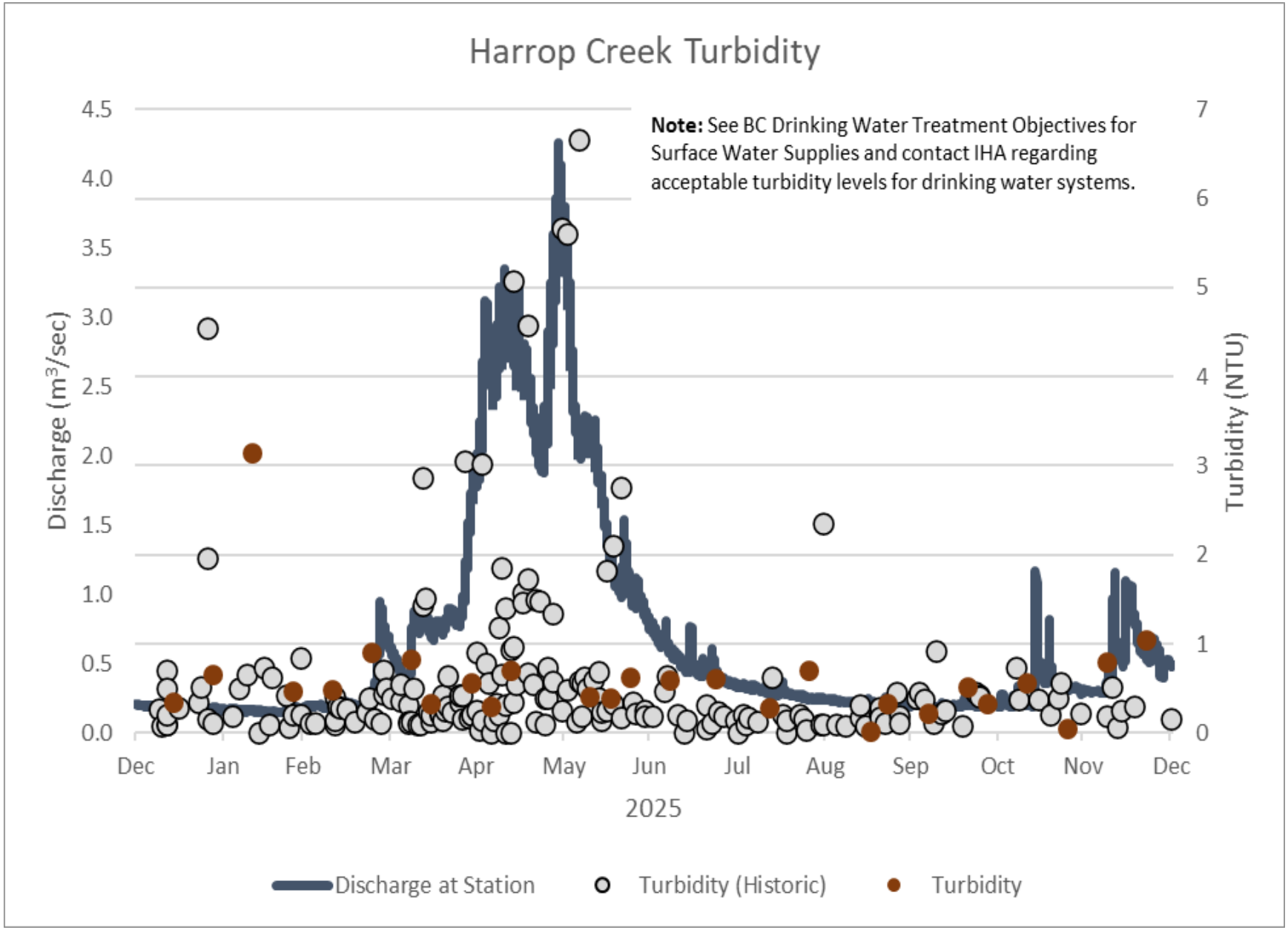
Turbidity Results

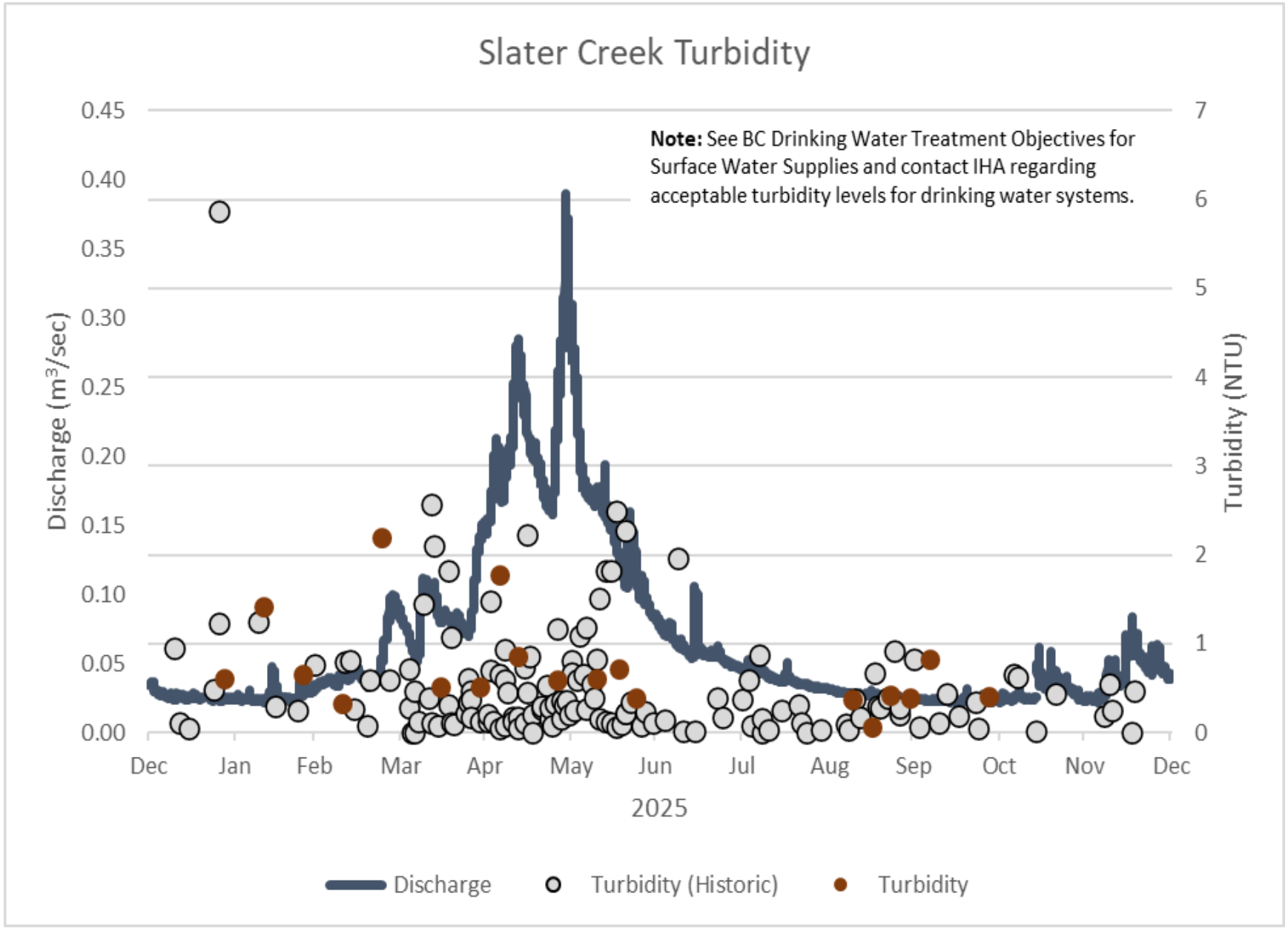
Reviewing the data in the graphs below shows that all four creeks have reported turbidity values above 1 NTU, though this is normal for all major creeks in the West Kootenays during times of high flows. It is somewhat difficult to compare each creek as turbidity samples were not necessarily collected on the same date or time. However, we can observe the number of turbidity samples above 1 NTU.

