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Appendices

Walla Walla River Basin Bacteria, pH, and Dissolved Oxygen Total Maximum Daily Load

Water Quality Effectiveness Monitoring Report

January 2021

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Appendices

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Bacteria, pH, and Dissolved Oxygen
Total Maximum Daily Load

Water Quality
Effectiveness Monitoring Report

by
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Appendix A: Quality Assurance Assessment

We completed the water quality sampling and analyses outlined in the Quality Assurance (QA) Project Plan (Ross 2014) with near 100% completeness. When field data were affected by logistical problems, stream conditions, or equipment failure, we adjusted our sampling when possible, and qualified or rejected data based on our observations and quality control (QC) results. We included samples or measurements qualified as estimates in analyses unless other factors precluded their use.

Laboratory sample QA assessment

All samples shipped or delivered to Walla Walla Regional Water Testing Services (WWRWTS) and Manchester Environmental Laboratory (MEL) followed chain-of-custody procedures.

Case narratives showed all internal laboratory QC checks for both MEL and WWRWTS met their laboratory measurement quality objectives (MEL 2008) (Table A1).

Table A1. Percentage of internal laboratory QC samples meeting objectives.

Parameter	Blank	Duplicate	LCS Spike Recovery	Matrix Spike Recovery
Fecal Coliform	100%	100%	NA	NA
Ammonia	100%	100%	100%	100%
Nitrate-Nitrite as N	100%	100%	100%	100%
Ortho-Phosphate	100%	100%	100%	100%
Total Persulfate Nitrogen	100%	100%	100%	100%
Total Phosphorus	100%	100%	100%	100%

Along with our 3,610 lab samples, we collected 373 (10.3%) field replicates and 77 (2.1%) field blanks for 12.5% of total samples collected with field QC samples. We present the lab sample field replicate precision summary in Table A2.

Table A2. Laboratory sample field replicate precision summary

Parameter	% RSD MQOs	Percentage of replicates < 5x the LPQL exceeding MQOs	Count of replicates < 5x the LPQL	Percentage of replicates ≥ 5x the LPQL exceeding MQOs	Count of replicates ≥ 5x the LPQL
Fecal coliform	40%	NA	0	8%	63
Ammonia	15%	10%	60	0%	2
Nitrate-Nitrite	15%	7%	14	0%	48
Soluble Reactive Phosphorus	15%	0%	2	0%	60
Total nitrogen	15%	10%	10	0%	52
Total phosphorus	15%	0%	4	0%	58

All replicates met %RSD objectives (Table A2).

When we identified field blank detections, we qualified samples as estimates when the sample results were less than five times the blank detection concentration.

Lab analyses revealed ammonia in five (31%) of 16 field blanks. Corresponding laboratory blanks revealed no contamination, so blank detections may indicate low-level contamination in the field or shipment. As noted above, all ammonia detections, both in the samples and the blanks, occurred near the Minimum Reporting Limit (MRL). All ammonia results for these weeks were less than 5 times the corresponding blank detections, so we qualified the associated sample results as estimates.

Two (12.5%) of 16 Total Nitrogen (TN) field blanks had positive detections. All TN detections in the blanks occurred near the MRL. This may indicate low-level contamination in the field. Nine corresponding sample TN detections for these sampling weeks were less than five times the blank detection level, so we qualified them as estimates. The remaining TN detections exceeded five times the blank detection concentration, so were not qualified.

Most ammonia detections occurred at a low level, below the reporting limit in 33% of samples, and our 2014-2015 ammonia concentrations at each site were consistent with our 2002-2003 concentrations. Ammonia nitrogen (NH_3 as N) tended to be a smaller portion of dissolved inorganic nitrogen (DIN) by nitrogen mass, less than 20% of the concentration in 78% of samples, with the remaining concentration from nitrite and nitrate nitrogen (NO_2NO_3 as N). Ammonia contamination is thus less likely to bias the DIN sample results, as it is a smaller portion of the total. NO_2NO_3 results did not show blank contamination or inconsistency between replicates, so this analyte, which made up the greater part of concentration for DIN, was consistent with little bias.

The 12.5% TN field blank contamination causes some uncertainty for our organic nitrogen analysis in the Touchet River basin. However, the 2014-2015 organic nitrogen results are again consistent with the 2002-2003 concentrations, and the bias appears to be less frequent than occurred for ammonia.

DIN and organic nitrogen results may show a slightly high bias due to ammonia and total nitrogen contamination. However, the potential bias from contamination was relatively low, so we did not qualify any results due to contamination.

Field meter QA assessment

We compared our field meter calibration and check results to the measurement quality objectives in Table A3 (McCarthy and Mathieu 2017).

Table A3. Measurement quality objectives (MQOs) for multi-parameter field meter post-checks.

Parameter	Units	Accept	Qualify	Reject
Dissolved Oxygen	% saturation	±5%	>±5% and < ±15%	> ±15%
Dissolved Oxygen	mg/L	±0.5	> ±0.5 and < ± 1.0	> ±1.0
pH	s.u.	±0.2	> ±0.2 and < ± 0.8	> ±0.8
Specific Conductance	µS/cm	±10%	>±10% and < ±20%	> ±20%
Water Temperature	°C	±0.2	> ±0.2 and < ± 0.8	> ±0.8

1. Criteria expressed as a percentage of readings; for example, buffer = 100.2 uS/cm and Hydrolab = 98.7 uS/cm; (100.2-98.7)/100.2 = 1.49% variation, which would fall into the acceptable data criteria of less than 5%.

Discrete field meter measurements

Our discrete field meter measurements met post-check MQOs throughout the study with one exception during the June 2 to 4, 2015 survey, when the Specific Conductivity check showed a post-check bias of +20% to +21% percent difference. We rejected the conductivity values from that survey and did not submit them to EIM (Table A4).

We collected 128 (4.4%) field meter replicate measurements out of 2,912 discrete field-meter measurements. We also collected 109 (17.8%) Winkler DO samples for our 612 optical DO field measurements, for 6.7% total replicate samples on field measurements. All field meter replicates met MQOs (Table A5).

Table A4. Percentage of discrete field meter post-deployment checks meeting MQOs.

Parameter	Number of Checks	% Checks Accepted	% Checks Qualified	% Checks Rejected
Conductivity (µS/cm)	20	90%	0%	10%
DO (% Saturation)	10	100%	0%	0%
pH	22	100%	0%	0%

Table A5. Percentage of discrete field meter replicate checks meeting MQOs.

Parameter	Number of Checks	% Checks Accepted	% Checks Qualified	% Checks Rejected
Conductivity (µS/cm)	32	100%	0%	0%
DO (mg/L), Field meter to field meter	32	100%	0%	0%
DO (mg/L), Winkler to field meter	109	100%	0%	0%
Temperature, water	32	100%	0%	0%
pH	32	100%	0%	0%

Continuous field meter measurements

Continuous multi-parameter sondes

We conducted periodic maintenance, calibration, and side-by-side field meter checks on our continuously deployed multi-parameter sondes. During these visits, prior to cleaning and calibrating the meter, we completed a post-check comparison between the deployed sonde and calibration standards (Table A6) and between the deployed sonde and our field meter (Table A7).

We field checked our sondes using twice the MQO targets listed in Table A5 to represent the combined error for our field check meter and the continuous sonde. Most continuous meter field-checks met MQOs (Tables A6 and A7).

Table A6. Percentage of continuous sonde calibration standard post-checks meeting MQOs.

Parameter	Number of Checks	% Checks Accepted	% Checks Qualified	% Checks Rejected
Conductivity (µS/cm)	5	100%	0%	0%
DO (% Saturation)	4	100%	0%	0%
pH	17	100%	0%	0%

Table A7. Percentage of continuous multi-parameter sondes field checks meeting MQOs.

Parameter	Number of Checks	% Checks Accepted	% Checks Qualified	% Checks Rejected
Conductivity (µS/cm)	44	100%	0%	0%
DO (mg/L)	49	96%	4%	0%
pH	48	98%	2%	0%
Water Temperature (°C)	60	100%	0%	0%

In post-processing, we removed continuous field meter logging errors from the data by inspecting outliers and data inconsistencies before conducting QC analysis. We noted all substantial data logging errors in the Appendix B figures.

When a continuous multi-parameter meter check result exceeded our estimate MQO, we qualified all data between the nearest successful field checks as estimates. Only pH results between September 9 and 25 for 32NFT-00.0 exceeded the MQO and were qualified as estimates. All other continuous sonde results met MQOs.

Continuous temperature loggers

We deployed Tidbit V2 continuous temperature loggers at all sampling sites, monitoring every half hour (see Appendix C). We recovered continuous temperature data for all sites, except the two lower Walla Walla River sites (32WAL-15.6 and 32WAL-09.3), which we lost to instream erosion or bed-load movement during the high-flow season.

In some cases, sediment buried temperature loggers during deployment. Burial in sediment tends to dampen the daily temperature highs and lows. In other cases, the stream level dropped and exposed the temperature logger to air. Air exposure tends to cause large and erratic diurnal swings in recorded temperature. We deployed air temperature loggers near several basin sites to provide a reference for air exposure conditions. We rejected any cases where sediment burial or air exposure appeared to affect temperature records in the figures in Appendix C.

To assess our thermometer accuracy during deployment, we compared pre- and post-deployment temperature checks at room temperature (~20 °C) and in an ice baths (~0° C) using a NIST traceable thermometer. We qualified data from a continuous logger as estimates if the logger exceeded a mean absolute difference from the reference thermometer of >0.2°C.

All sites met the MQO target, except 32MIL-00.5. We adjusted all temperature data from 32MIL-00.5 by the mean difference from the NIST (-0.28 °C, Figure C17) and qualified the EIM submittal for this site as estimated data.

External data sources

When available, we used continuous flow monitoring data for our sampling sites from external partners, including the USGS and WWBWC. We show these results in Appendix E.

The USGS conducted continuous monitoring of stage and flow at three stations in the Walla Walla River Basin from the late 1980s to present. USGS posts these data online at https://waterdata.usgs.gov/nwis/rt. The USGS conducts rigorous and regular QA and QC checks to support their flow monitoring results.

In a cooperative effort with this project, WWBWC deployed pressure transducers for 15-minute stage monitoring and developed flow-stage rating curves for several of our sampling stations in the Walla Walla Basin. WWBWC collected and analyzed the flow monitoring data following procedures from their 2013 SOP (WWBWC 2013) and reassessed their data following their 2018 SOP update (WWBWC 2018 and Tara Patten pers. comm. 2019).

An Ecology staff hydrologist reviewed the WWBWC flow-stage rating curves for data quality (Mitch Wallace, pers. comm. 2019). Of the WWBWC sites, we rated Coppei and Dry Creek flow data and associated loads as estimates. These small tributaries tended to have lower quality flow-stage rating curves, especially in the low-flow period, due to high measurement variability at low velocities and changing stream morphology due to silt and vegetation growth and die-off. All other WWBWC flow-stage rating data were deemed credible.

Appendix B. Effectiveness Monitoring Continuous Multi-Parameter Monitoring Stations

North Fork Touchet River at confluence (32E050, 32NFT-00.0)

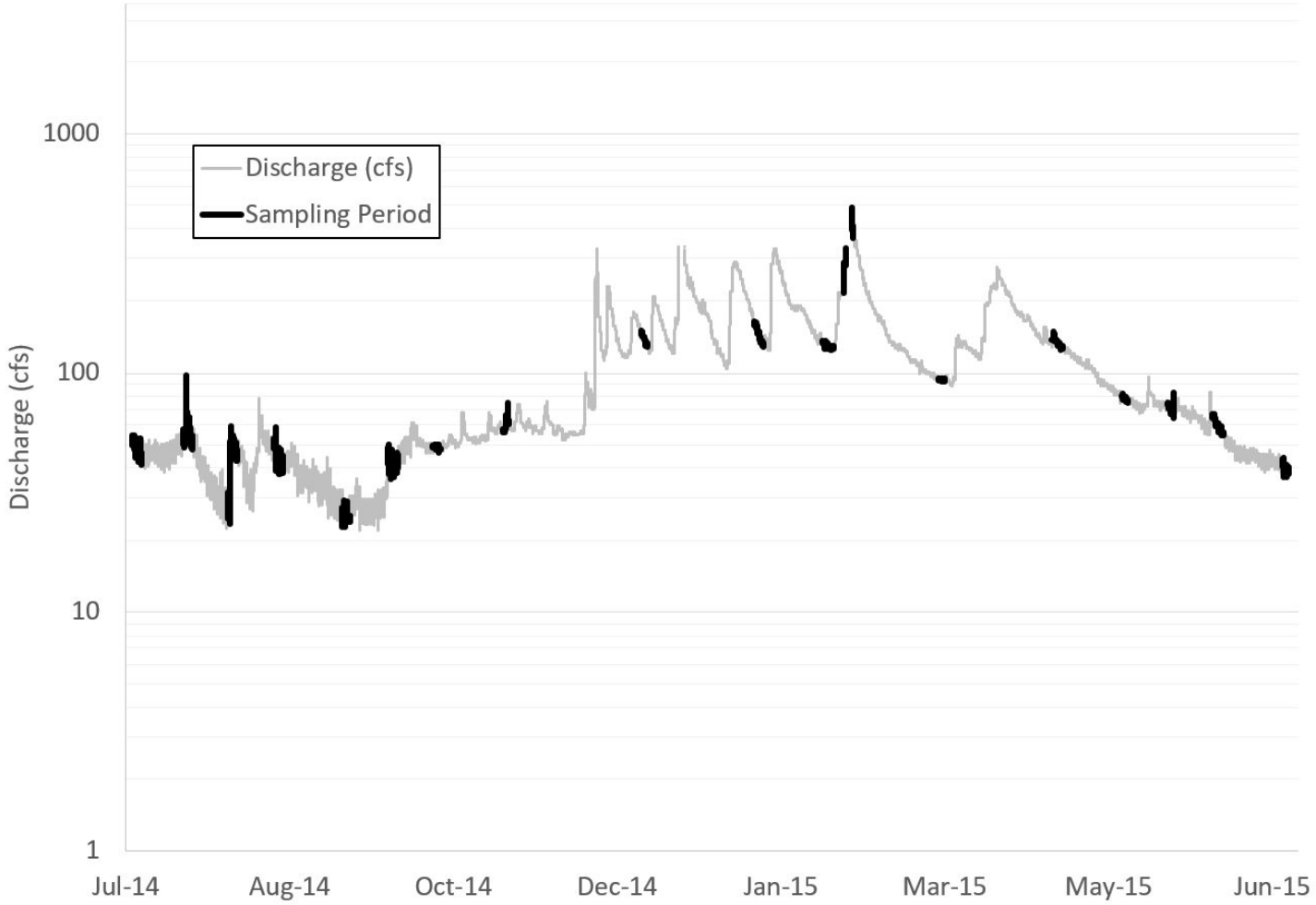

Figure B1: North Fork Touchet River at the confluence with the South Fork Touchet River (32E050) flow.

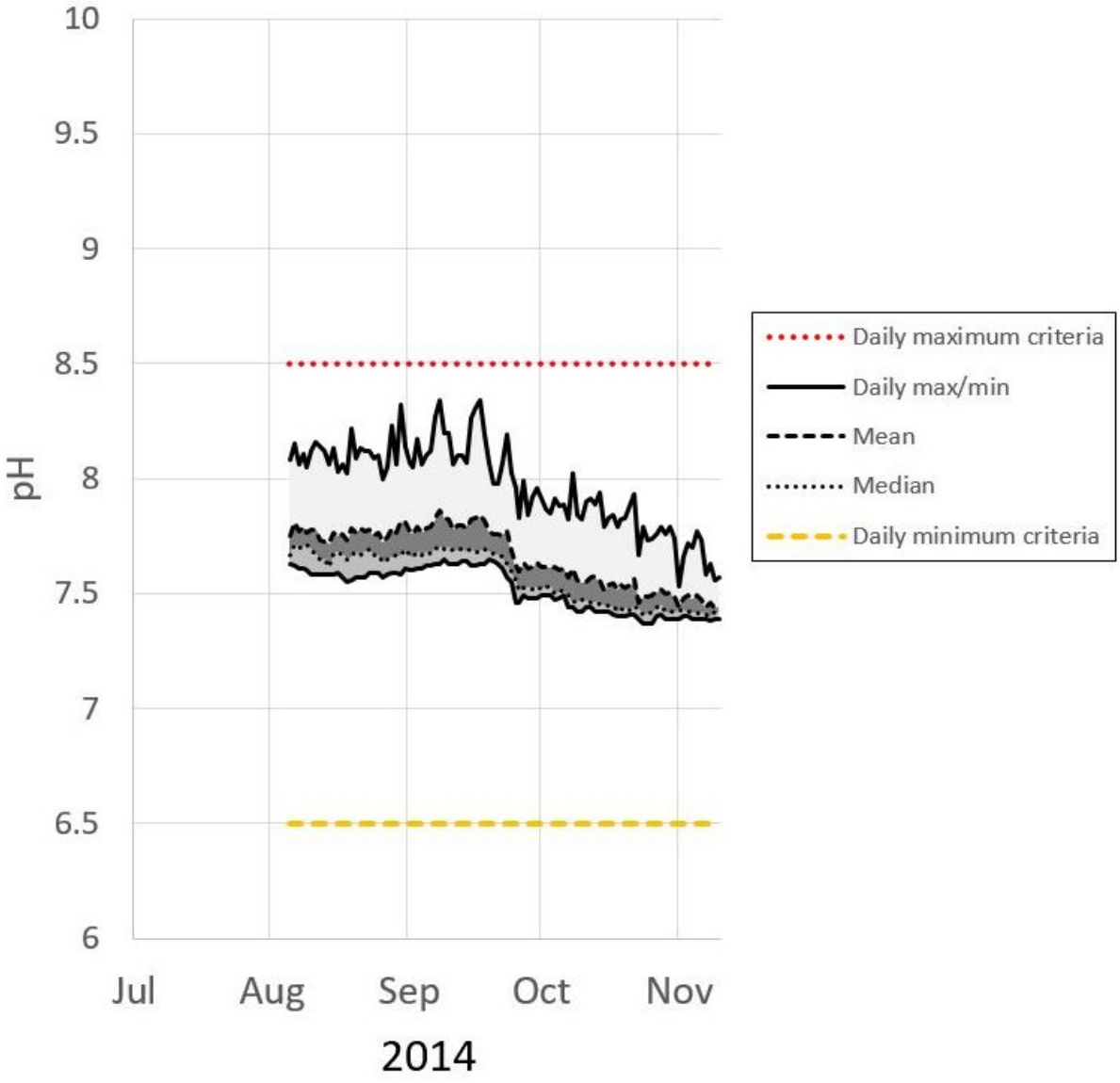

Figure B2: North Fork Touchet River at the mouth (32E050) daily summaries of 15-minute data for pH.

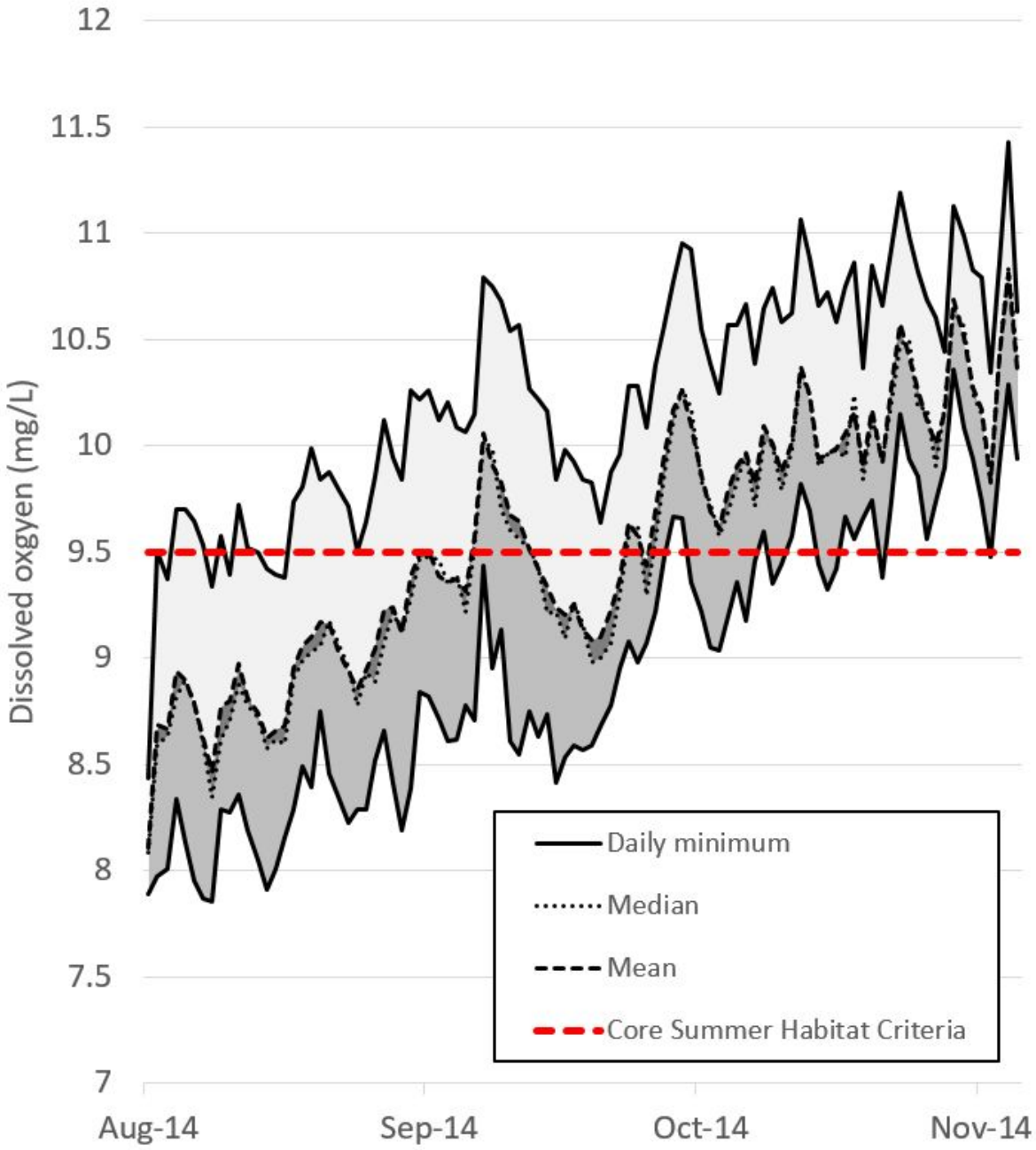

Figure B3: North Fork Touchet River at the mouth (32E050) daily summaries of 15-minute data for dissolved oxygen (DO).

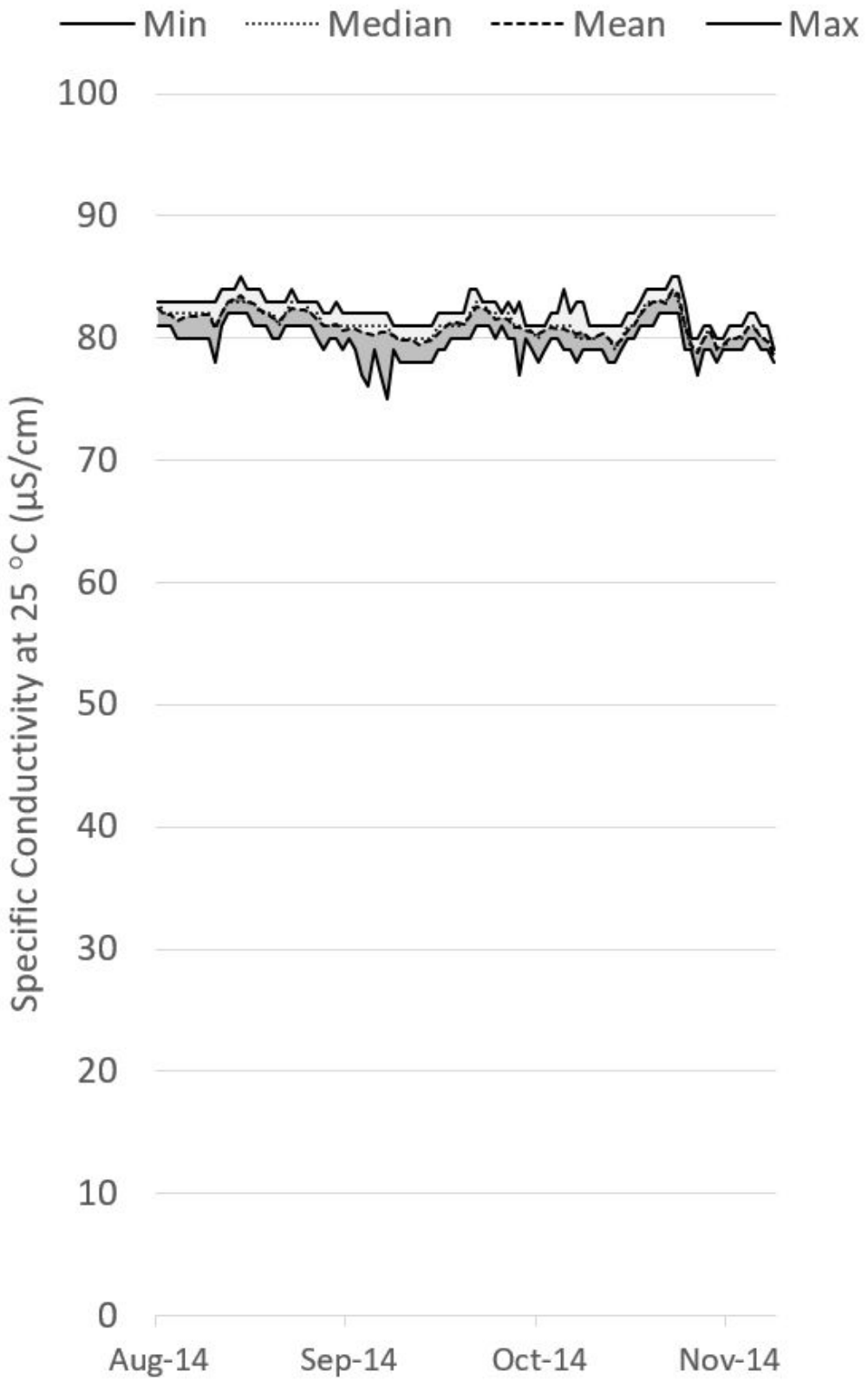

Figure B4: North Fork Touchet River at the mouth (32E050) daily summaries of 15-minute data for Specific Conductivity at 25 °C.

Touchet River at Bolles Rd (32B100, 32TOU-40.5)

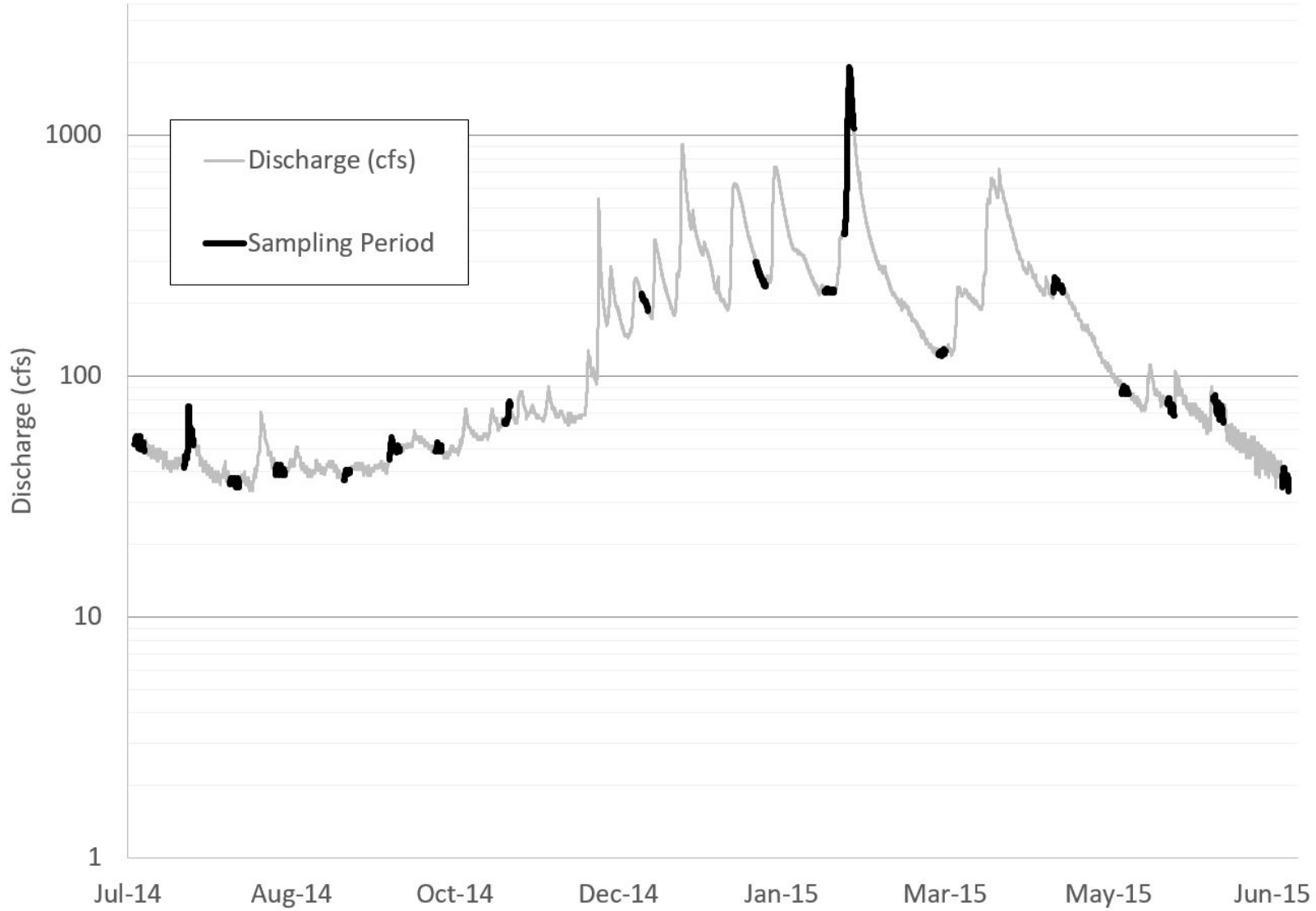

Figure B5: Touchet River at Bolles Rd (32B100) flow.

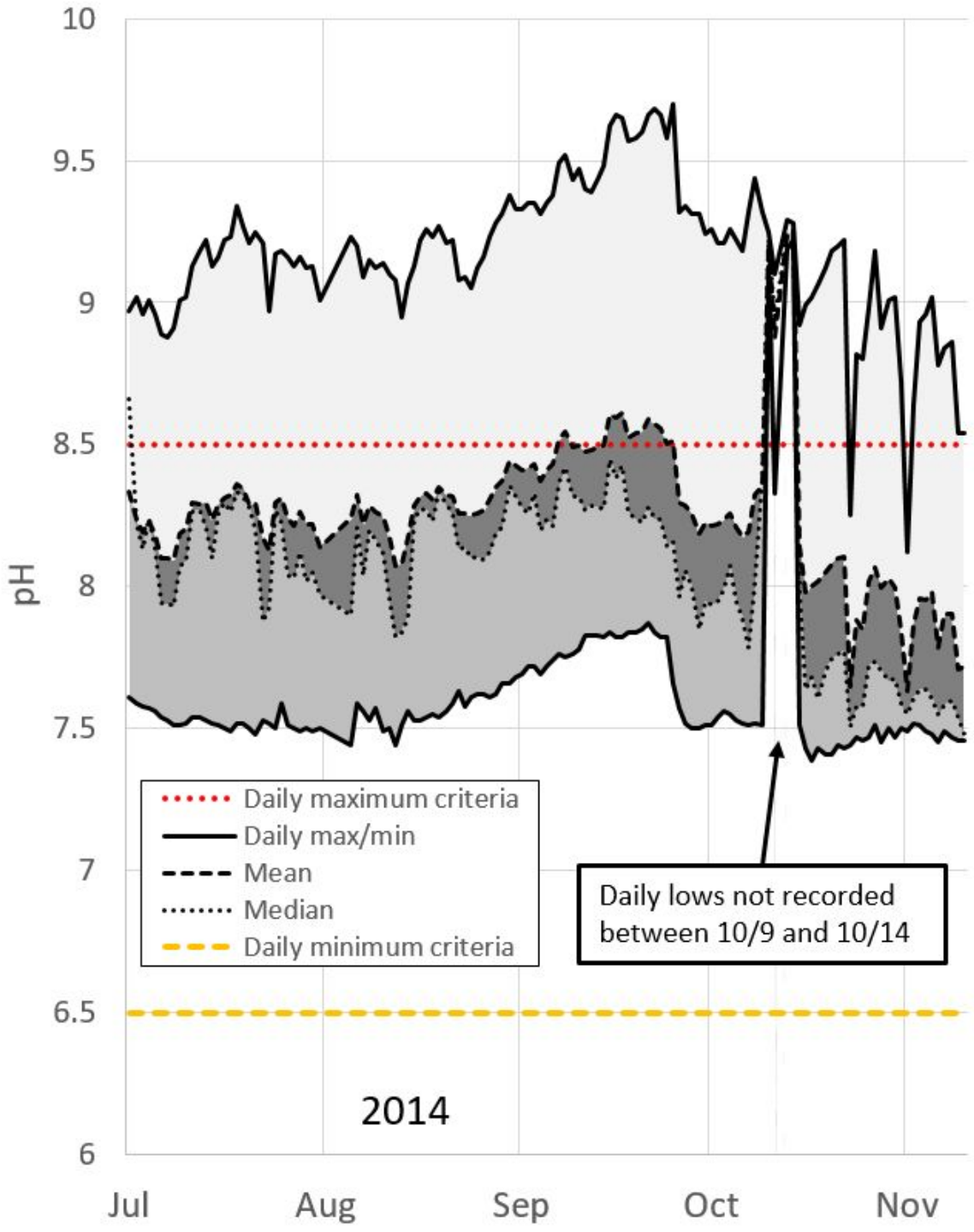

Figure B6: Touchet River at Bolles Rd (32B100) daily summaries of 15-minute data for pH.

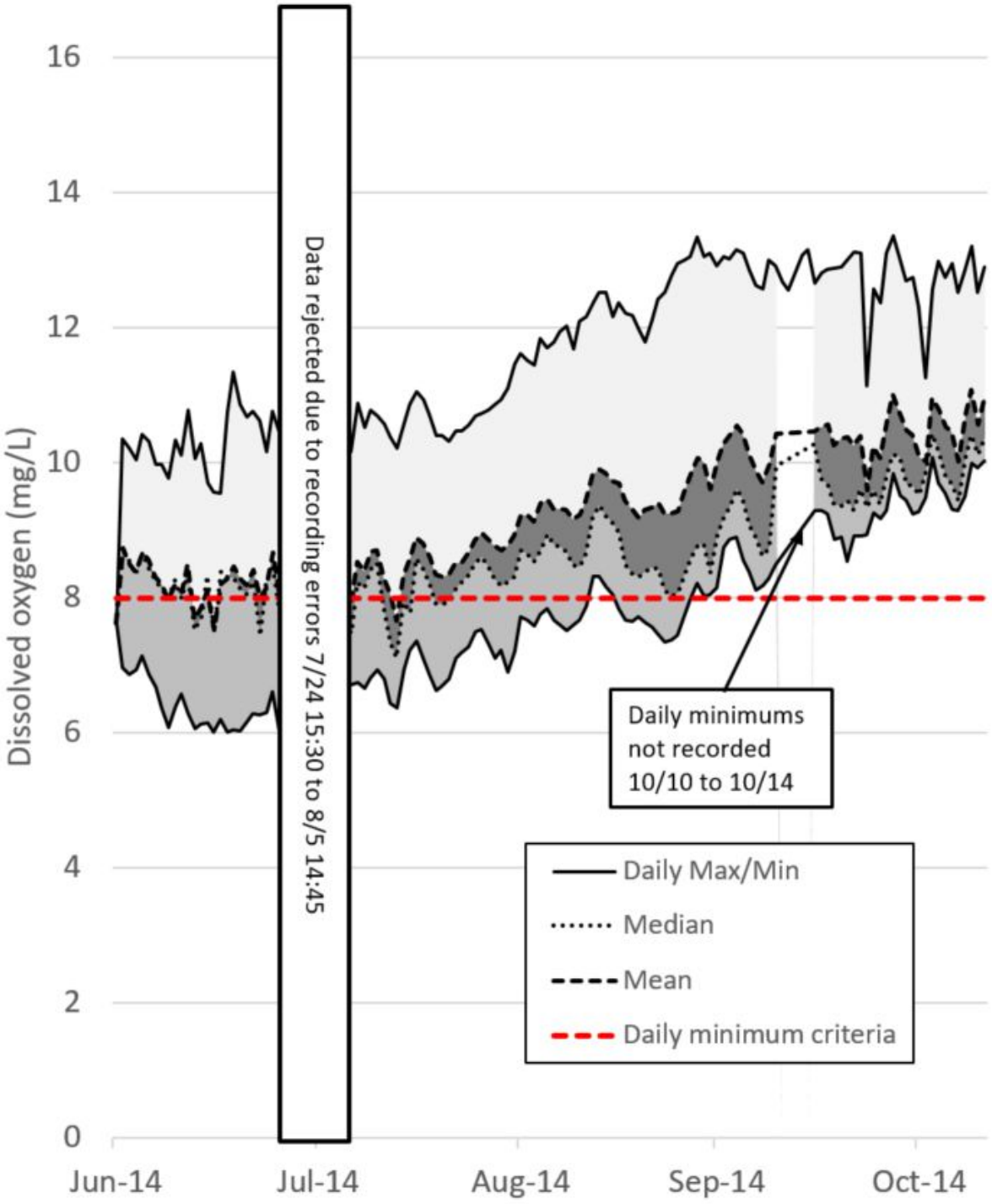

Figure B7: Touchet River at Bolles Rd (32B100) daily summaries of 15-minute data for dissolved oxygen (DO).

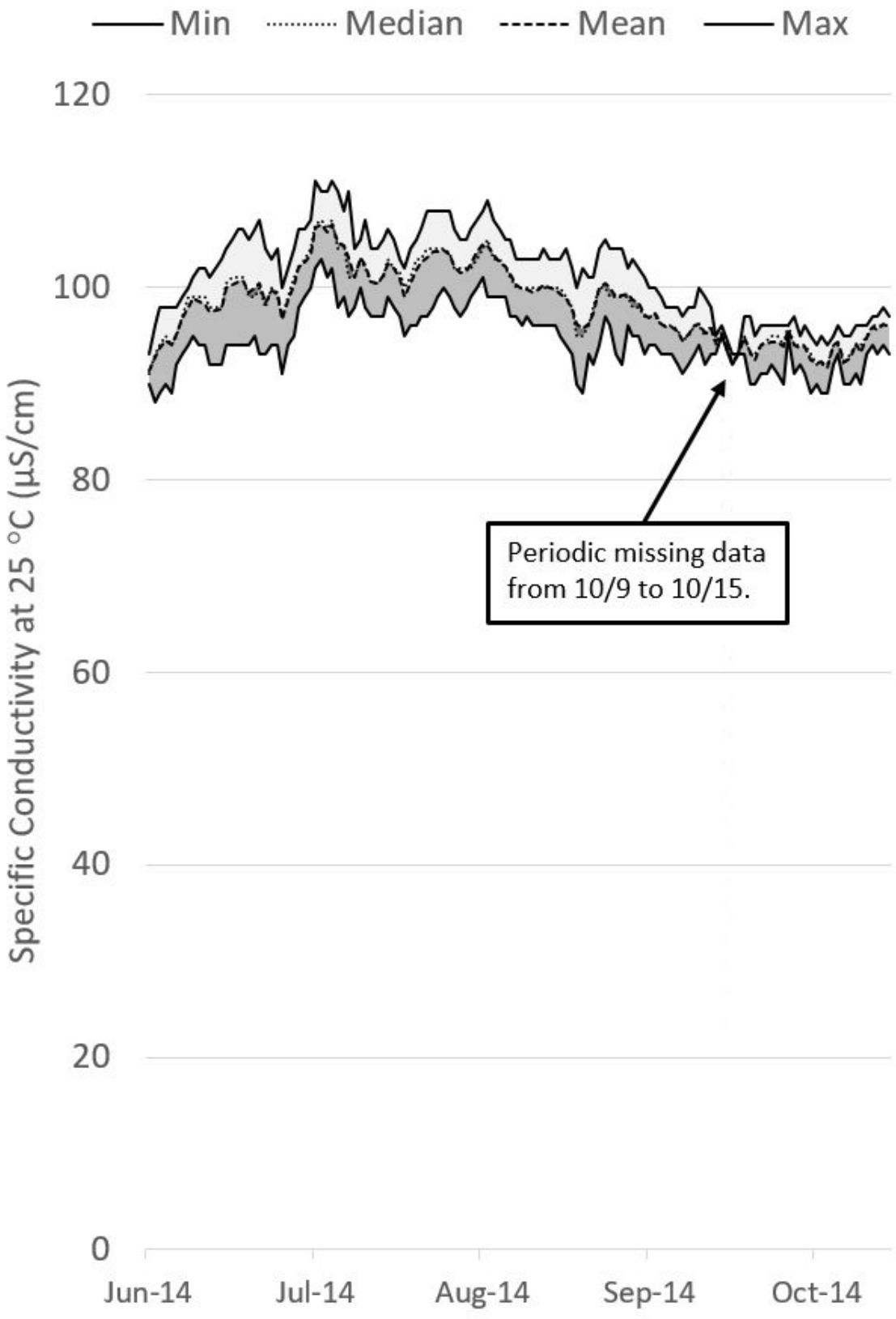

Figure B8: Touchet River at Bolles Rd (32B100) daily summaries of 15-minute data for Specific Conductivity at 25 °C.

Touchet River at Cummins Rd (32B075, 32TOU-02.0)

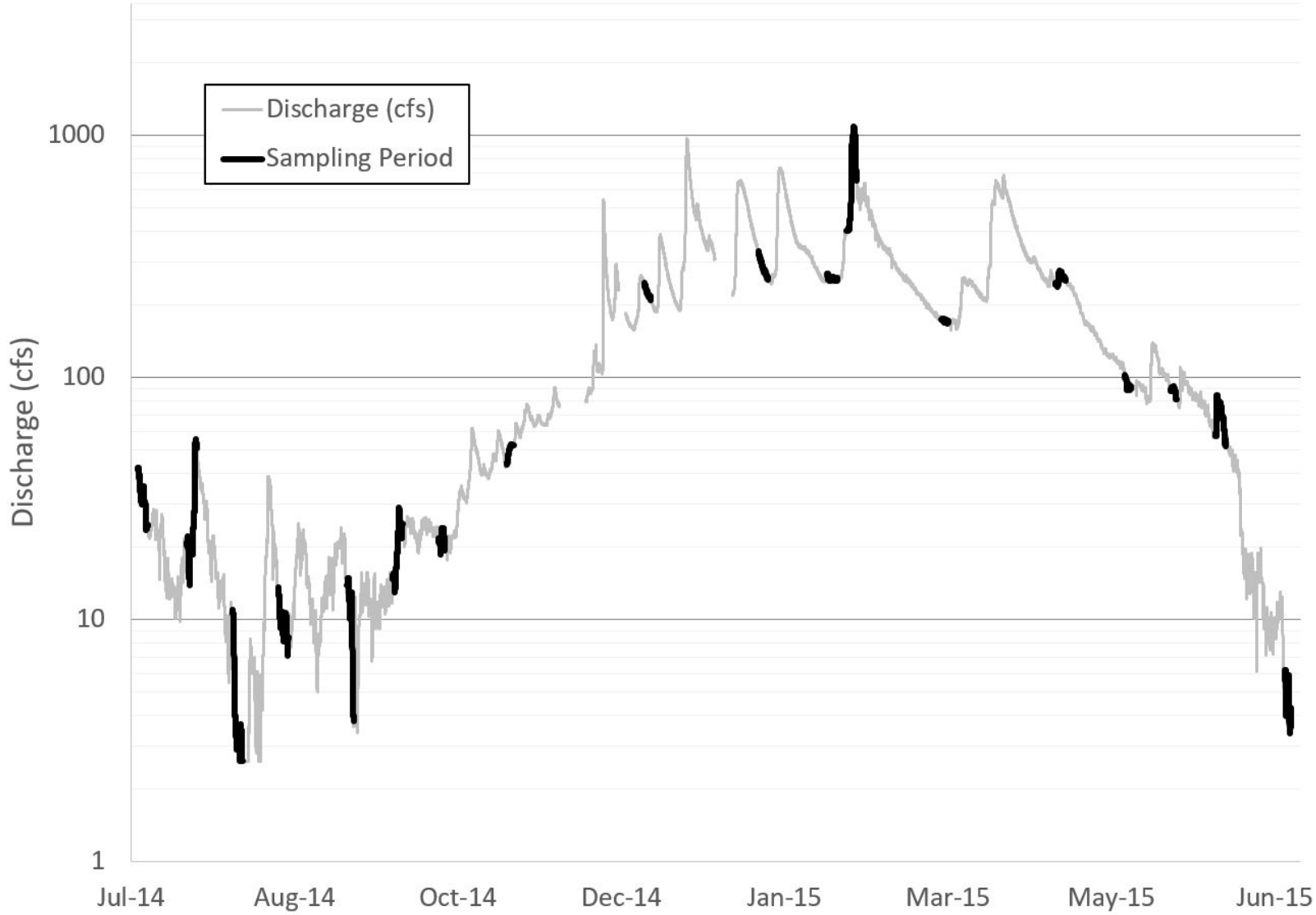

Figure B9: Touchet River at Cummins Rd (32B075) flow.

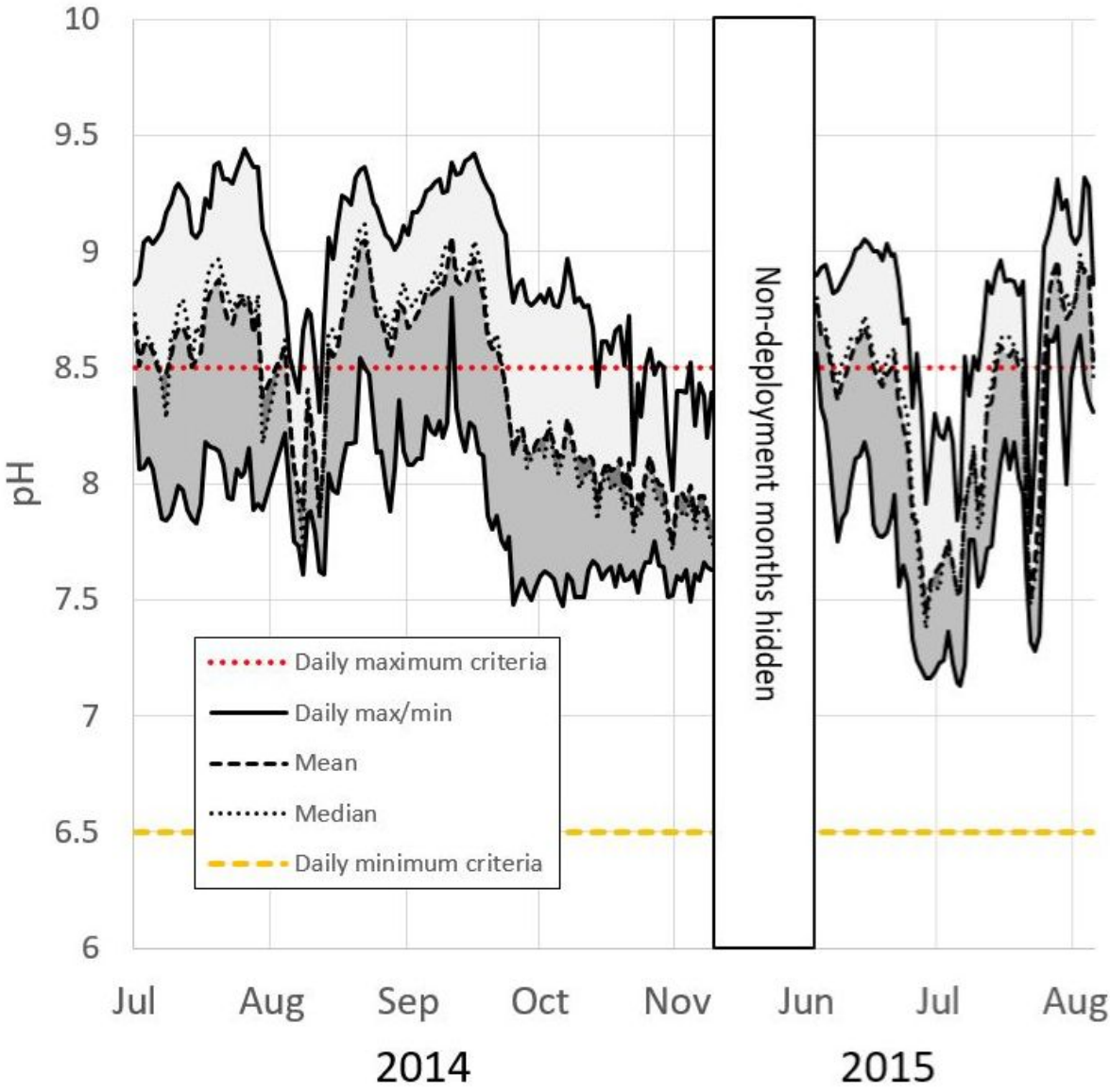

Figure B10: Touchet River at Cummins Rd (32B075) daily summaries of 15-minute data for pH.