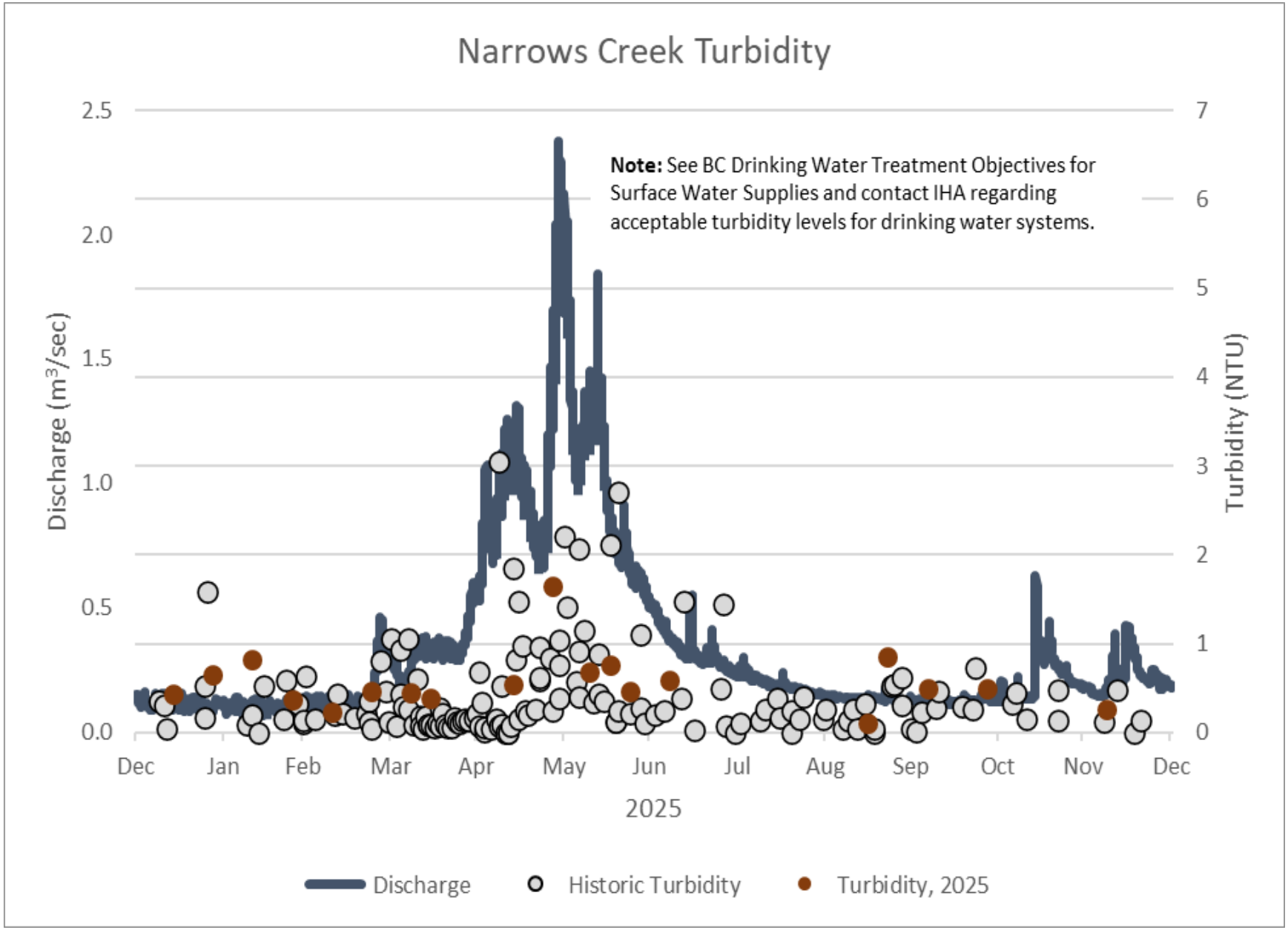
Turbidity Results Greater than 1NTU:

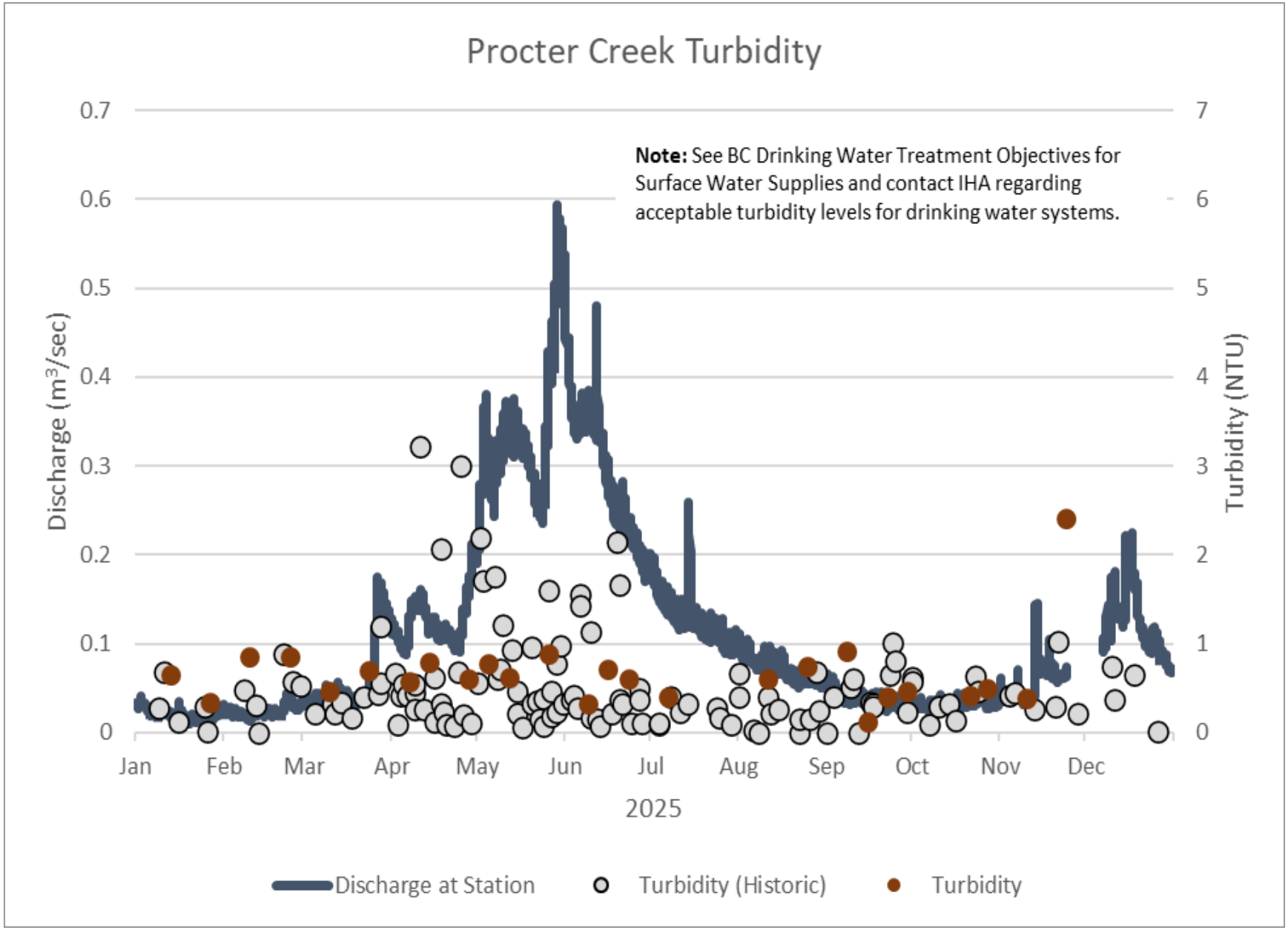
- Harrop Creek: 2
- Slater Creek: 3
- Narrows Creek: 1
- Procter Creek: 1

When observing the points above 1 NTU, we can see that none of the results were above 4 NTU. The turbidity results showed no significant turbidity events, which is in line with the mild and early freshet.


Harrop Creek Turbidity
Note: See BC Drinking Water Treatment Objectives for Surface Water Supplies and contact IHA regarding acceptable turbidity levels for drinking water systems.
Discharge (m³/sec)
Turbidity (NTU)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
7
6
5
4
3
2
1
0
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Discharge at Station
Turbidity (Historic)
Turbidity


Slater Creek Turbidity
Note: See BC Drinking Water Treatment Objectives for Surface Water Supplies and contact IHA regarding acceptable turbidity levels for drinking water systems.
Discharge (m³/sec)
Turbidity (NTU)
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
7
6
5
4
3
2
1
0
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Discharge
Turbidity (Historic)
Turbidity


Narrows Creek Turbidity
Note: See BC Drinking Water Treatment Objectives for Surface Water Supplies and contact IHA regarding acceptable turbidity levels for drinking water systems.
Discharge (m³/sec)
Turbidity (NTU)
2.5
2.0
1.5
1.0
0.5
0.0
7
6
5
4
3
2
1
0
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Discharge
Historic Turbidity
Turbidity, 2025


Procter Creek Turbidity
Note: See BC Drinking Water Treatment Objectives for Surface Water Supplies and contact IHA regarding acceptable turbidity levels for drinking water systems.
Discharge (m³/sec)
Turbidity (NTU)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
7
6
5
4
3
2
1
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Discharge at Station
Turbidity (Historic)
Turbidity

Coliforms

Coliforms may be the most critical water quality parameter commonly monitored as certain coliforms, such as E. coli, are known to be detrimental to human health. Unfortunately, compared to physical and chemical water quality parameters such as pH or turbidity, coliforms must be analyzed in an accredited laboratory, have moderately high analysis costs, and must be analyzed within a short period after sampling.

For treated water, the Surface Water Treatment Objectives (SWTO) limits E. coli, fecal coliforms and total coliforms to zero detectable colony-forming units per 100mL (CFU/100mL). The only guidance it gives on the presence of E. coli in untreated water is in regards to the filtration exception criterion (FEC). Water providers must meet this criterion, among others specified specifically by Interior Health, to be exempted from the requirement for filtration treatment. The limits state that "[t]he number of E. coli in raw water does not exceed 20 CFU/100 mL (or if E. coli data are not available less than 100 CFU/100 mL of total coliform) in at least 90% of the weekly samples from the previous six months."

Coliform Results

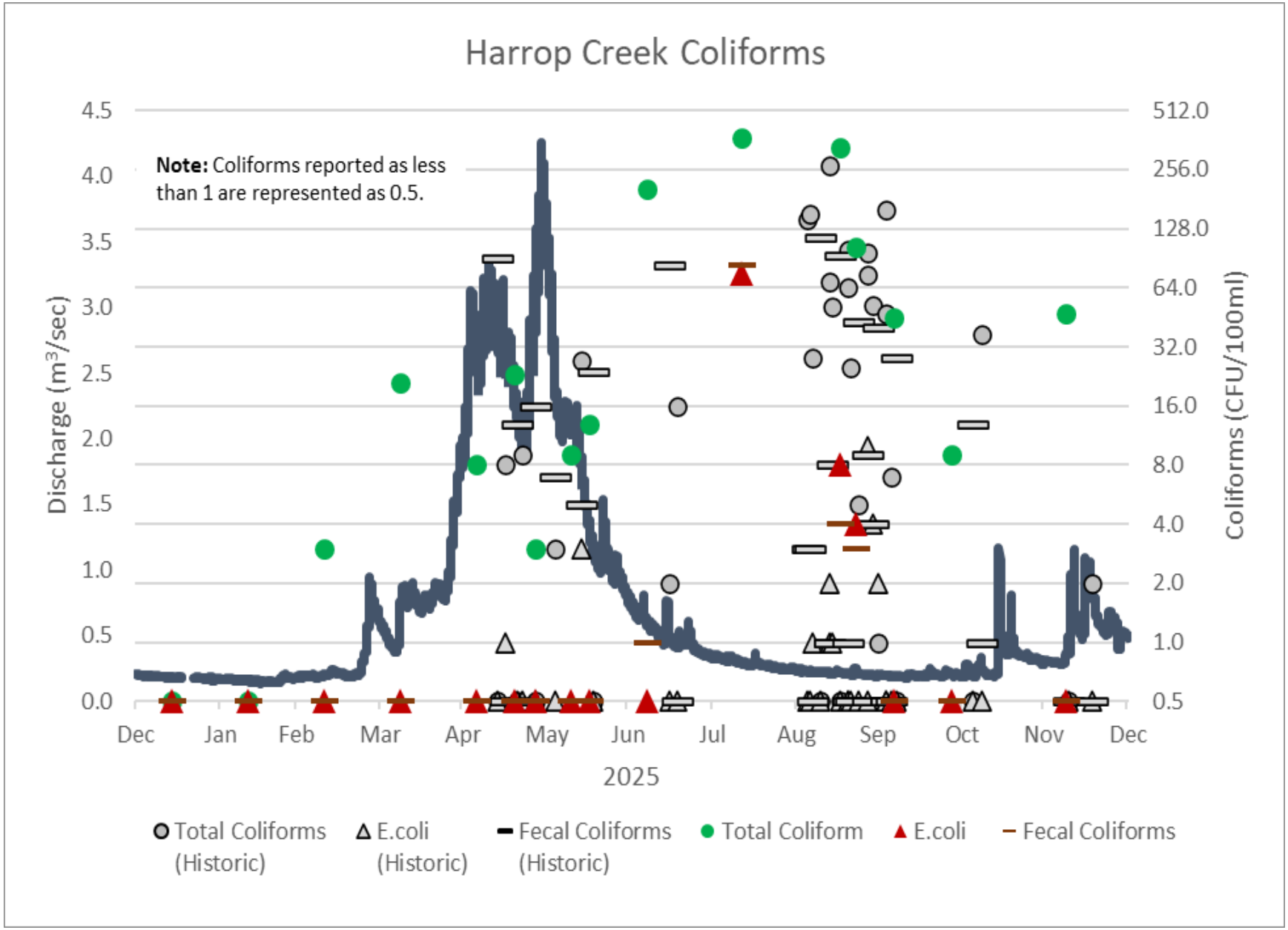
Since the villages of Harrop and Procter do not provide water treatment nor weekly testing, the FEC requirements can only be used to provide context for the results and are not an indicator of potability. The 2024 HPWPS monitoring program collected five coliform samples over 30 days each spring and fall, supplemented by monthly samples throughout the summer and winter.

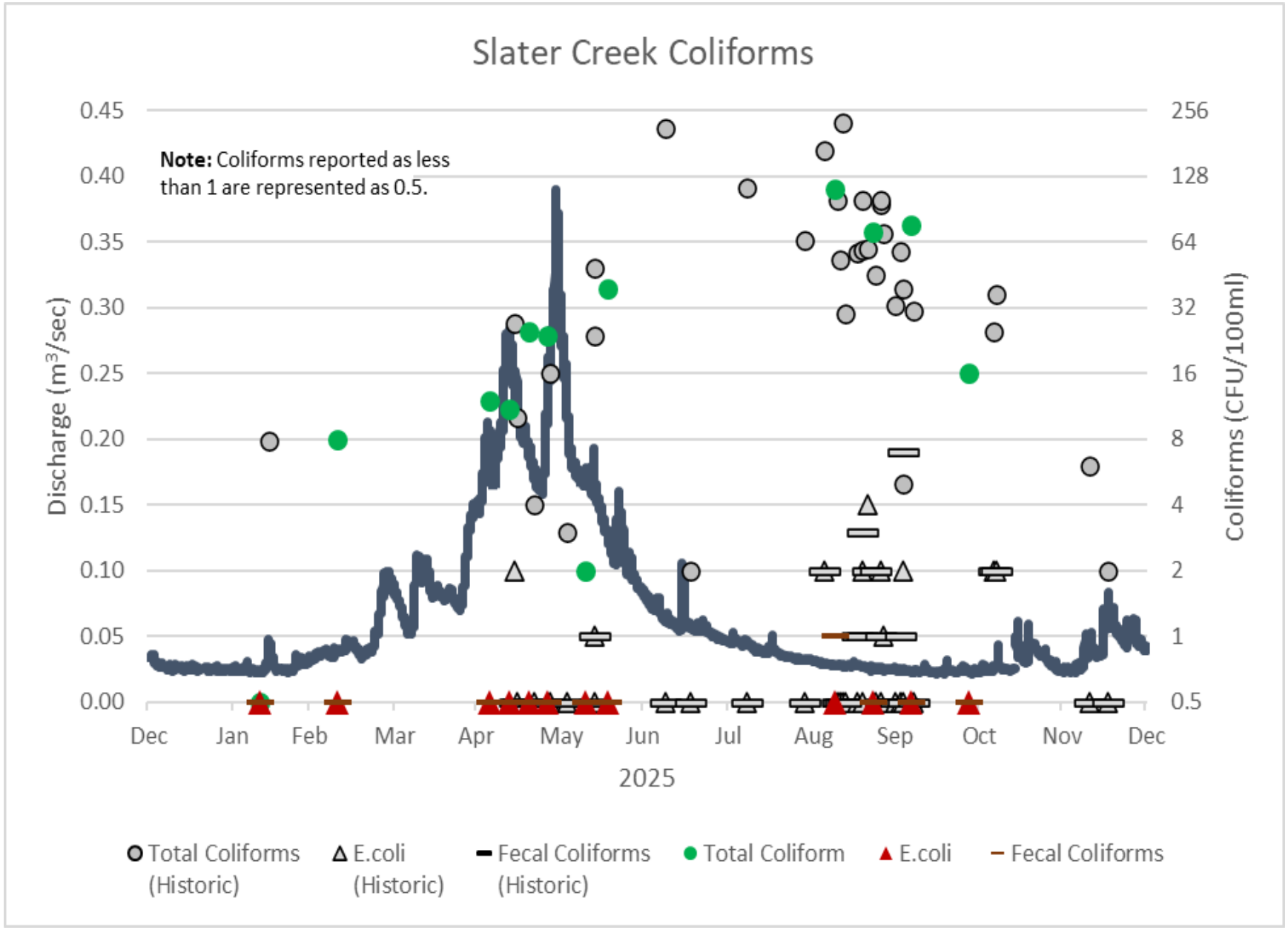
Coliform results from the 2025 monitoring season indicate generally low E. coli concentrations across all four monitored creeks. One E. coli result exceeding 20 CFU/100 mL was recorded at Harrop Creek on August 11, 2025 (76 CFU/100 mL). This exceedance was isolated, with E. coli concentrations returning to lower levels in September and declining to non-detectable levels by October. No other sites recorded E. coli concentrations above 20 CFU/100 mL during the 2025 monitoring period.