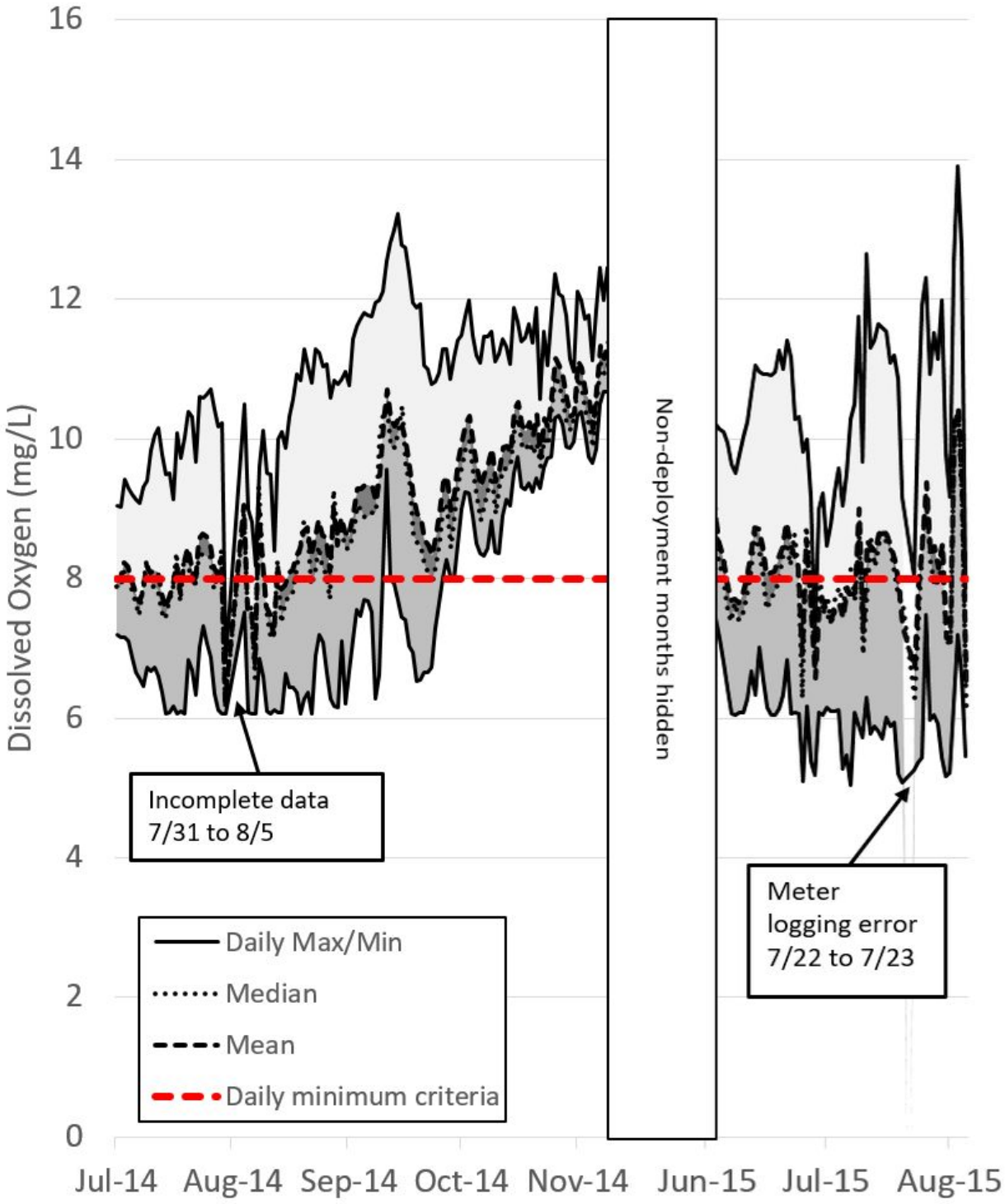

Figure B11: Touchet River at Cummins Rd (32B075) daily summaries of 15-minute data for dissolved oxygen (DO).

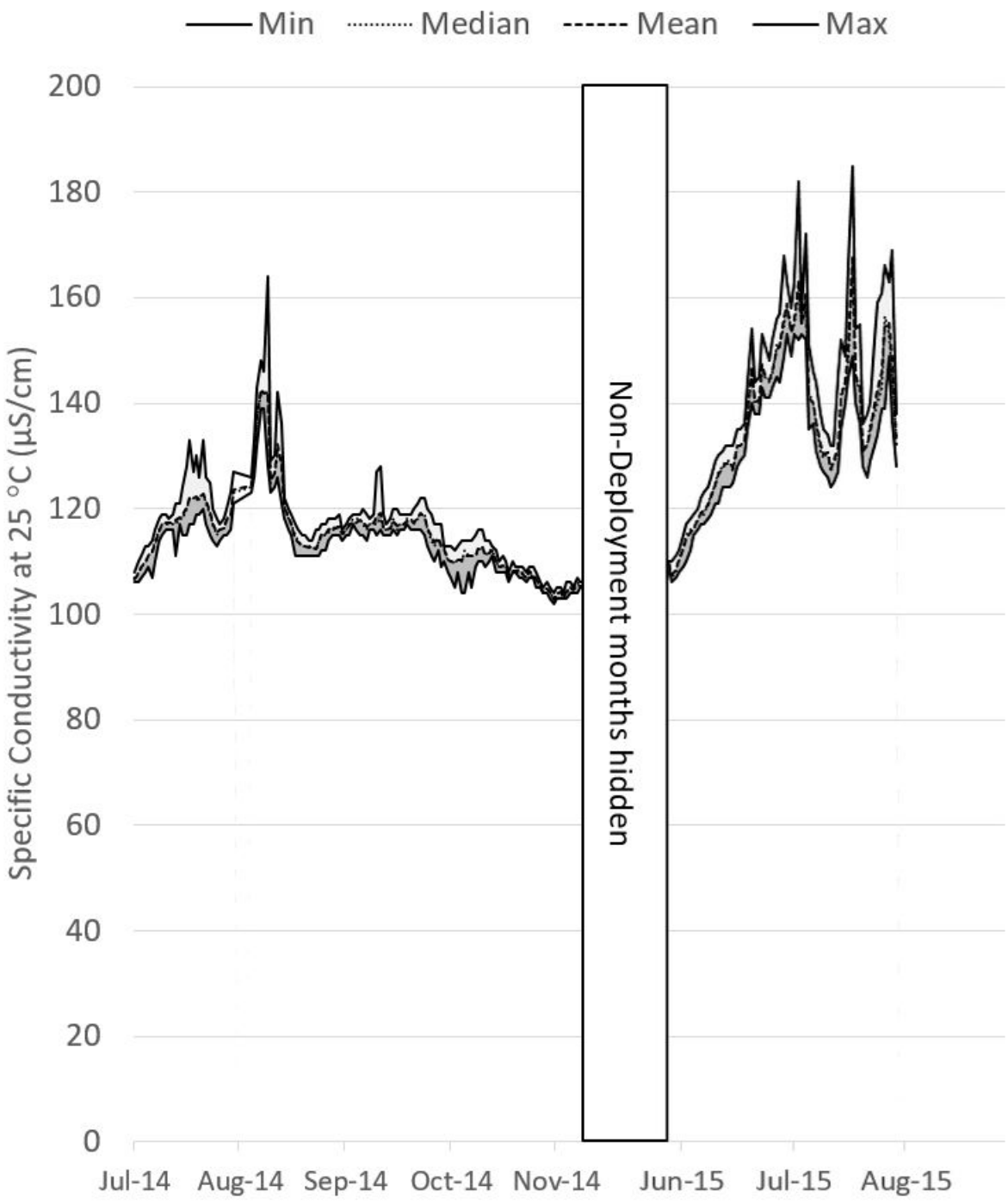

Figure B12: Touchet River at Cummins Rd (32B075) daily summaries of 15-minute data for Specific Conductivity at 25 °C.

Walla Walla River at Beet (Mojonnier) Rd (32A105, 32WAL-36.5)

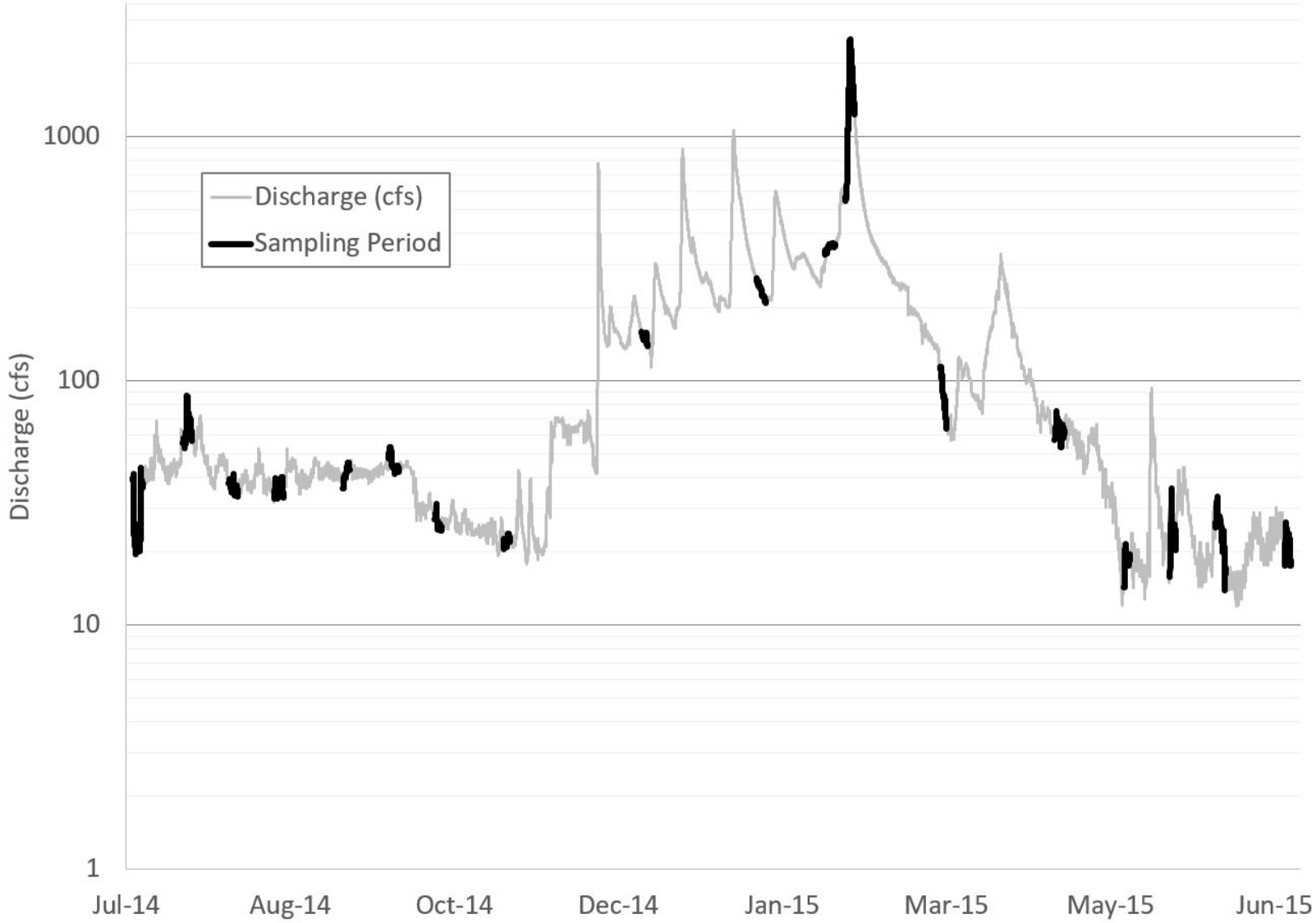

Figure B13: Walla Walla River at Beet (Mojonnier) Rd (32A105) flow.

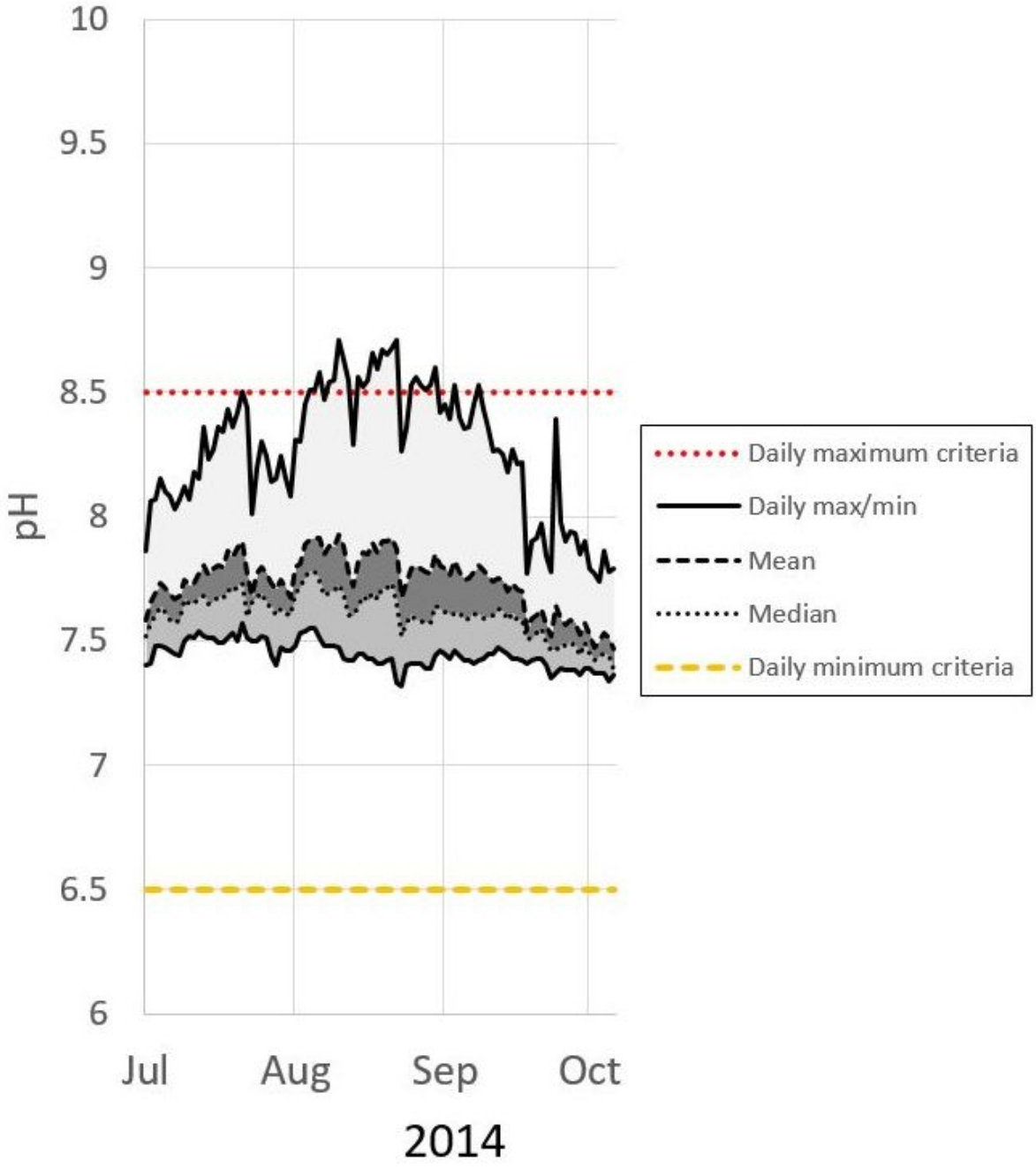

Figure B14: Walla Walla River at Beet (Mojonnier) Rd (32A105) daily summaries of 15-minute data for pH.

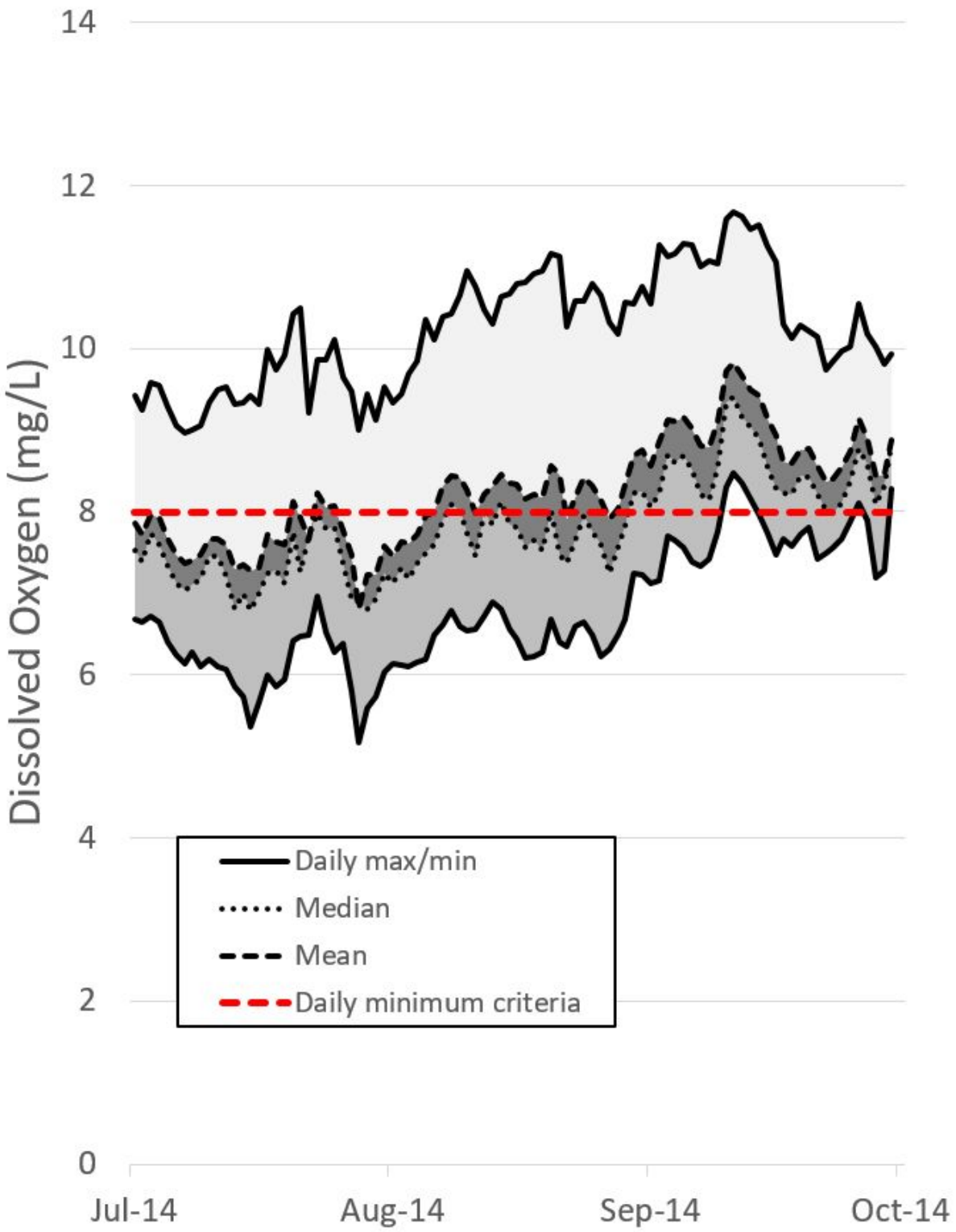

Figure B15: Walla Walla River at Beet (Mojonnier) Rd (32A105) daily summaries of 15-minute data for dissolved oxygen (DO).

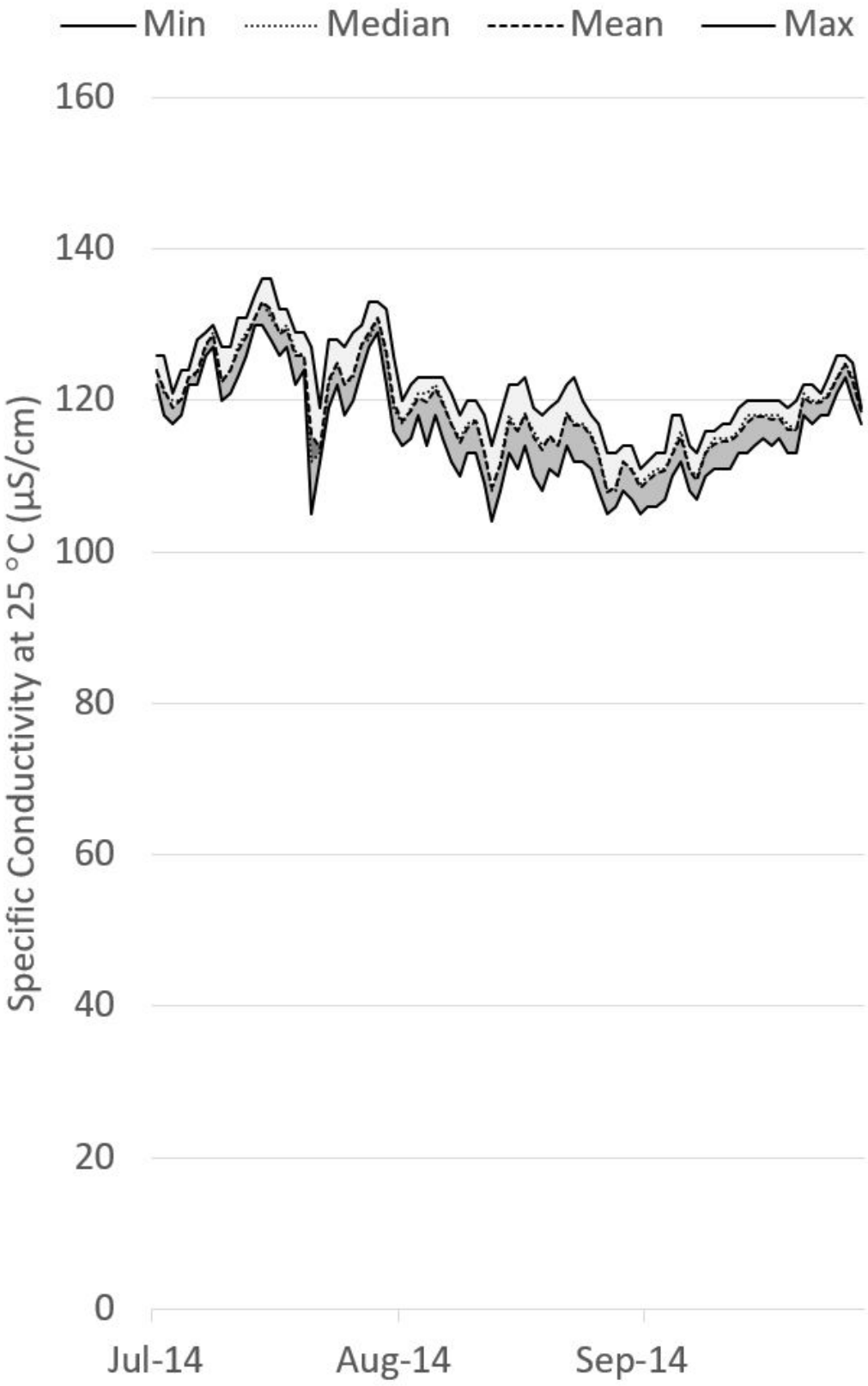

Figure B16: Walla Walla River at Beet (Mojonnier) Rd (32A105) daily summaries of 15-minute data for Specific Conductivity at 25 °C.

Walla Walla River at Detour Rd (32A100, 32WAL-32.8)

Figure B17: Walla Walla River at Detour Rd (32A100) daily summaries of 15-minute data for flow.

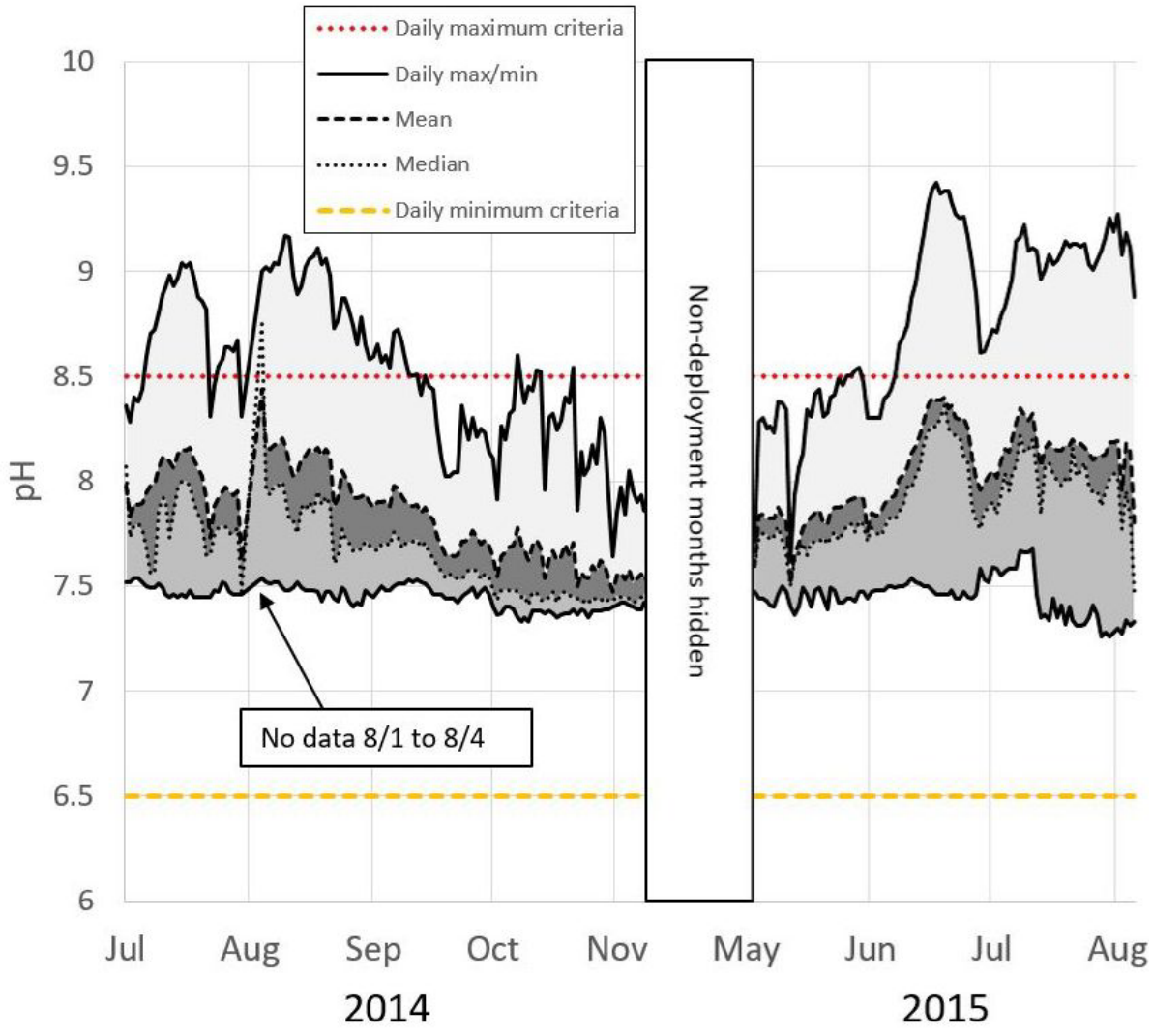

Figure B18: Walla Walla River at Detour Rd (32A100) daily summaries of 15-minute data for pH.

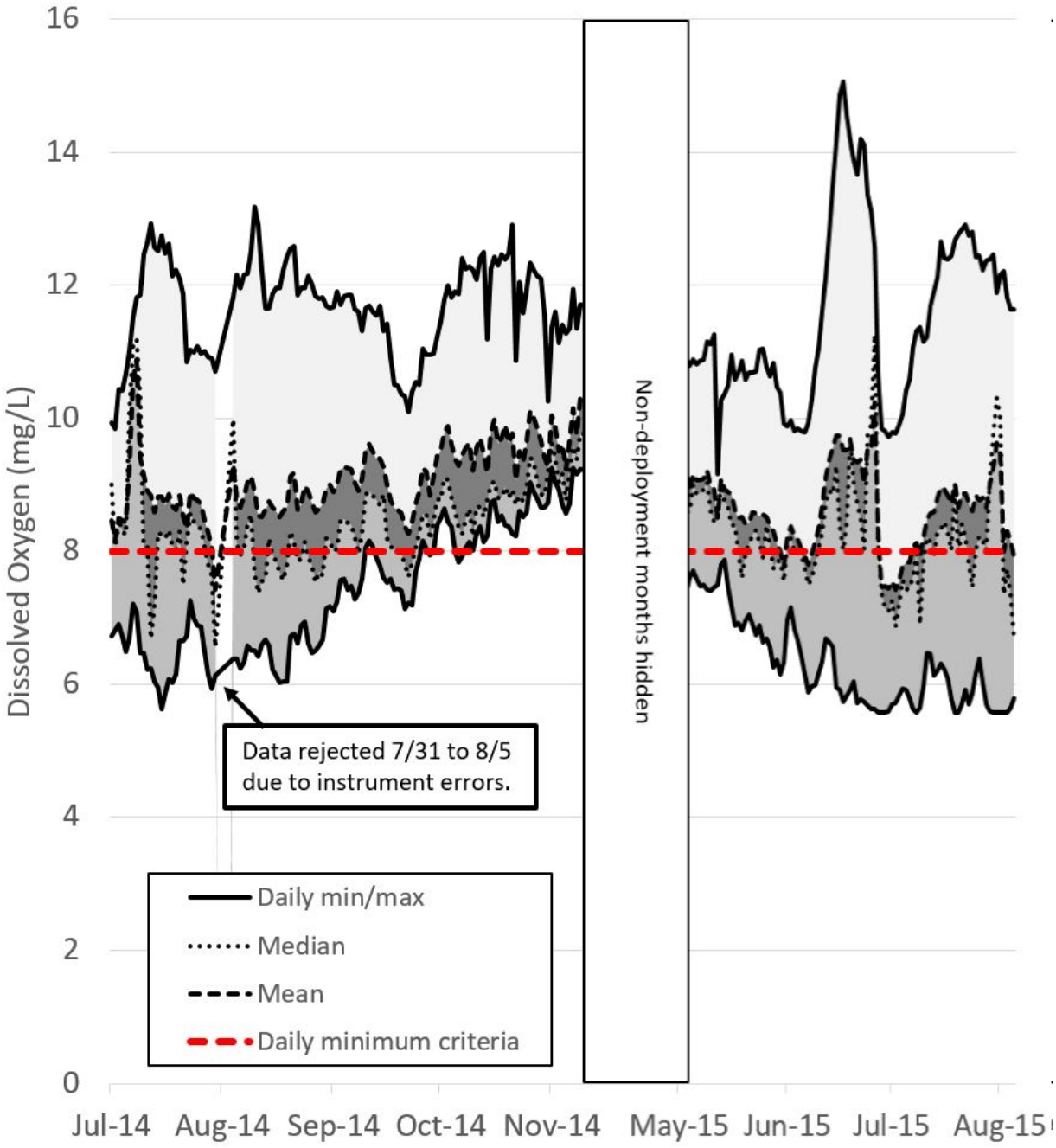

Figure B19: Walla Walla River at Detour Rd (32A100) daily summaries of 15-minute data for dissolved oxygen (DO).

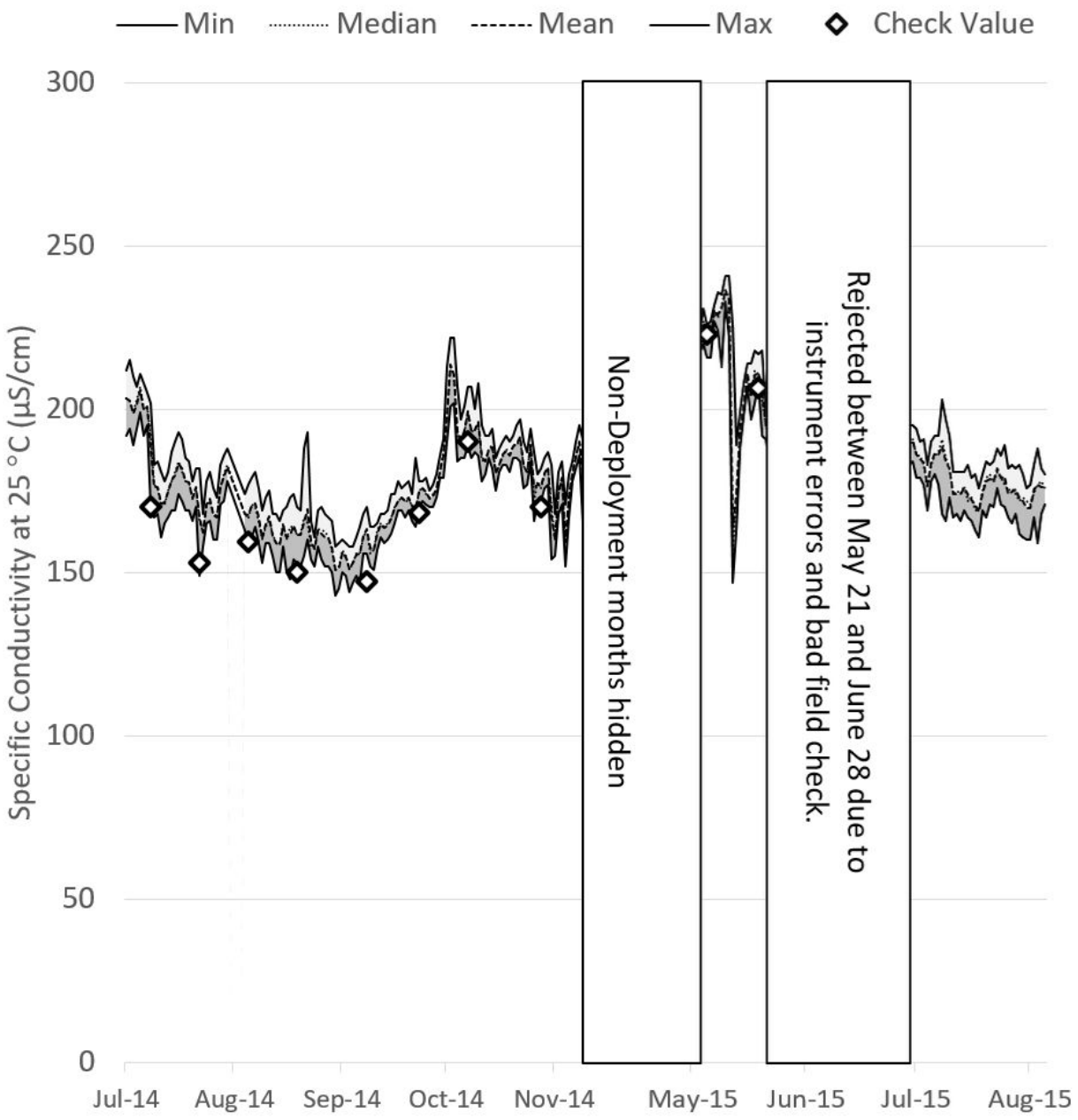

Figure B20: Walla Walla River at Detour Rd (32A100) daily summaries of 15-minute data for Specific Conductivity at 25 °C.

Appendix C. Effectiveness Monitoring Continuous Temperature Monitoring Stations

Touchet River basin

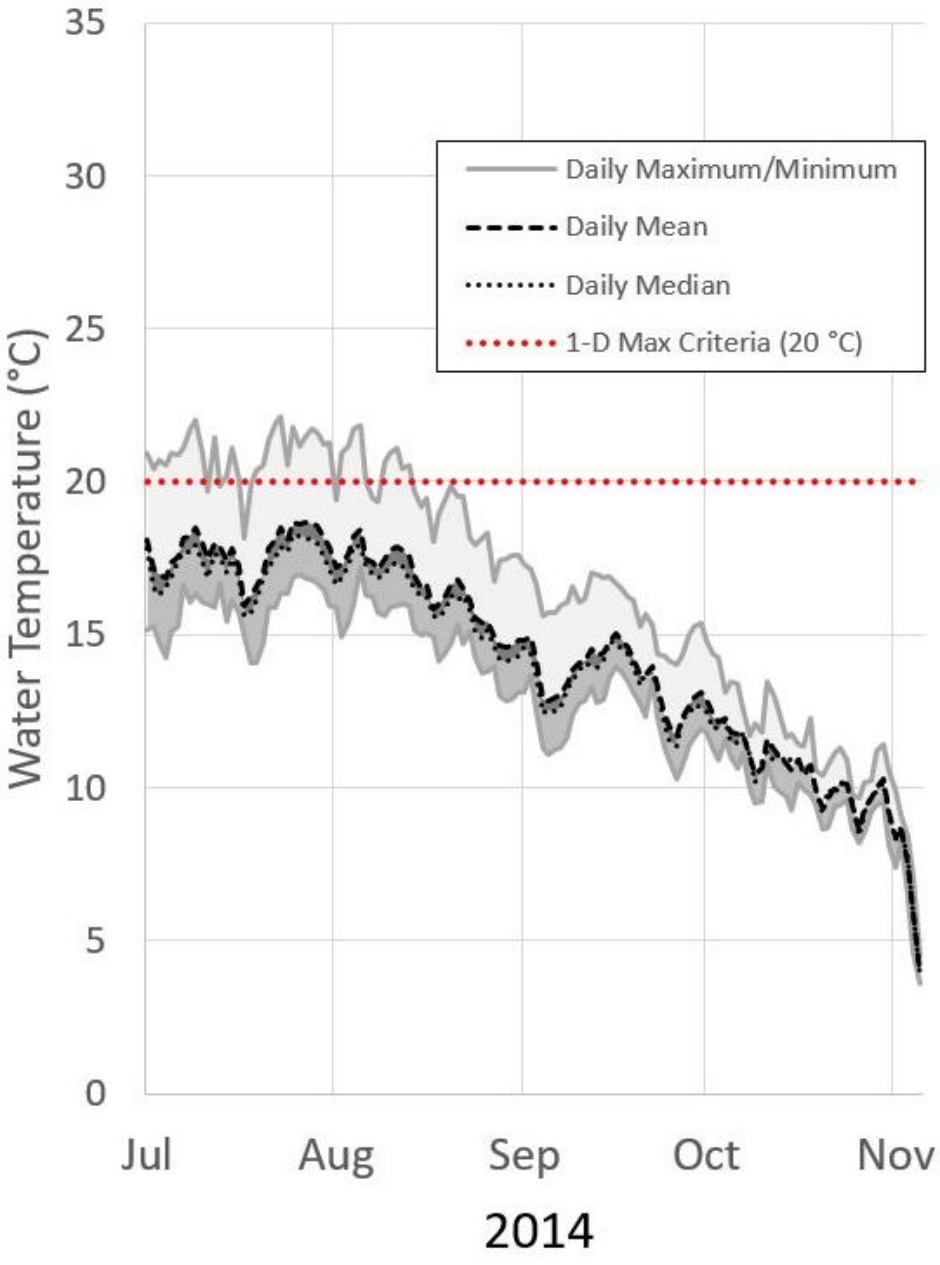

Figure C1: South Fork Touchet River at Rainwater (32SFT-08.8) daily summaries of 15-minute temperature data.

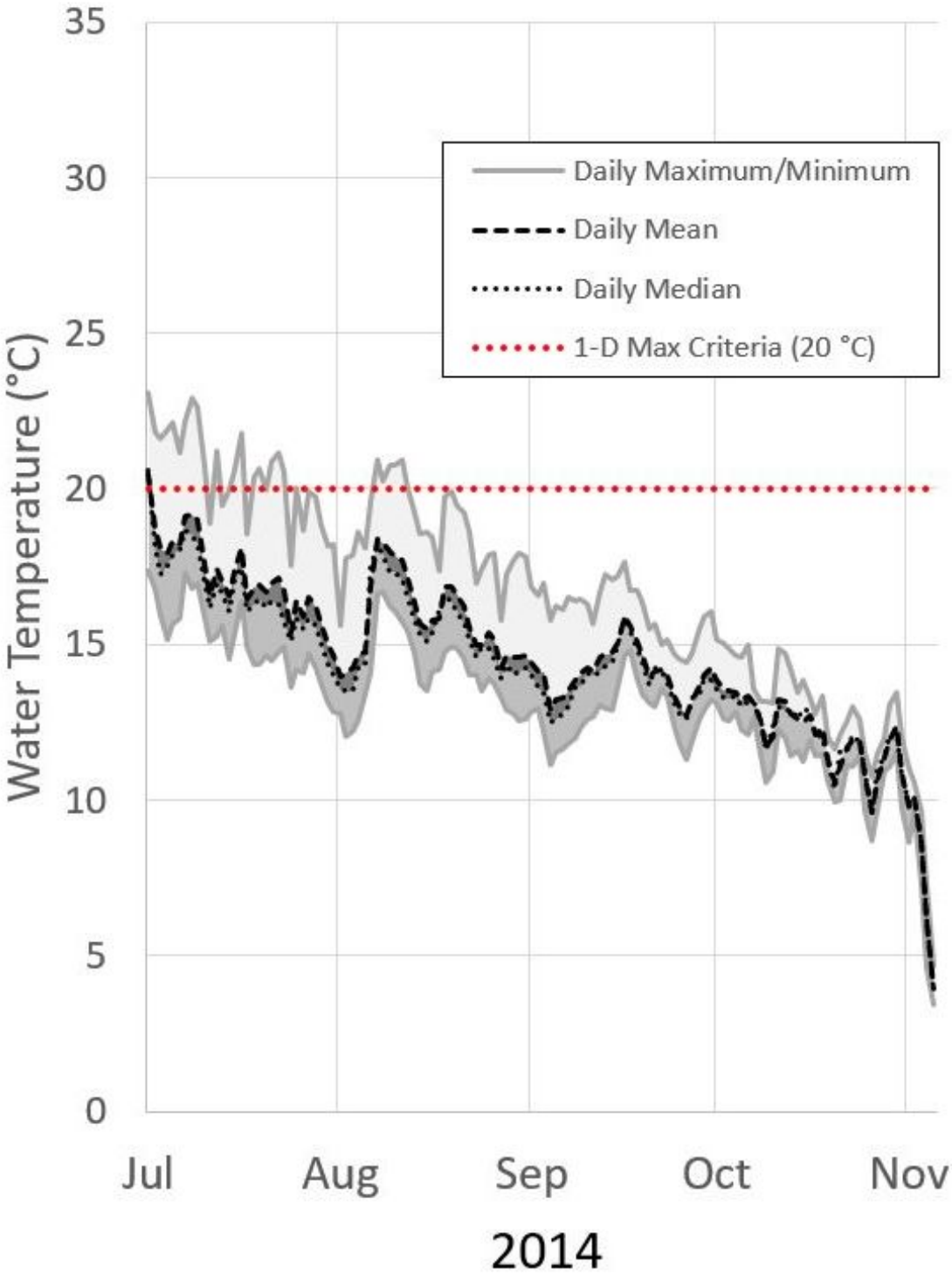

Figure C2: South Fork Touchet River at Magill Rd (32SFT-00.3) daily summaries of 15-minute temperature data.

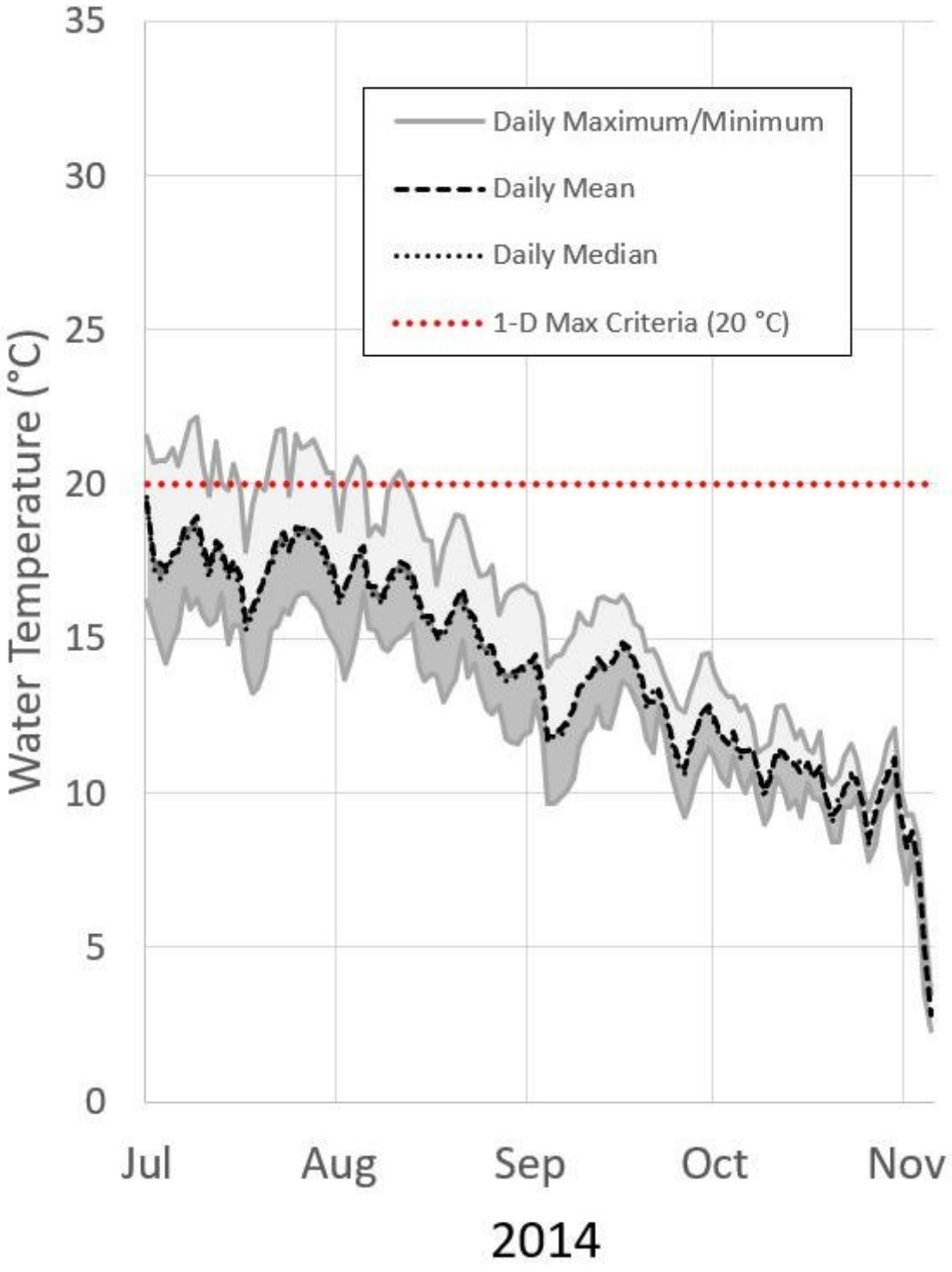

Figure C3: North Fork Touchet River at Confluence (32E050; 32NFT-00.0) daily summaries of 15-minute temperature data.