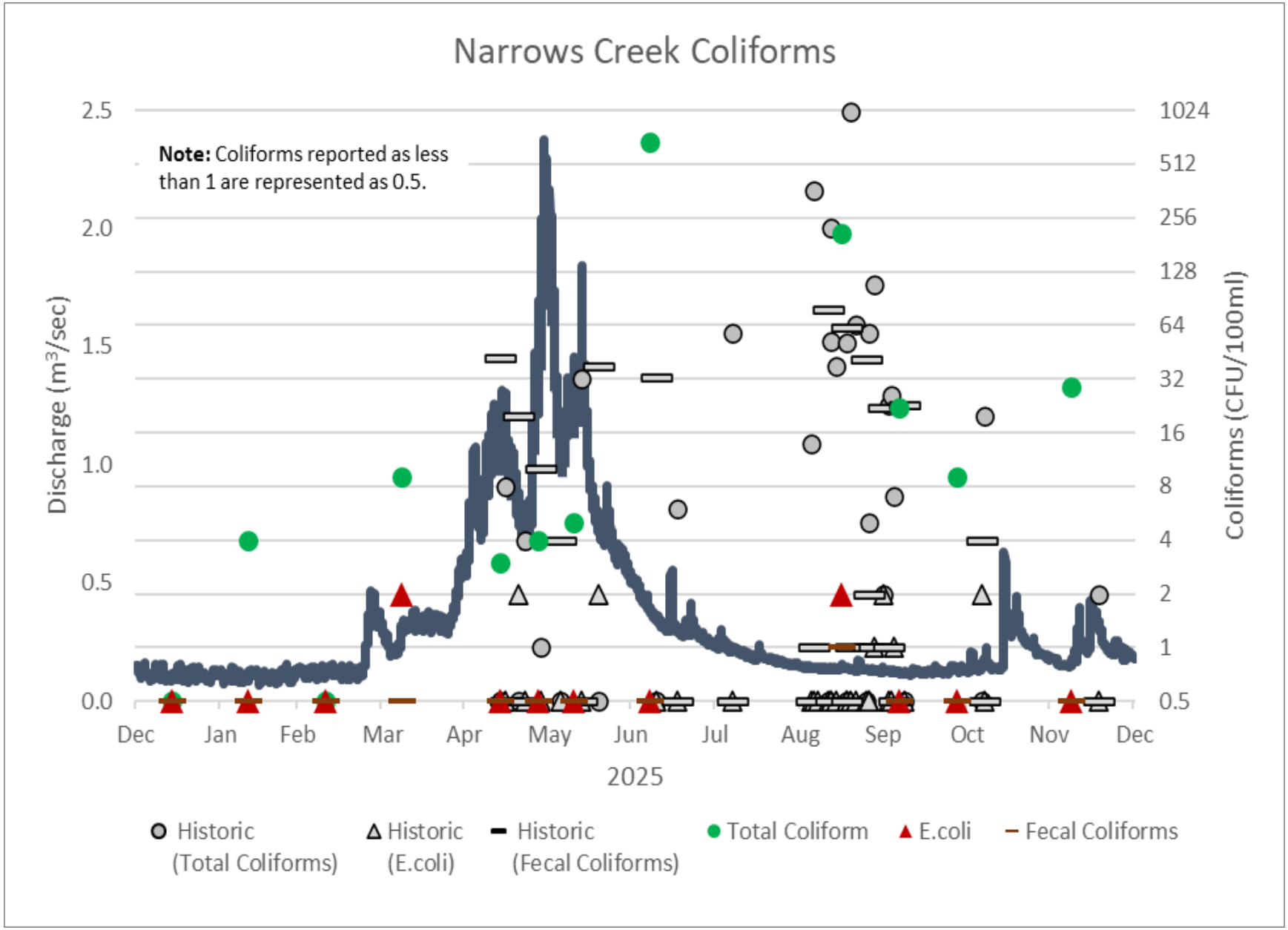
E. coli concentrations at Procter and Slater Creeks were exceptionally low throughout the season, with no positive detections recorded at these sites. Narrows Creek showed limited E. coli presence, with two detections of 2 CFU/100 mL recorded on separate sampling dates. Overall, these results indicate minimal E. coli occurrence at three of the four sites and a single short-duration exceedance at Harrop Creek.

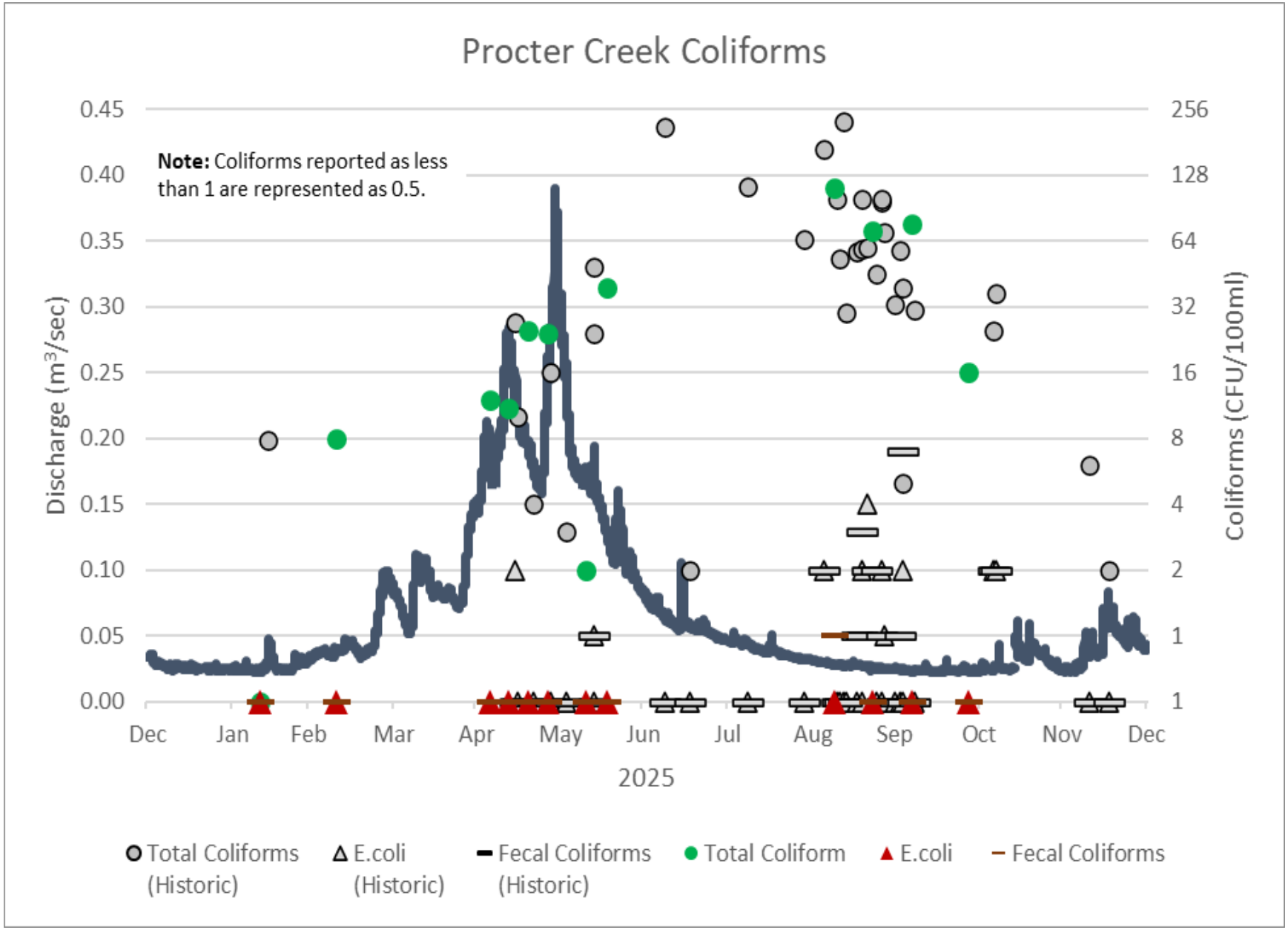
Fecal and total coliforms were detected more frequently than E. coli and were most prevalent during summer and fall sampling periods. Harrop Creek consistently exhibited higher concentrations of coliforms compared to the other creeks. Narrows Creek also showed intermittent detections of fecal coliforms during these periods, while Slater and Procter Creeks generally remained low across all coliform indicators.

The higher frequency and magnitude of coliform detections at Harrop Creek is a pattern observed consistently over multiple monitoring years. A suspected contributing factor is the presence of two lakes within the Harrop Creek drainage, which may increase wildlife activity and organic matter accumulation, both of which can elevate coliform concentrations.


Harrop Creek Coliforms
Note: Coliforms reported as less than 1 are represented as 0.5.
Discharge (m3/sec)
Coliforms (CFU/100ml)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
512.0
256.0
128.0
64.0
32.0
16.0
8.0
4.0
2.0
1.0
0.5
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Total Coliforms (Historic)
E.coli (Historic)
Fecal Coliforms (Historic)
Total Coliform
E.coli
Fecal Coliforms


Slater Creek Coliforms
Note: Coliforms reported as less than 1 are represented as 0.5.
Discharge (m3/sec)
Coliforms (CFU/100ml)
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
256
128
64
32
16
8
4
2
1
0.5
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Total Coliforms (Historic)
E.coli (Historic)
Fecal Coliforms (Historic)
Total Coliform
E.coli
Fecal Coliforms


Narrows Creek Coliforms
Note: Coliforms reported as less than 1 are represented as 0.5.
Discharge (m3/sec)
Coliforms (CFU/100ml)
2.5
2.0
1.5
1.0
0.5
0.0
1024
512
256
128
64
32
16
8
4
2
1
0.5
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Historic (Total Coliforms)
Historic (E.coli)
Historic (Fecal Coliforms)
Total Coliform
E.coli
Fecal Coliforms


Procter Creek Coliforms
Note: Coliforms reported as less than 1 are represented as 0.5.
Discharge (m3/sec)
Coliforms (CFU/100ml)
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
256
128
64
32
16
8
4
2
1
1
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
2025
Total Coliforms (Historic)
E.coli (Historic)
Fecal Coliforms (Historic)
Total Coliform
E.coli
Fecal Coliforms

Specific Conductivity And pH

Specific conductivity and pH were measured throughout the 2025 monitoring season at all four sites. Review of the results indicates a sustained and simultaneous increase in both parameters at all monitored creeks beginning in the latter portion of the monitoring period. Because it is unlikely that four independent watersheds would exhibit the same directional change in water chemistry over the same time frame, these trends are interpreted as an instrumentation or calibration issue rather than a true watershed-scale change.

The upward trends observed in specific conductivity and pH were consistent across sites, further supporting the conclusion that the instruments used by HPWPS volunteers had come out of calibration. Figure 2 and Figure 3 illustrate this pattern at Slater Creek, where specific conductivity and pH values rise steadily between 2023 and 2025, mirroring trends observed at the other sites.

To improve quality assurance and ensure confidence in future water chemistry data, it is recommended that one water sample per quarter be submitted to Passmore Laboratories for professional analysis. These results can then be directly compared to values recorded by HPWPS volunteers. If discrepancies are identified, calibration procedures, field methods, and instrumentation should be reviewed and adjusted accordingly.