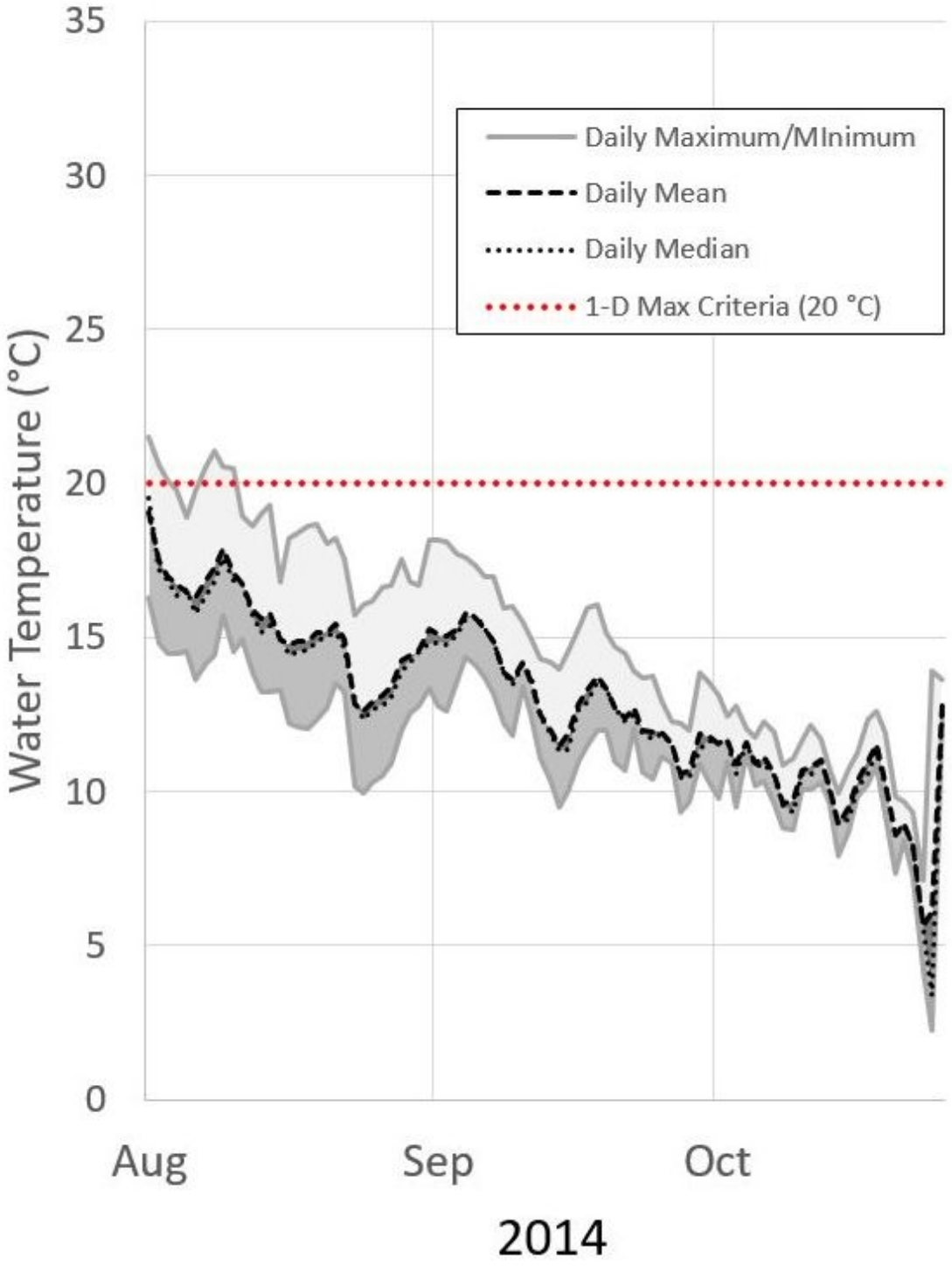

Figure C4: Touchet River above Dayton WWTP (32TOU-52.2) daily summaries of 15-minute temperature data.

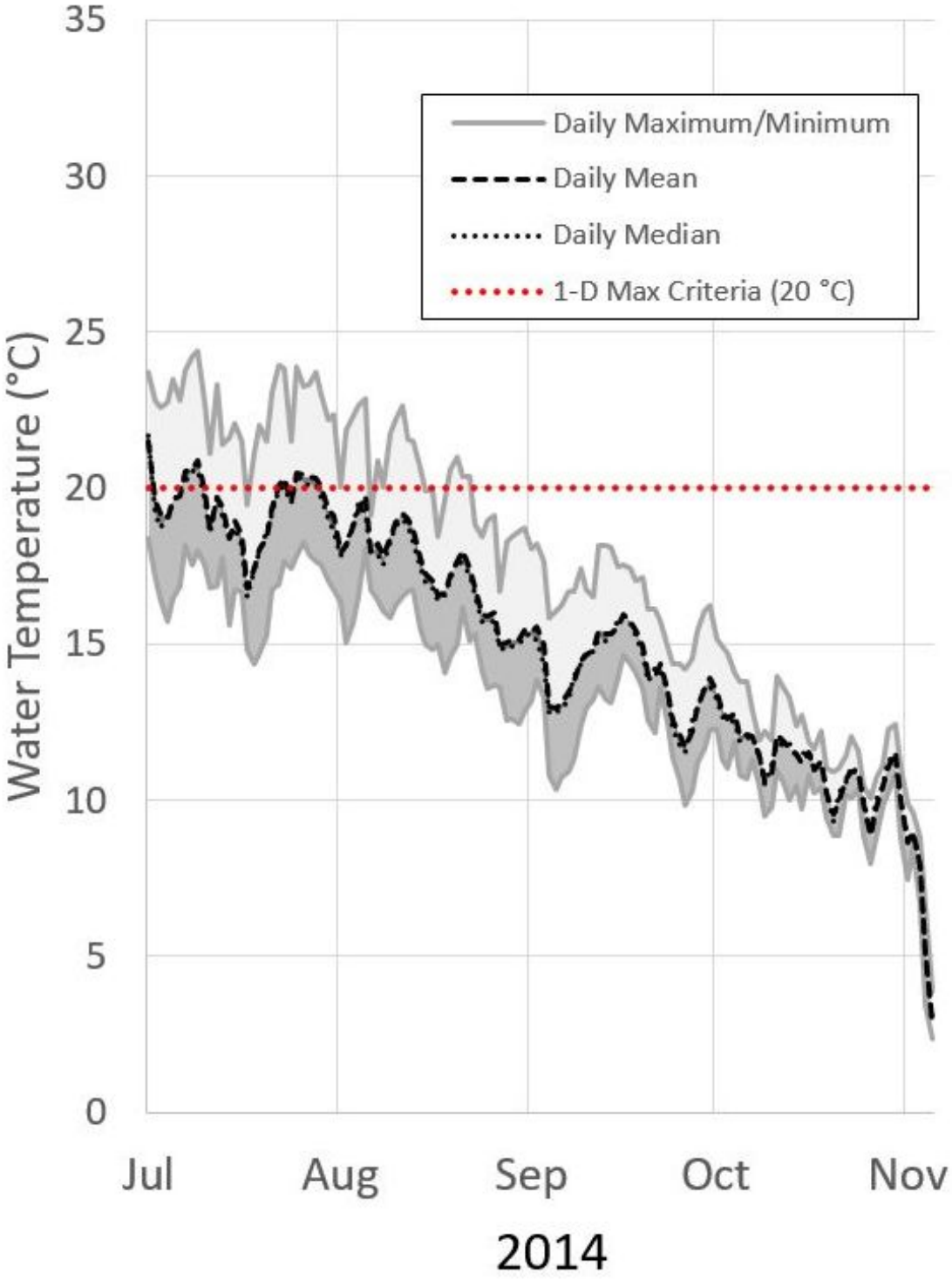

Figure C5: Touchet River at Ward Rd (32TOU-51.2) daily summaries of 15-minute temperature data.

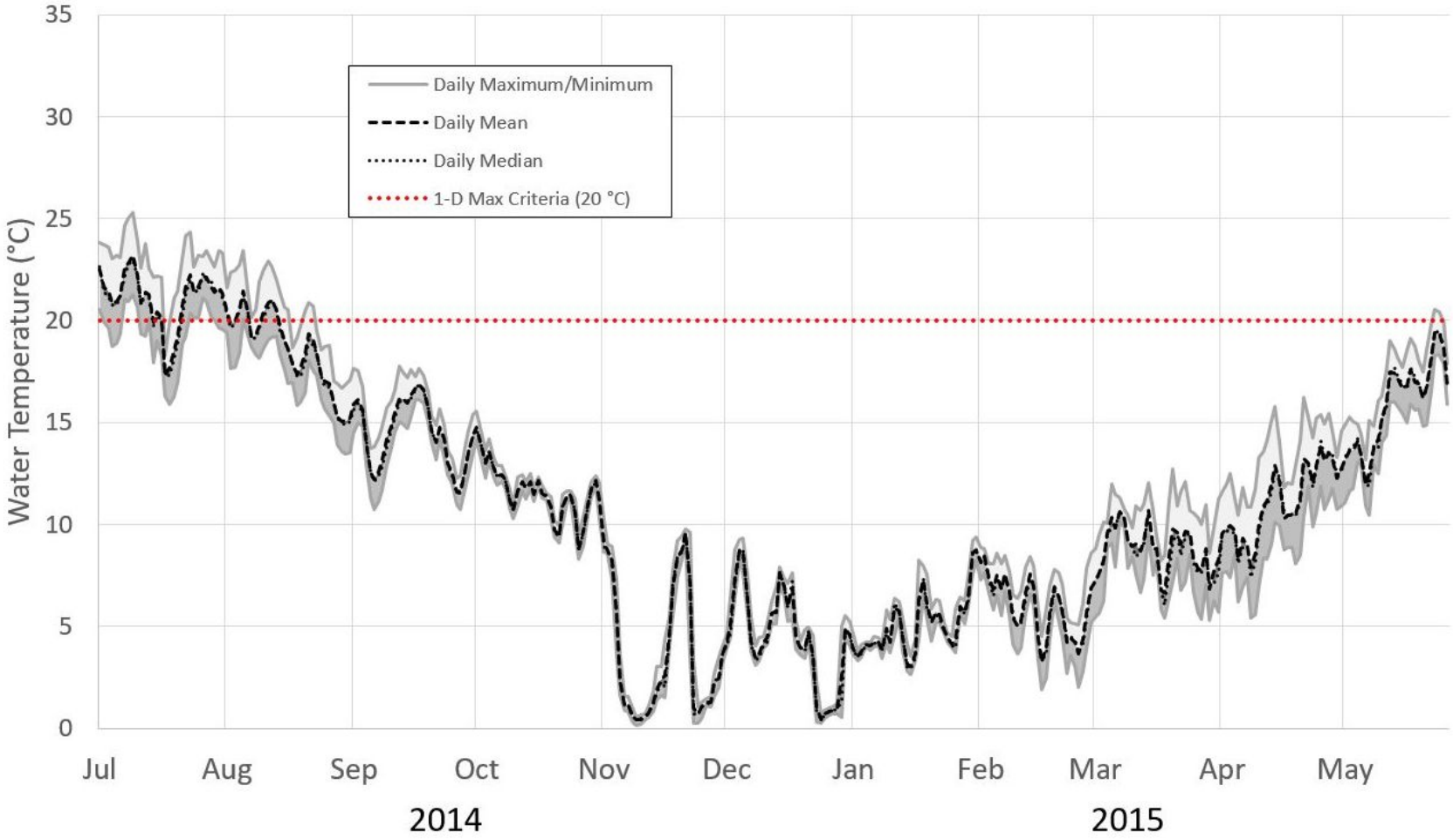

Figure C6: Coppei Creek at Hwy 124 (32COP-00.5) daily summaries of 15-minute temperature data.

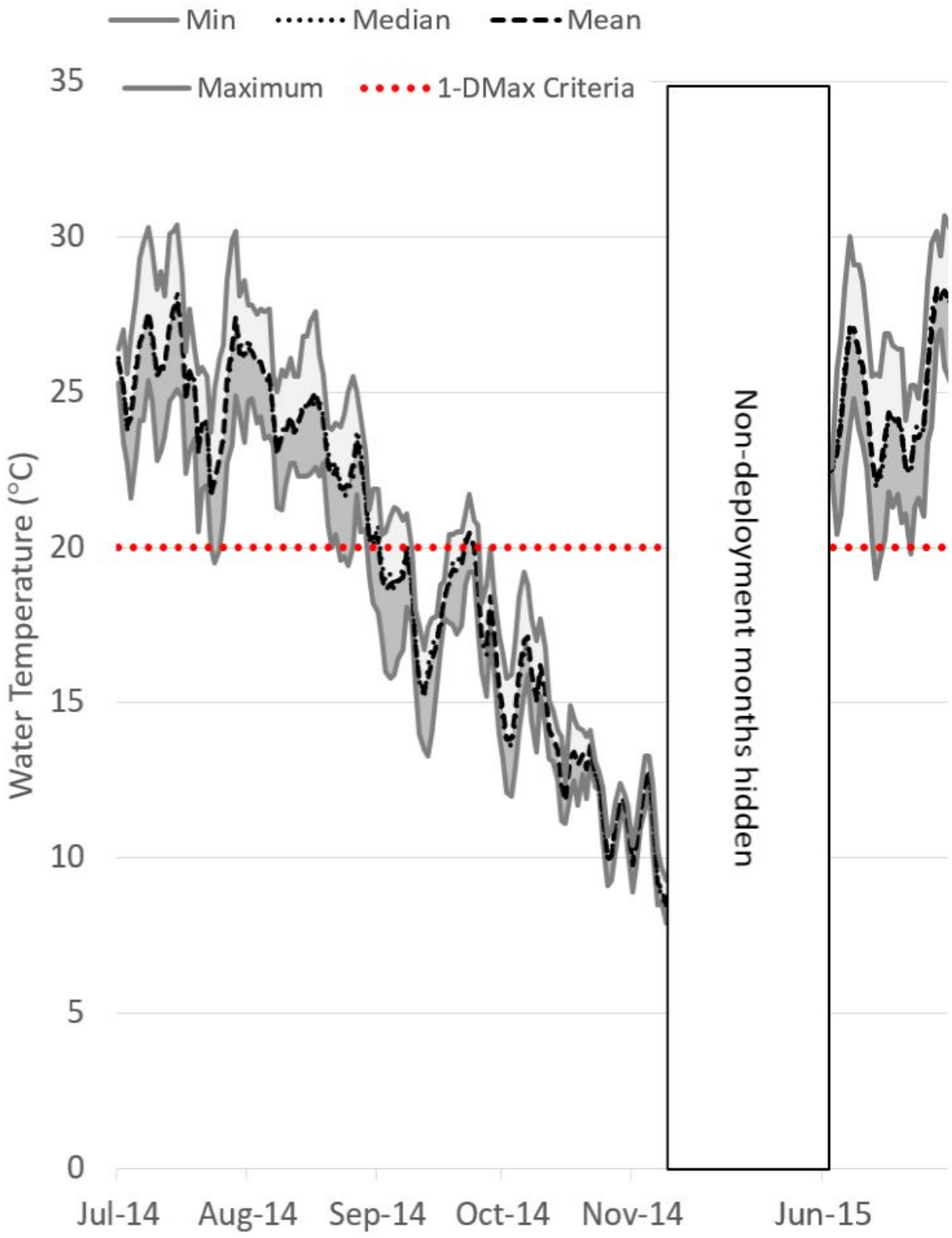

Figure C7: Touchet River at Bolles Rd (32TOU-40.5) daily summaries of 15-minute temperature data.

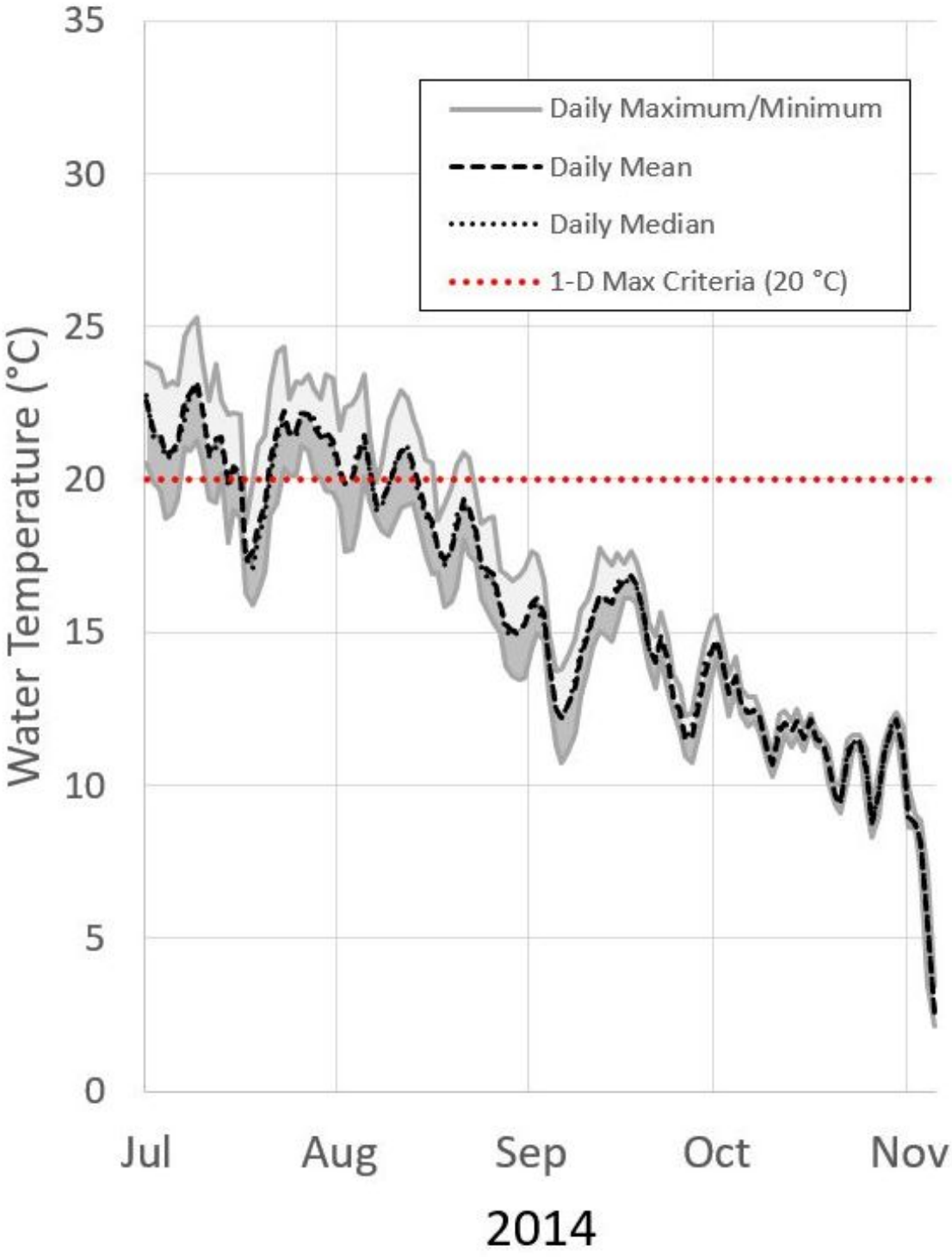

Figure C8: Touchet River at Highway 125 (32TOU-34.2) daily summaries of 15-minute temperature data.

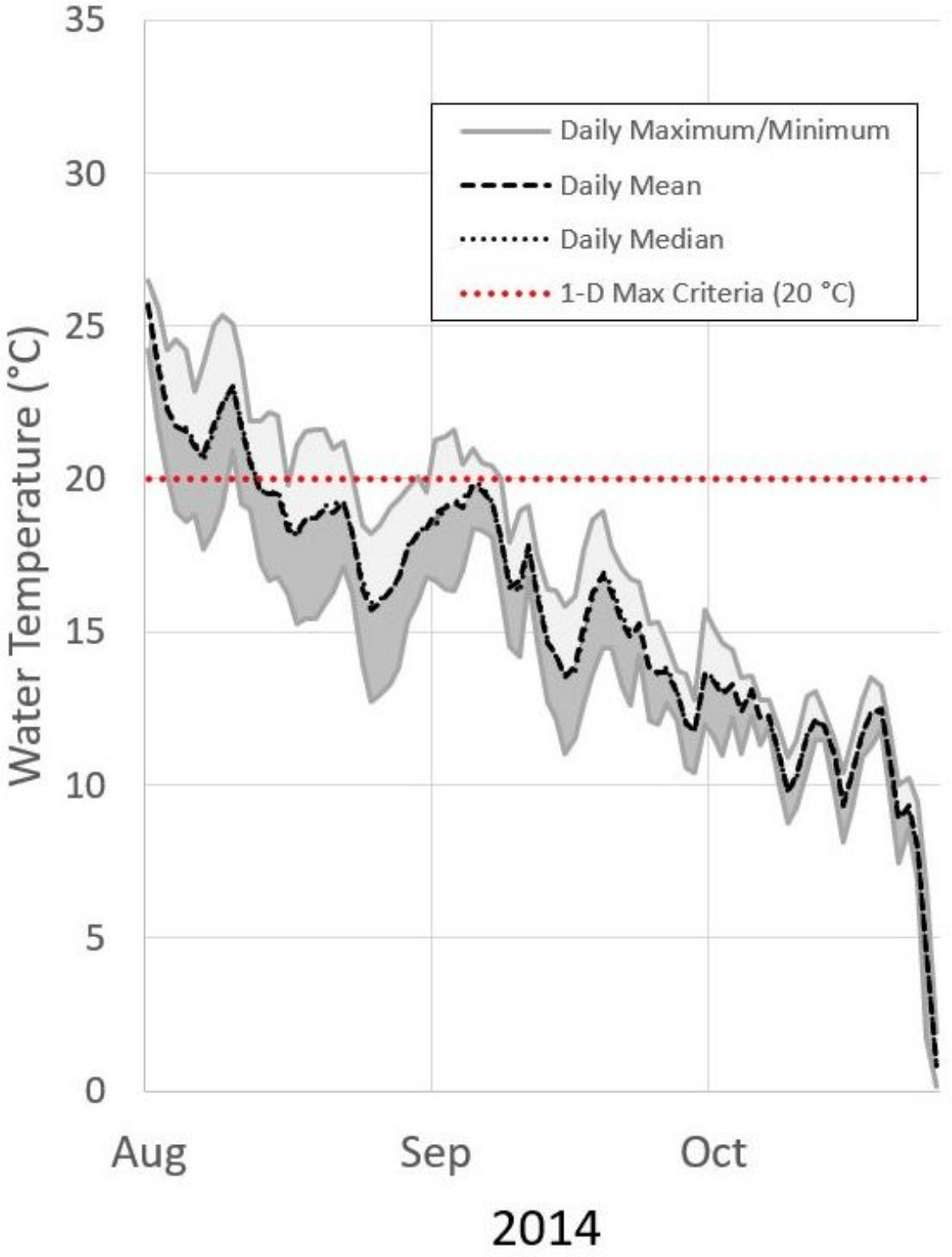

Figure C9: Touchet River at Lamar (32TOU-25.0) daily summaries of 15-minute temperature data.

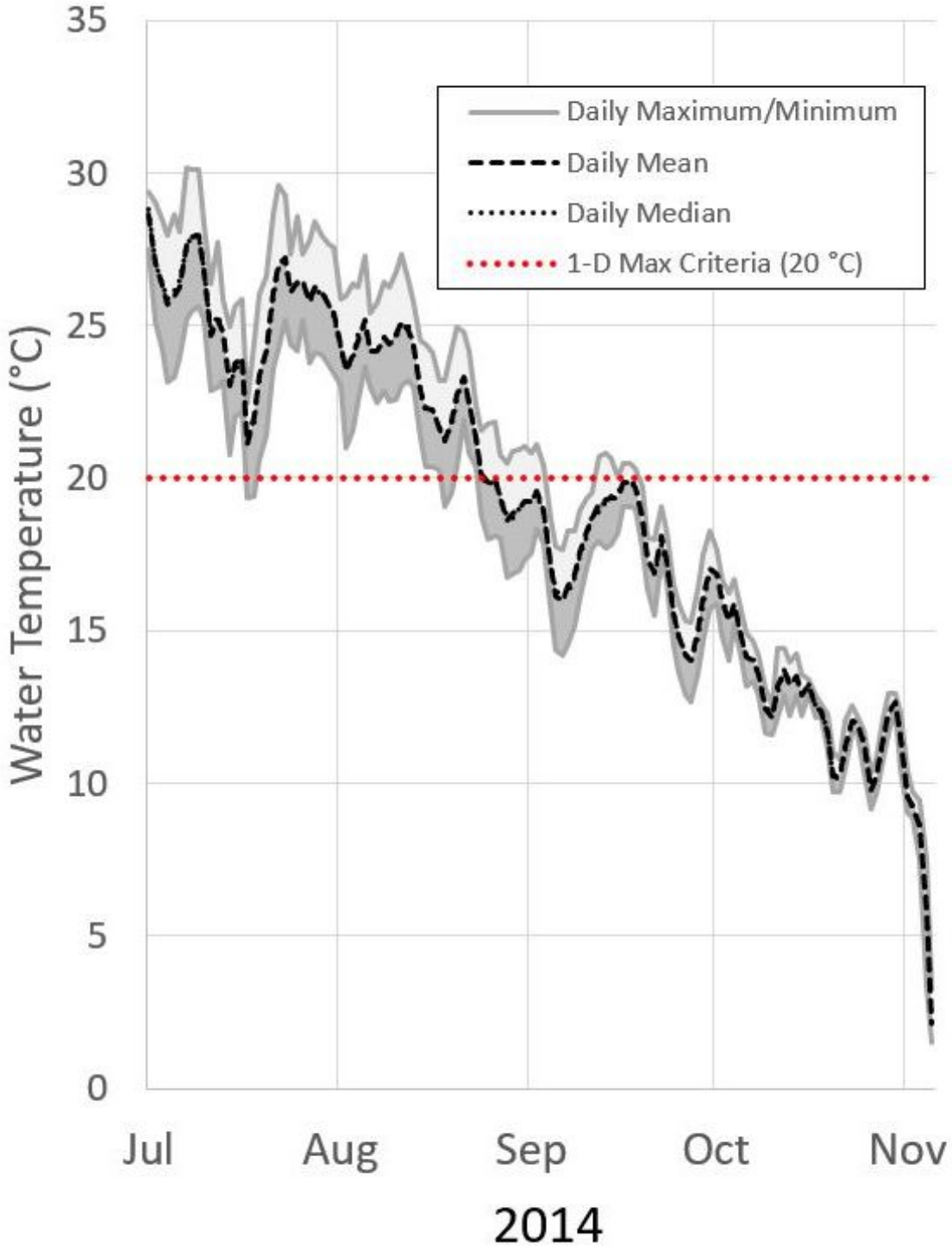

Figure C10: Touchet River at Luckenbill Rd (32TOU-17.8) daily summaries of 15-minute temperature data.

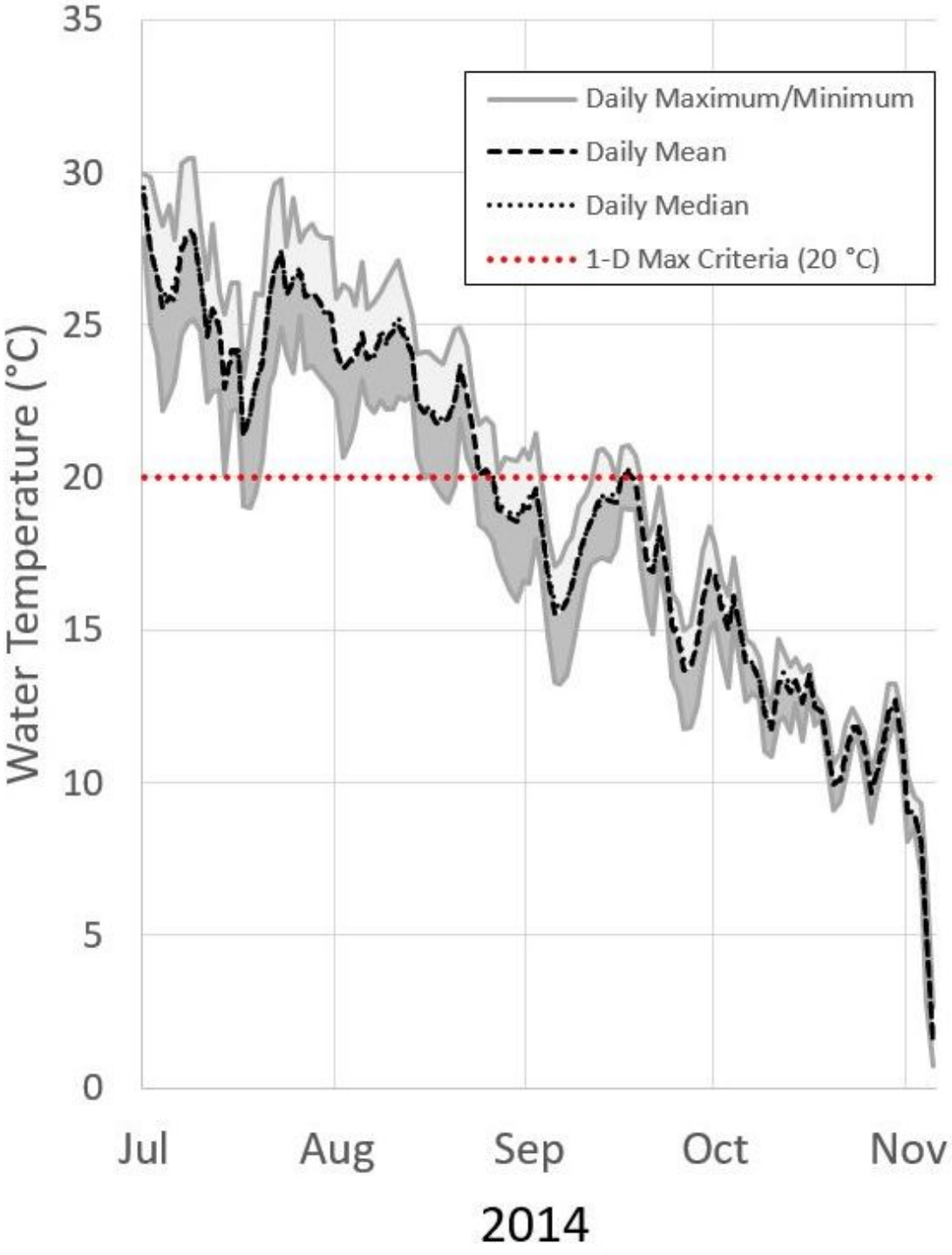

Figure C11: Touchet River at Touchet N Rd (32TOU-07.0) daily summaries of 15-minute temperature data.

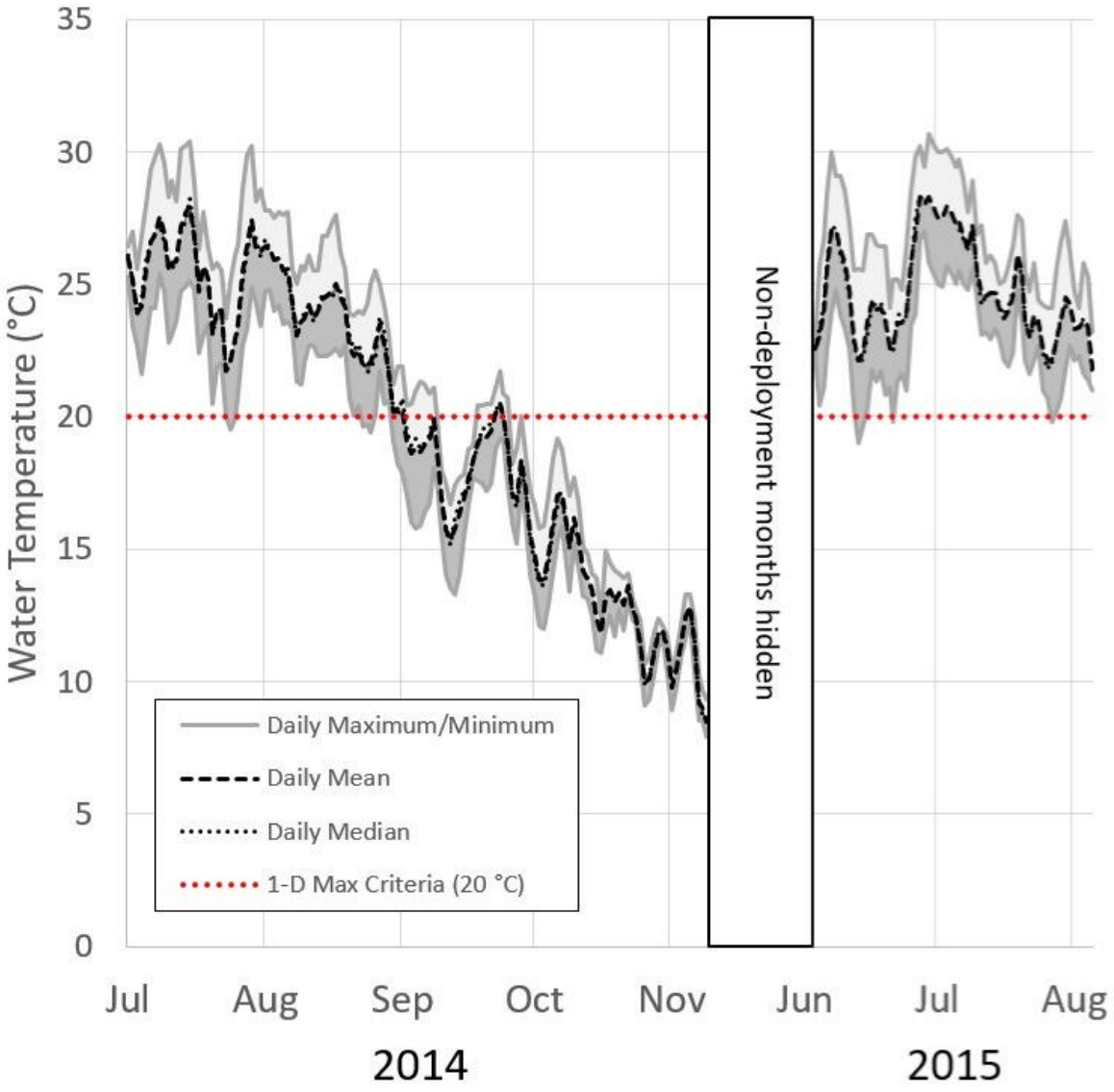

Figure C12: Touchet River at Cummins Rd (32TOU-02.0) daily summaries of 15-minute temperature data.

Mill Creek and other Walla Walla urban-area tributaries

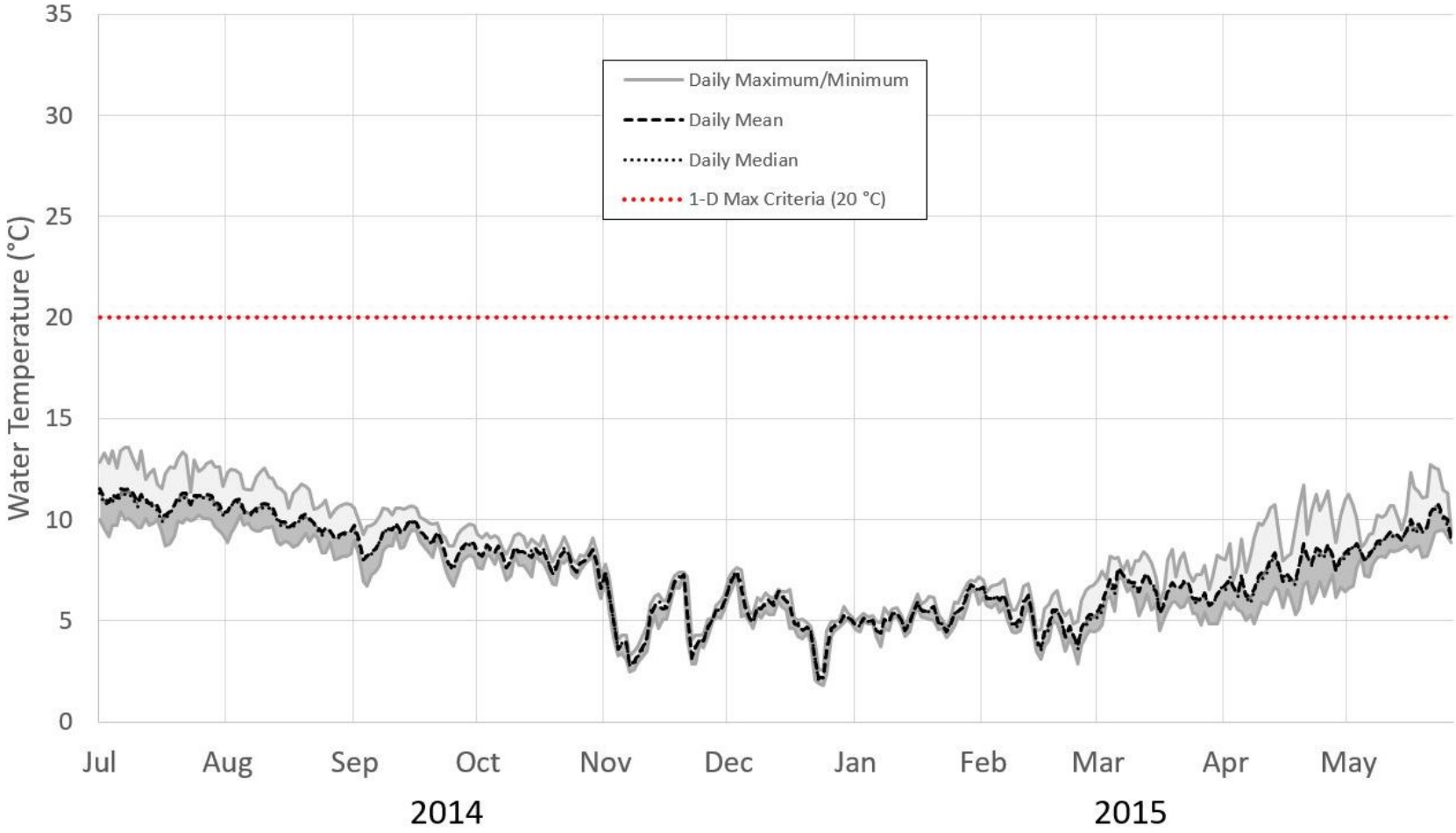

Figure C13: Mill Creek at Tiger Creek Rd (32MIL-24.6) daily summaries of 15-minute temperature data.

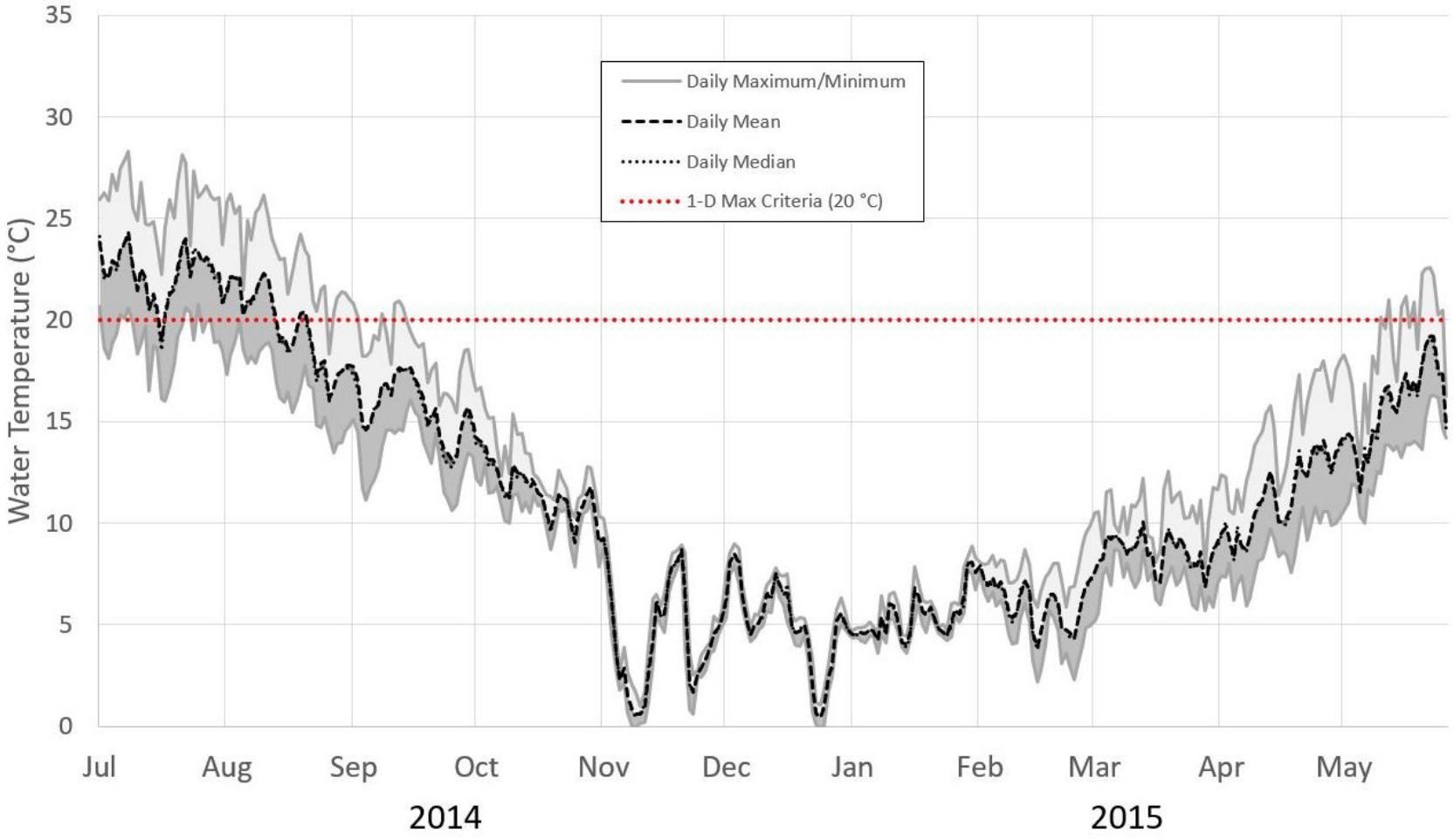

Figure C14: Mill Creek at Yellowhawk / Garrison Creek Diversion (32MIL-11.5) daily summaries of 15-minute temperature data.

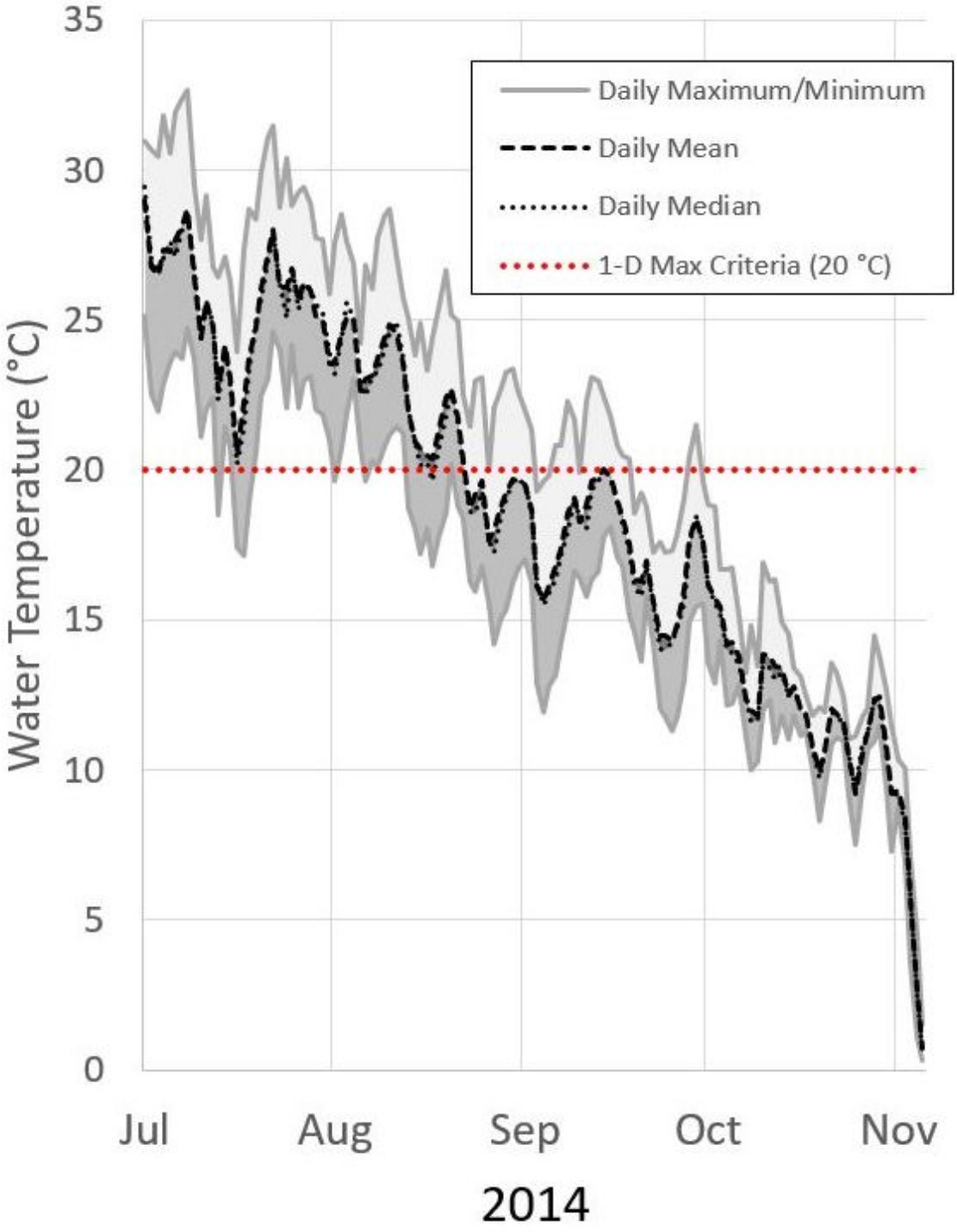

Figure C15: Mill Creek at Roosevelt Street (32MIL-08.9) daily summaries of 15-minute temperature data.

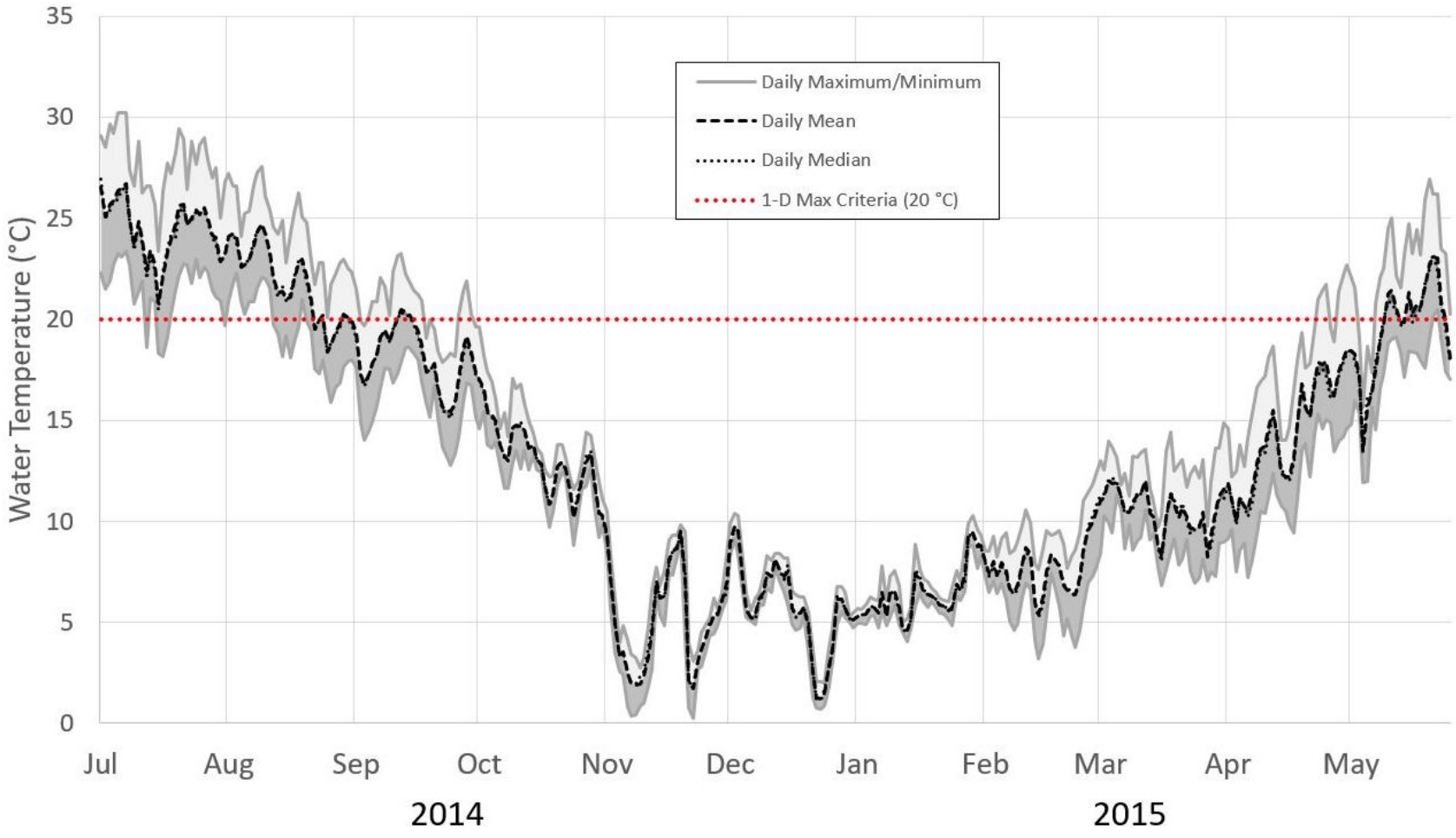

Figure C16: Mill Creek at Gose Rd (32MIL-04.8) daily summaries of 15-minute temperature data.