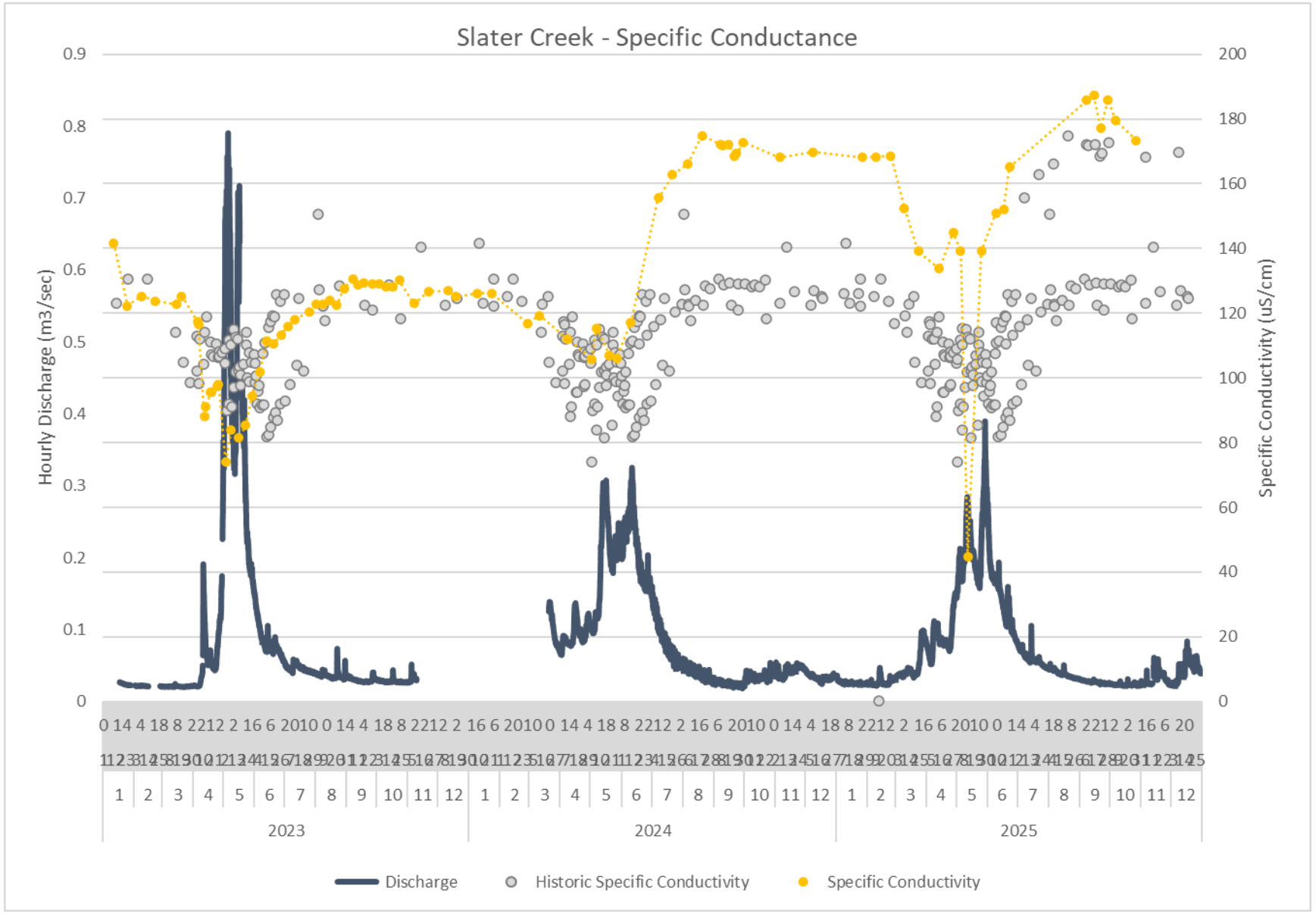


Figure 2: Slater Creek Conductivity Increase Over Time

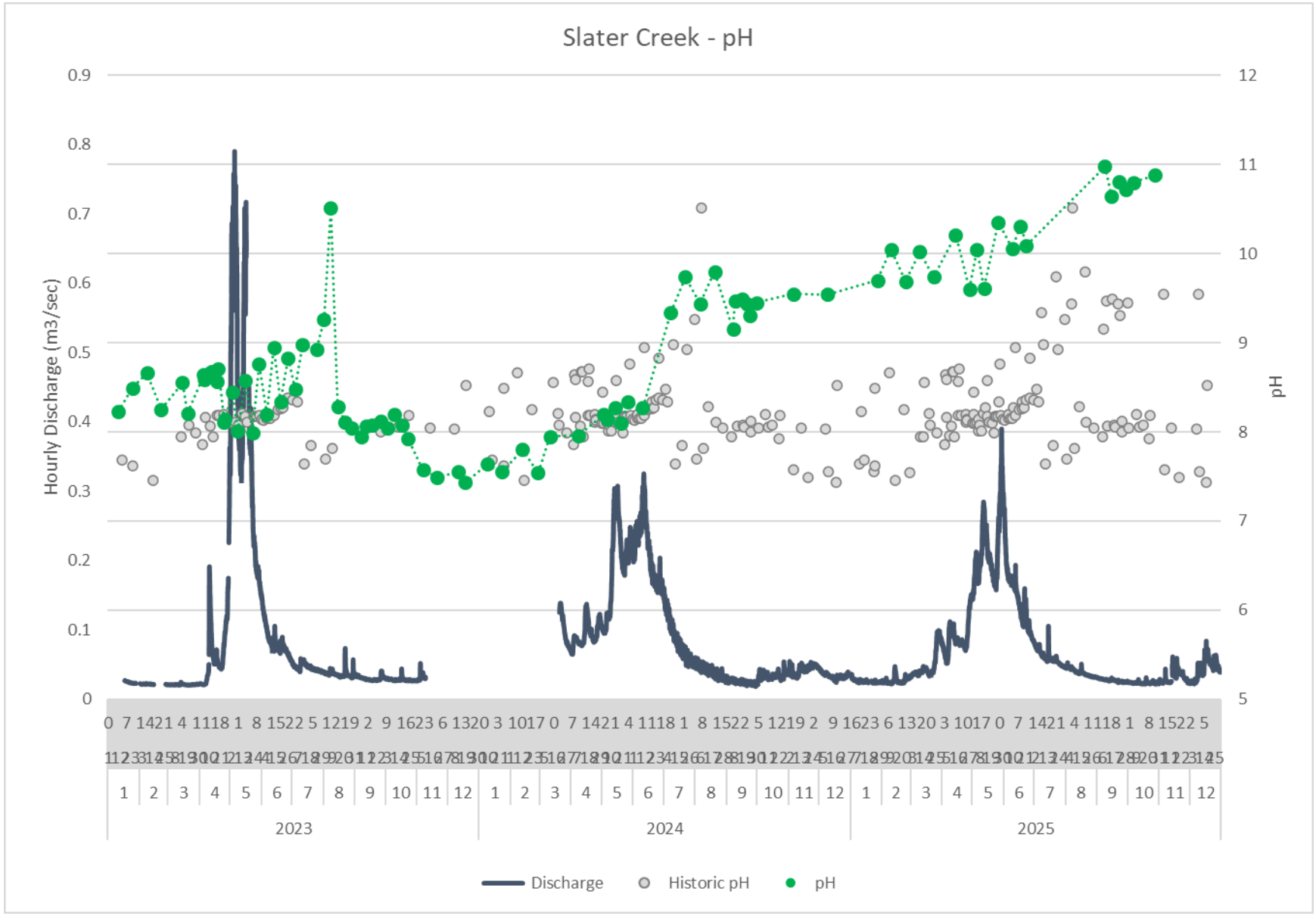


Figure 3: Slater Creek pH increases Over Time

Station Performance

The four to five discrete discharge measurements collected at each site aligned well with the continuously calculated discharge derived from the stage-discharge relationships. This agreement indicates that the continuous discharge values used to generate the hydrographs are generally representative of actual streamflow conditions during the 2025 monitoring season.

Continuous water level data were collected using Onset sensors at all sites. Three of the four sensors were owned by KEI and were loaned to the project while the HPWPS-owned Solinst sensors were removed from the stations due to well-documented diurnal fluctuation issues observed in previous years. As a result of using Onset sensors, the stage data exhibited minimal diurnal fluctuation, and data losses were kept to a minimum. Due to the lack of sensor failures, the daily average discharge could be calculated 98.8% of the time throughout 2025 between all four sites.

In past years, Narrows Creek experienced significant control changes that reduced the accuracy of the calculated hydrographs. Channel controls remained stable through 2024 and 2025, resulting in improved confidence in the discharge estimates for this site during the current reporting period.

Ice and Leaf Litter Blockages at Slater Creek

As shown in Figure 4 and Figure 5, leaf and ice buildup at the grizzly grate at Slater Creek, immediately downstream of the water level sensor, led to inaccurate streamflow data while the blockages occurred. Consequently, the streamflow data collected at Slater is less accurate as the blockages occur incrementally, and no visual or written record is available to confirm when the blockages were present.



Figure 4: Leaf Litter Blockage at Slater Creek



Figure 5: Ice Blockage at Slater Creek

The results of the blockages lead to a need for significant manipulation in Excel to correct, which is both costly and leads to lower data quality. Figure 6 shows the manipulation that was required in 2025 alone at Slater Creek. The yellow data is the actual water level at the station, the white circles are the staff gauge readings taken during site visits, and the green line is the data that was corrected to match the staff gauge readings after the grizzly grate had been cleaned. In 2025 there were 11 separate offsets and drifts that had to be applied to the data to correct it. None of the three other sites in the project required a drift or offset.

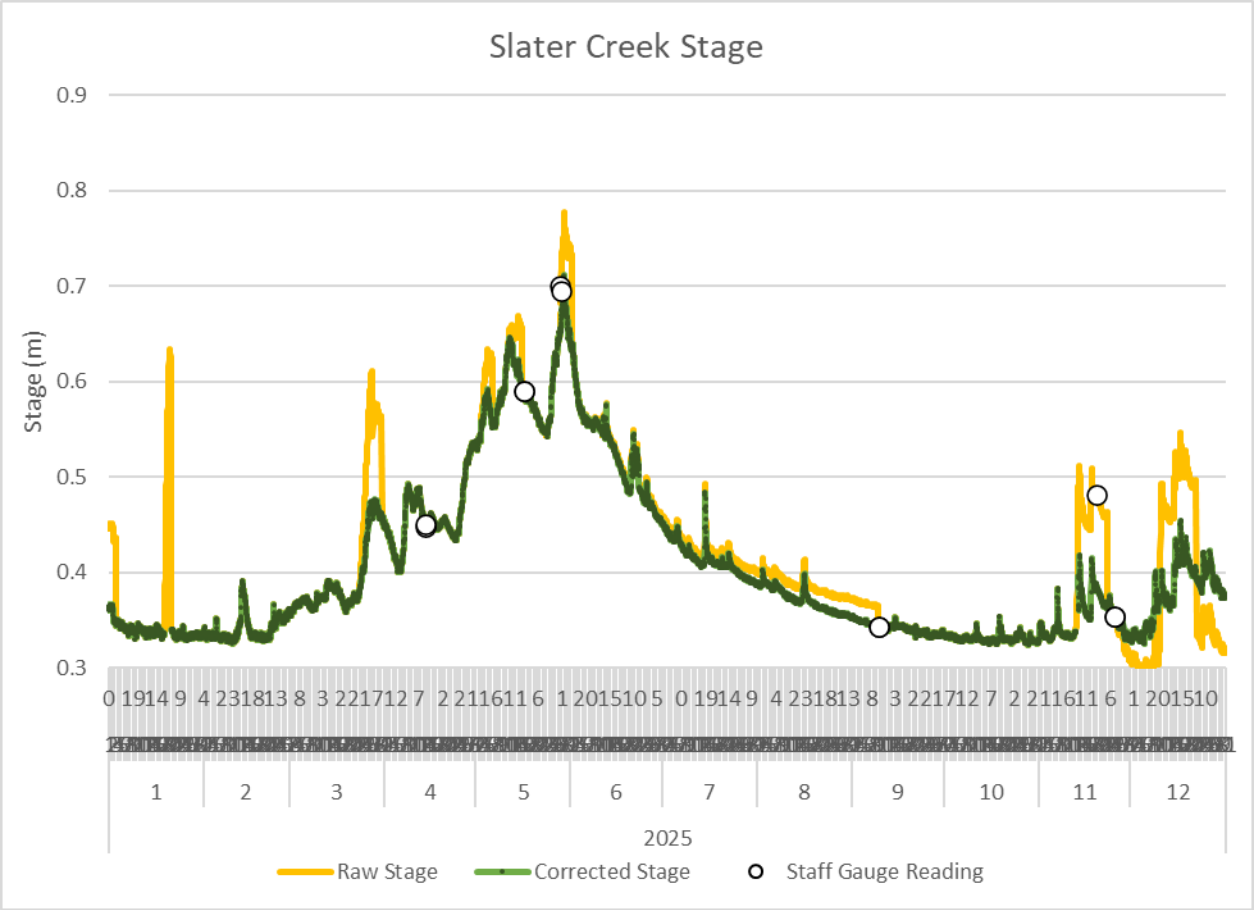


Figure 6: Slater Creek Stage 2025 Corrections

Recommendations

Coliform Sampling

Given that few water quality concerns were observed during winter and spring sampling periods, HPWPS could consider reducing coliform sampling frequency during these seasons to optimize program resources. Sampling could be focused on monthly collections from June through November, supplemented by a 5-in-30-day sampling procedure during the fall. This approach would retain the ability to detect seasonal coliform presence while reducing overall monitoring costs.

Conductivity and pH Sampling

Specific conductivity and pH provided limited interpretive value relative to other monitored parameters and proved challenging to monitor accurately. HPWPS could consider discontinuing routine monitoring of these parameters. If monitoring is continued, a clearly defined calibration schedule and quality assurance / quality control (QA/QC) procedure will be required to ensure data accuracy and interpretability.

Low Flow Monitoring

If the monitoring program aims to better characterize low-flow conditions for drought response or water supply management, additional discharge measurements should be collected during low-flow periods. Increased measurement frequency would improve confidence in the lower portion of the stage-discharge relationship, particularly at Harrop and Narrows Creeks, where water level sensors are not located at intake structures.

Grizzly Grate at Slater

Removal of the grizzly grate at Slater Creek, or modification by removing every second bar, would significantly improve data quality by reducing the potential for leaf litter and ice accumulation near the water level sensor. This change would also reduce post-processing effort and associated costs. Based on site conditions, this modification is expected to have little to no impact on the downstream water intake.

Disclaimer

The discharge data collected for Harrop-Procter Watershed Protection Society has been collected to meet the BC Hydrometric RISC Standards v.2 released in 2019. All data grades assigned to the discharge data have been assigned by Rory Gallaugher, AScT, Principal of Kootenay Environmental Innovations Ltd. (KEI). The data grades, if applied, are intended to assist users of the discharge data in understanding KEI's considerations on how the data was collected and analyzed and how the site conditions met the requirements presented in standards requirement criteria Table 1-1 of the RISC Standards.

Per the RISC Standards, grading hydrometric data is a subjective practice based on the Qualified Hydrometric Reviewer's (QHR's) interpretation of the RISC Standards and the data collected. In practice, each QHR may grade data differently based on their interpretation of the instrumentation, field procedures used, and data calculation and assessment. The RISC standards are intended to support data collection using calibrated equipment to provide standardization for review and audits and support the archiving of hydrometric data of known quality.

Further, data grades only apply for the period reported in the report. Changes to the creek morphology, watershed, or climate may change the water level and creek discharge in ways not reported by this data. Therefore, it is recommended that, should the data presented in this report be used for engineering purposes, or where there is any chance of damage or harm to personal property or health, KEI expects that the engineer using the data to apply their own data grade, based on their own interpretation of the data. KEI will not be held liable for any damages that occur due to the use of this data.

Water quality data is collected by third-party individuals most of the time and, depending on the metric, is analyzed at accredited third-party labs or by the third party collecting the data. Though water quality data are presented in the report with an emphasis on the Province of British Columbia's Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British

Columbia, KEI makes no representation as to the potability of the water. For questions regarding the potability of drinking water, KEI recommends contacting the water supplier and Interior Health.

References

B.C. Ministry of Forests and Range. (2010). *Compendium of Forest Hydrology and Geomorphology in British Columbia.* Victoria: Province of British Columbia.

BC Ministry of Health. (2012). *Drinking Water Treatment Objectives (microbiological) for Surface Water Supplies in British Columbia v. 1.2.* Victoria: The Province of BC.

Health Canada. (2023, February 8). *Guidelines for Canadian Drinking Water Quality - Summary Tables*. Retrieved from Government of Canada: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/water-quality/guidelines-canadian-drinking-water-quality-summary-table.html