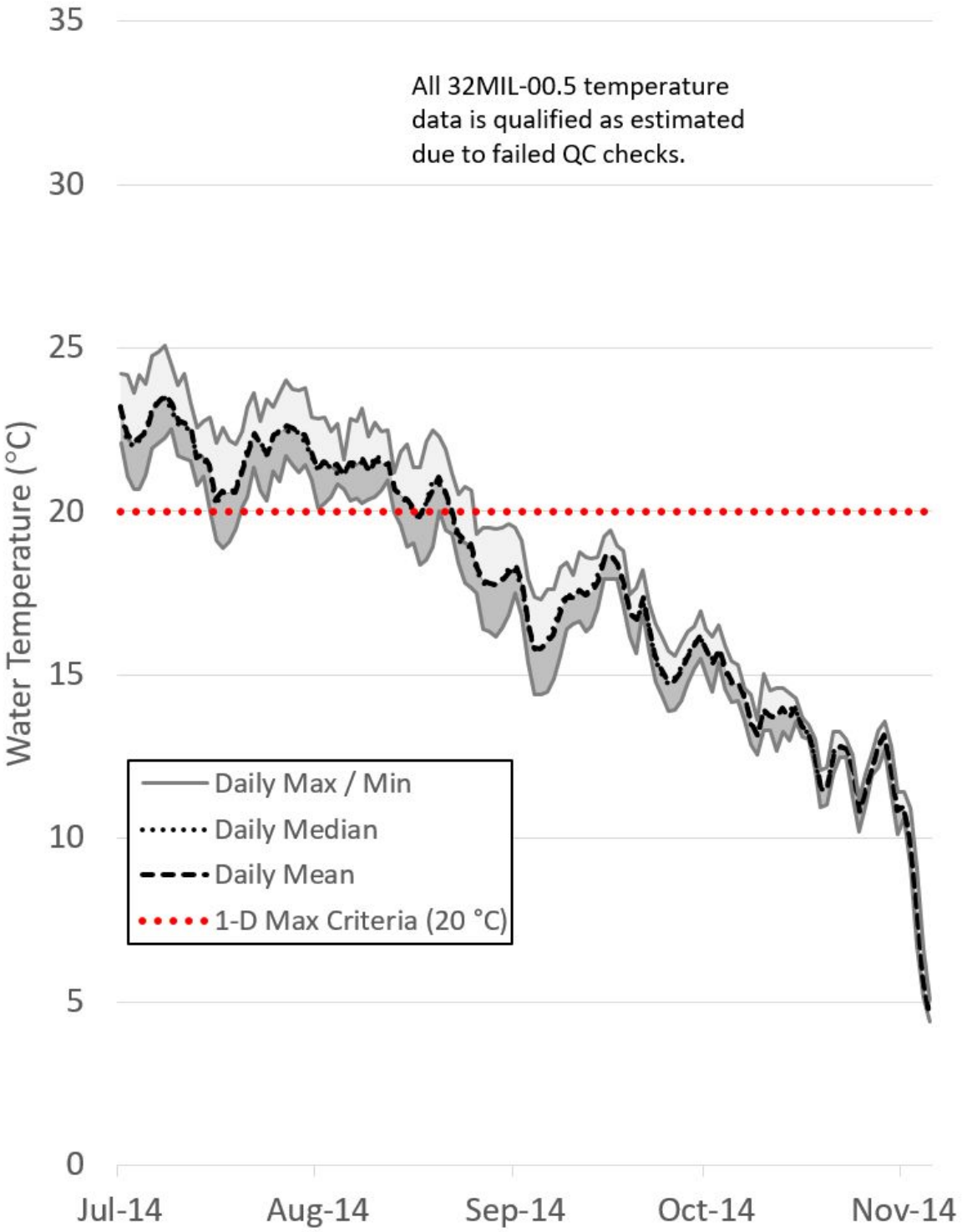

Figure C17: Mill Creek at Sweagle Rd (32MIL-00.5) daily summaries of 15-minute temperature data.

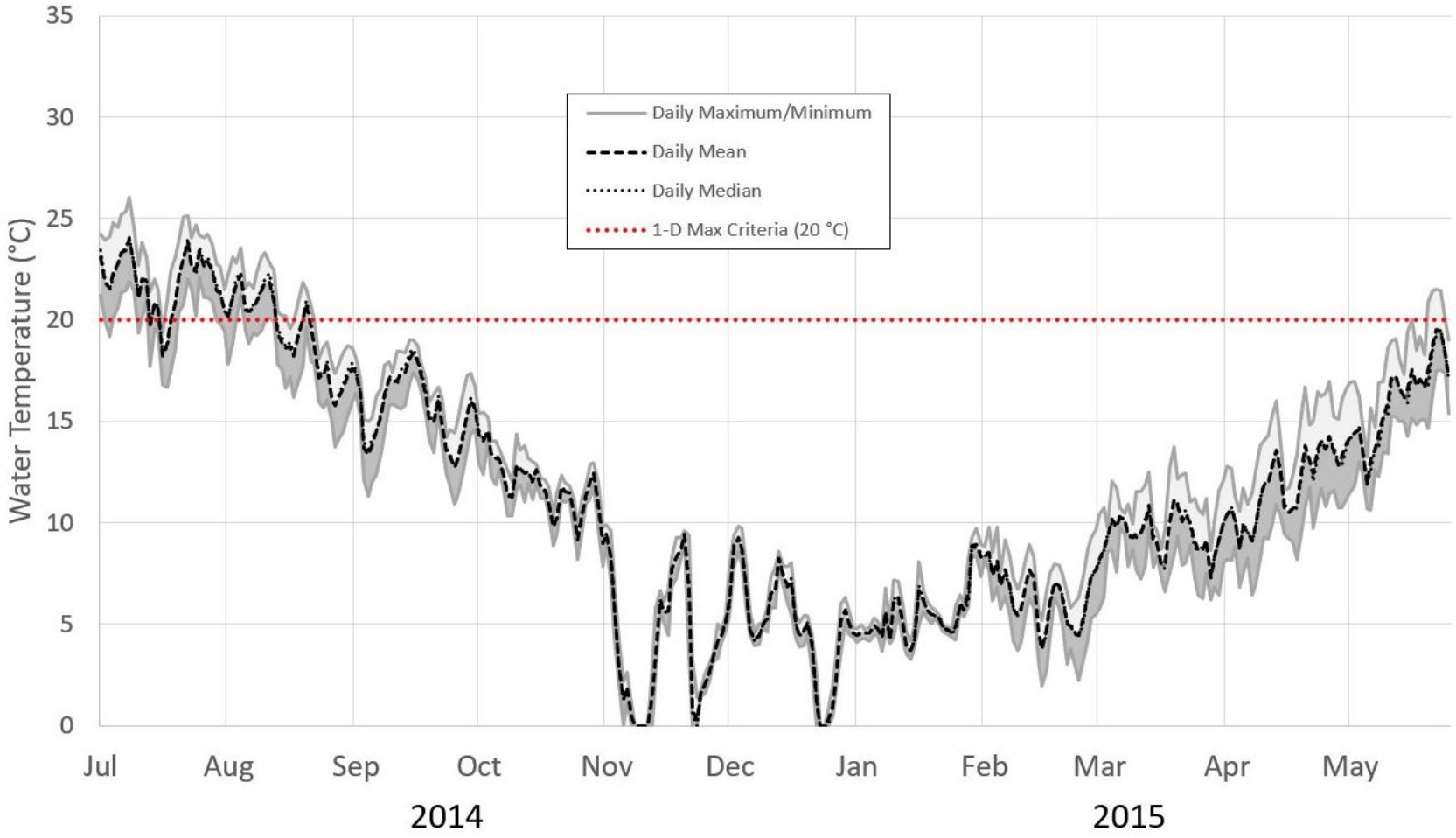

Figure C18: Yellowhawk Creek at Plaza Rd (32YEL-03.5) daily summaries of 15-minute temperature data.

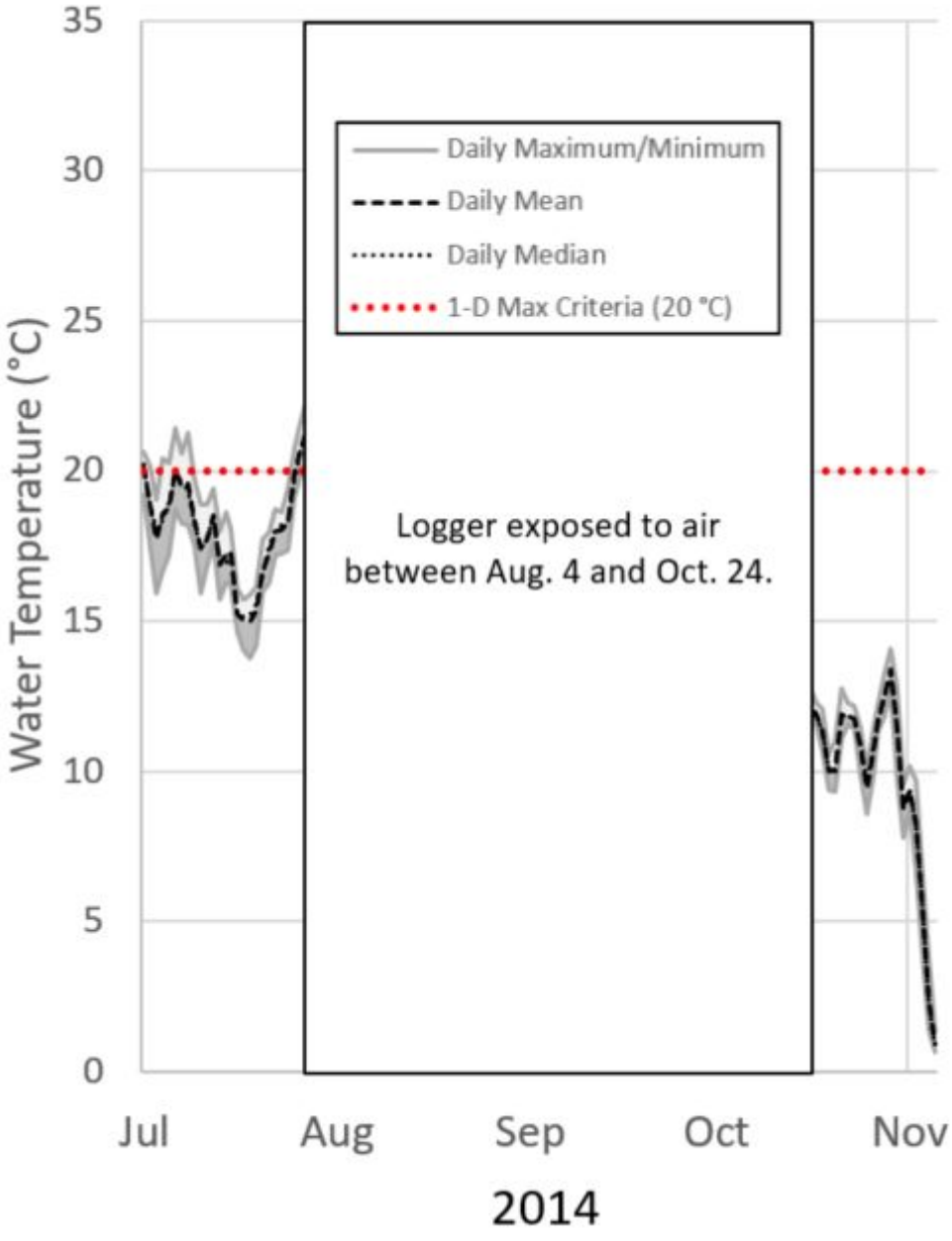

Figure C19: Russell Creek at Plaza Rd (32RUS-00.1) daily summaries of 15-minute temperature data.

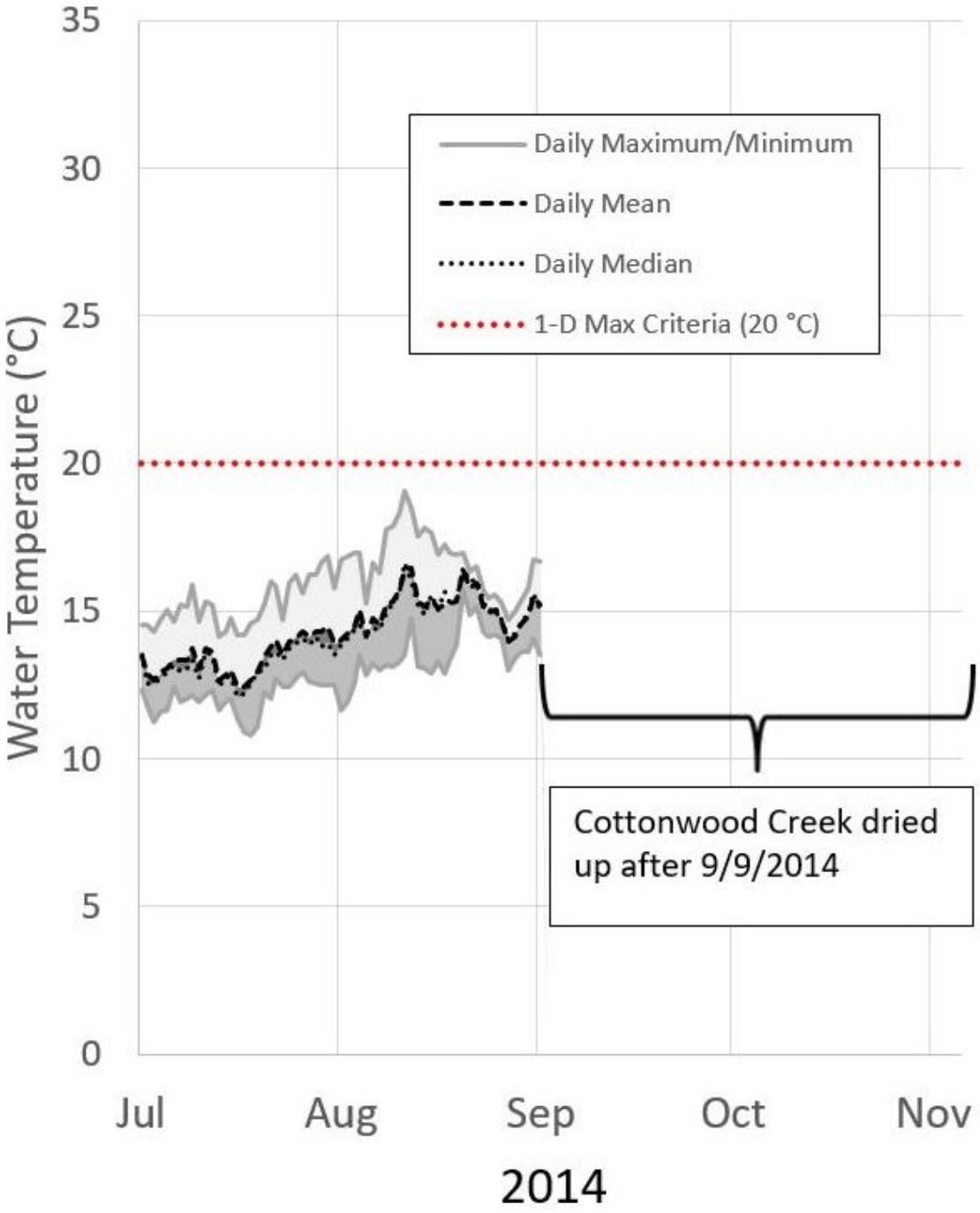

Figure C20: Cottonwood Creek at Plaza Rd (32COT-01.0) daily summaries of 15-minute temperature data.

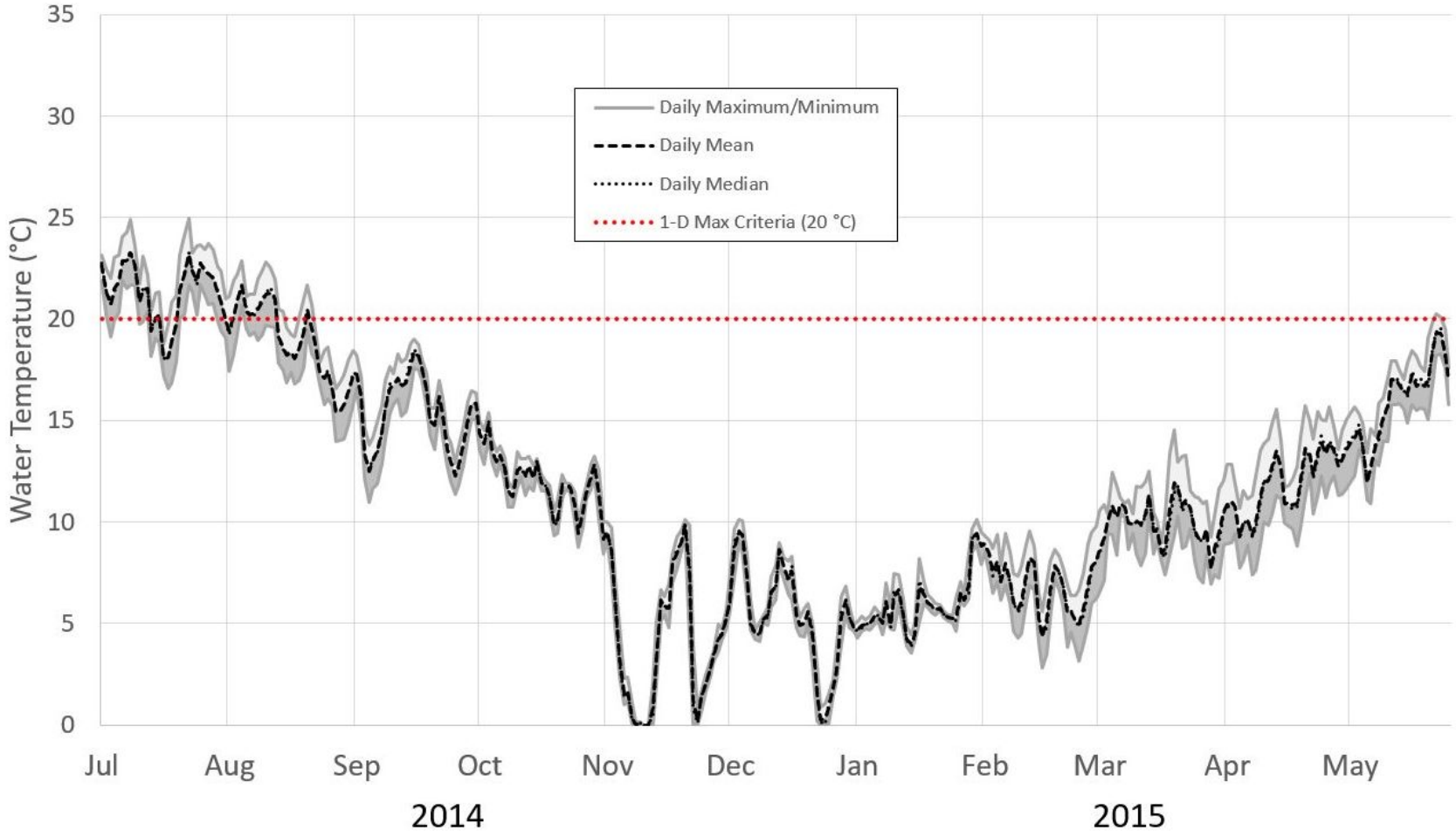

Figure C21: Yellowhawk Creek at Old Milton Rd (32YEL-00.2) daily summaries of 15-minute temperature data.

Walla Walla River mainstem and rural tributaries

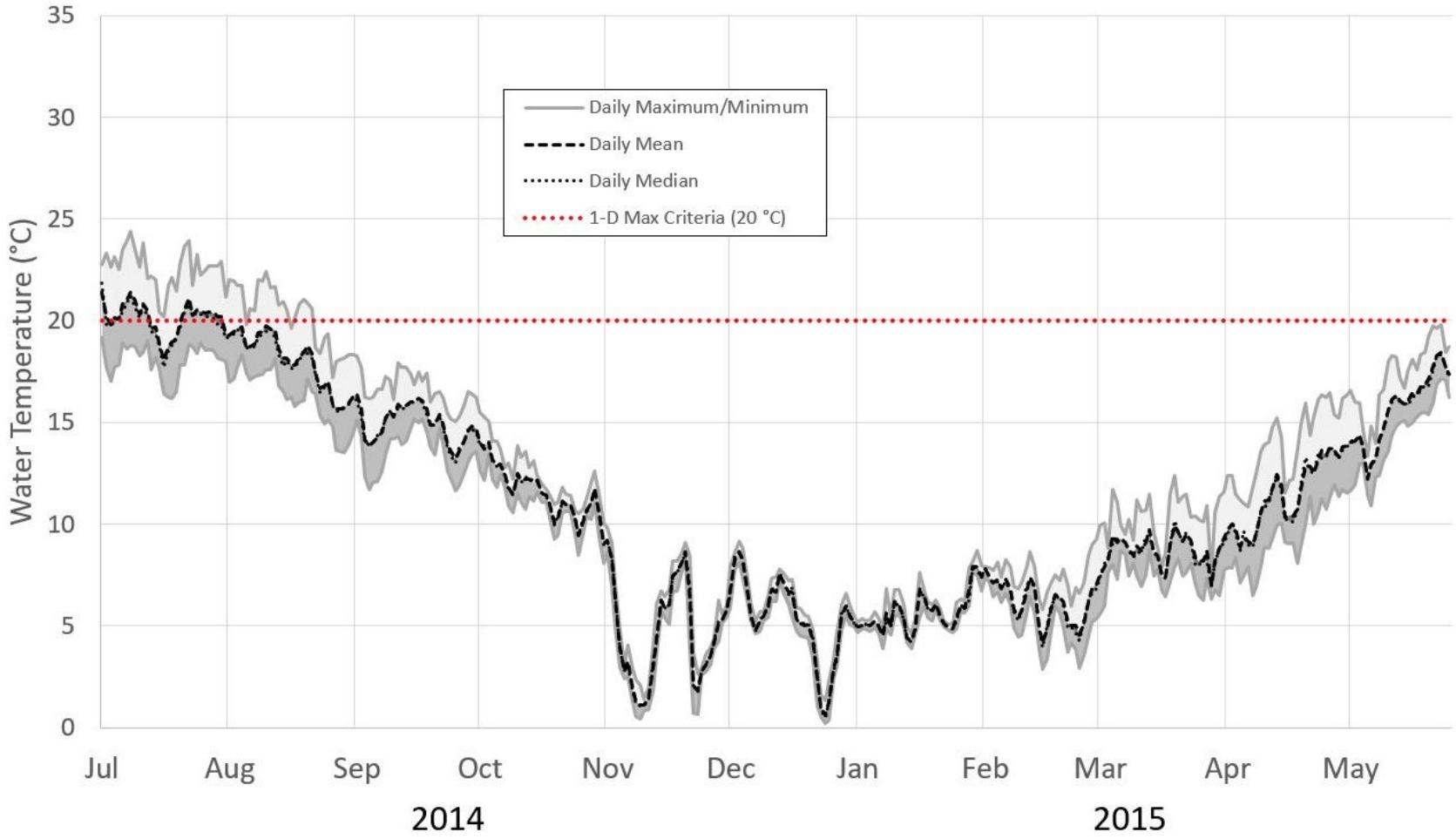

Figure C22: Walla Walla River at Peppers Bridge Rd (32WAL-39.6) daily summaries of 15-minute temperature data.

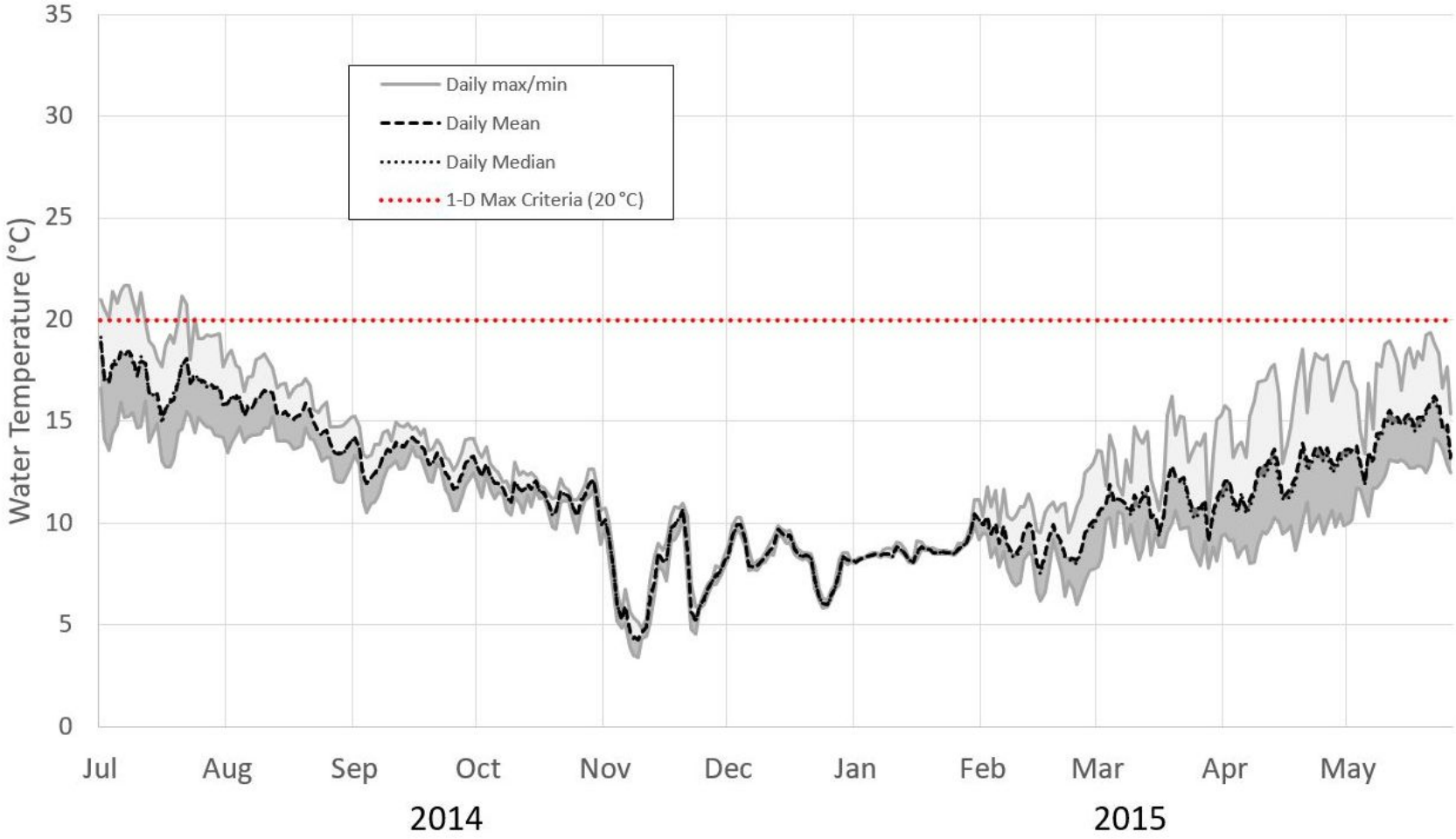

Figure C23: East Little Walla Walla River at Springdale Rd (32ELW-00.7) daily summaries of 15-minute temperature data.

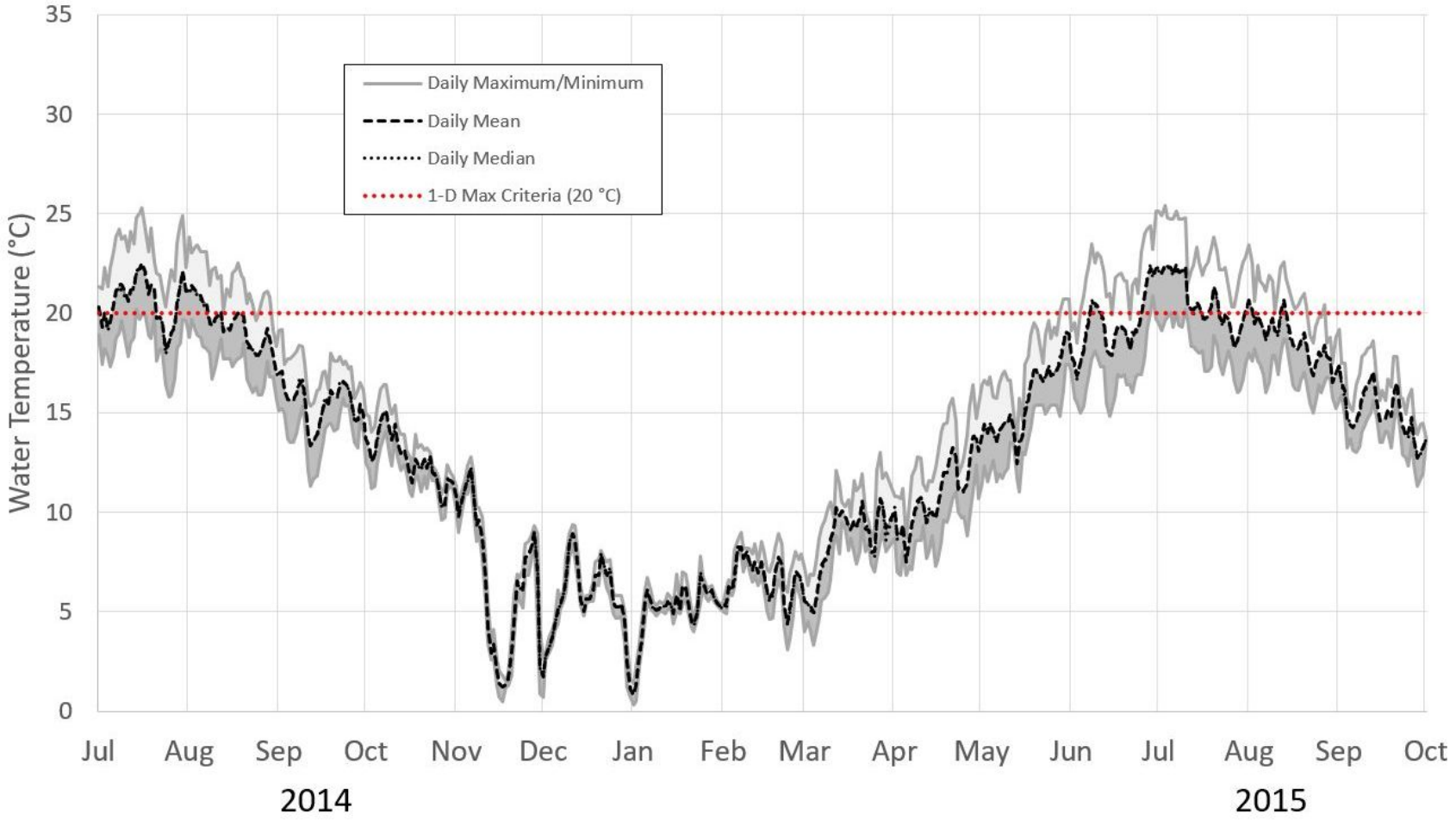

Figure C24: Walla Walla River at Mojonnier (Beet) Rd (32WAL-36.5) daily summaries of 15-minute temperature data.

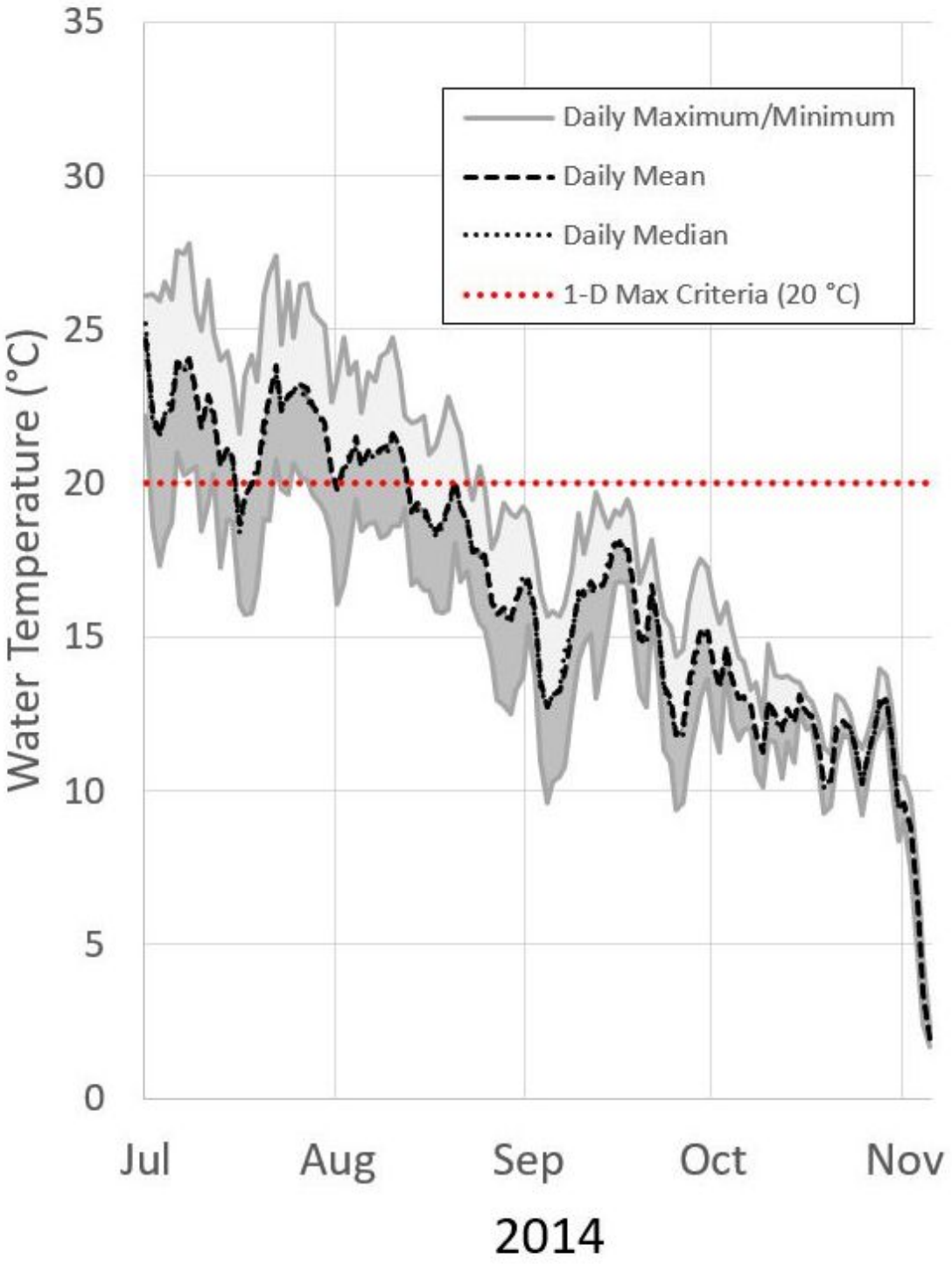

Figure C25: West Little Walla Walla River at Sweagle Rd (32WLW-00.8) daily summaries of 15-minute temperature data.

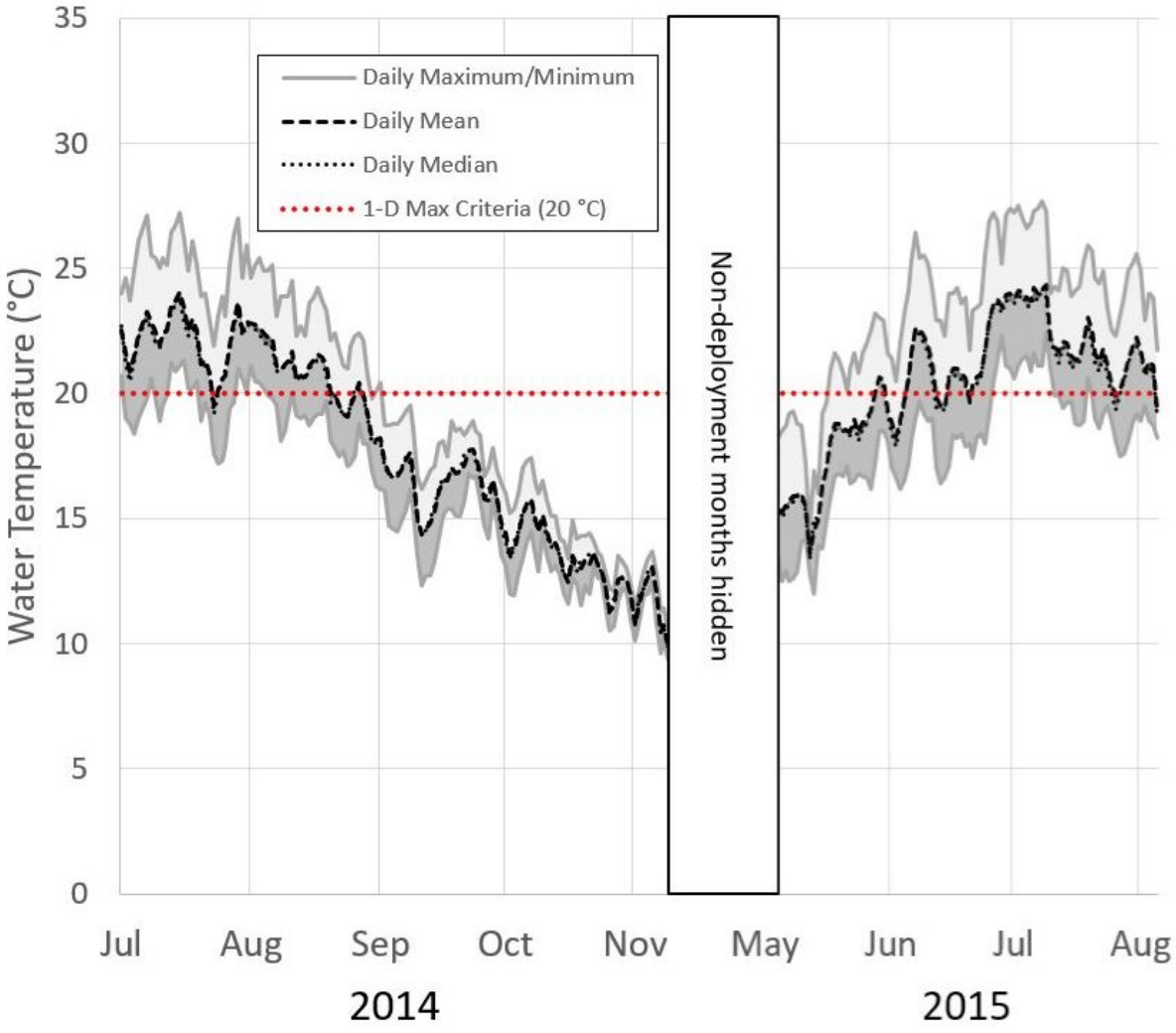

Figure C26: Walla Walla River at Detour Rd (32WAL-32.8) daily summaries of 15-minute temperature data.

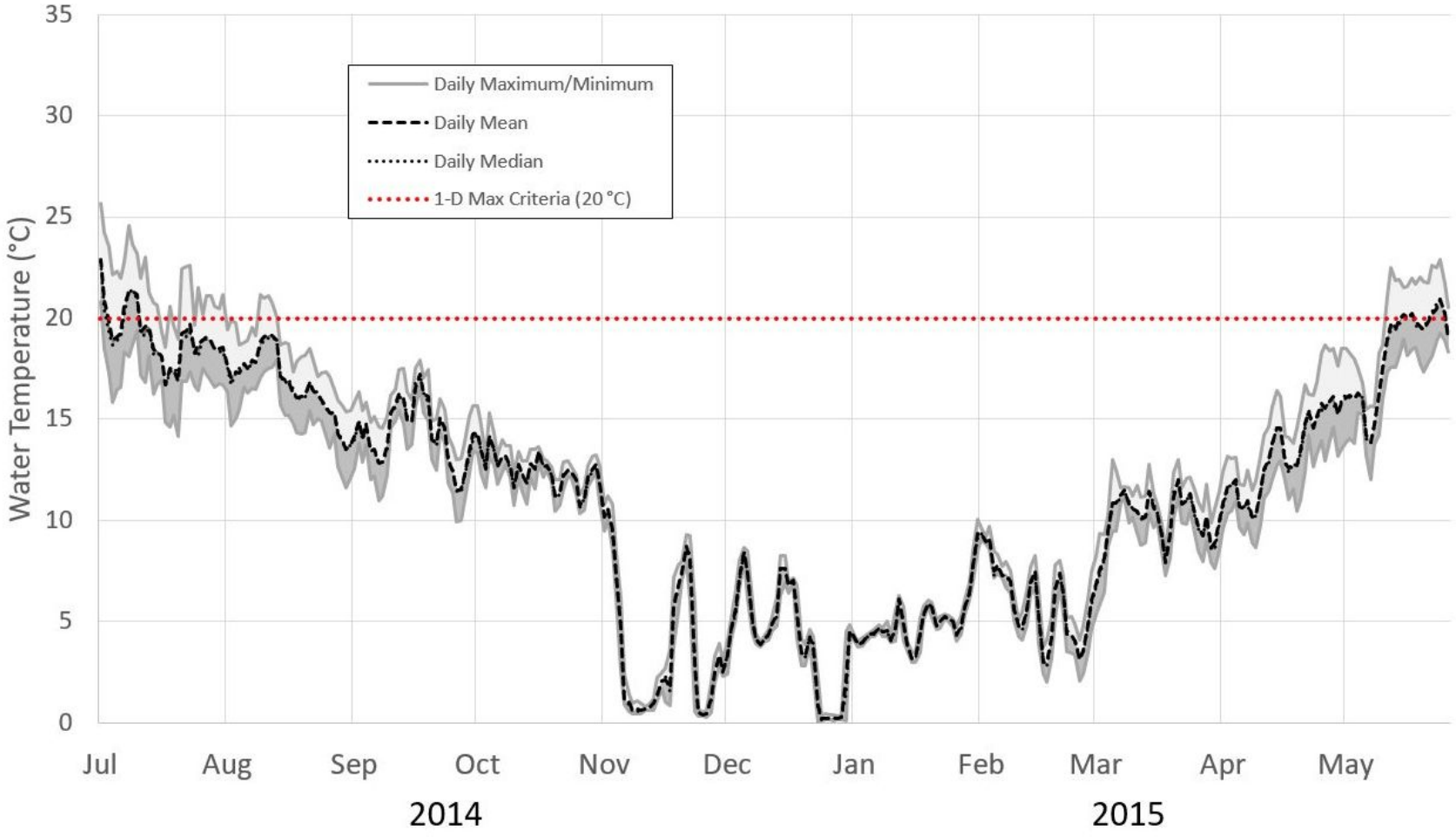

Figure C27: Dry Creek at Dodd Ranch (32DRY-00.1) daily summaries of 15-minute temperature data.

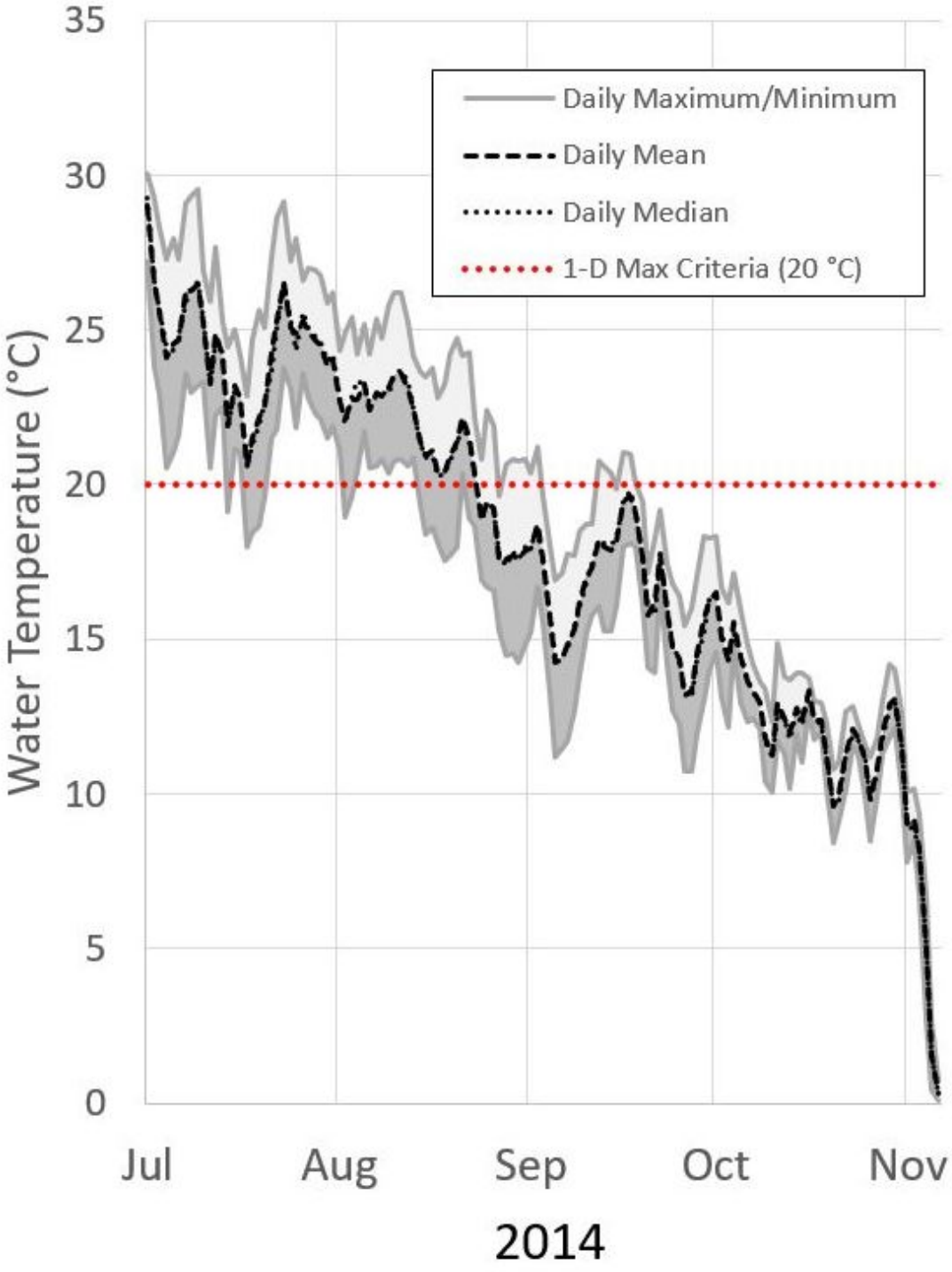

Figure C28: Mud Creek at Borgen (Barney) Rd (32MUD-00.5) daily summaries of 15-minute temperature data.

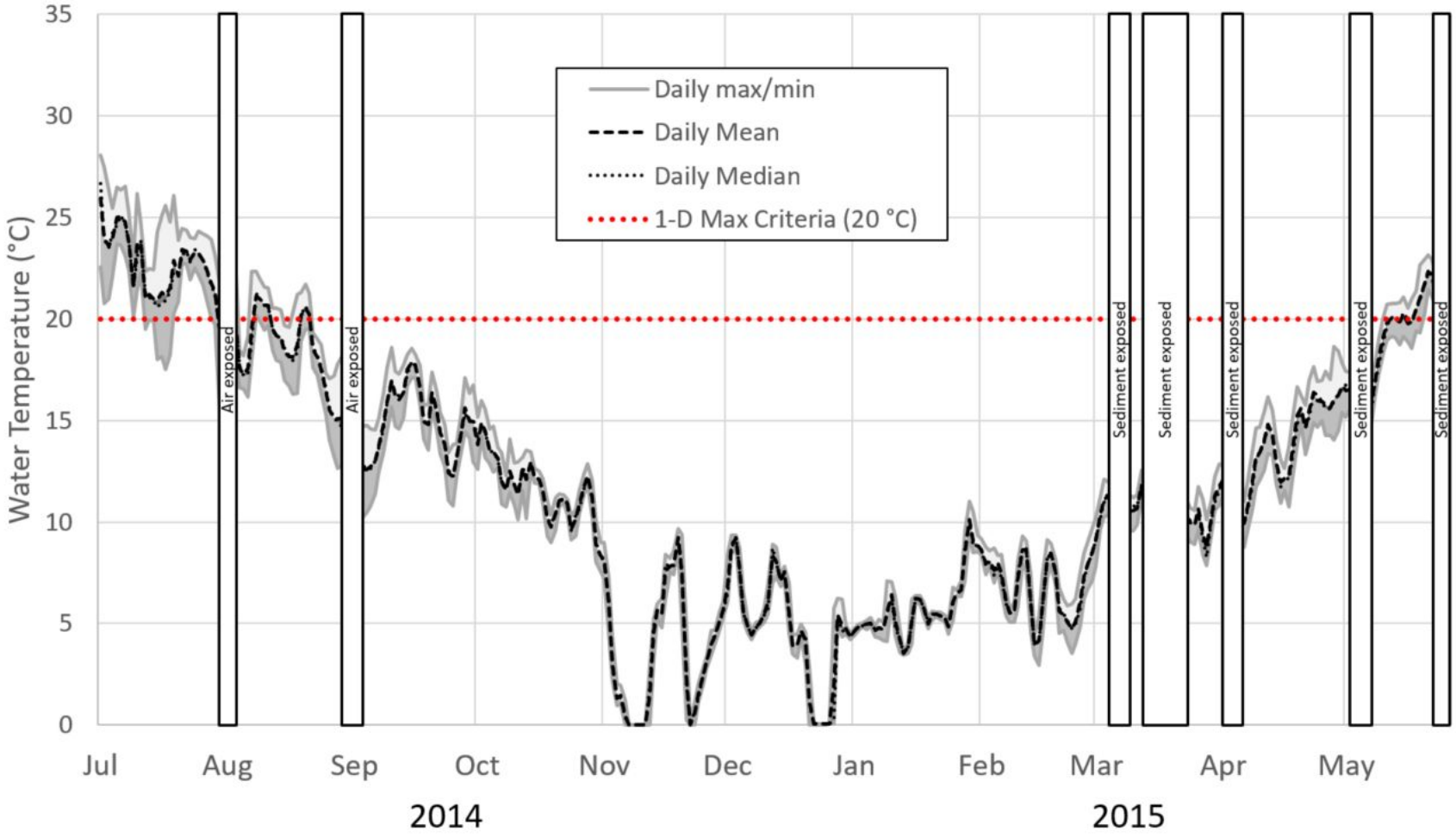

Figure C29: Pine Creek at Sand Pit Rd (32PIN-01.4) daily summaries of 15-minute temperature data.

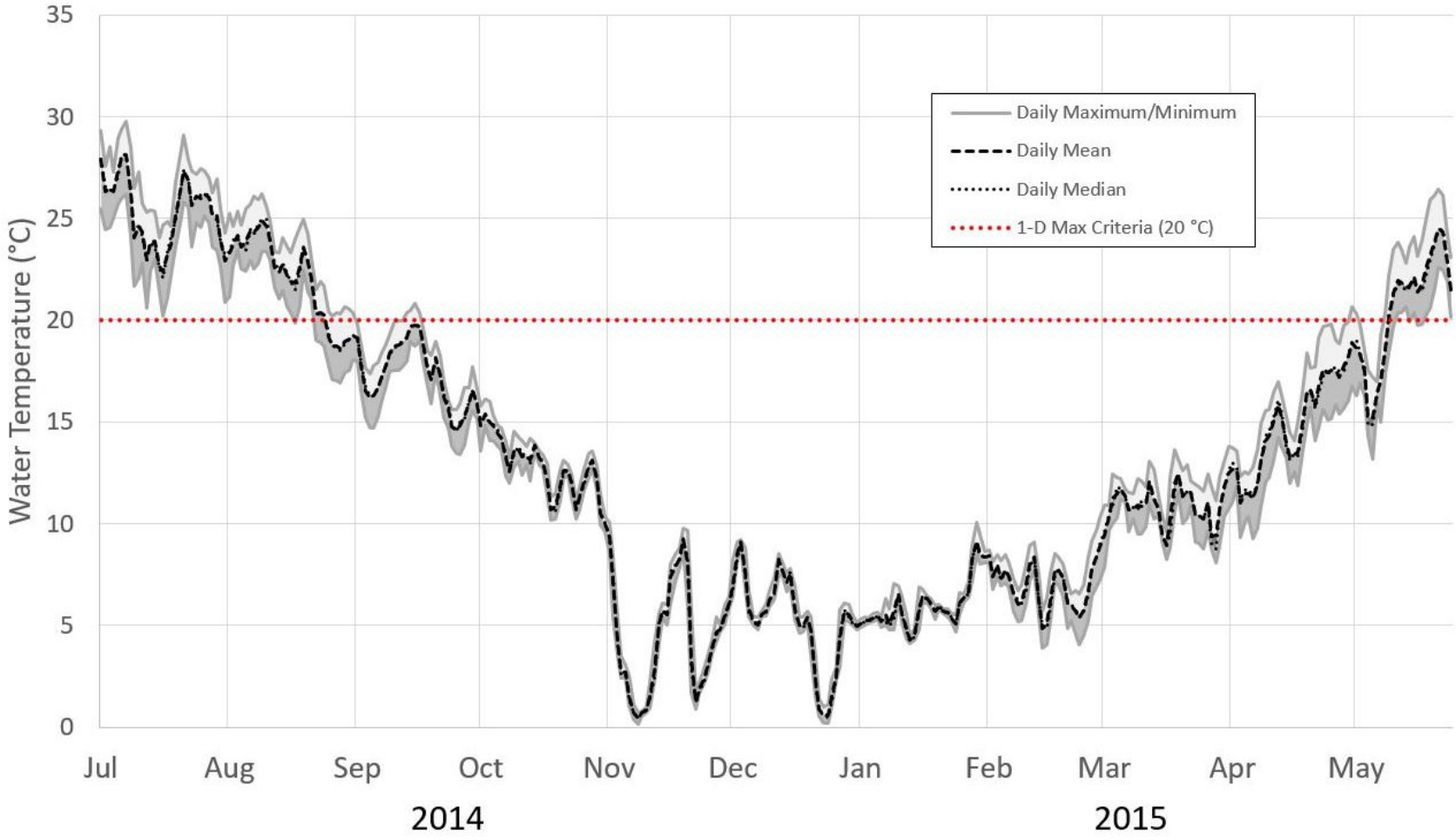

Figure C30: Walla Walla River at Touchet-Gardena Rd (32WAL-22.7) daily summaries of 15-minute temperature data.

Figure C31: Walla Walla River at Pierce's RV Park (32WAL-09.3) daily summaries of 15-minute temperature data.[1]

[1] Data from Walla Walla Basin Watershed Council (WWBWC) Water Quality Monitoring website, http://www.wwbwc.org/monitoring/surfacewater.html.

Appendix D. Discrete Meter Results

This section includes charts of single grab-sample (discrete) measurements of instream water collected during site visits for the following parameters:

- Dissolved Oxygen (DO)
- pH
- Specific Conductivity at 25°C
- Temperature

Discrete water measurements provide a snapshot of instream conditions at the time of our sampling and do not represent the location conditions over the full day.

Dissolved oxygen (DO)

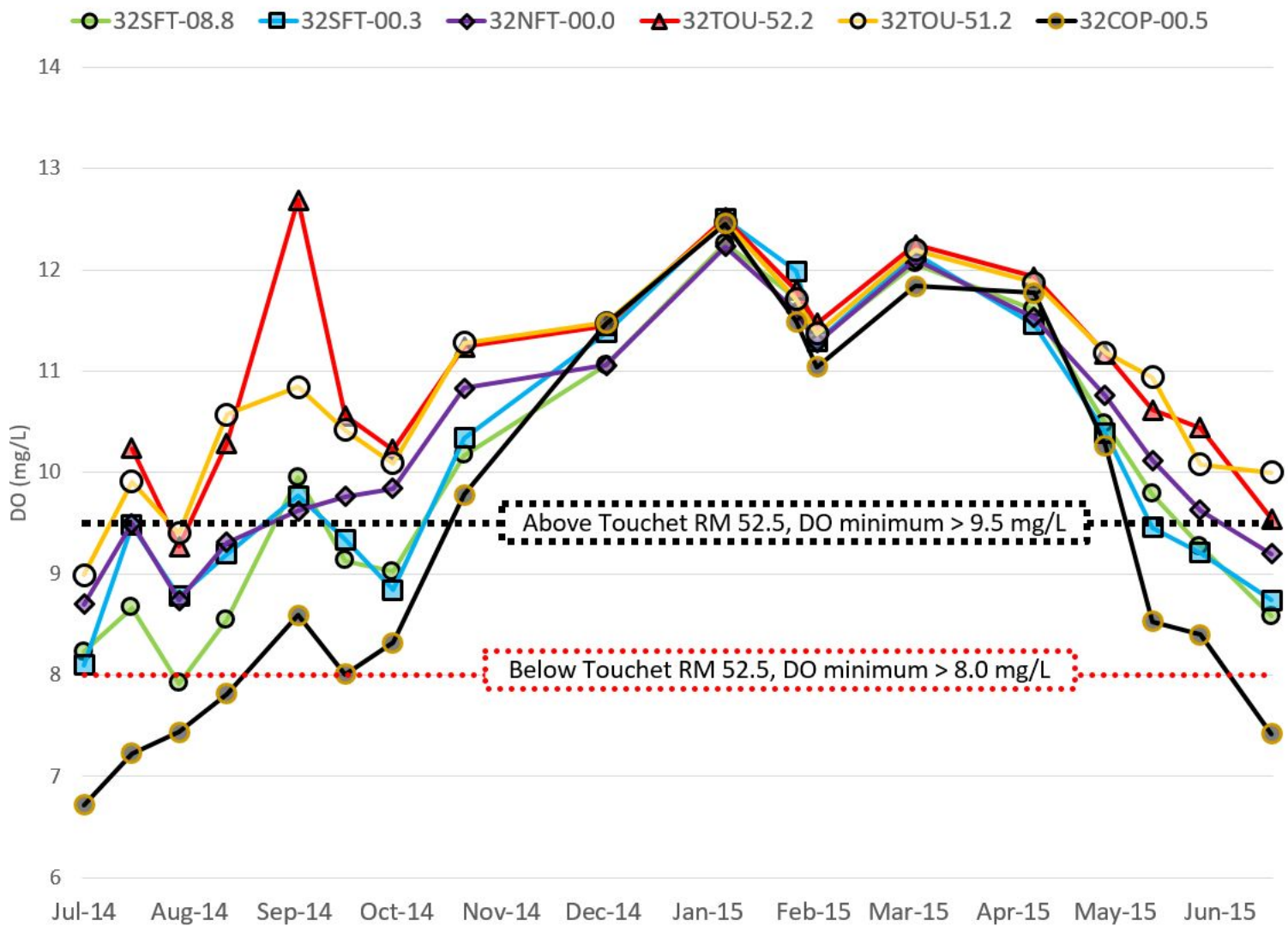

Figure D1: **Upper Touchet River, headwater, and tributary discrete dissolved oxygen (DO) measurements.**

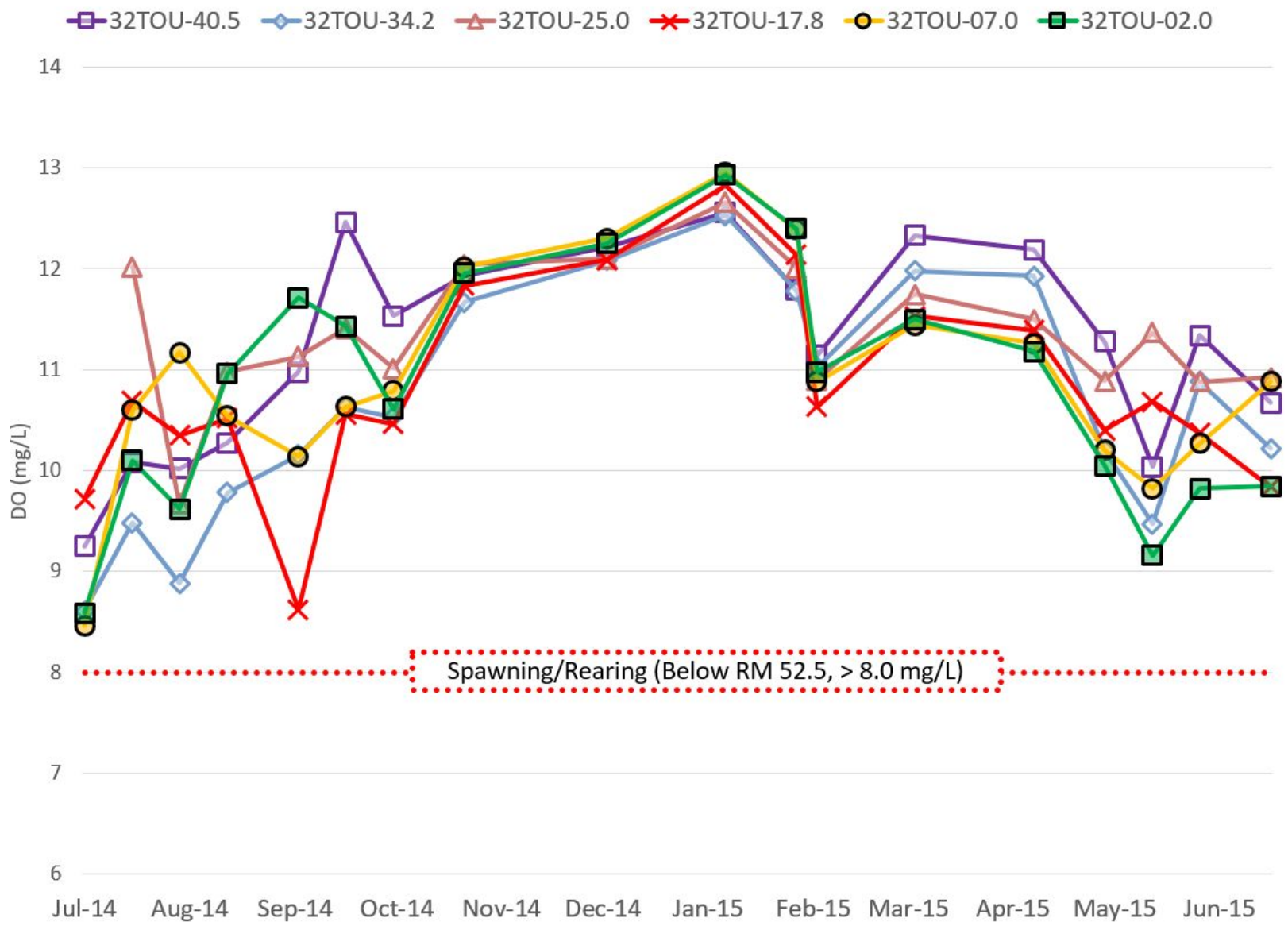

Figure D2: **Lower Touchet River discrete DO measurements.**

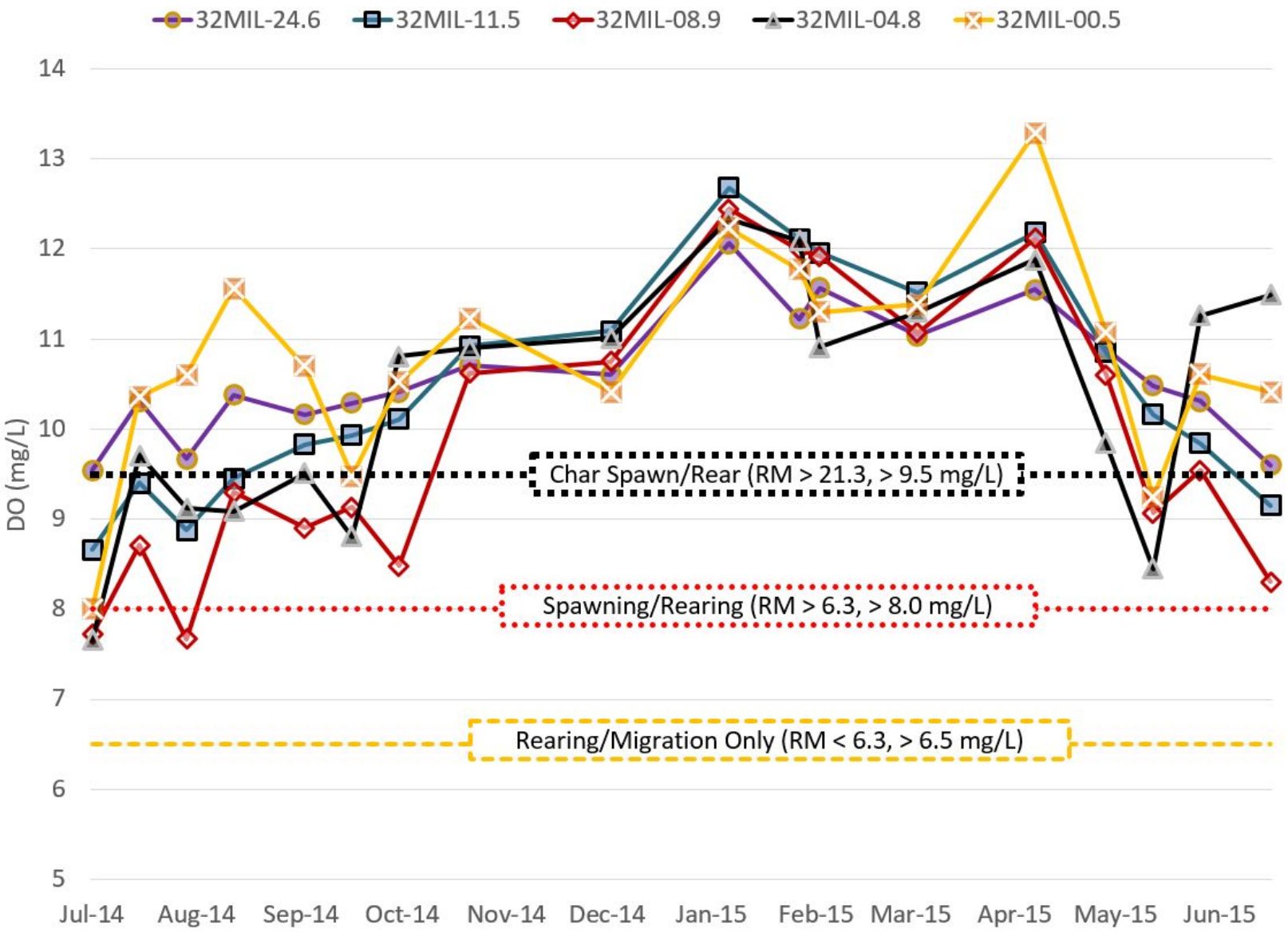

Figure D3: **Mill Creek discrete DO measurements.**

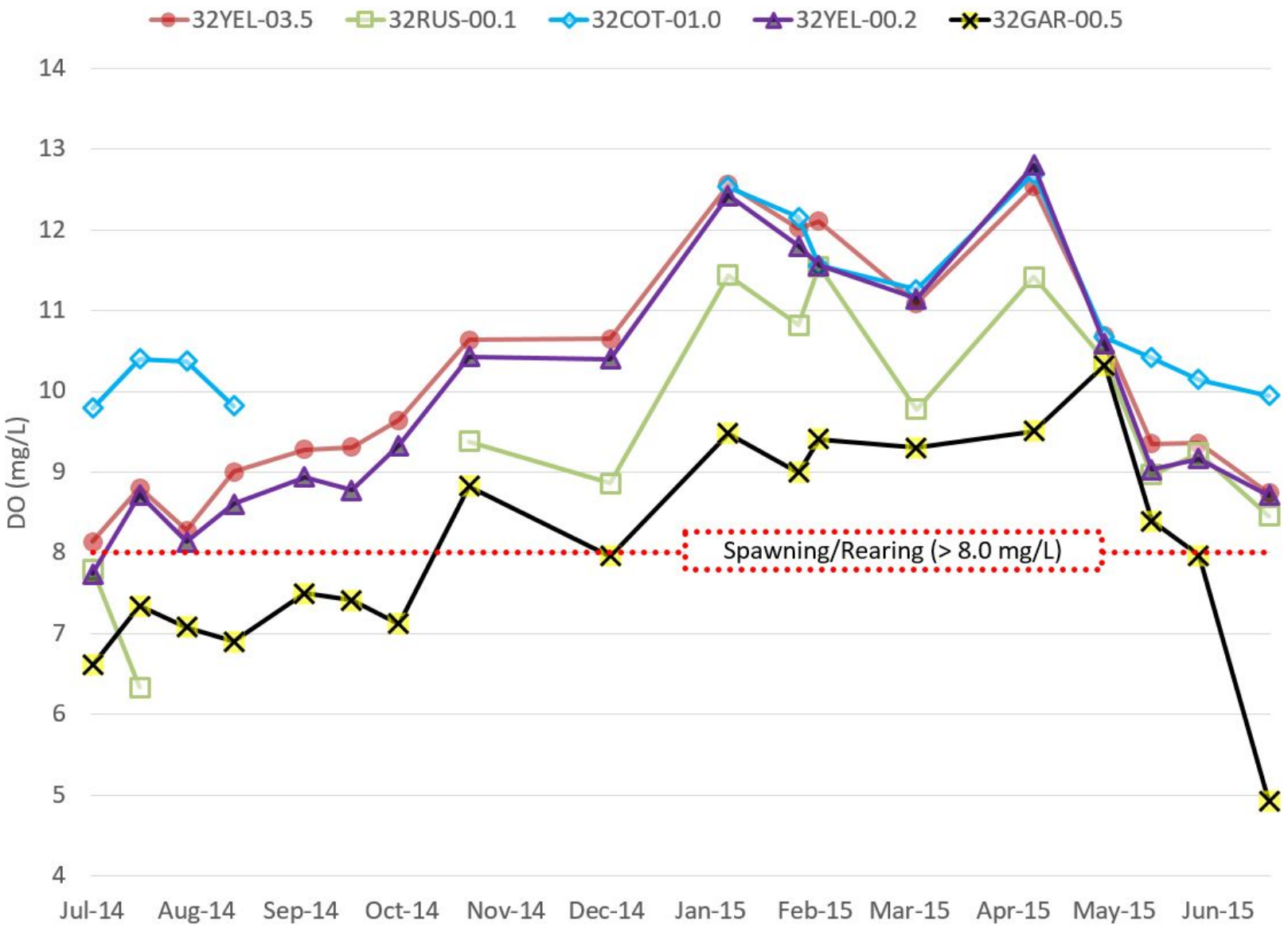

Figure D4: **Walla Walla urban-area tributaries discrete DO measurements**.

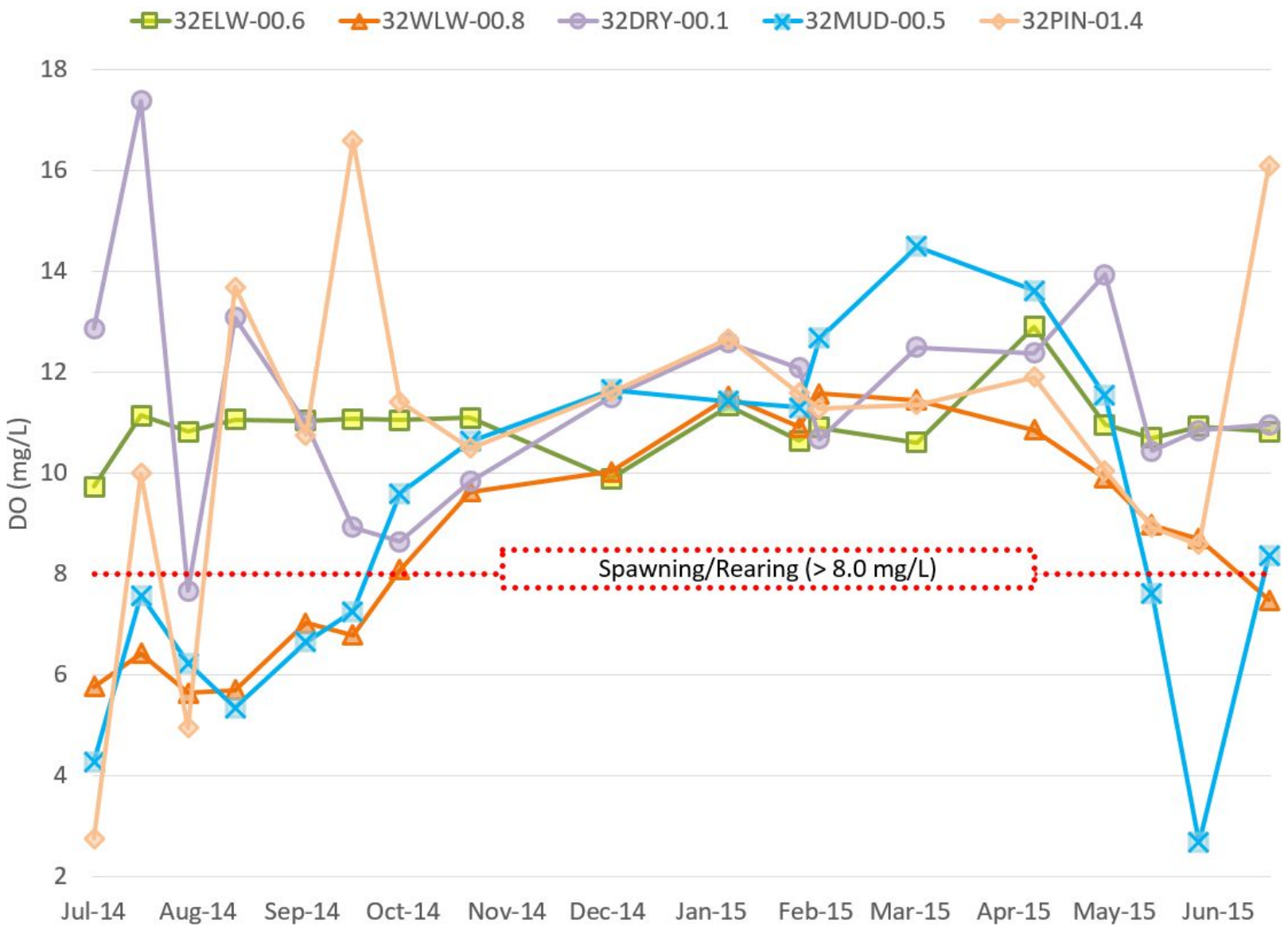

Figure D5: Walla Walla rural-area tributaries discrete DO measurements.

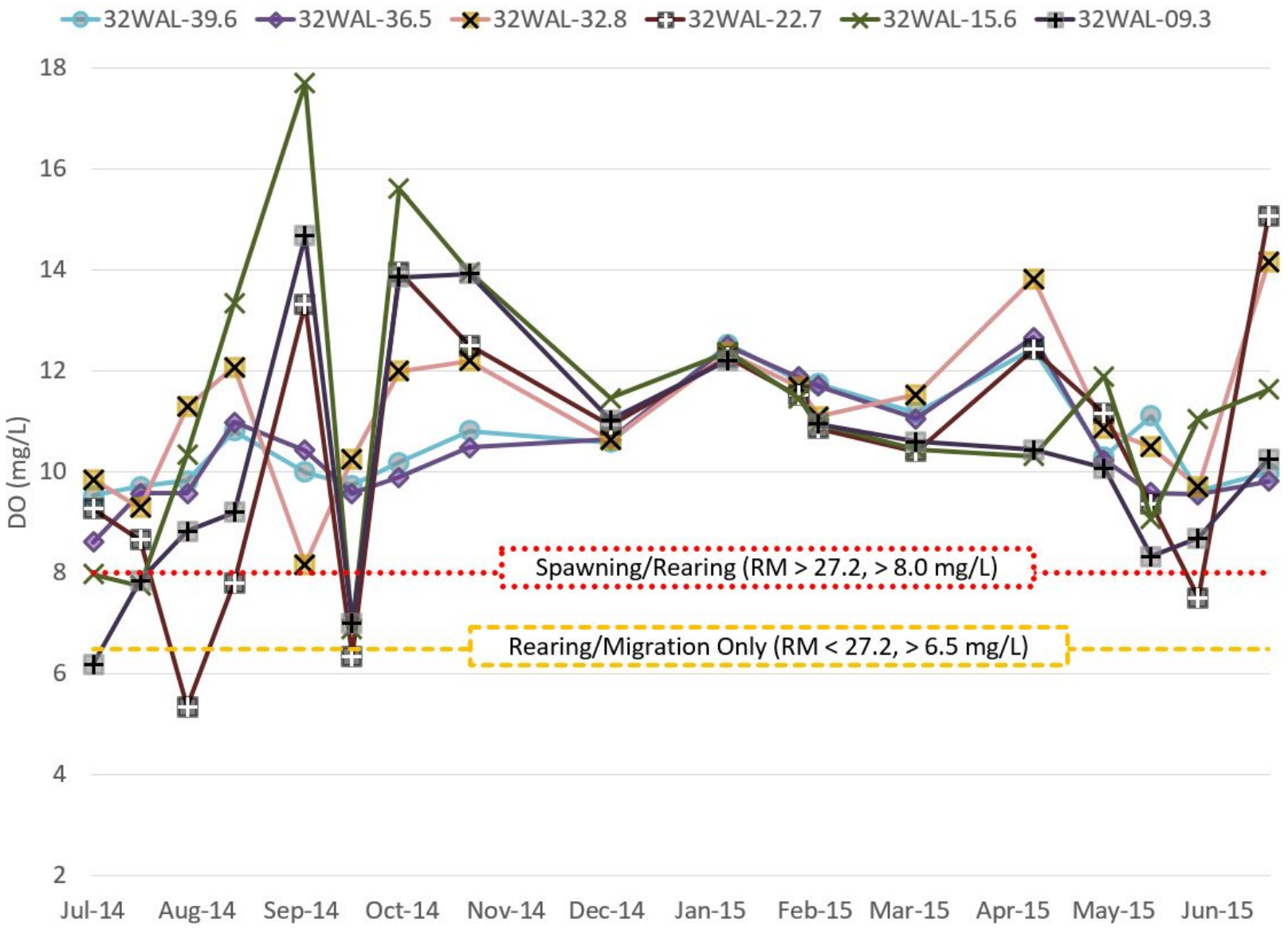

Figure D6: **Walla Walla River mainstem discrete DO measurements**.

pH

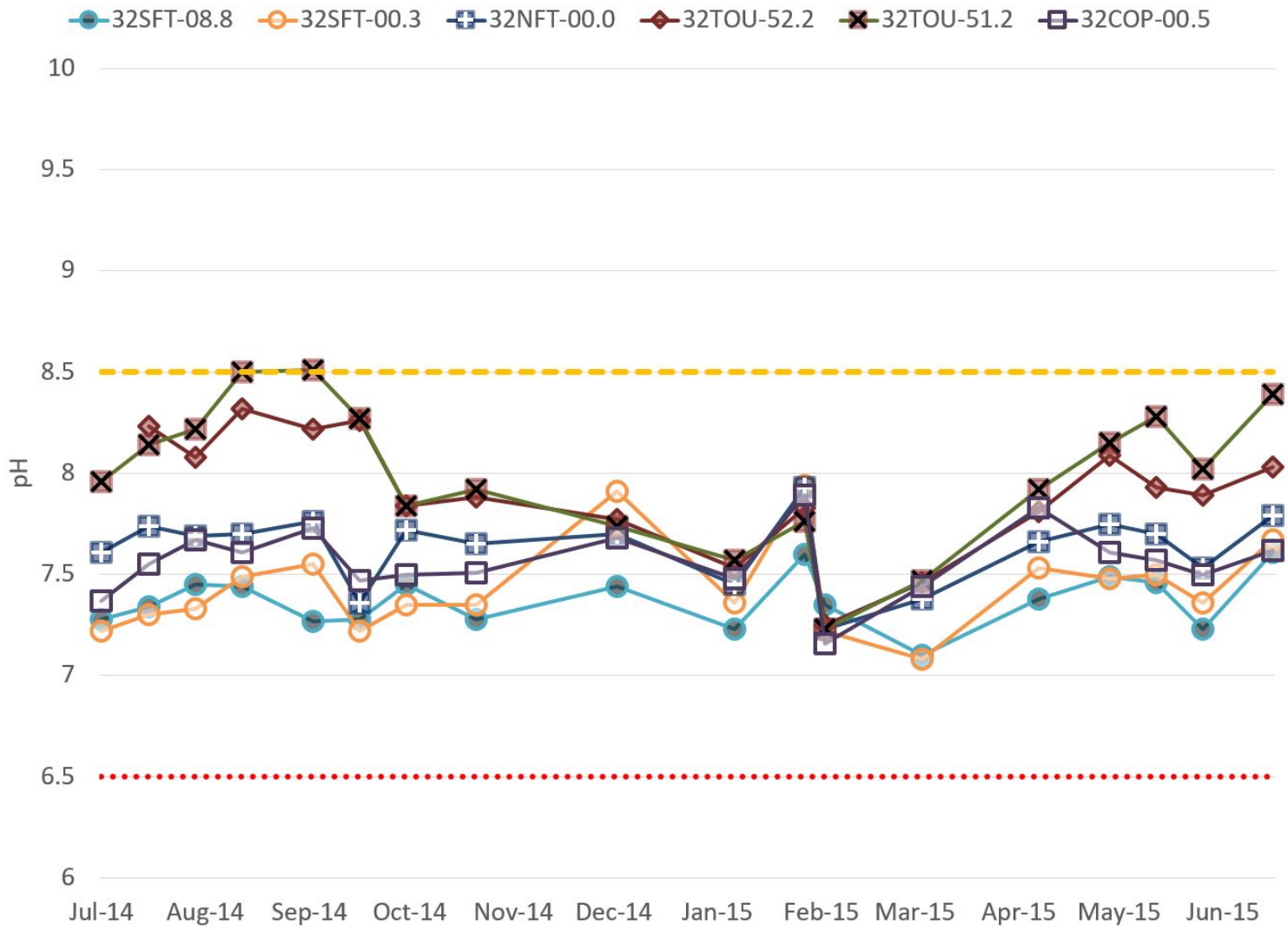

Figure D7: **Upper Touchet River, headwaters, and tributaries discrete pH measurements**.

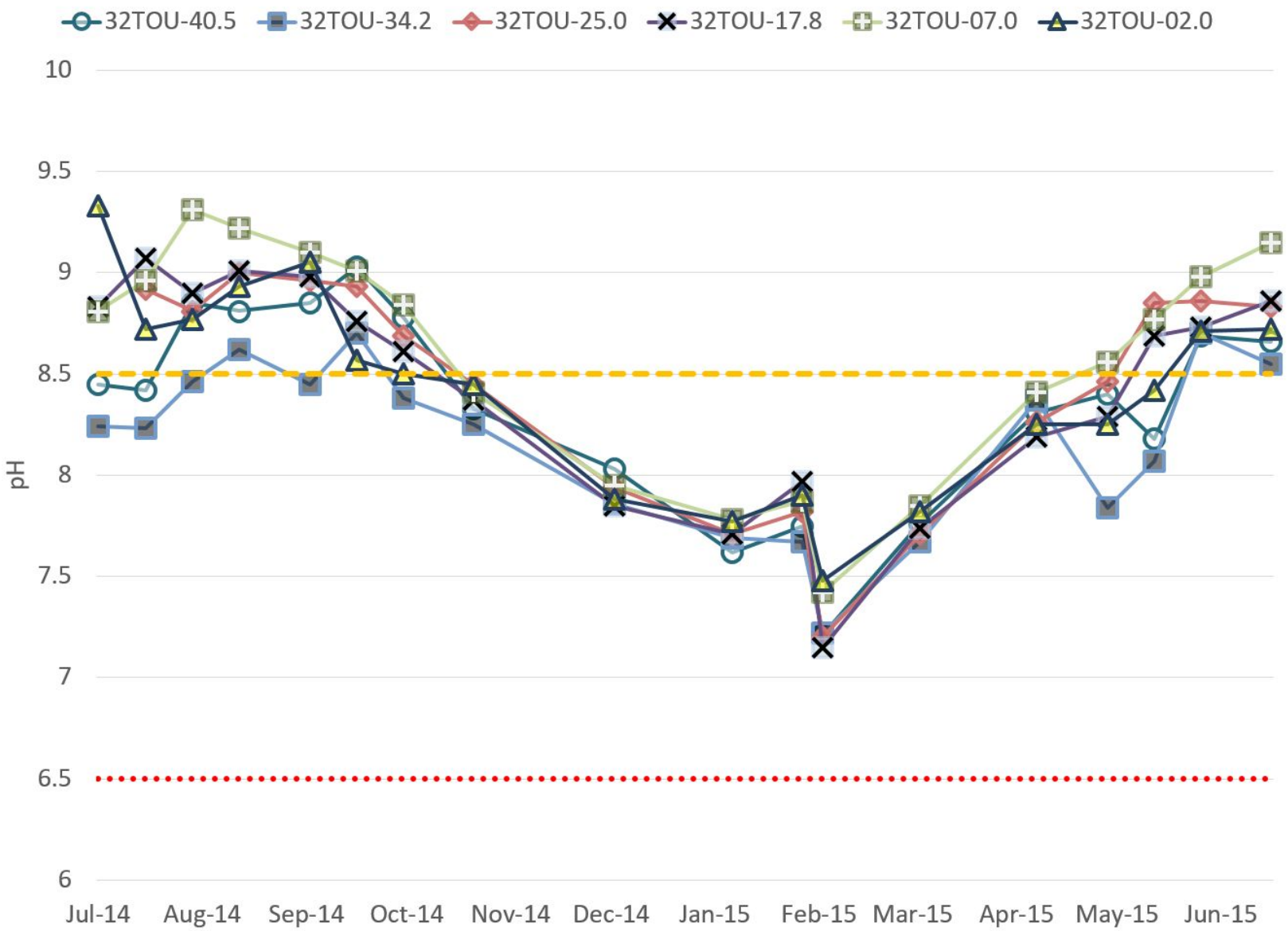

Figure D8: **Lower Touchet River discrete pH measurements**.

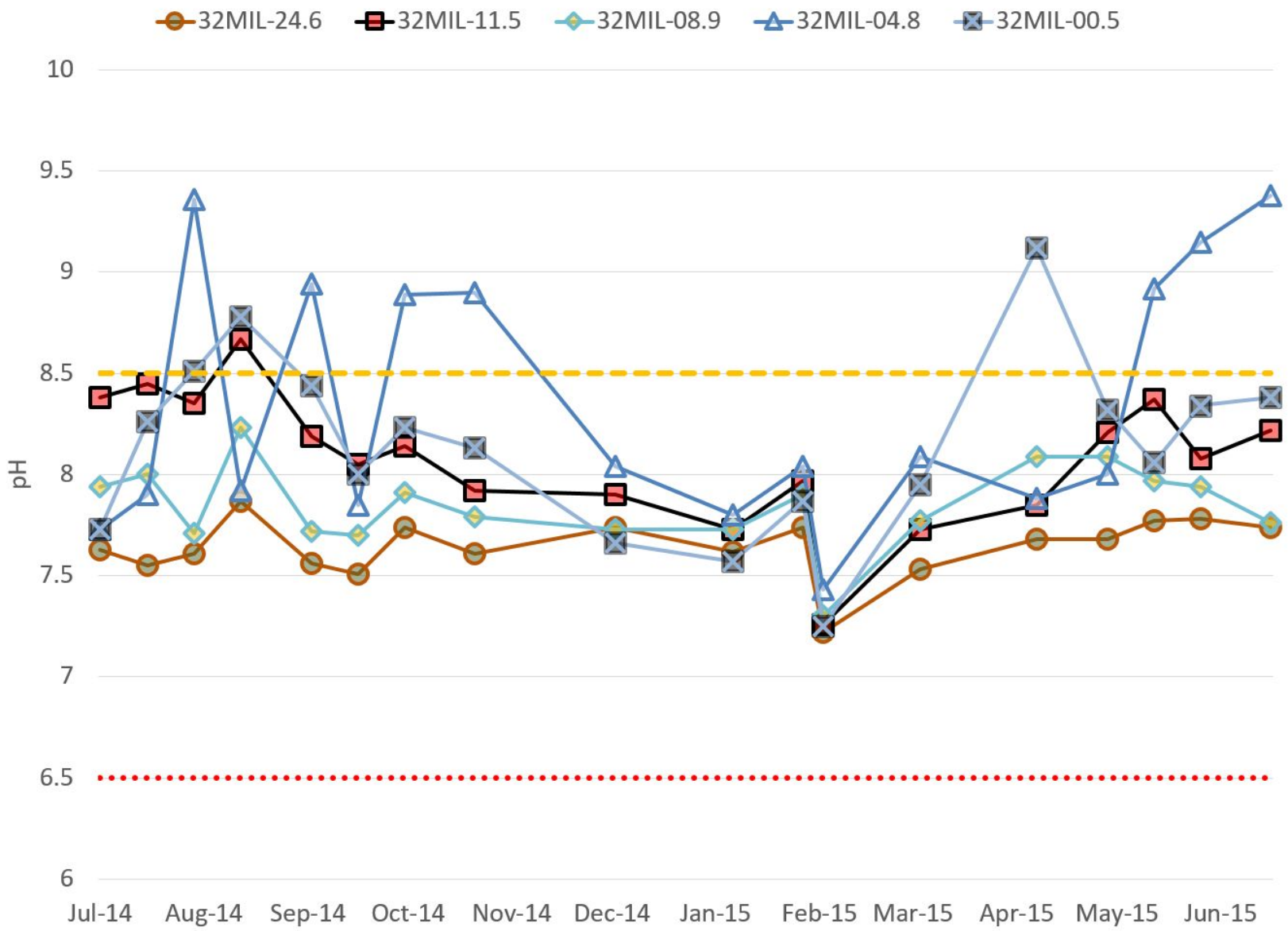

Figure D9: **Mill Creek discrete pH measurements**.

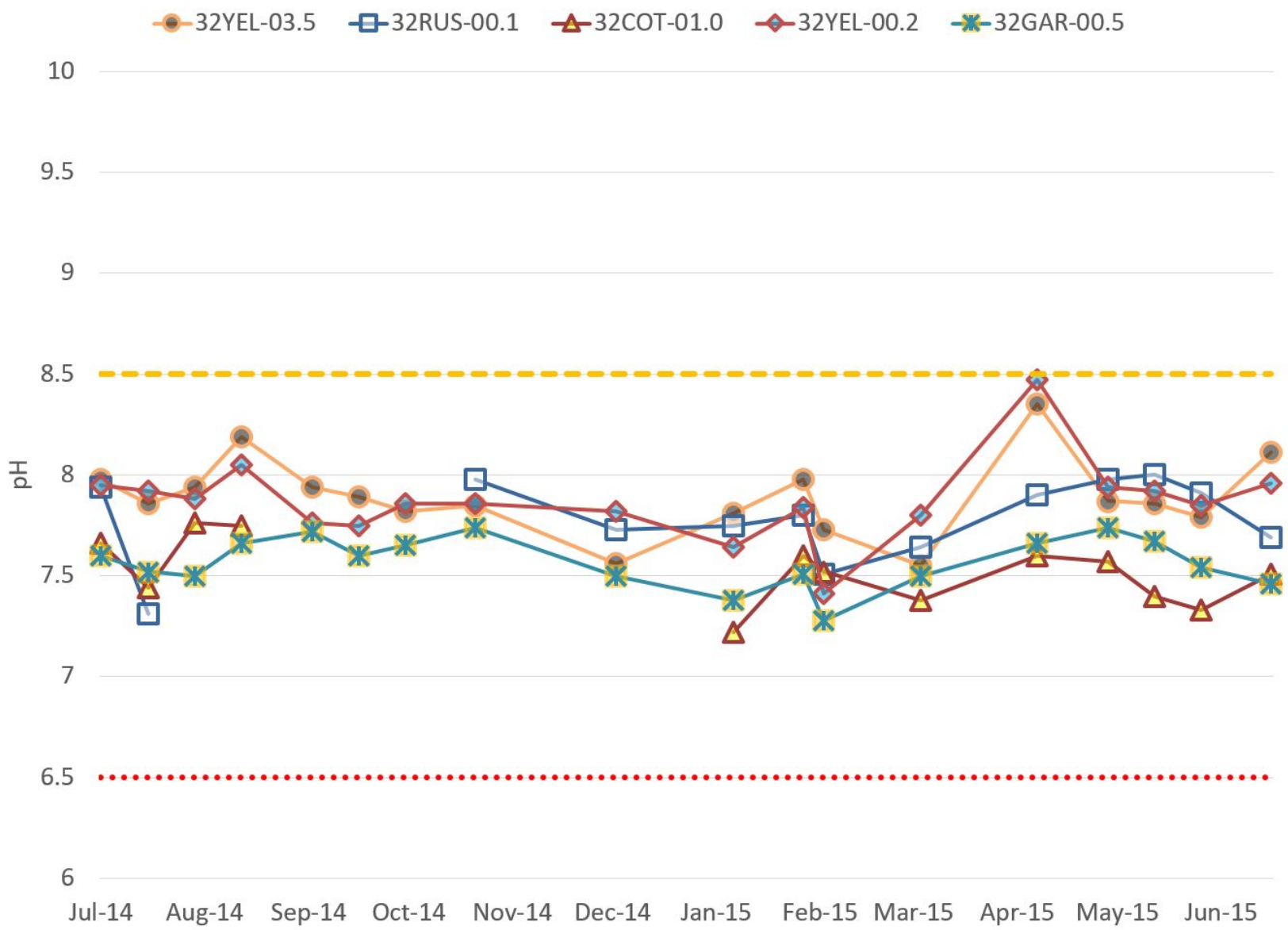

Figure D10: Walla Walla urban-area tributaries discrete pH measurements.

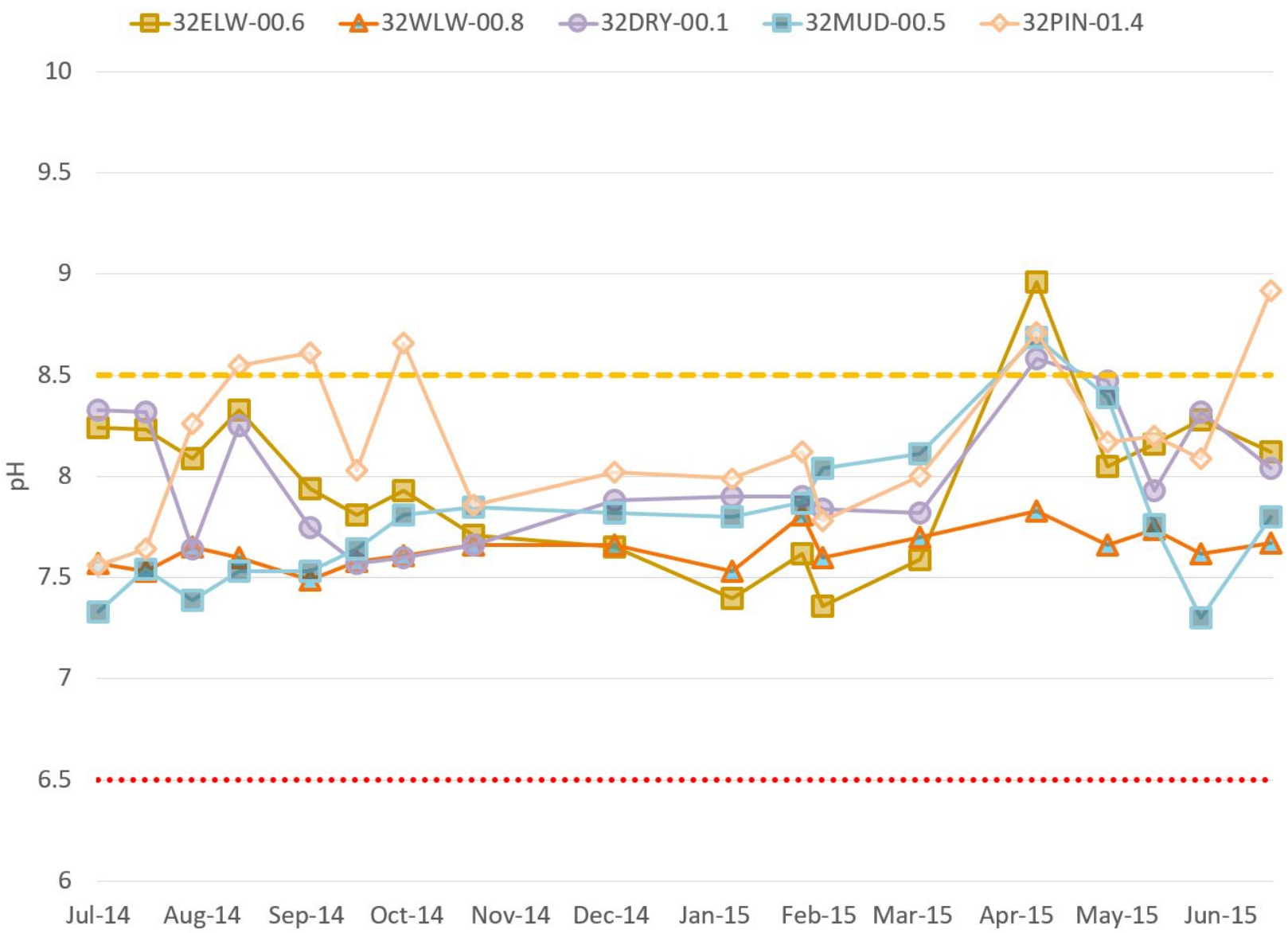

Figure D11: **Walla Walla rural-area tributaries discrete pH measurements**.

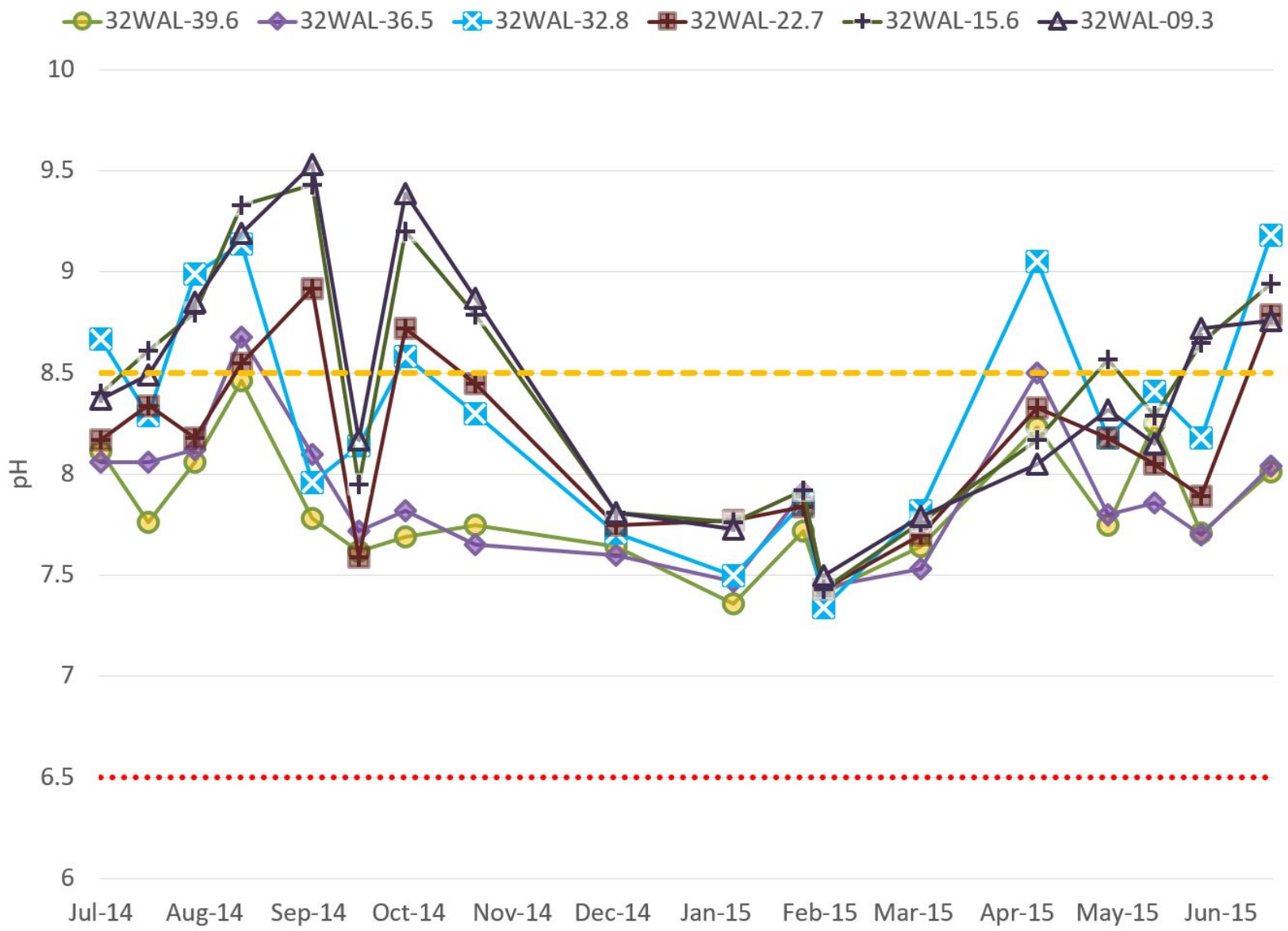

Figure D12: **Walla Walla River mainstem discrete pH measurements**.

Specific conductivity at 25 °C

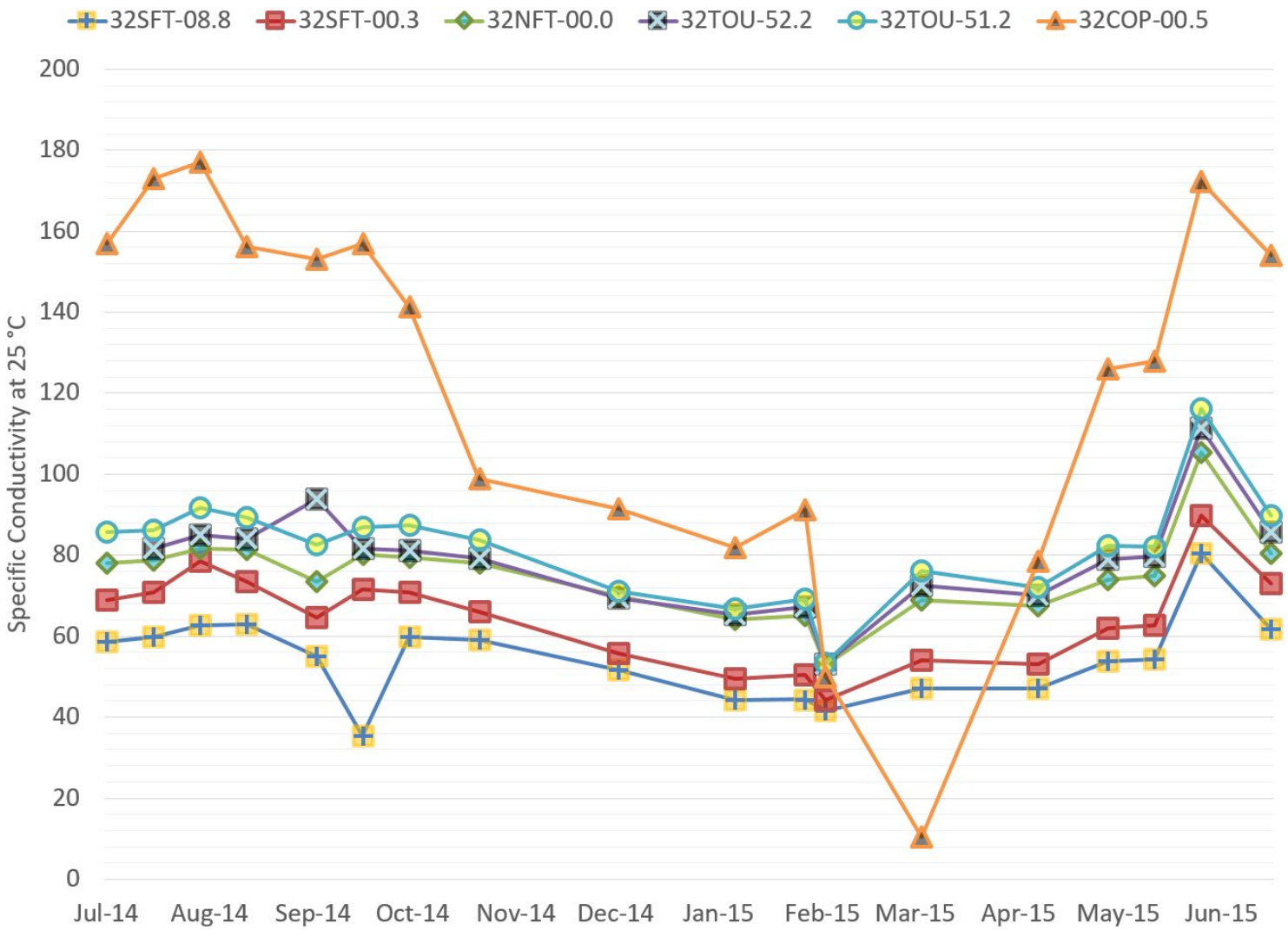

Figure D13: **Upper Touchet River, headwaters, and tributaries discrete Specific Conductivity at 25 °C measurements**.

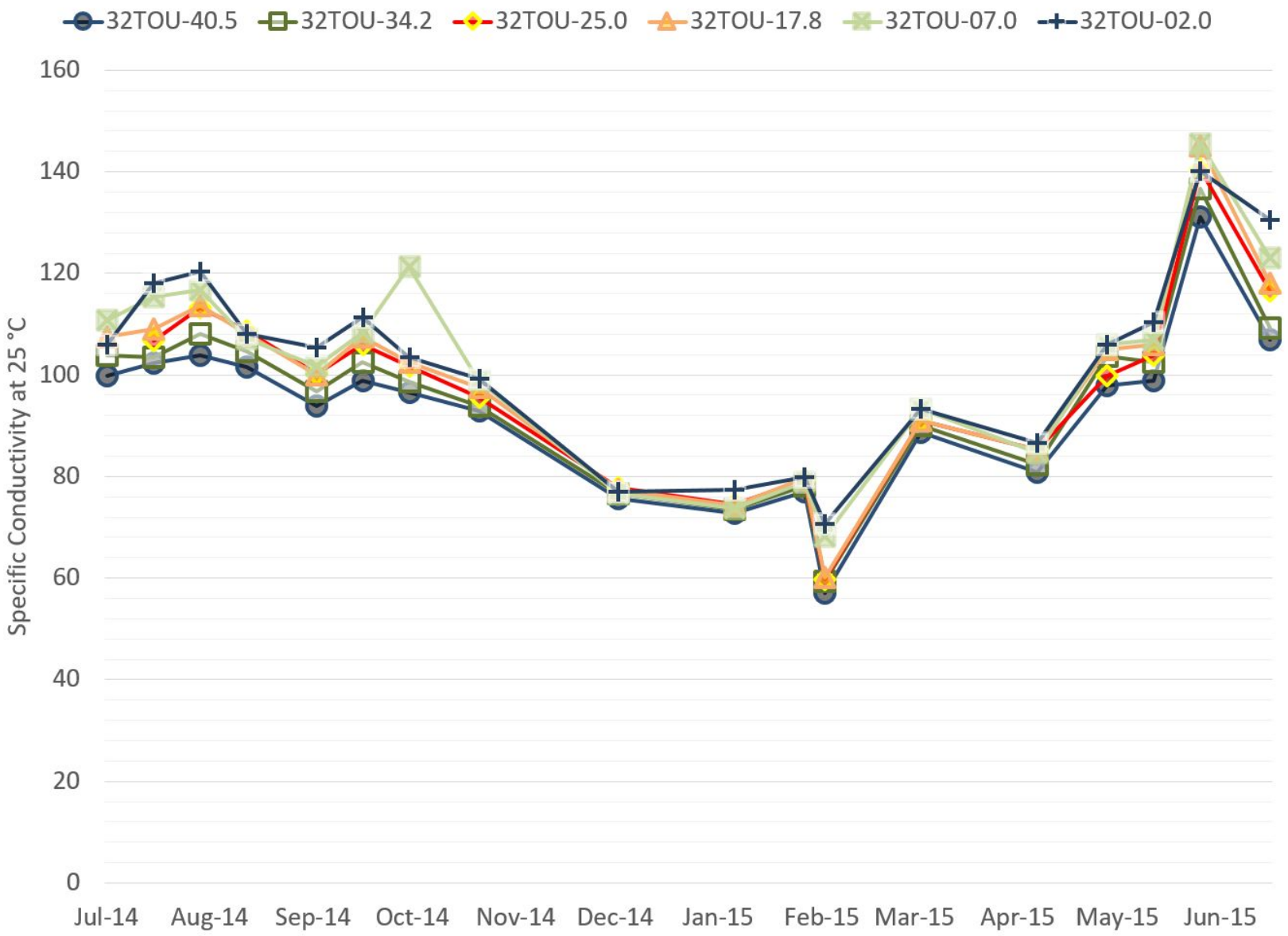

Figure D14: **Lower Touchet River discrete Specific Conductivity at 25 °C measurements**.

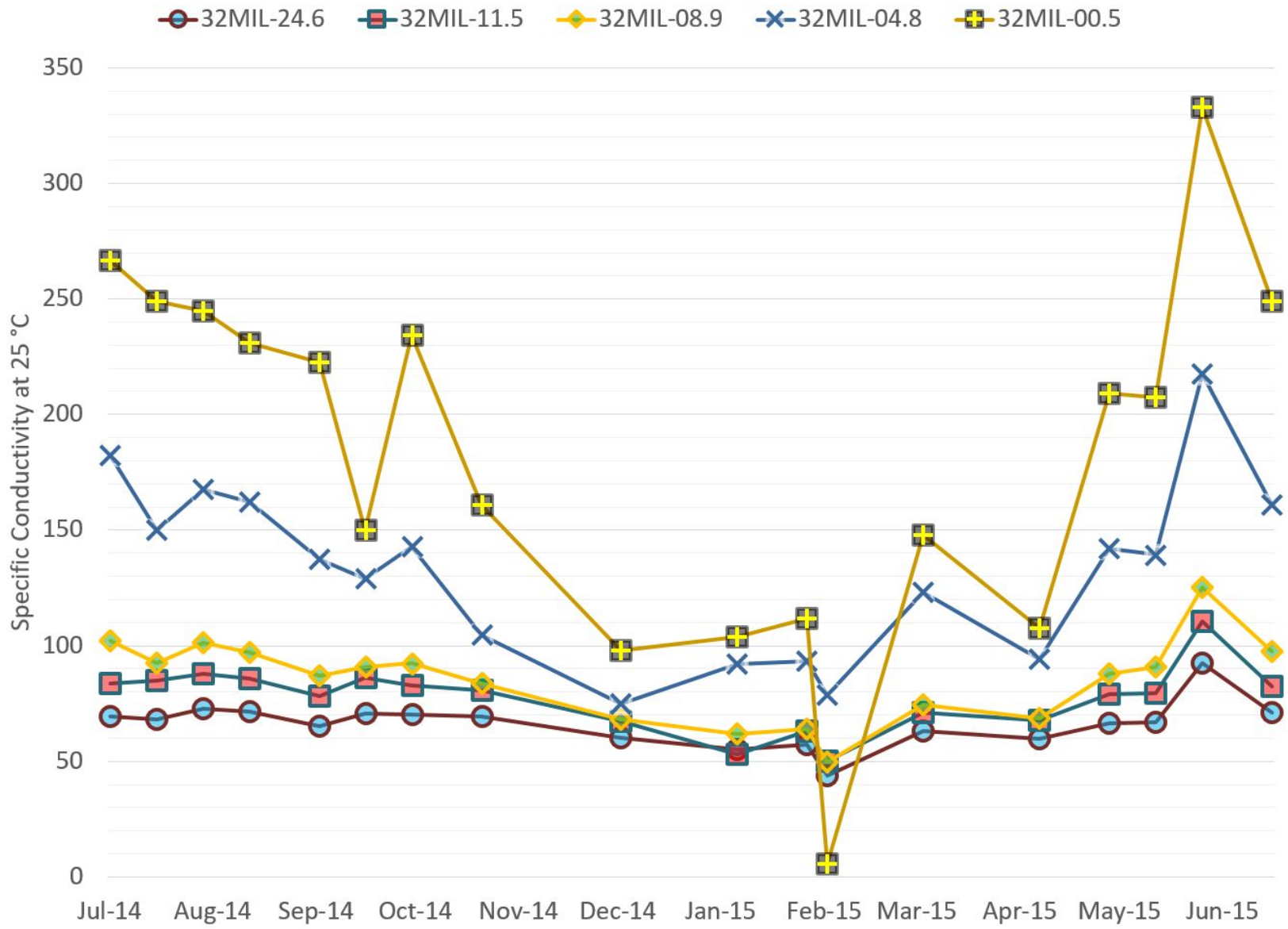

Figure D15: **Mill Creek discrete Specific Conductivity at 25 °C measurements**.

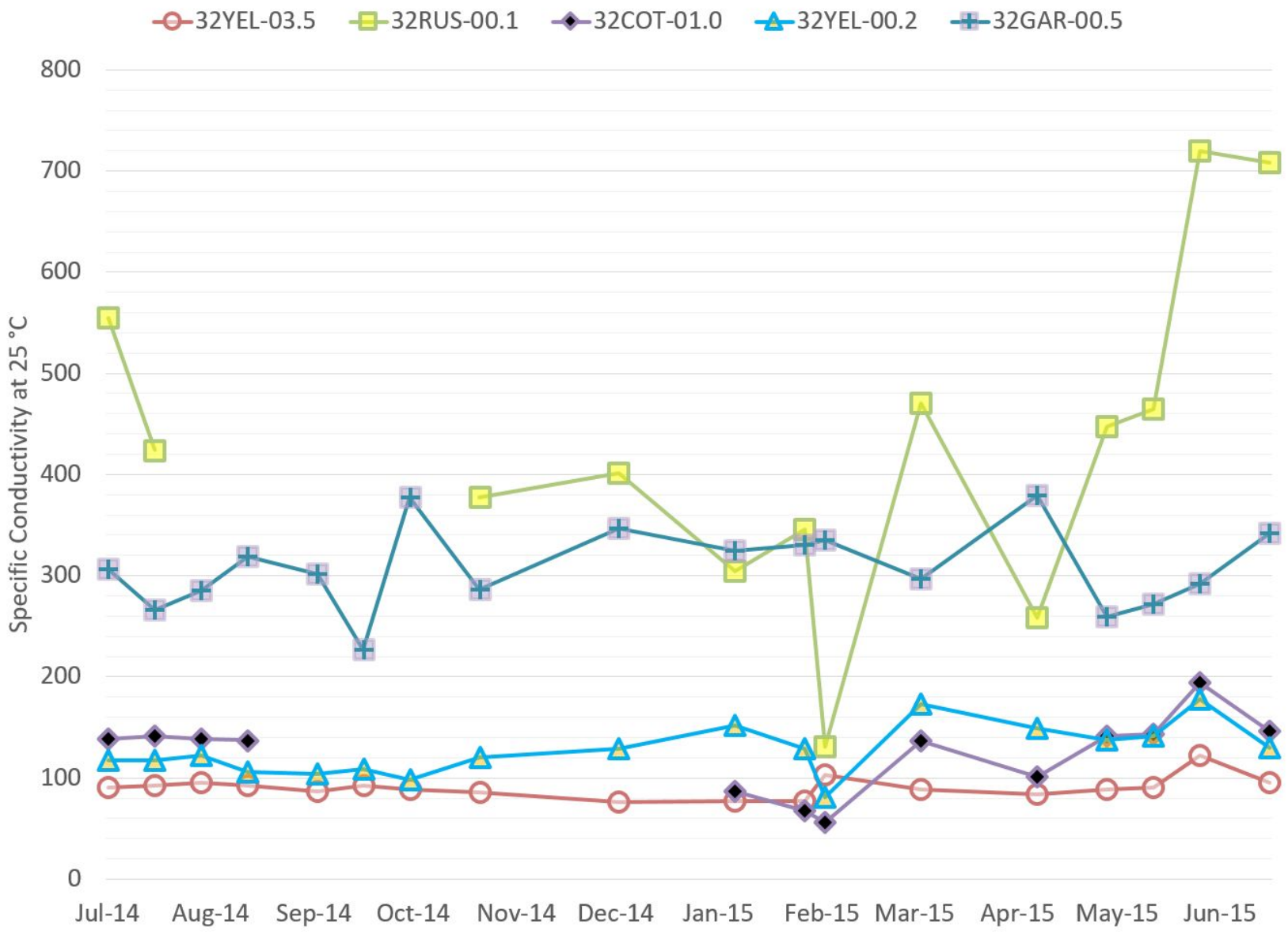

Figure D16: **Walla Walla River urban-area tributaries discrete Specific Conductivity at 25 °C measurements**.

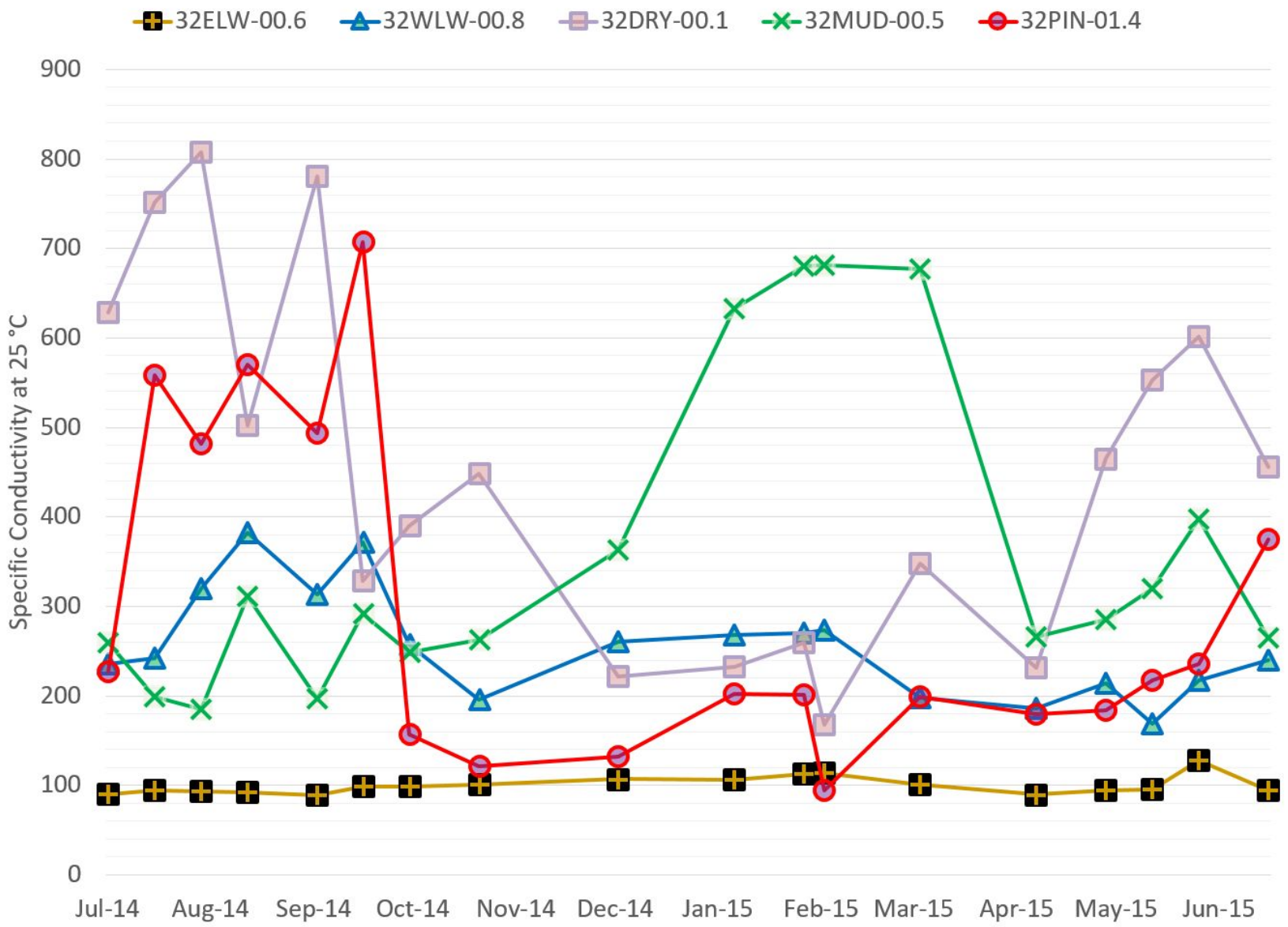

Figure D17: **Walla Walla River rural-area tributaries discrete Specific Conductivity at 25 °C measurements**.

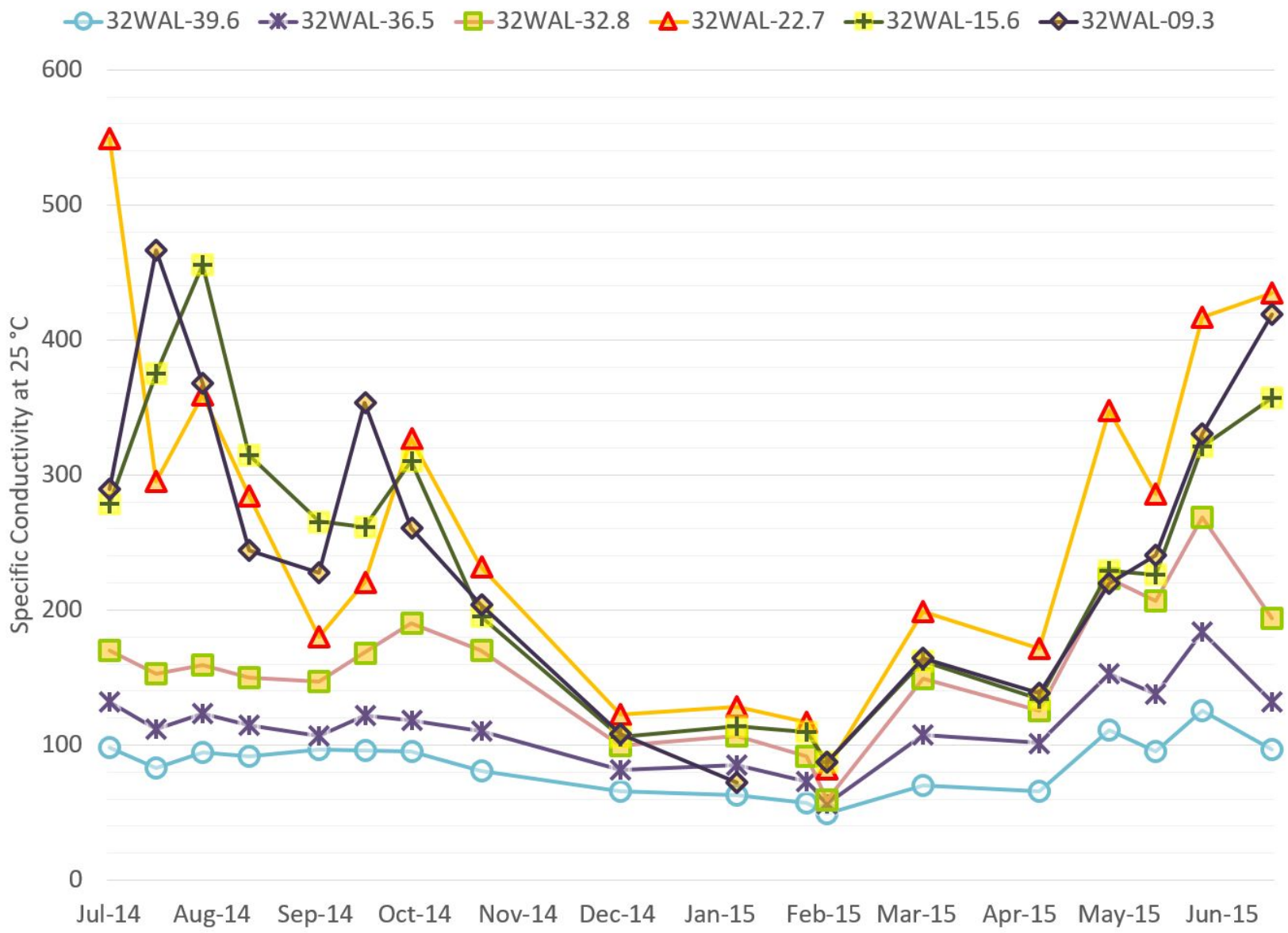

Figure D18: **Walla Walla River mainstem discrete Specific Conductivity at 25 °C measurements**.

Temperature

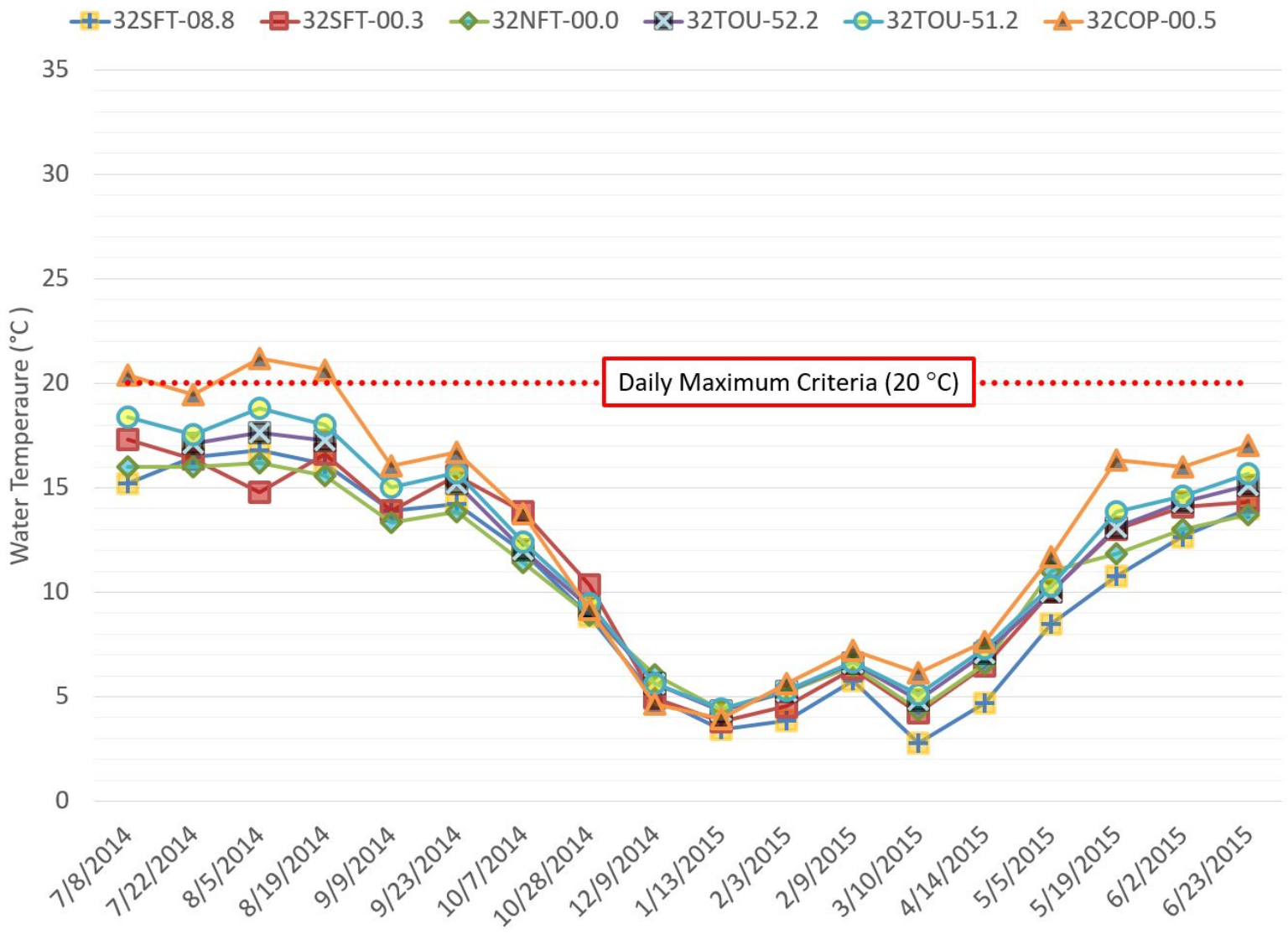

Figure D19: **Upper Touchet River, headwaters, and tributaries discrete temperature measurements.**

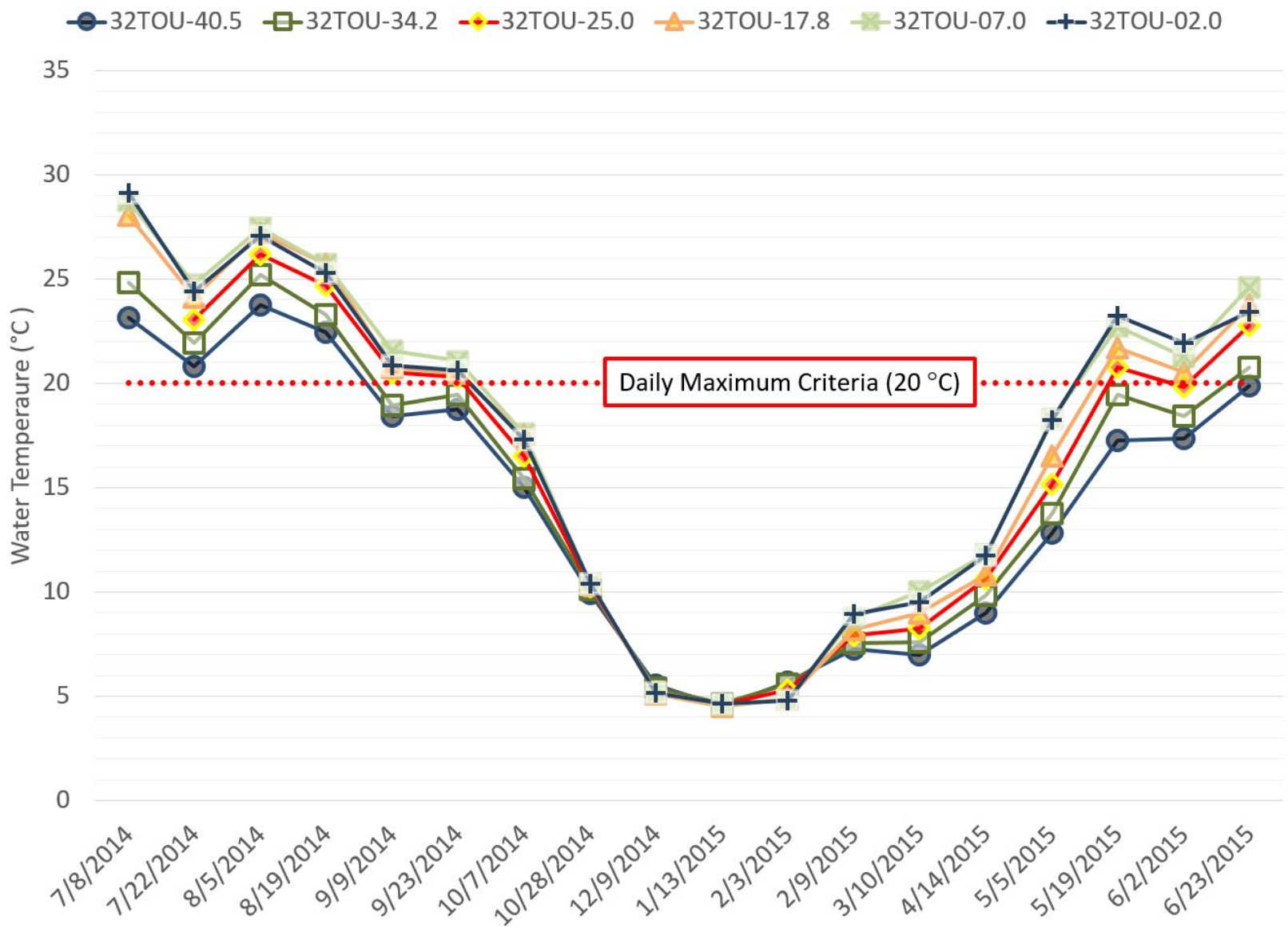

Figure D20: **Lower Touchet River discrete temperature measurements.**

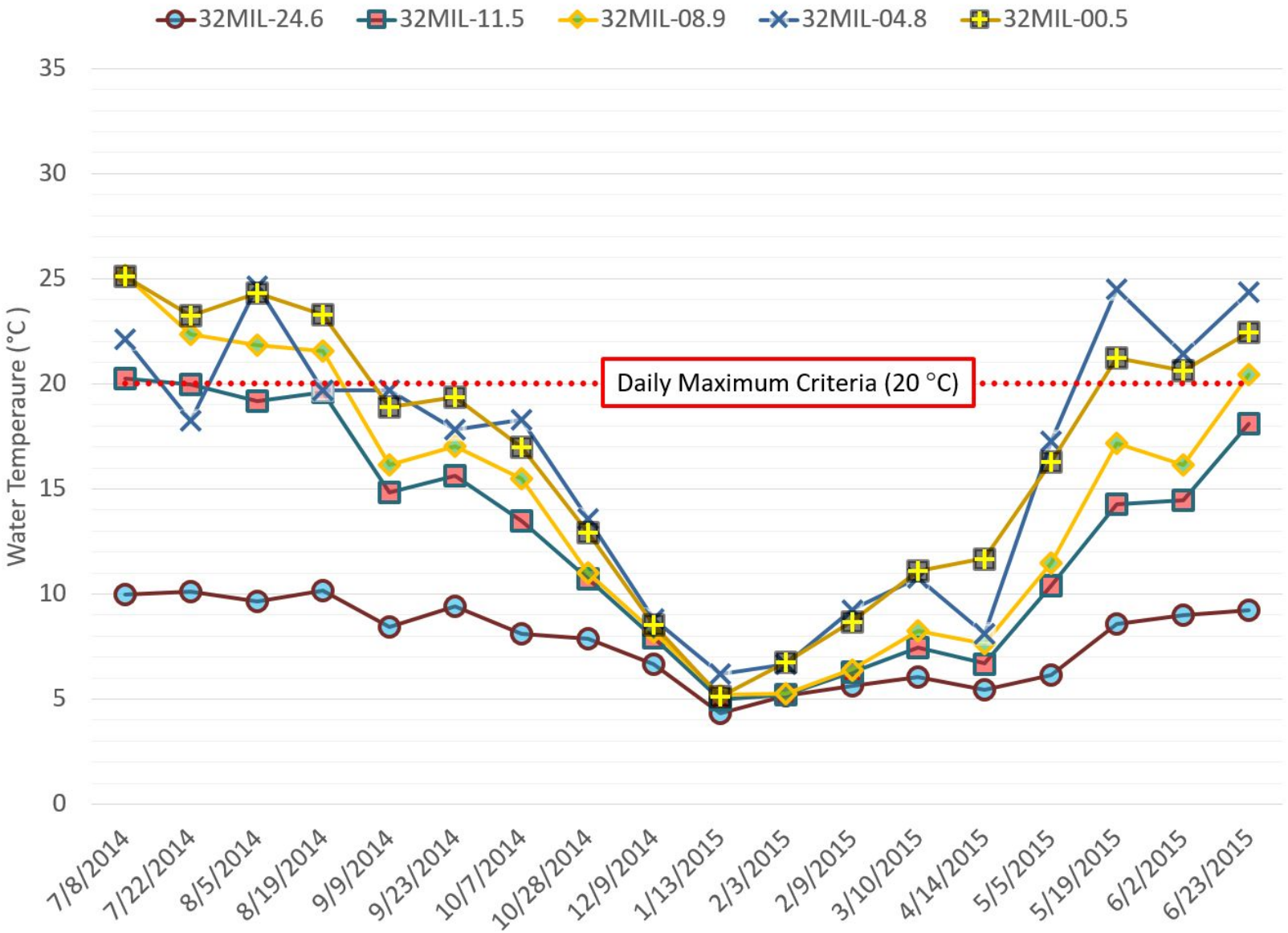

Figure D21: **Mill Creek discrete temperature measurements**.

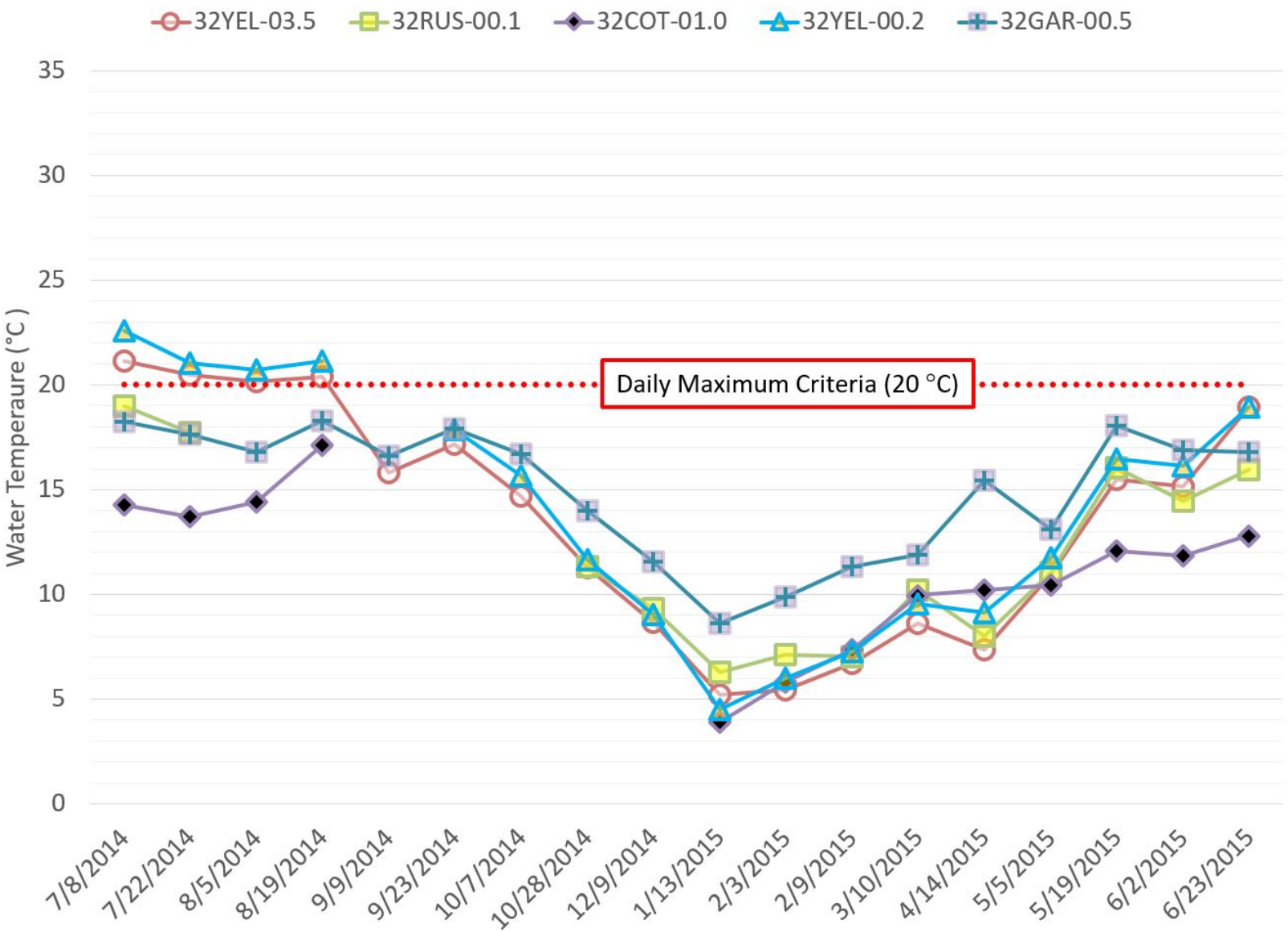

Figure D22: **Walla Walla River urban-area tributaries discrete temperature measurements.**

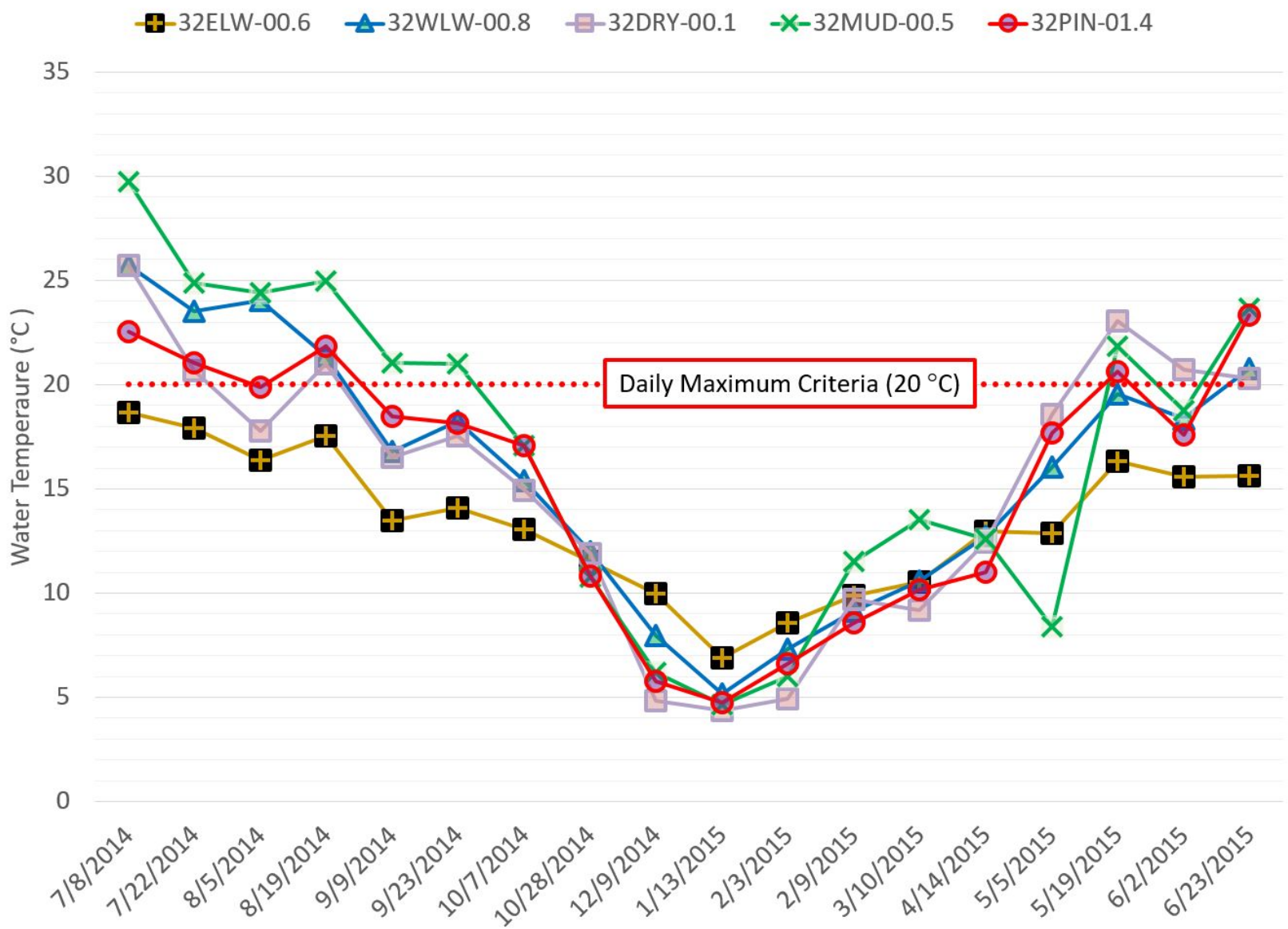

Figure D23: **Walla Walla River rural-area tributaries discrete temperature measurements.**

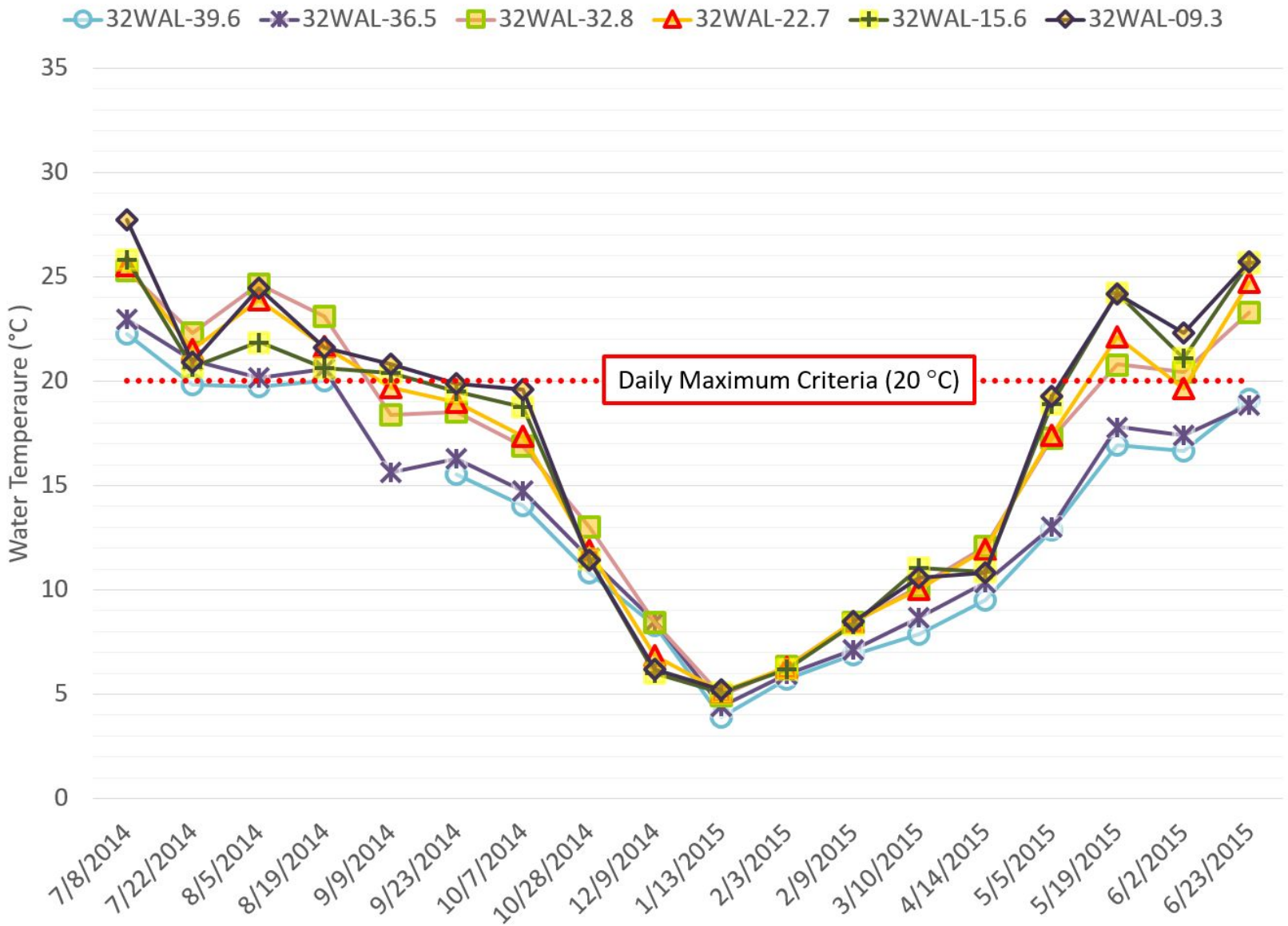

Figure D24: **Walla Walla River mainstem discrete temperature measurements**.

Appendix E. USGS and WWBWC Streamflow Data

We supplemented our stage and flow data with flow monitoring data from both the US Geological Survey (USGS) and the Walla Walla Basin Watershed Council (WWBWC).

The USGS conducted continuous monitoring of stage and flow at three stations in the Walla Walla River Basin from the late 1980s to present. USGS posts these data online at https://waterdata.usgs.gov/nwis/rt.

In a cooperative effort with this project, WWBWC deployed pressure transducers for 15-minute stage monitoring at several of our sampling stations in the Walla Walla River Basin. WWBWC also conducted site visits and flow measurements to develop flow rating-curves for these stage measurements. WWBWC collected and analyzed the flow monitoring data following procedures from their 2013 SOP (WWBWC 2013). WWBWC posts flow records online at http://www.wwbwc.org/monitoring/surfacewater.html.

WWBWC did not publish flow data when flows exceeded 1.5 to 2 times higher than the highest manual flow measurement at a given site. This resulted in missing flow data during the highest flow conditions (Figures E4, E6, and E11).

USGS flow monitoring stations

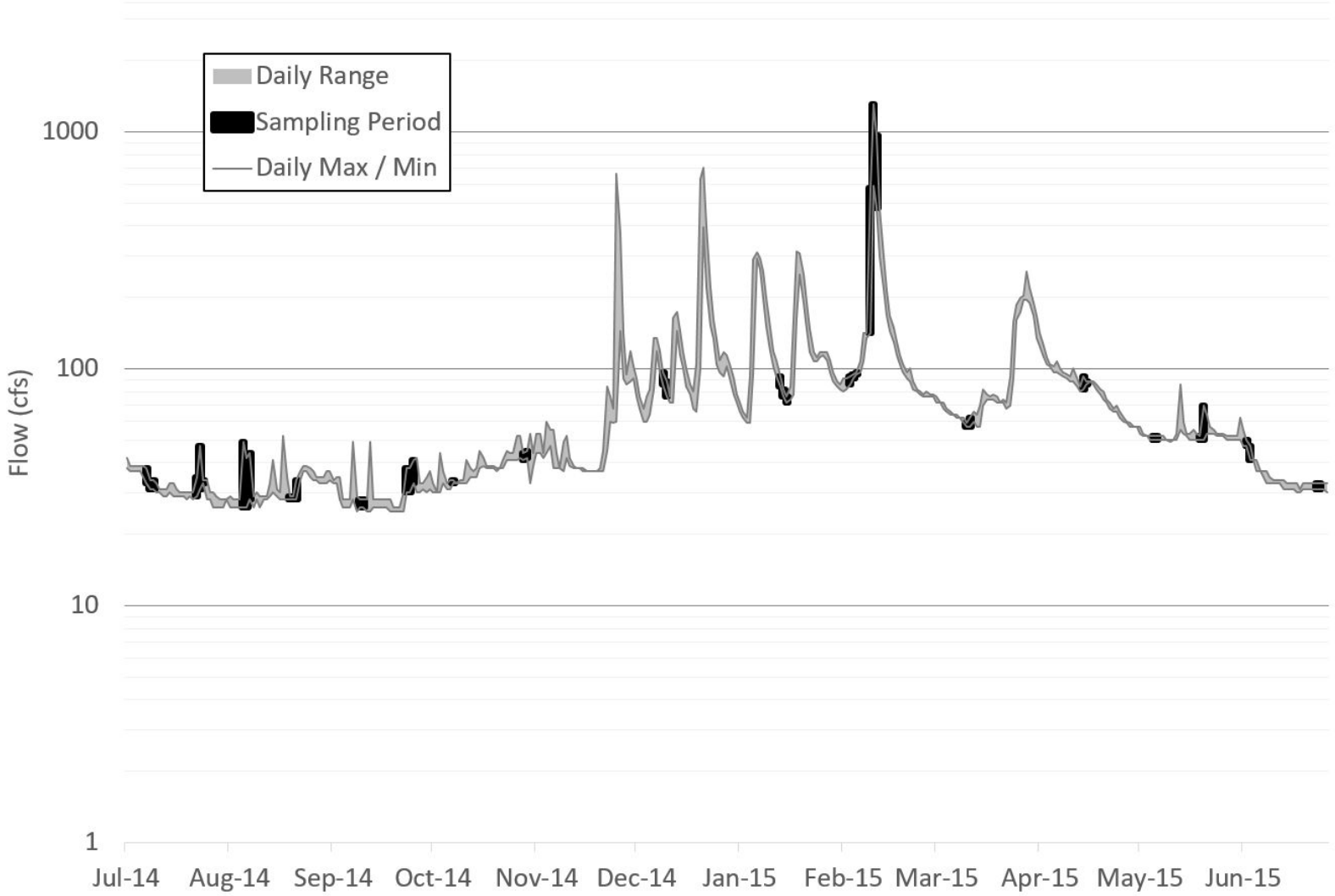

Figure E1. Mill Creek at Kooskooskie (USGS Station ID 14013000; Ecology Station ID 32MIL-21.1)

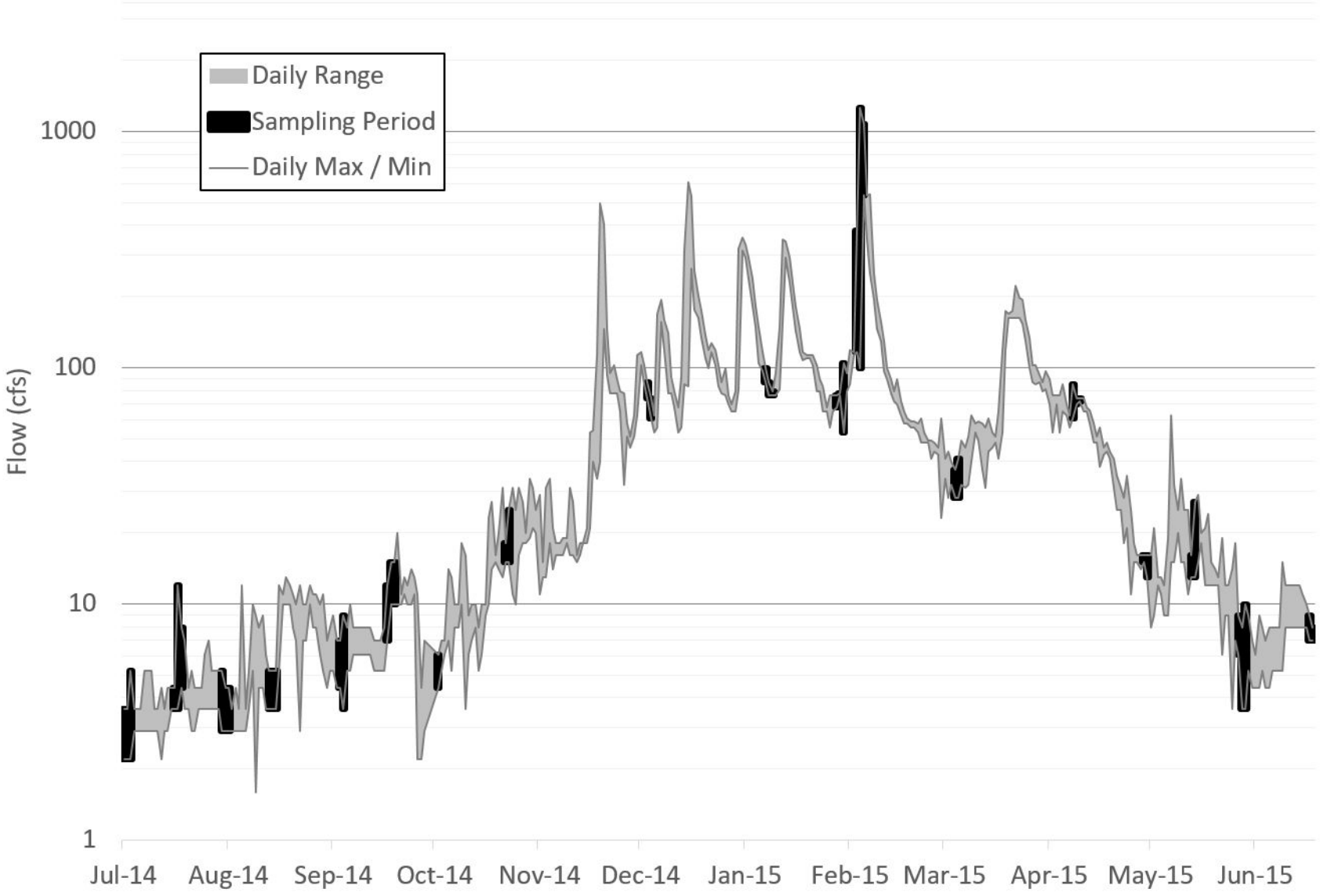

Figure E2. Mill Creek at Yellowhawk / Garrison Creek diversion (USGS Station ID 14015000; Ecology Station ID 32MIL-11.5)

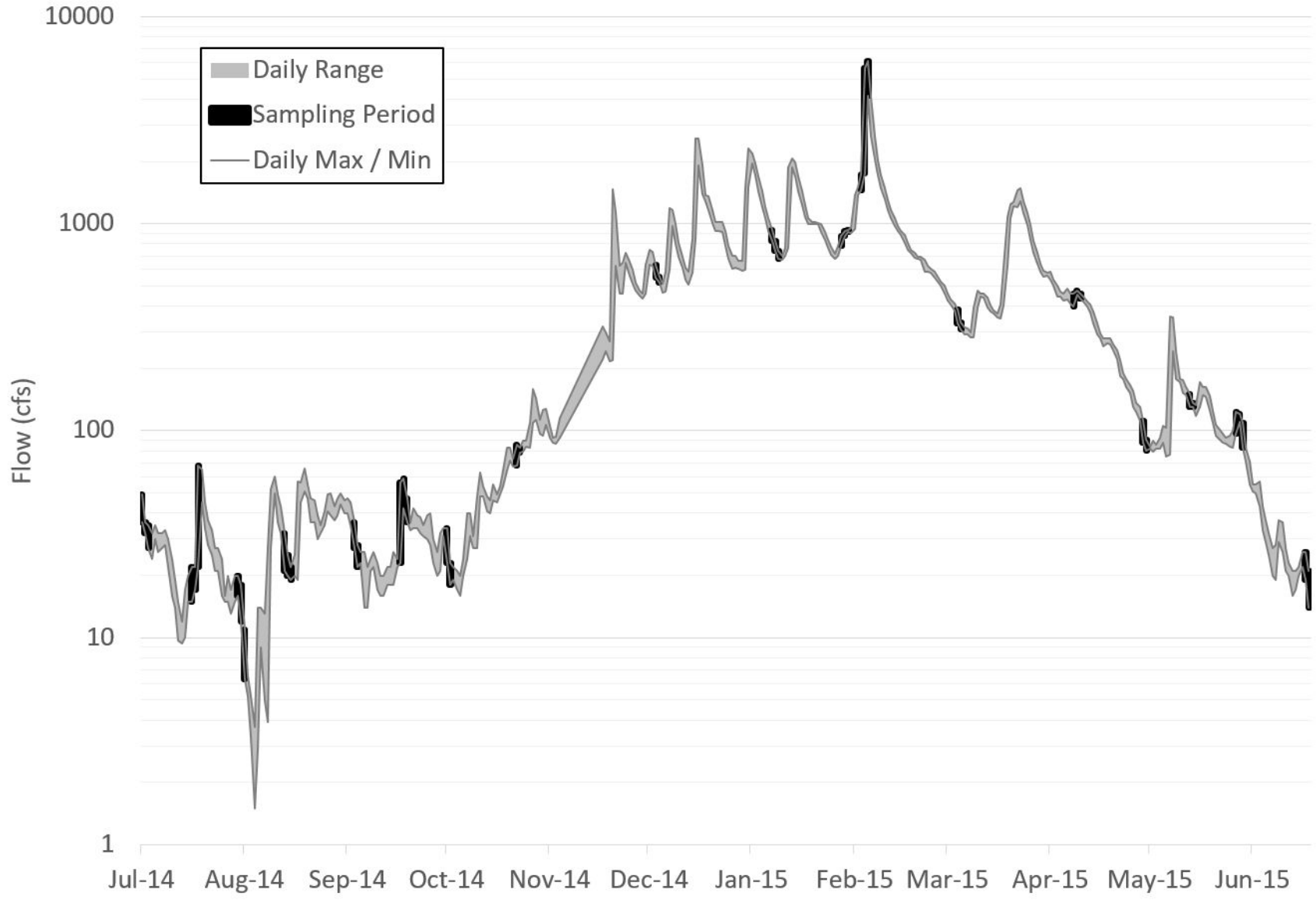

Figure E3. Walla Walla River near Touchet (USGS Station ID 14018500; Ecology Station ID 32WAL-15.6)

WWBWC flow monitoring stations

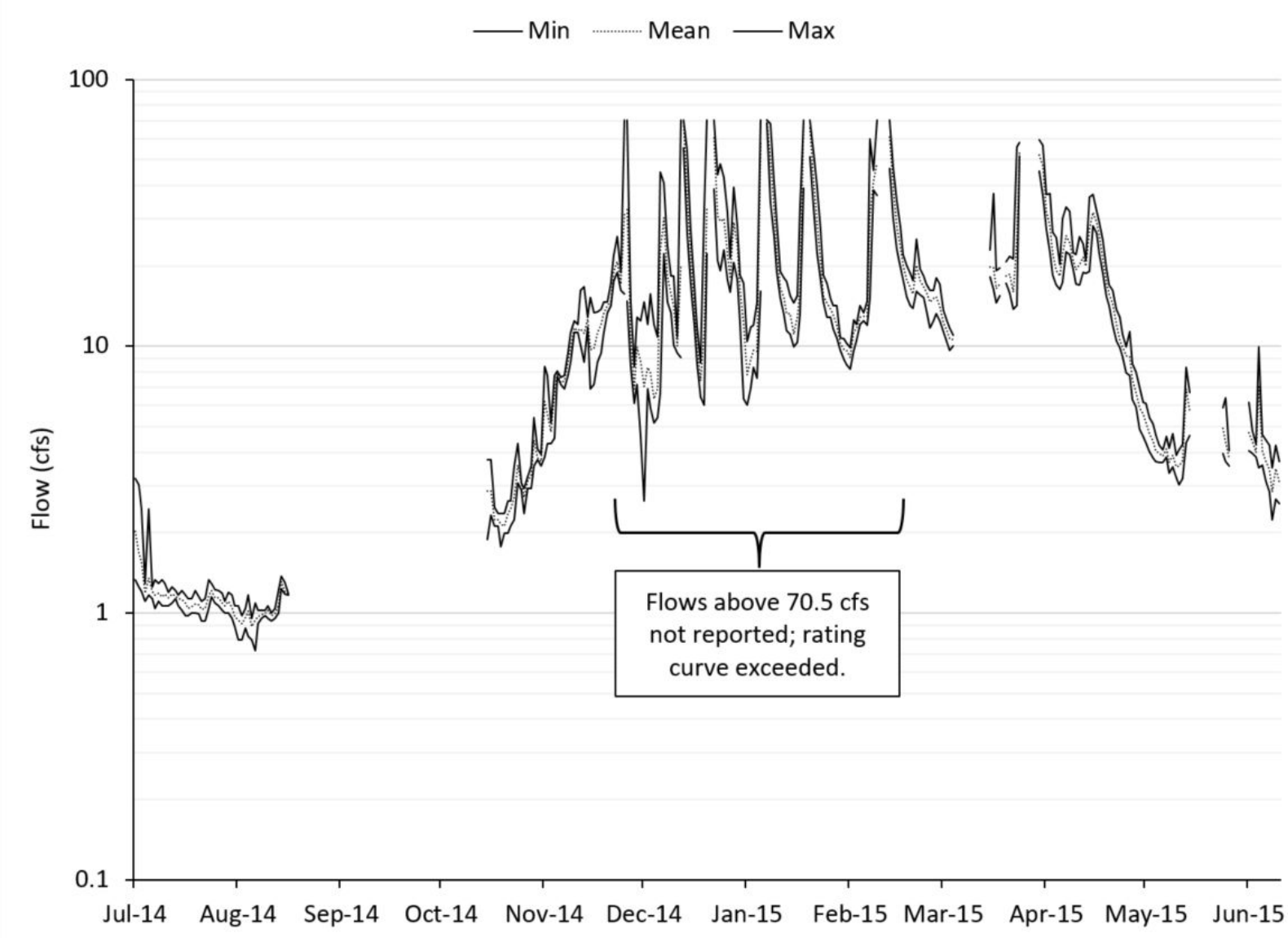

Figure E4. Coppei Creek at Highway 125 (32COP-00.5).

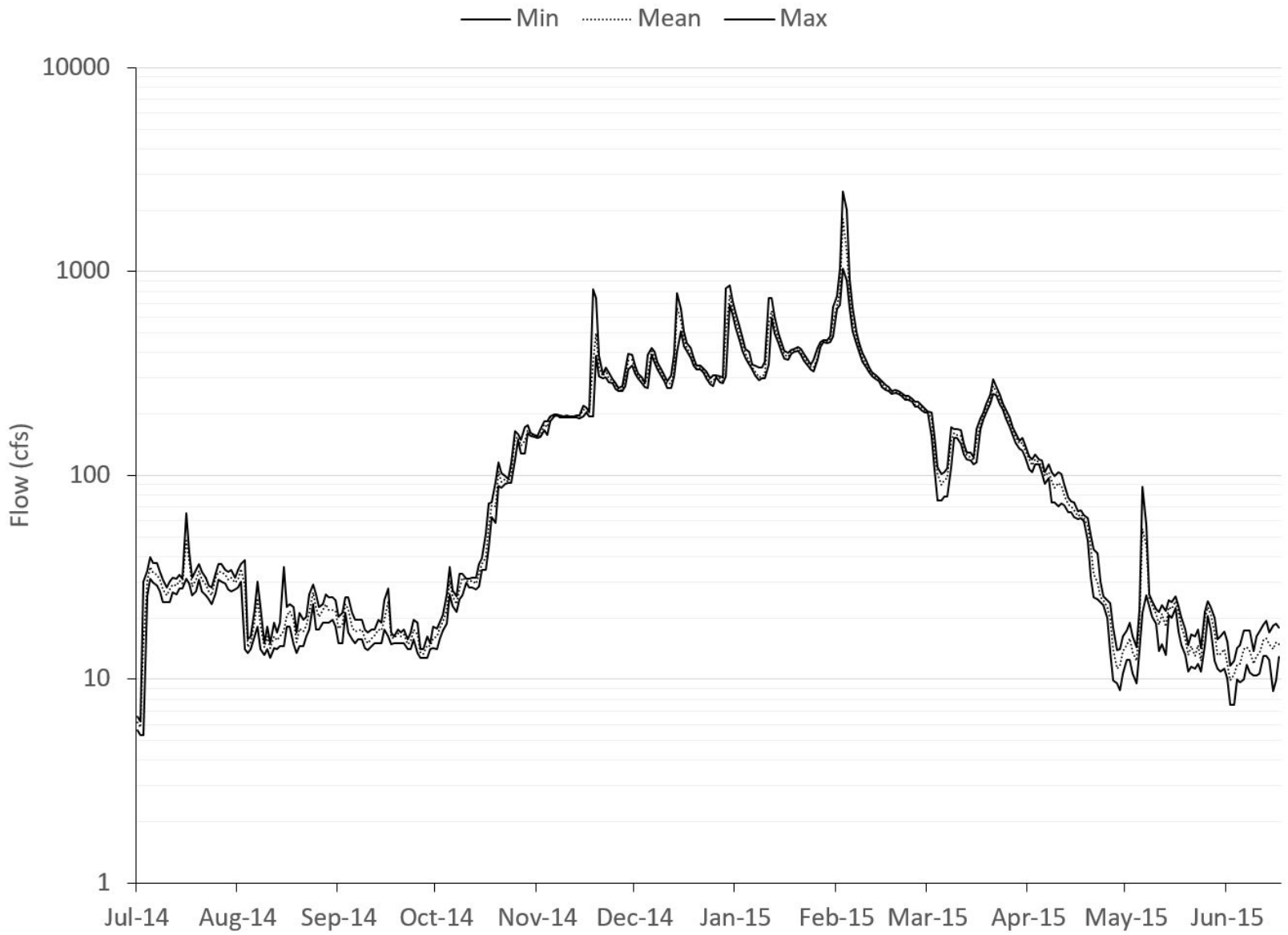

Figure E5. Walla Walla River at Peppers Road Bridge (32WAL-39.6).

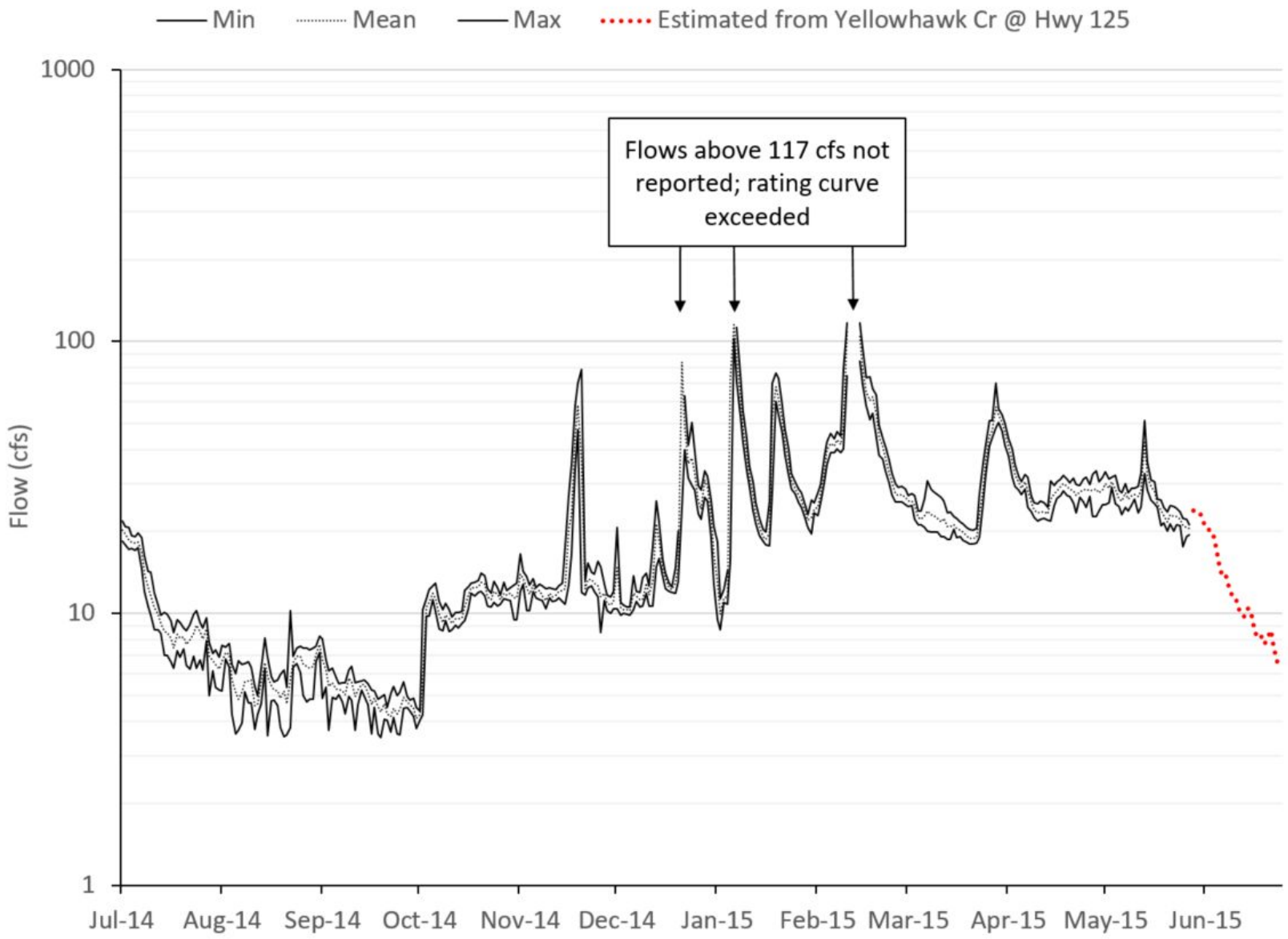

Figure E6. Yellowhawk Creek at Old Milton Road (32YEL-00.2).

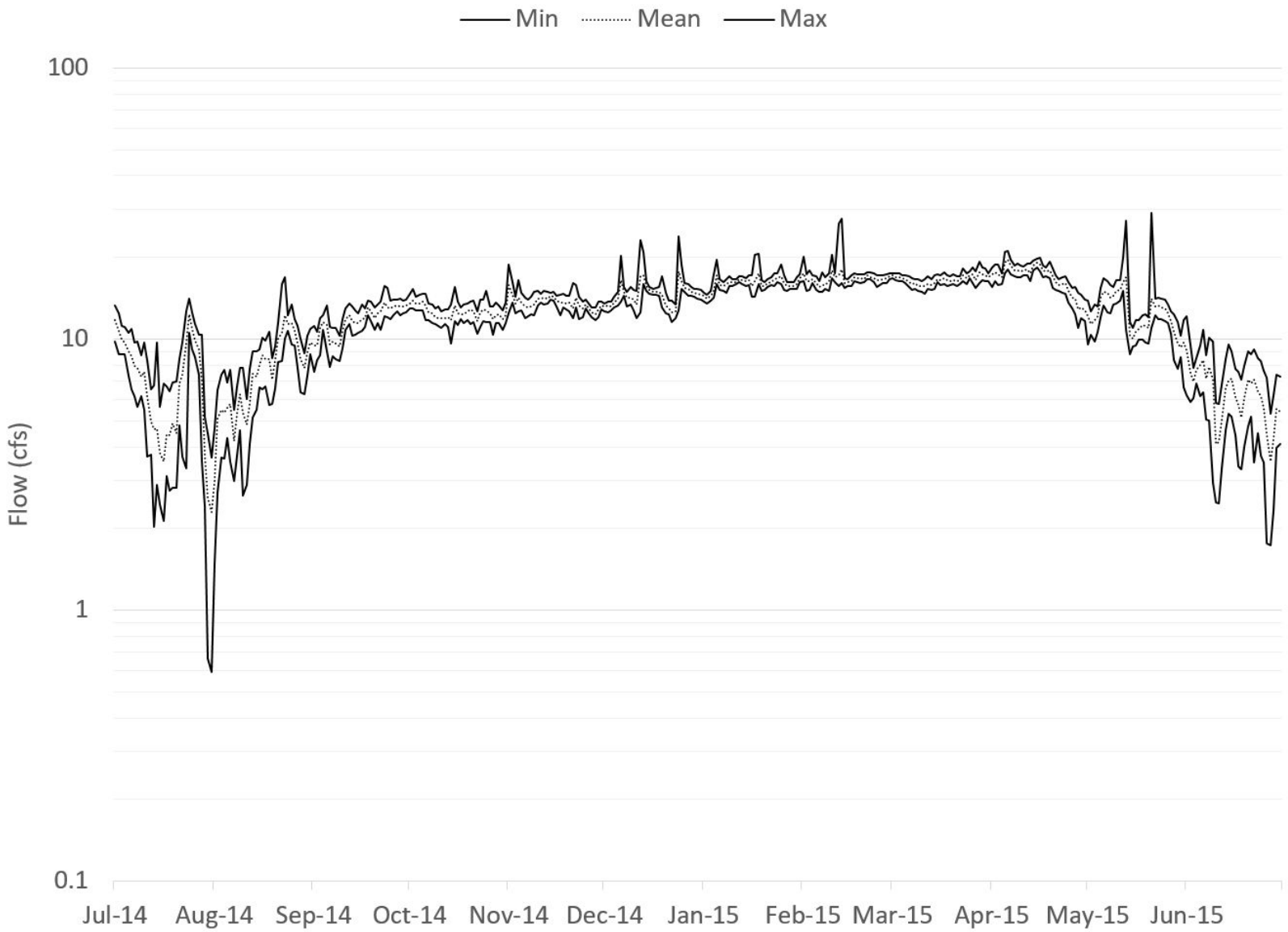

Figure E7. East Little Walla Walla River at Springdale Road (32ELW-00.7).

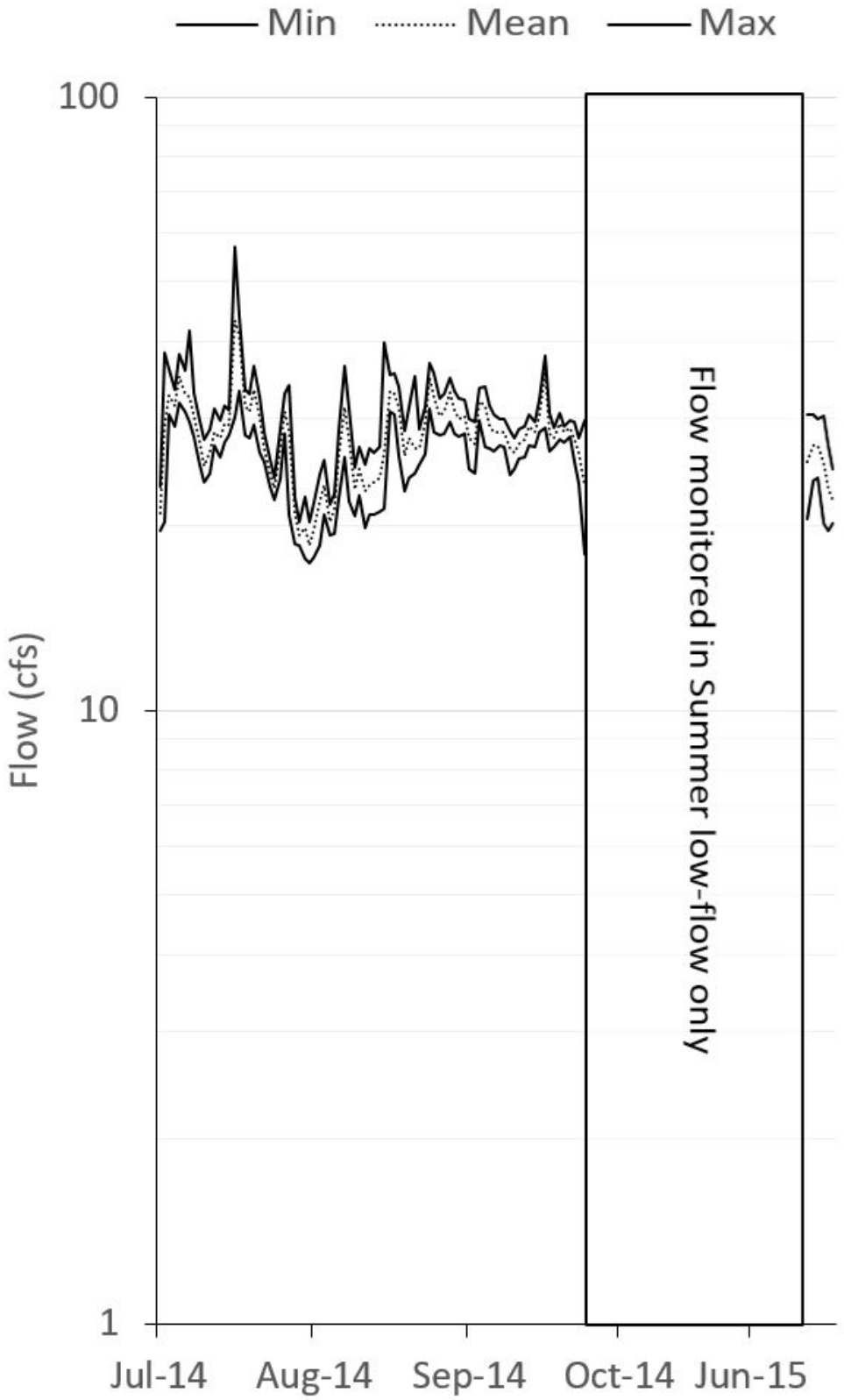

Figure E8. Walla Walla River at Mojonnier (Beet) Road (32WAL-36.5), low-flow monitoring station.

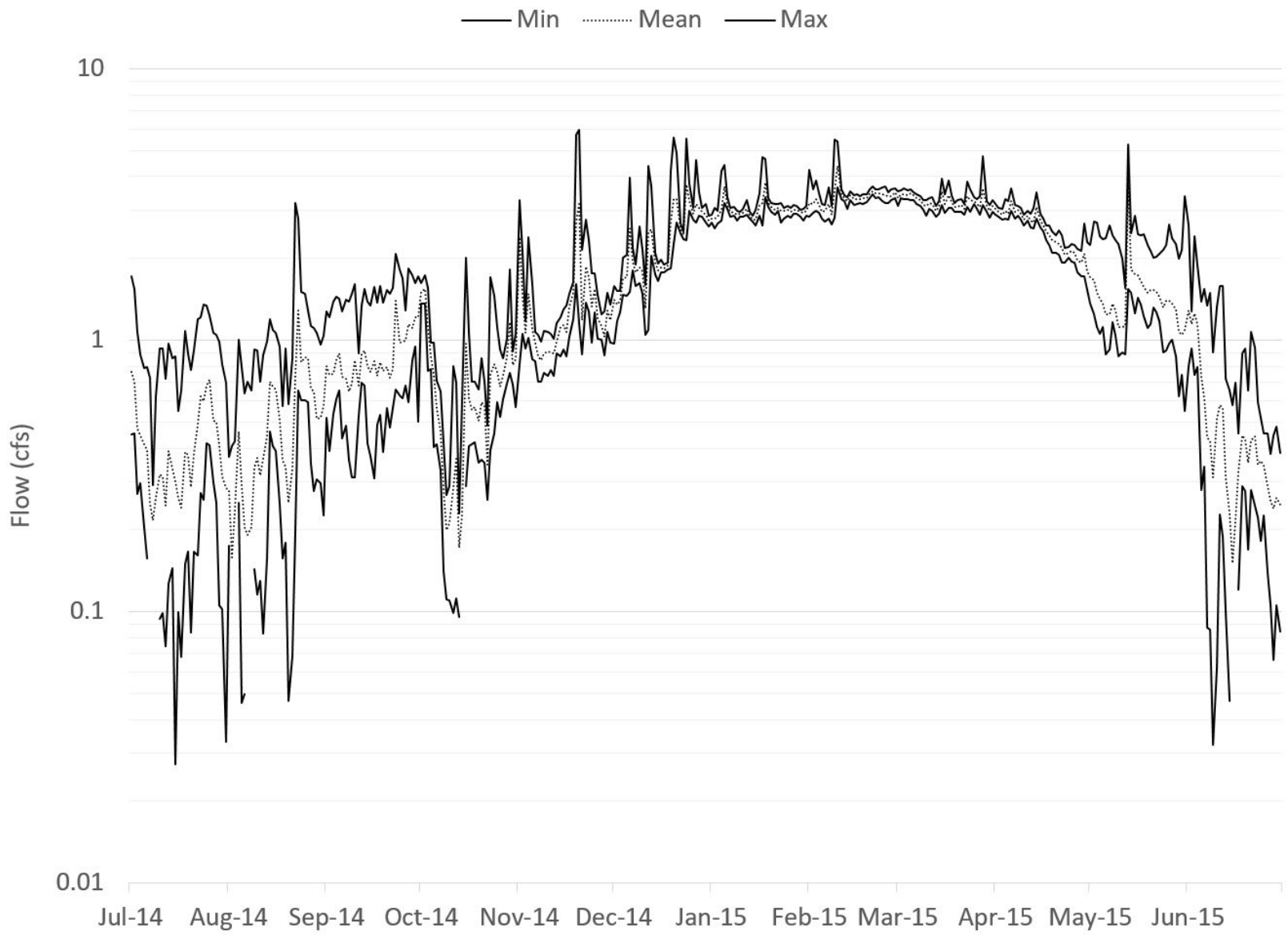

Figure E9. Garrison Creek at Mission Road (32GAR-00.5).

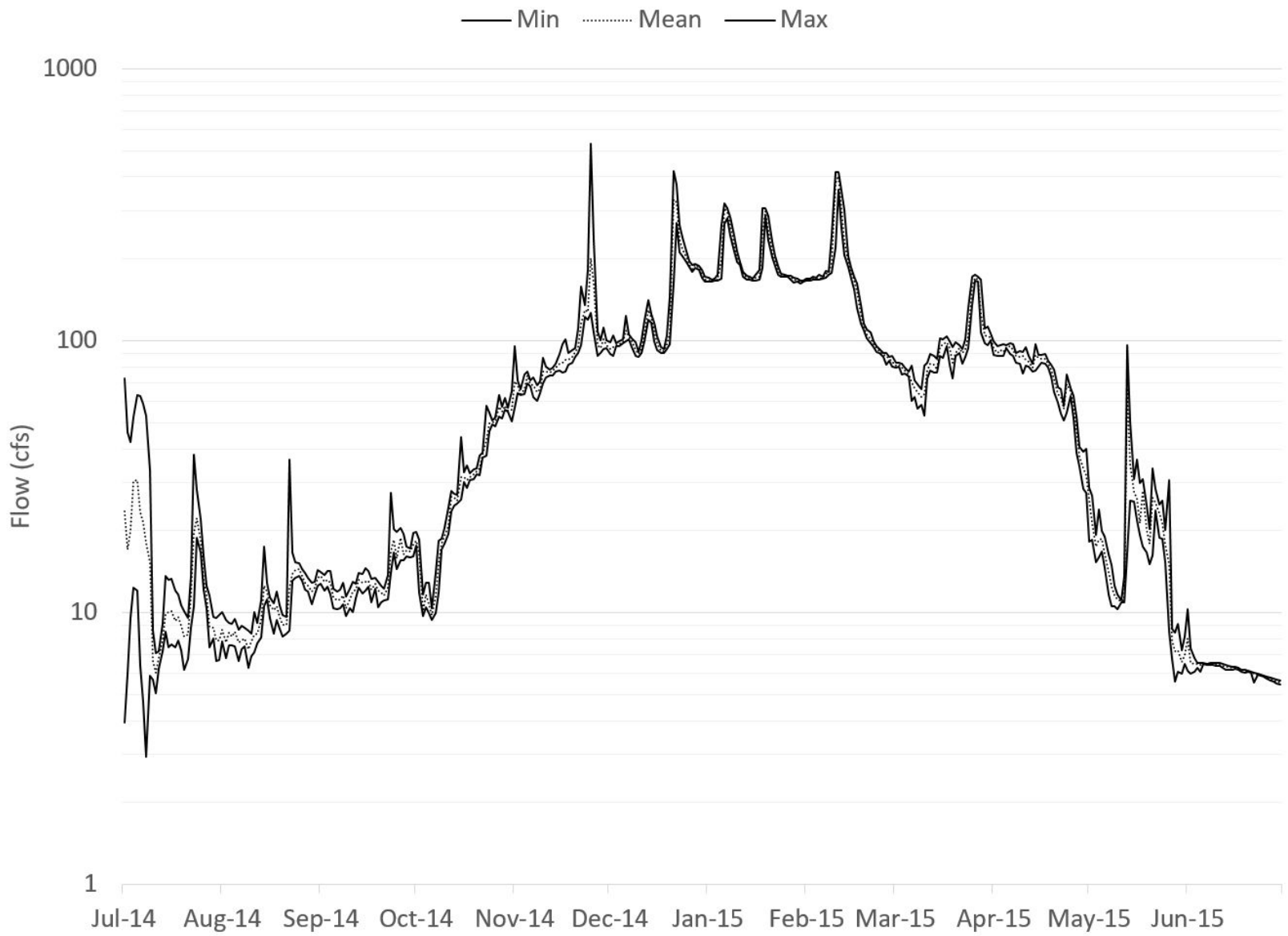

Figure E10. Mill Creek at Wallula Ave (RM 2.8).

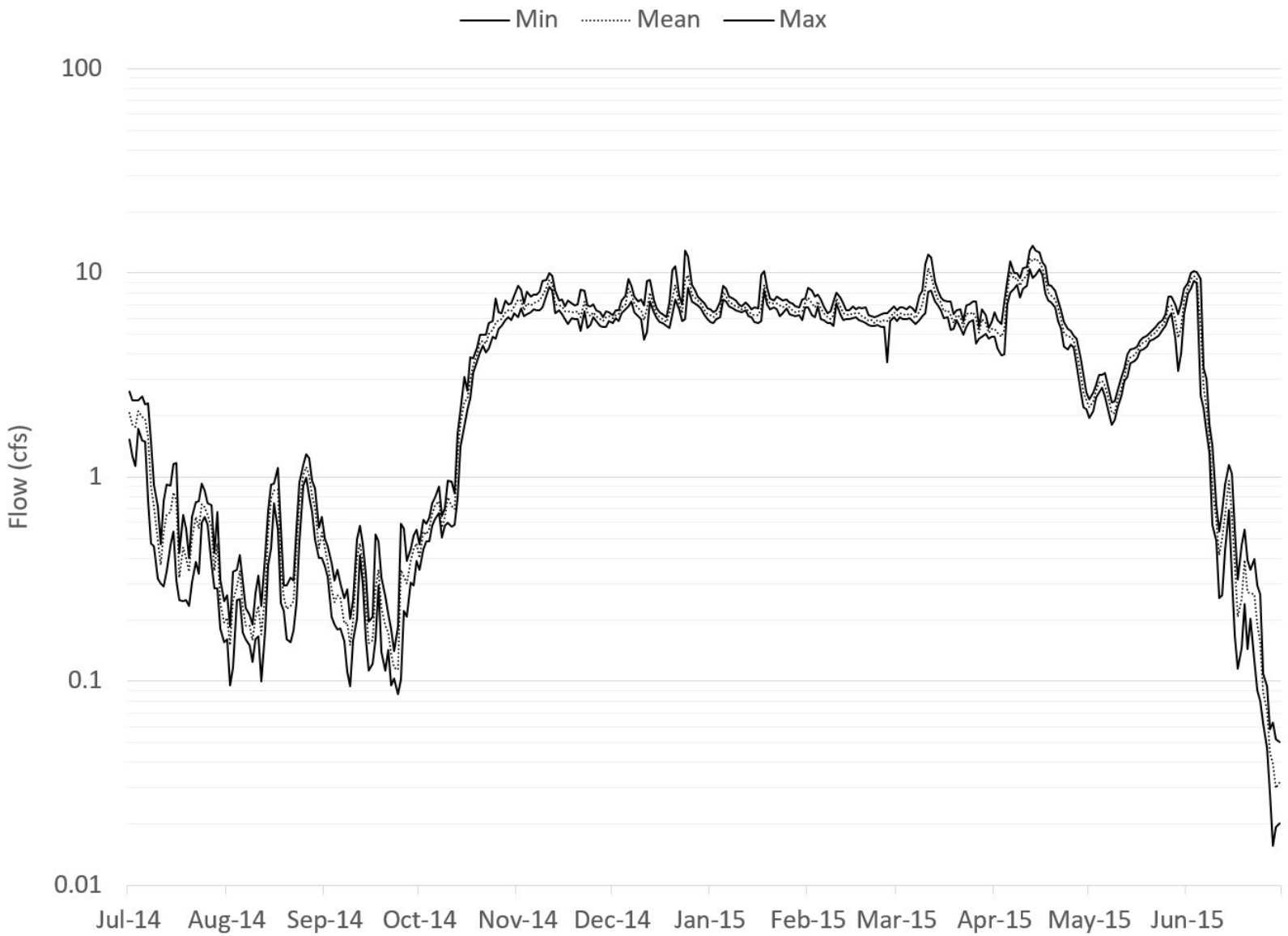

Figure E11. West Little Walla Walla River at Sweagle Road (32WLW-00.8).

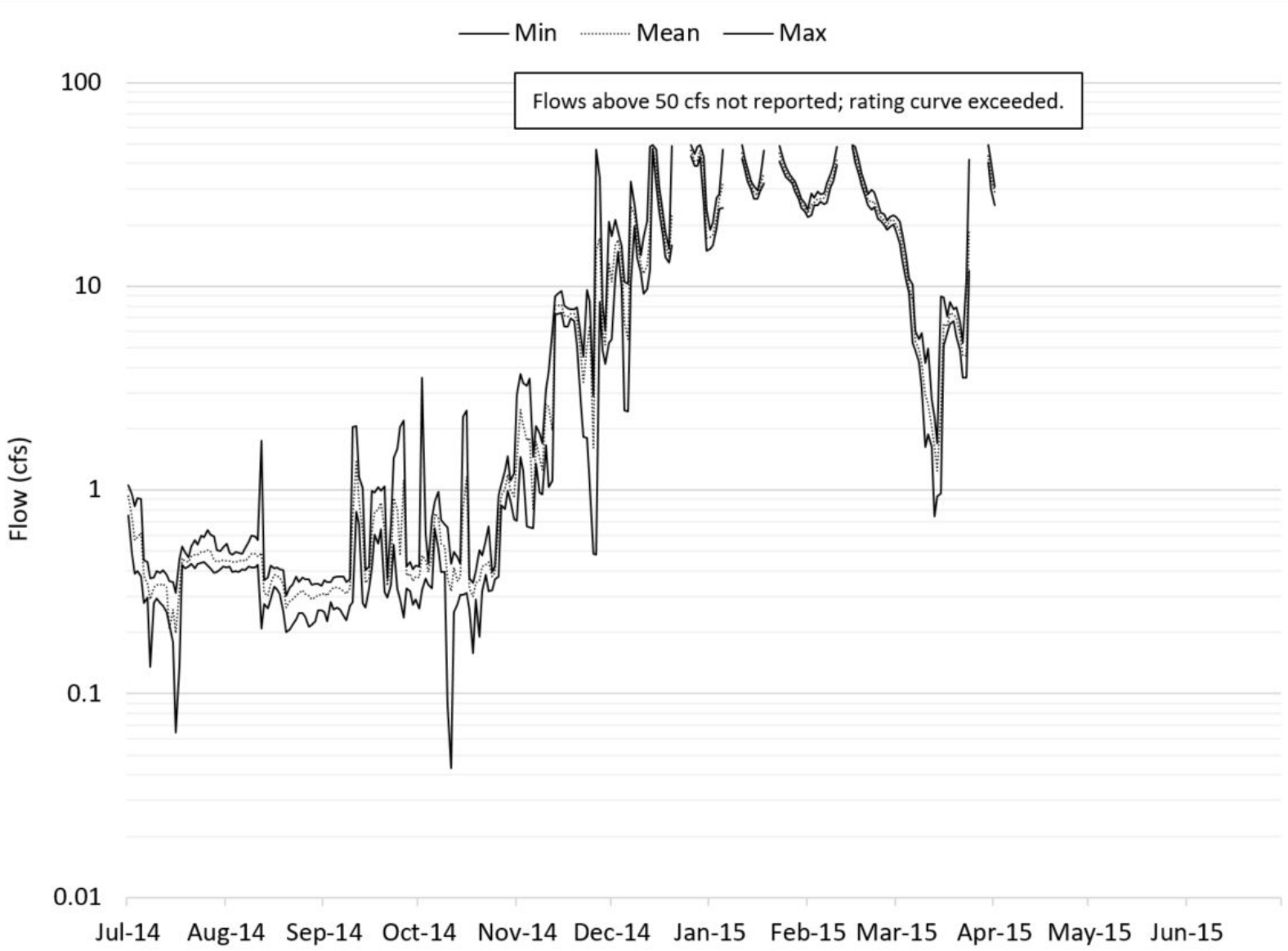

Figure E12. Dry Creek near mouth at Dodd Ranch in Lowden, WA (32DRY-00.2).

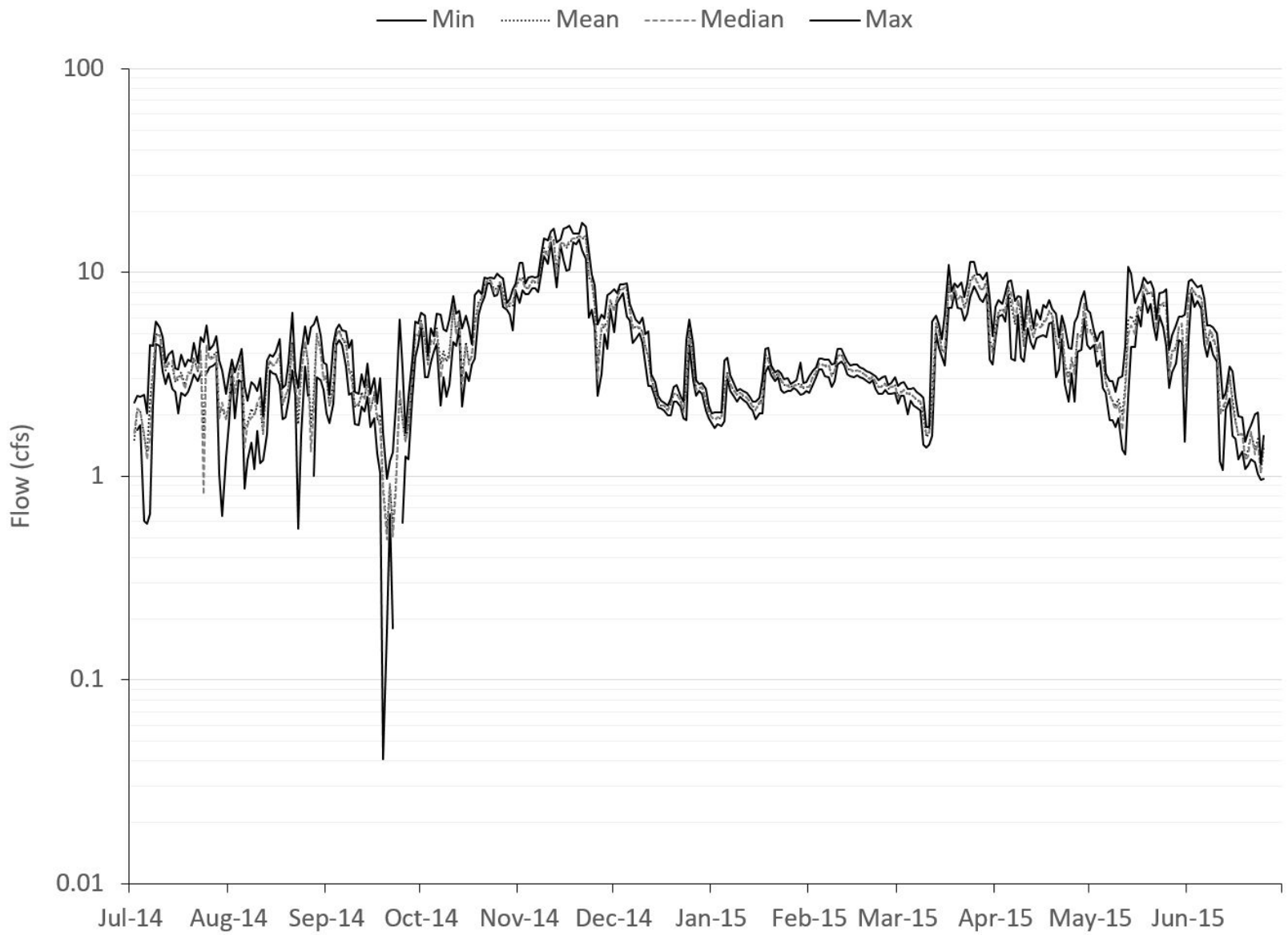

Figure E13. Mud Creek at Borgen (Barney) Road (32MUD-00.5).

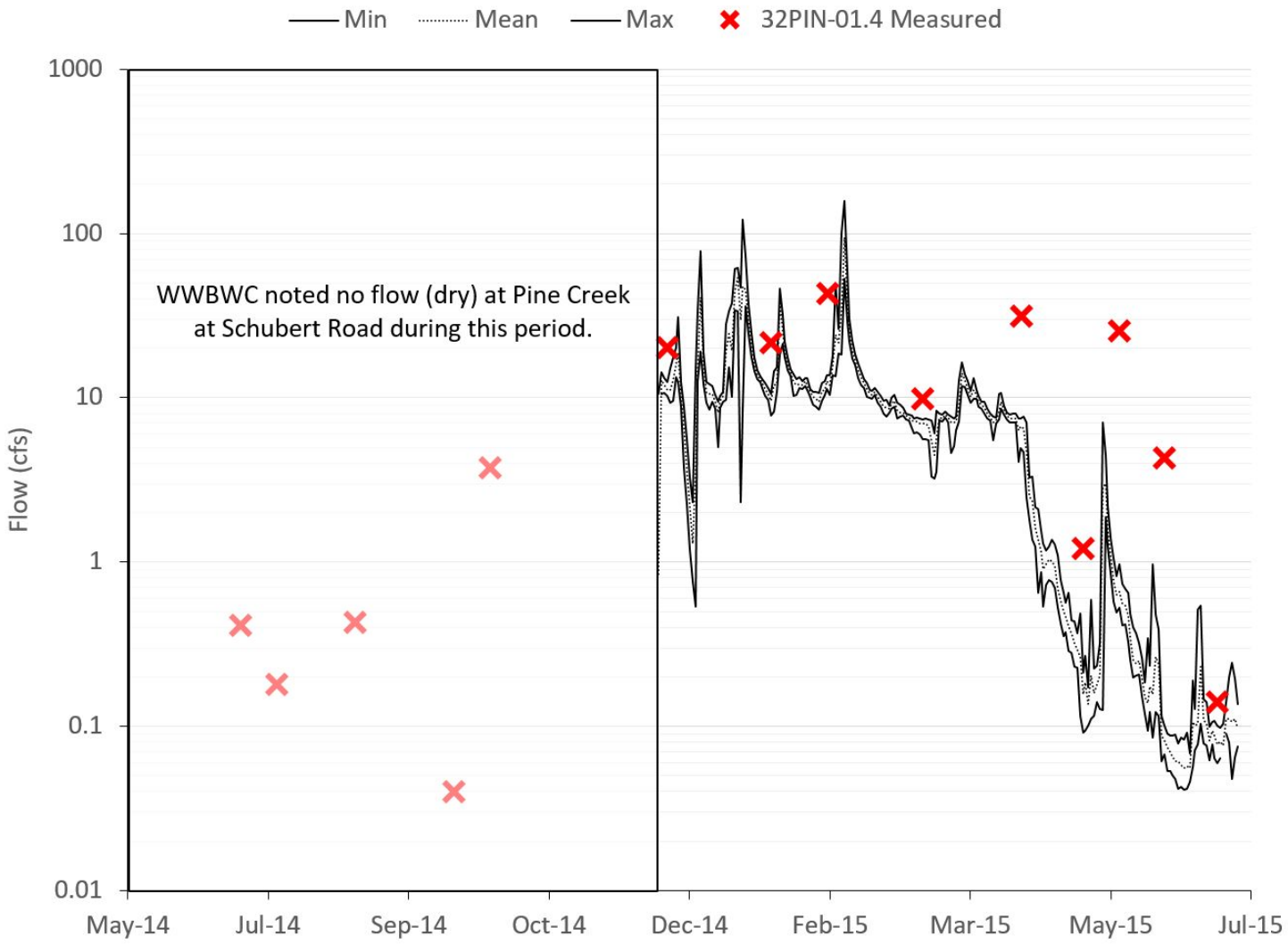

Figure E14. Pine Creek at Schubert Road (RM 10.0) and Ecology's discrete flow measurements at Pine Creek at Sand Pit Road (32PIN-01.4, RM 1.4).

Figure E15. Walla Walla River at Pierce's RV Park (32WAL-09.3).

Appendix F. National Pollutant Discharge Elimination System (NPDES) Data from WWTP Discharge Monitoring Reports (DMRs)

The TMDL (Baldwin et al. 2008) allocated pollutant loads to point sources in the Walla Walla River Basin. Point sources receive wasteload allocations that Ecology uses to develop limits in a city's National Pollutant Discharge Elimination System (NPDES) or stormwater permit. WWTPs collect Discharge Monitoring Report (DMR) data as part of their NPDES permits to verify treatment of effluent and to ensure effluent loads do not degrade water quality in their receiving waters.

In this appendix, we represent figures of NPDES permitted DMR effluent monitoring for Walla Walla River Basin WWTPs. We accessed these data from Ecology's water quality permit database – PARIS (https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-database). We use these appendix figures to provide context for our instream conditions during this study, and, where possible, to compare reported effluent loads to observed instream loads.

Three WWTPs in the Walla Walla River Basin, Dayton, Walla Walla, and College Place, discharge effluent for at least part of the year to the Touchet River, Mill Creek, and Garrison Creek, respectively. The Waitsburg WWTP discharges effluent to a wetland adjacent to the Touchet River.

Dayton Wastewater Treatment Plant

The City of Dayton, located in Columbia County, owns and operates a municipal wastewater treatment plant (WWTP) that uses a trickling-filter wastewater treatment system with ultraviolet (UV) disinfection prior to discharging treated wastewater to the Touchet River at river mile (RM) 52.1 (Figure F1) under NPDES permit number WA0020729 (Ecology 2015b). The permit limits effluent concentrations for ammonia, Biochemical Oxygen Demand (BOD5), total suspended solids, fecal coliform bacteria (FC), and pH.

The Touchet River, which flows into the Walla Walla River, is impaired for temperature, pH, FC, and dissolved oxygen (DO). The TMDLs set wasteload allocations for the Dayton WWTP that resulted in very strict limits for the nutrient surrogates of DO and pH (soluble reactive phosphorus, dissolved inorganic nitrogen (DIN), organic phosphorus, and organic nitrogen) (Baldwin 2008). Significant upgrades to Dayton's aging WWTP will be necessary to meet these limits and the TMDL studies suggested that Dayton needed to remove their discharge from the river altogether during the critical season. However, alternatives to meet these limits that involve directly removing seasonal discharge are further restricted by stringent water rights constraints in the Walla Walla River Basin. Ecology continues to work with the City of Dayton to develop monitoring requirements for the WWTP to meet surface water quality requirements and the goals of the TMDL/Water Quality Improvement Plan for the Walla Walla Basin (Peterschmidt 2020).

The limits set by the wasteload allocations have not yet been incorporated into the WA0020729 permit. Instead, a compliance schedule has been set in the permit to allow Dayton to plan, design and construct an upgrade alternative while coordinating funding options (Ecology 2015a). The City of Dayton, working with consultant Anderson Perry, partnered with the Confederated Tribes of the Umatilla, Ecology and Washington Water Trust to develop an innovative wastewater alternative that will be designed to meet both water quality and water resource constraints (Peterschmidt 2020). The WA0020729 permit establishes a schedule for completion of construction of the innovative alternative by December 31, 2021 (Ecology 2015a).

At its core the proposed alternative includes:

- Advanced year-round secondary treatment system.
- Unlined constructed wetland system for seasonal treatment, hydraulically connected to the Touchet River.
- Wetland system designed to provide enhanced nutrient removal and cooling of the secondary treatment system discharge.
- Projects to restore wetlands and floodplains areas that will provide expanded benefits by improving habitat and river function (Peterschmidt 2020).

The Dayton WWTP, in compliance with the NPDES permit (Ecology 2015a), conducts effluent monitoring for flow and FC. We present the 2014-2015 results with this study's instream results in Figures F2 and F3.

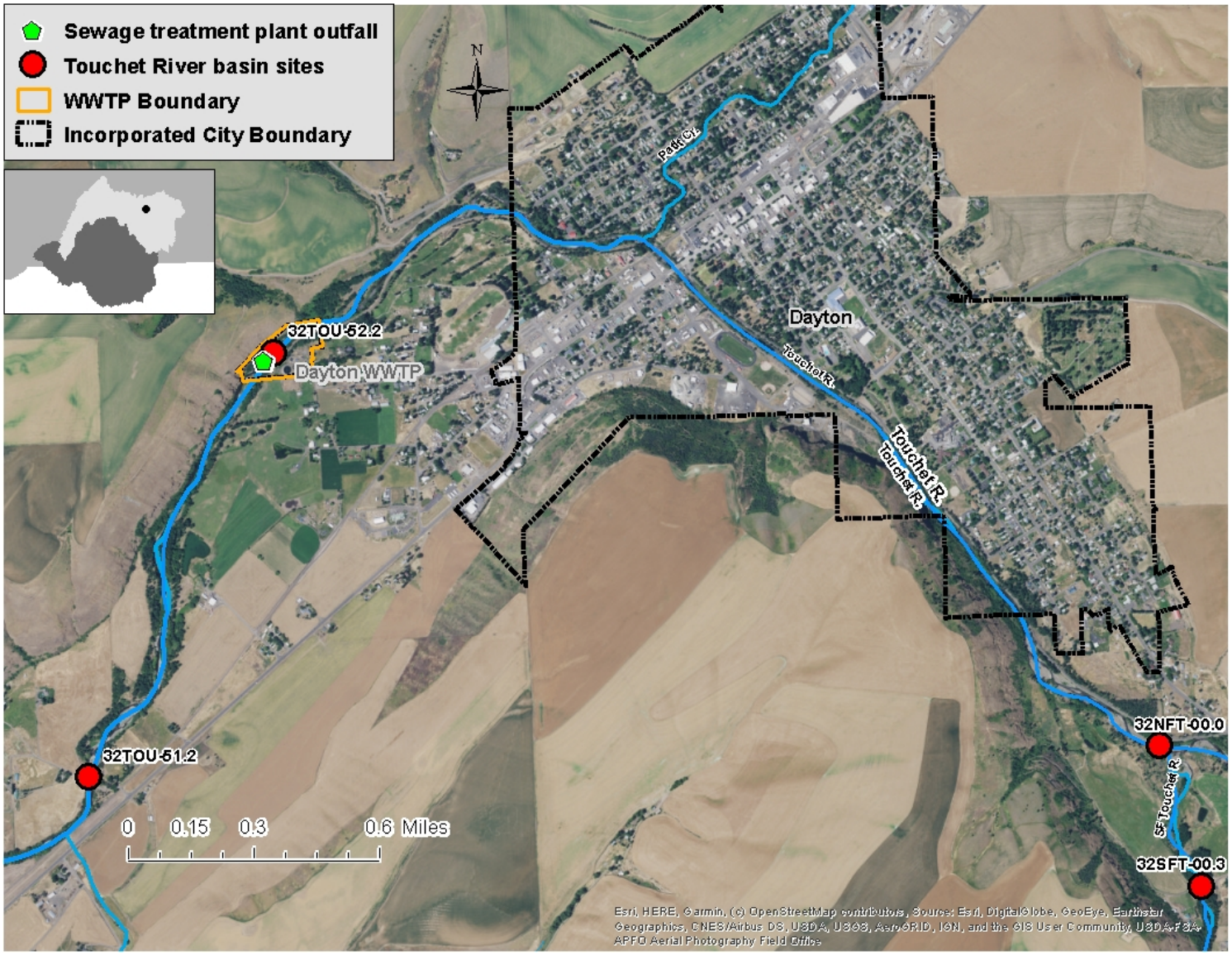

Figure F1. Dayton Wastewater Treatment Plant (WWTP) and Dayton area Effectiveness Monitoring (EM) study sites.

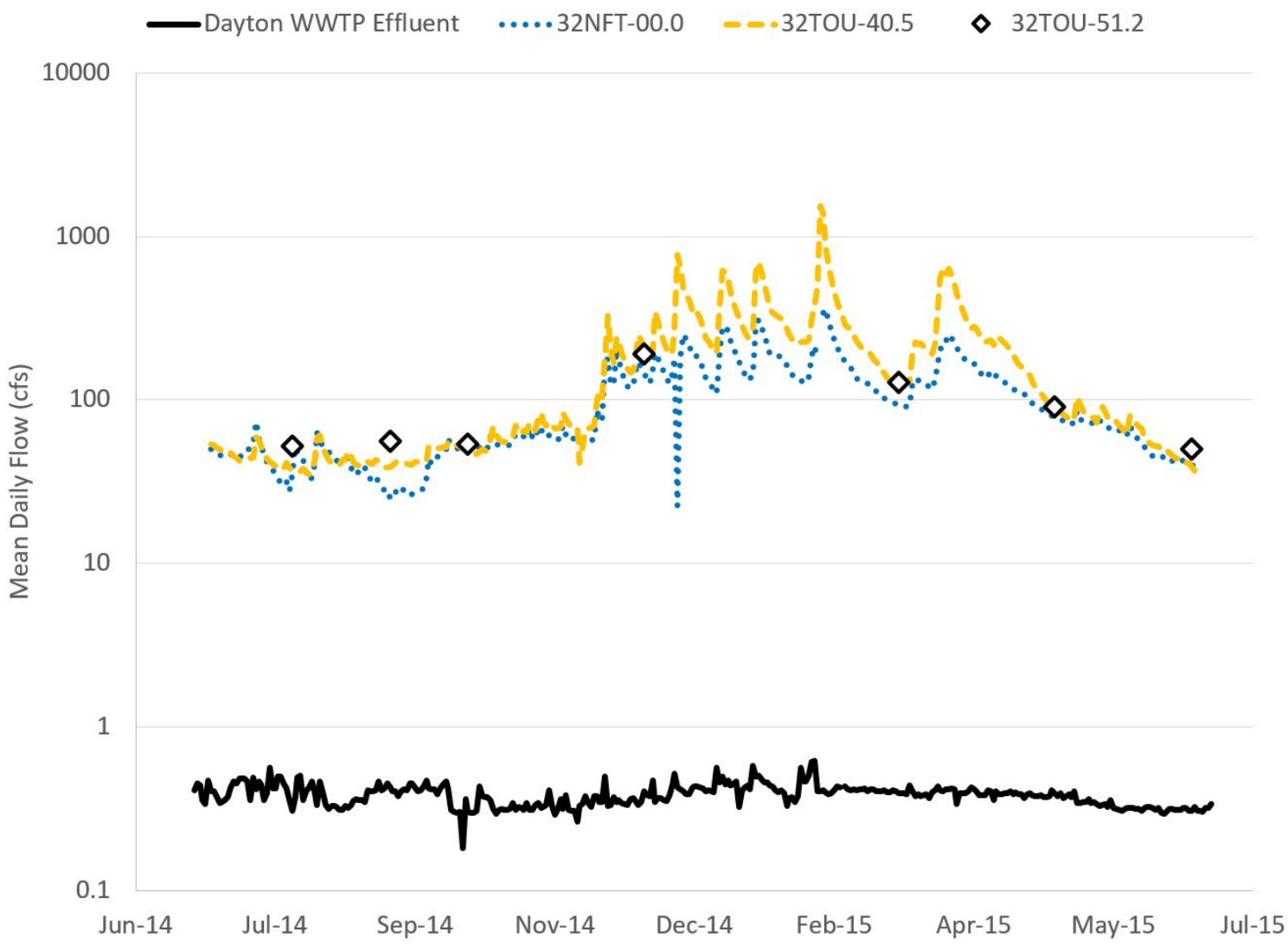

Figure F2: Dayton WWTP effluent discharge to the Touchet River at RM 52.1 versus the upstream discharge at the NF Touchet River confluence (RM 0.0), the downstream manual discharge measurements at Ward Rd (RM 51.2), and the downstream gauge at Bolles Road (RM 40.5).

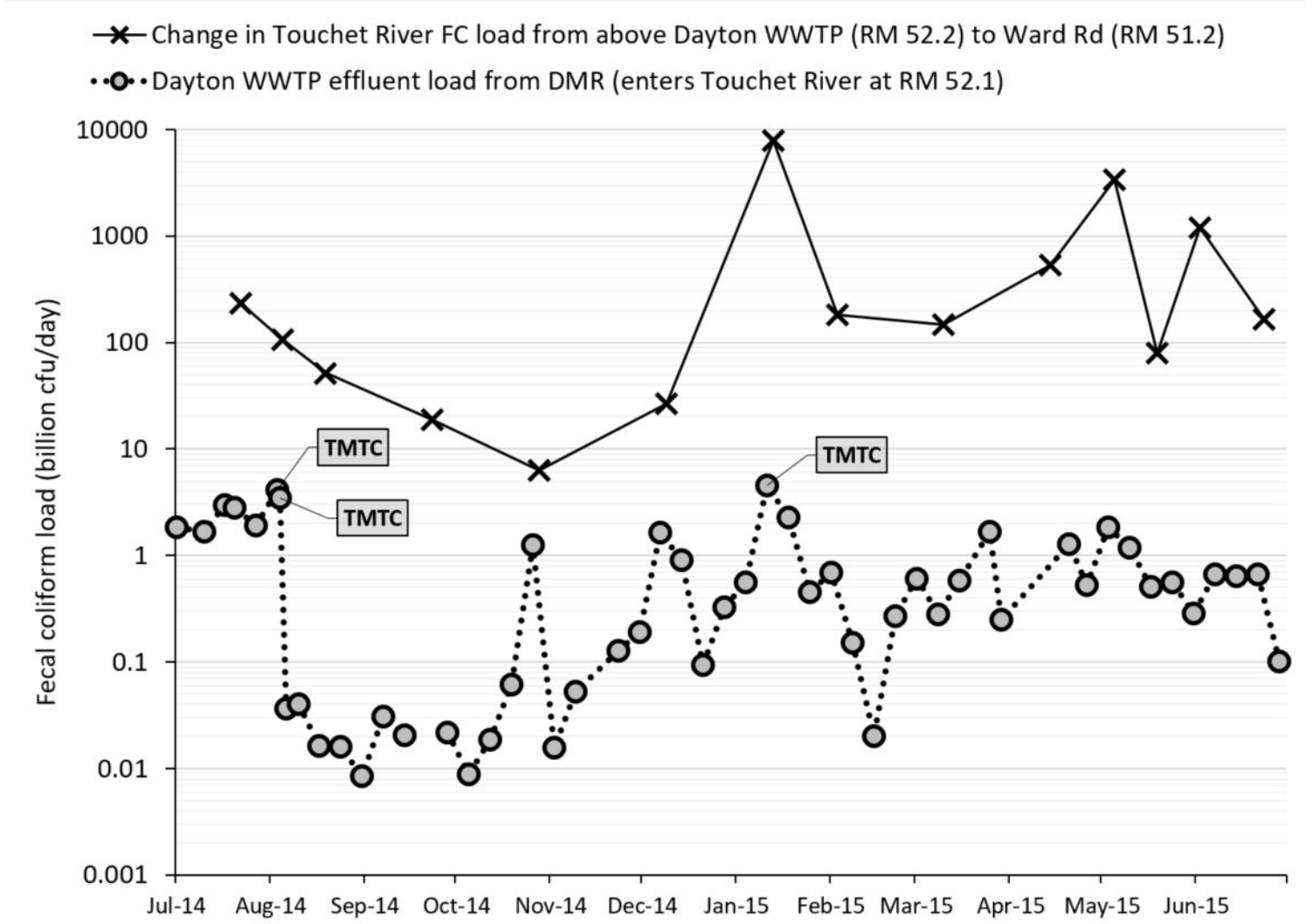

Figure F3: Dayton WWTP FC loads in effluent discharging to the Touchet River at RM 52.1 versus FC load changes in the Touchet River between RM 52.2 and RM 51.2.[1]

1. TMTC indicates one or more "Too Many to Count" fecal coliform results (estimated at 401 cfu/100 ml) were included in the load calculation. Actual loads are probably higher.

Waitsburg Wastewater Treatment Plant

Waitsburg WWTP discharges treated effluent to a wetland along the floodplain of the Touchet River near RM 43.4 (Figure F4) under NPDES permit number WA0045551 (Ecology 2014b).

Before 1996, effluent was discharged to a lined treatment lagoon, about 600 feet above the mouth of Coppei Creek. However, during a flood event the river avulsed and flowed through the existing treatment lagoon, damaging the lagoon and creating new wetlands. Ecology approved a new facility plan and design in 2000. The facility upgrade completed in 2003 improved effluent treatment to the wetland (Doremus 2014a).

In a follow-up study to the TMDL (Pitz and Tarbutton 2010, Tarbutton 2010), Ecology analyzed nutrient loading to the Touchet River from groundwater sources adjacent to the Waitsburg WWTP effluent wetland. The study estimated load ranges for nitrogen (as NH_4 and NO_3) and phosphorus (as total dissolved phosphorus; and orthophosphates) entering the Touchet River in the adjacent reach. They concluded there was strong evidence for both nonpoint nitrogen loads entering the Touchet River in the downtown area of Waitsburg (RM 44.2 to RM 43.5) and point source groundwater loads from the WWTP. The authors recommended nitrogen sources in the Waitsburg downtown reach be investigated and eliminated, and suggested further upgrades to the Waitsburg WWTP effluent treatment be considered.

During this 2014-2015 EM study, DMR results show effluent discharge to the wetland remained less than 0.25 cfs year round or less than 0.4% of the instream Touchet River flow (Figure F5). The Waitsburg WWTP met permit requirements for FC concentrations (Figures F6 and F7). The WWTP did not monitor for SRP, DIN, OrgP, or OrgN in WWTP effluent during this study. However, ammonia concentrations also remained well below permit criteria (Figure F8).

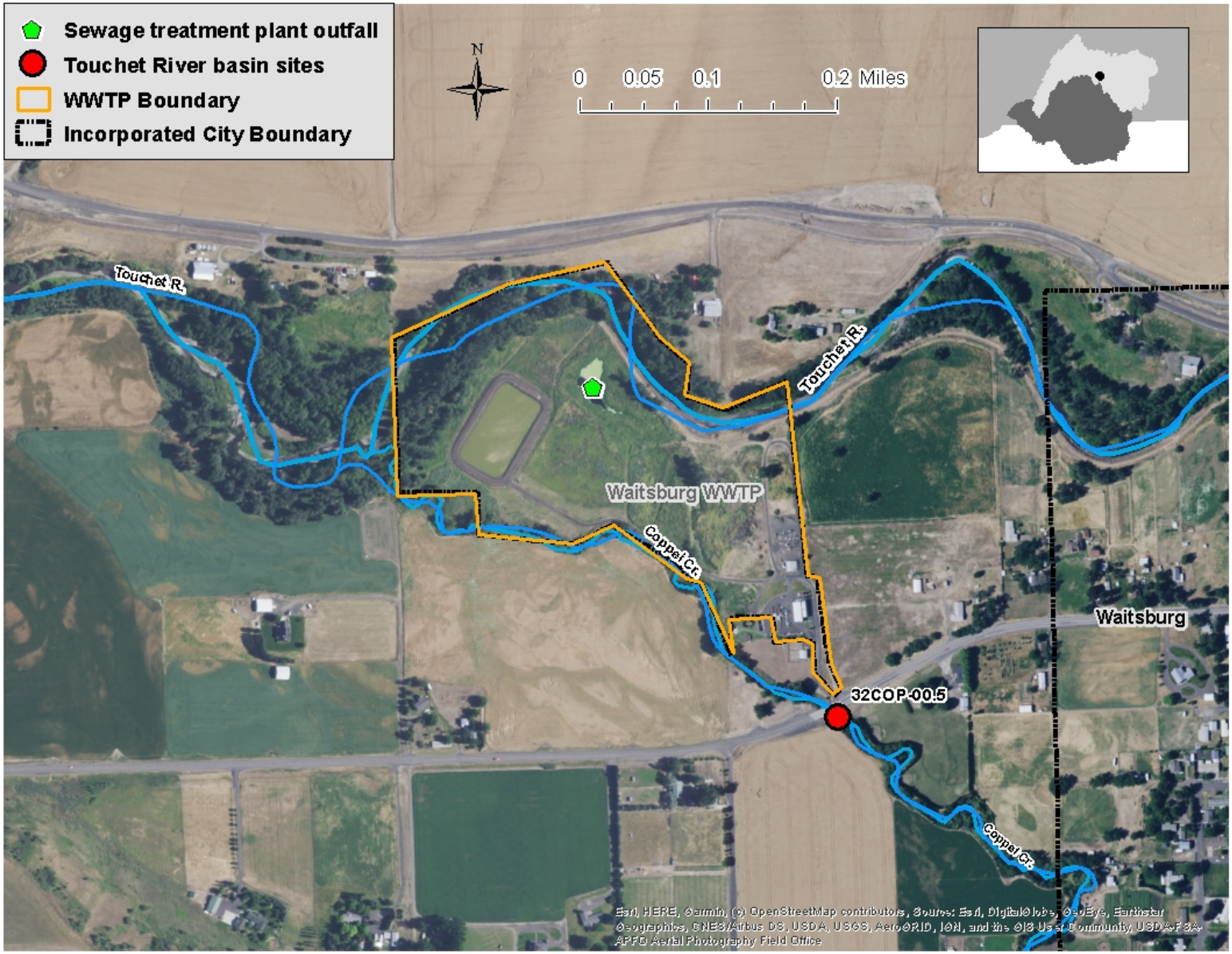

Figure F4. Waitsburg WWTP and wetland effluent outfall location.

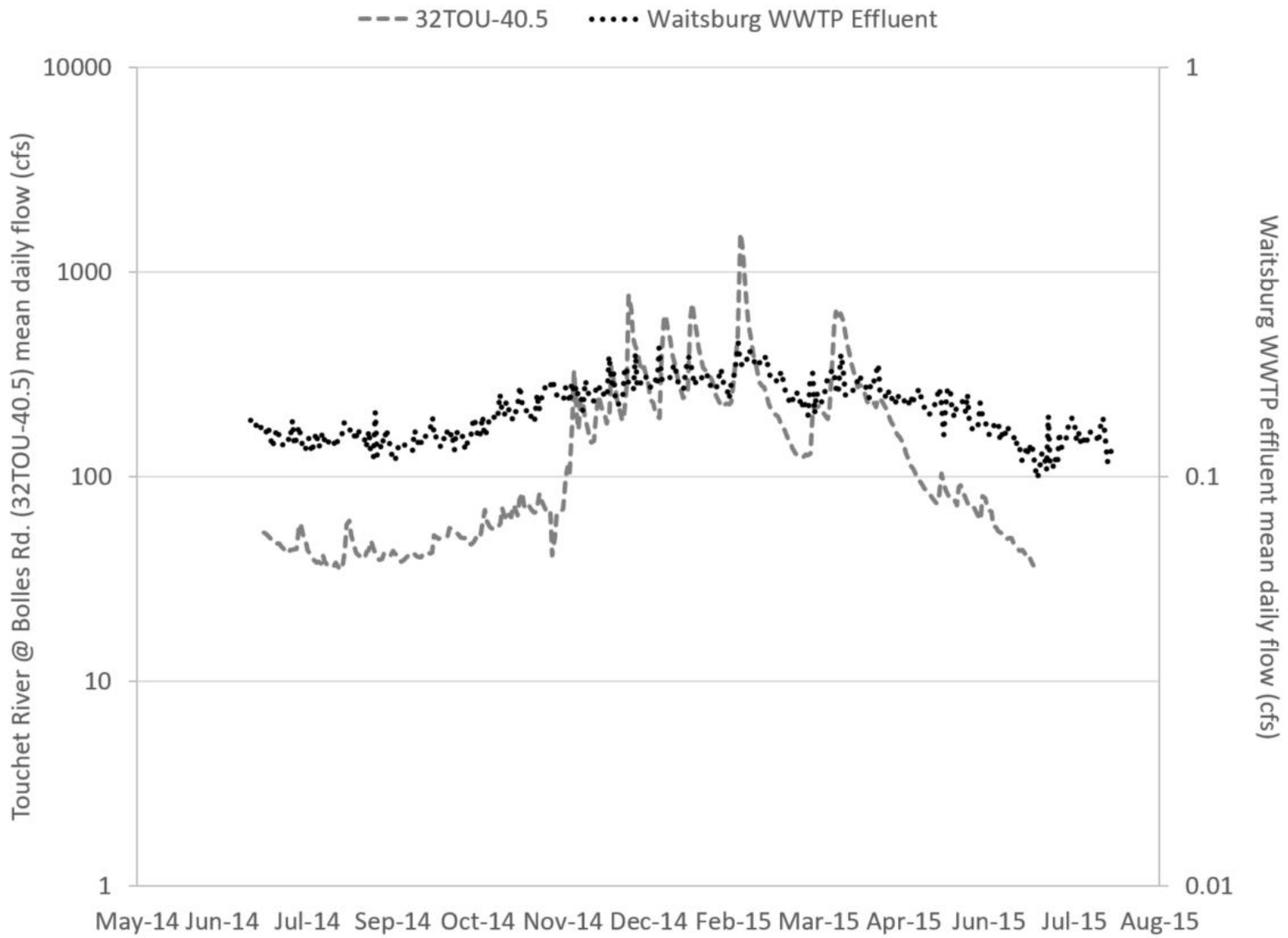

Figure F5: Waitsburg WWTP mean daily effluent flows to a wetland adjacent to the Touchet River at RM 43.0 versus mean daily Touchet River flows downstream at RM 40.5 at the Bolles Road gauge (32TOU-40.5 or 32B100).

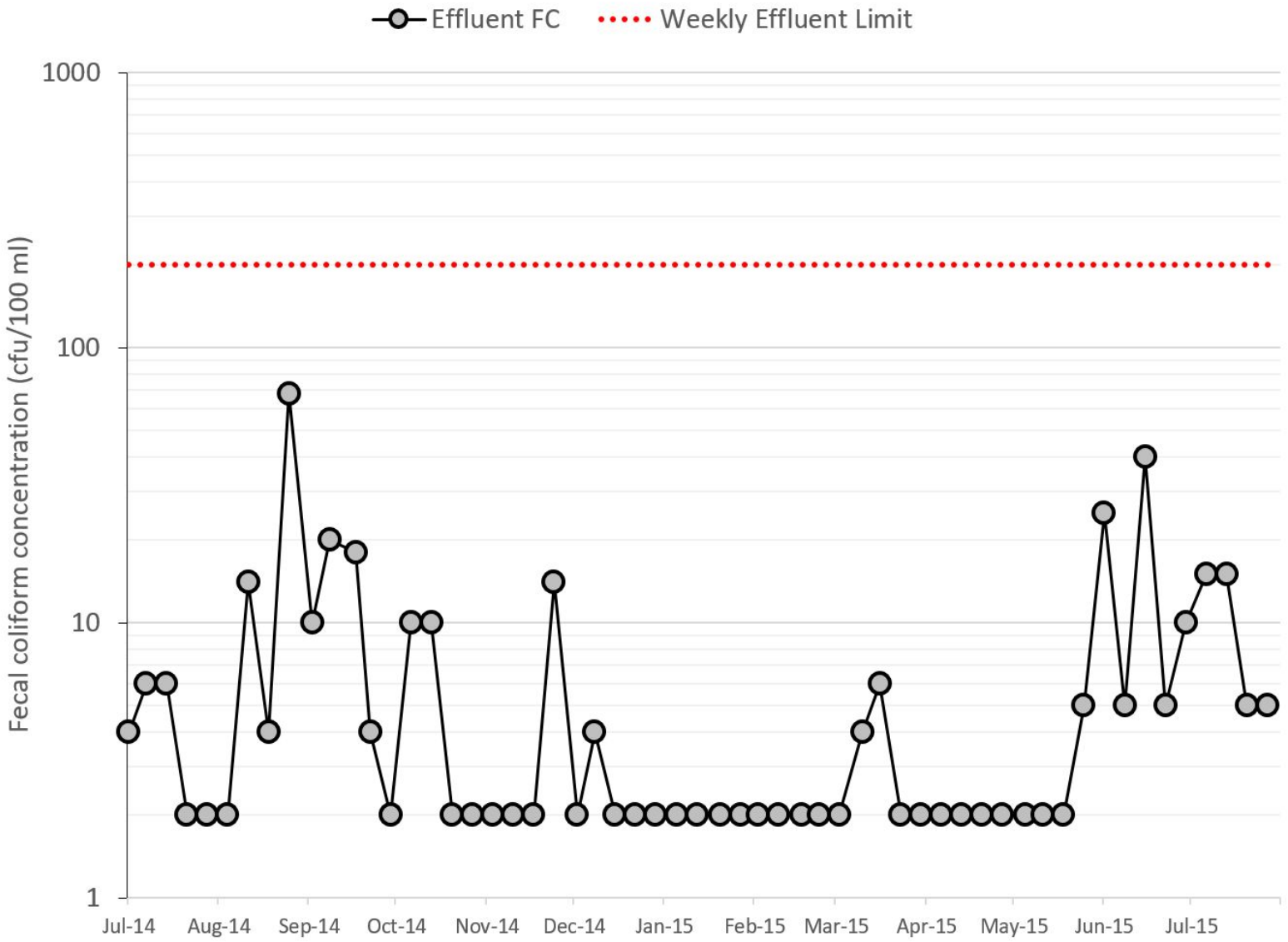

Figure F6: Waitsburg WWTP weekly FC concentrations in effluent discharging to an adjacent wetland on the Touchet River at RM 43.0 versus the weekly NPDES permit limit.

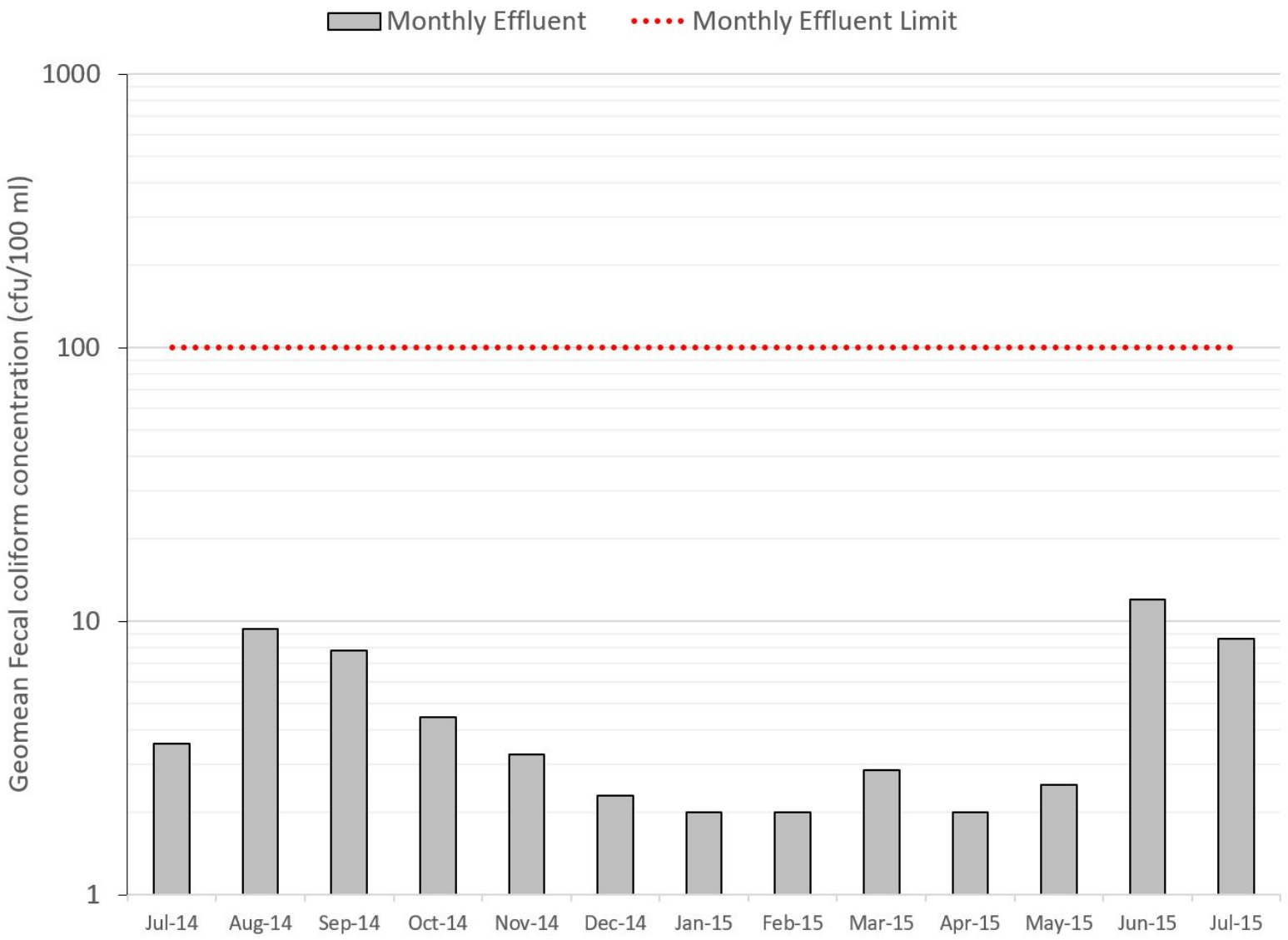

Figure F7: Waitsburg WWTP monthly FC concentrations in effluent discharging to an adjacent wetland on the Touchet River at RM 43.0 versus the monthly NPDES permit limit.

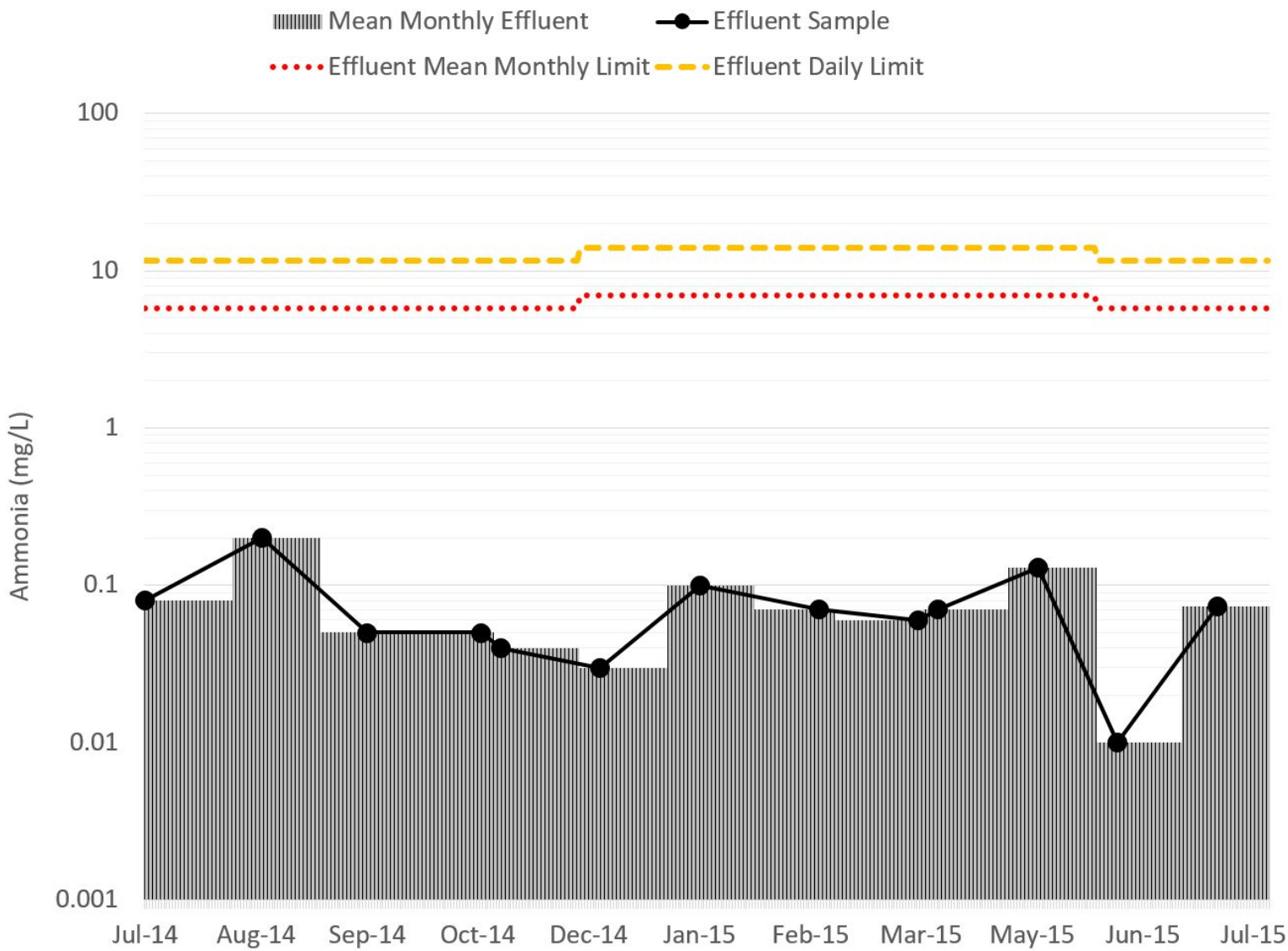

Figure F8: Waitsburg WWTP monthly ammonia concentrations in effluent discharging to an adjacent wetland on the Touchet River at RM 43.0 versus the daily and monthly NPDES permit limits.

City of Walla Walla Wastewater Treatment Plant

The Walla Walla WWTP operates under NPDES Permit No. WA0024627. The NPDES permit authorizes the Walla Walla WWTP to discharge municipal wastewater to Mill Creek at about river mile (RM) 5.4 (Figure F9), December 1 through April 30, subject to the limits in Table 3. From April 15 through December 15, the discharge routes reclaimed water to the Gose Irrigation System and Blalock Irrigation District, which discharge all wastewater to the ground.

To improve effluent water quality and comply with TMDL wasteload allocations, the city completed several expansions and modifications to the plant. The approved Wastewater Facilities Plan (City of Walla Walla 1997) identifies the most recent plant upgrades designed to meet the state's reclaimed water standards and to meet water quality requirements for the receiving water.

In 2008, the city completed constructing the last phase of improvements designed to meet the reclaimed water redundancy and reliability requirements that assure the water distributed to the irrigation districts meets water quality standards.

We present Walla Walla WWTP DMR 2014-2015 results in Figures F10 to F13. Figures F10 and F13 also include Mill Creek flow and water quality data collected by WWBWC and this study.

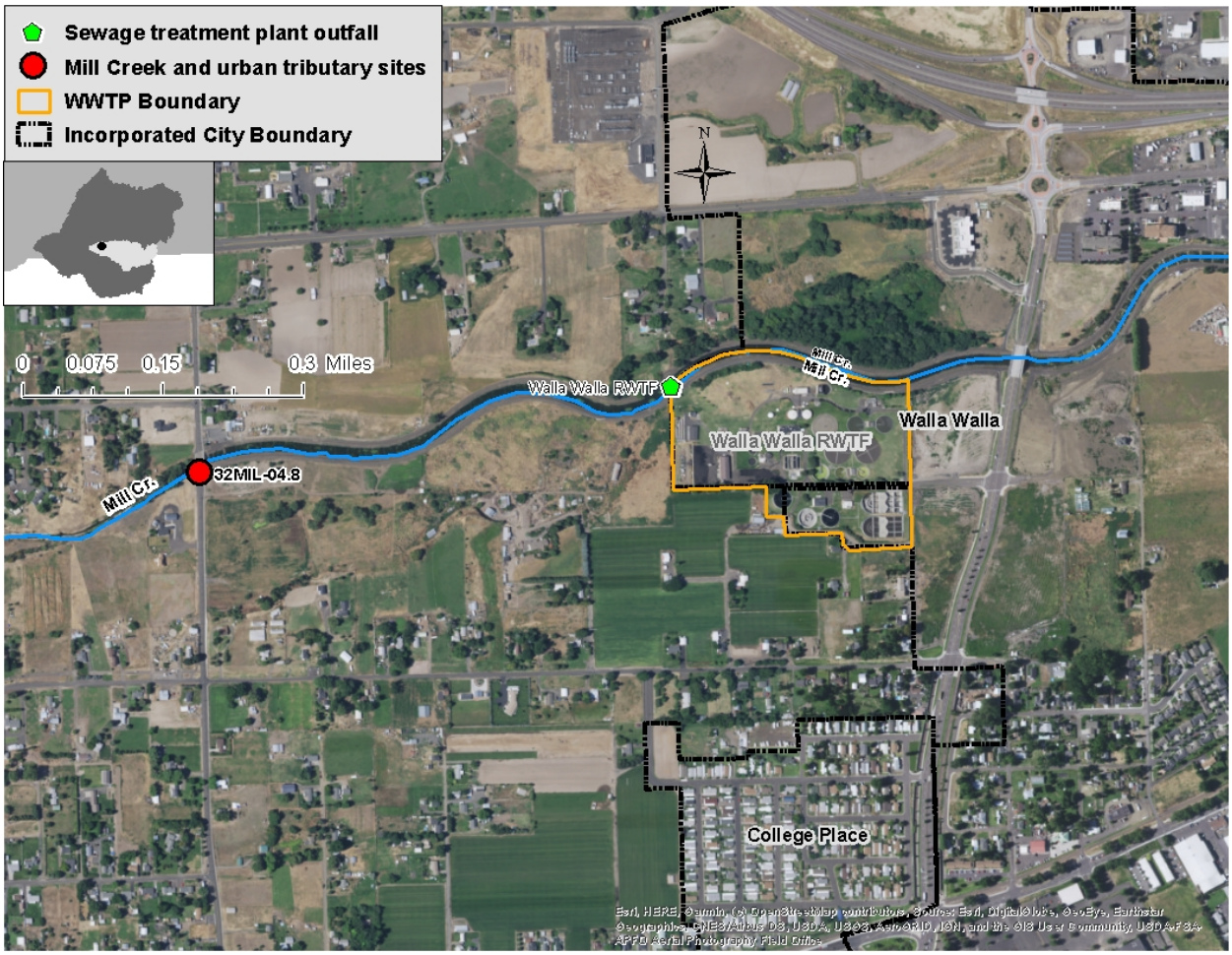

Figure F9. Walla Walla WWTP, outfall, and downstream EM study site.

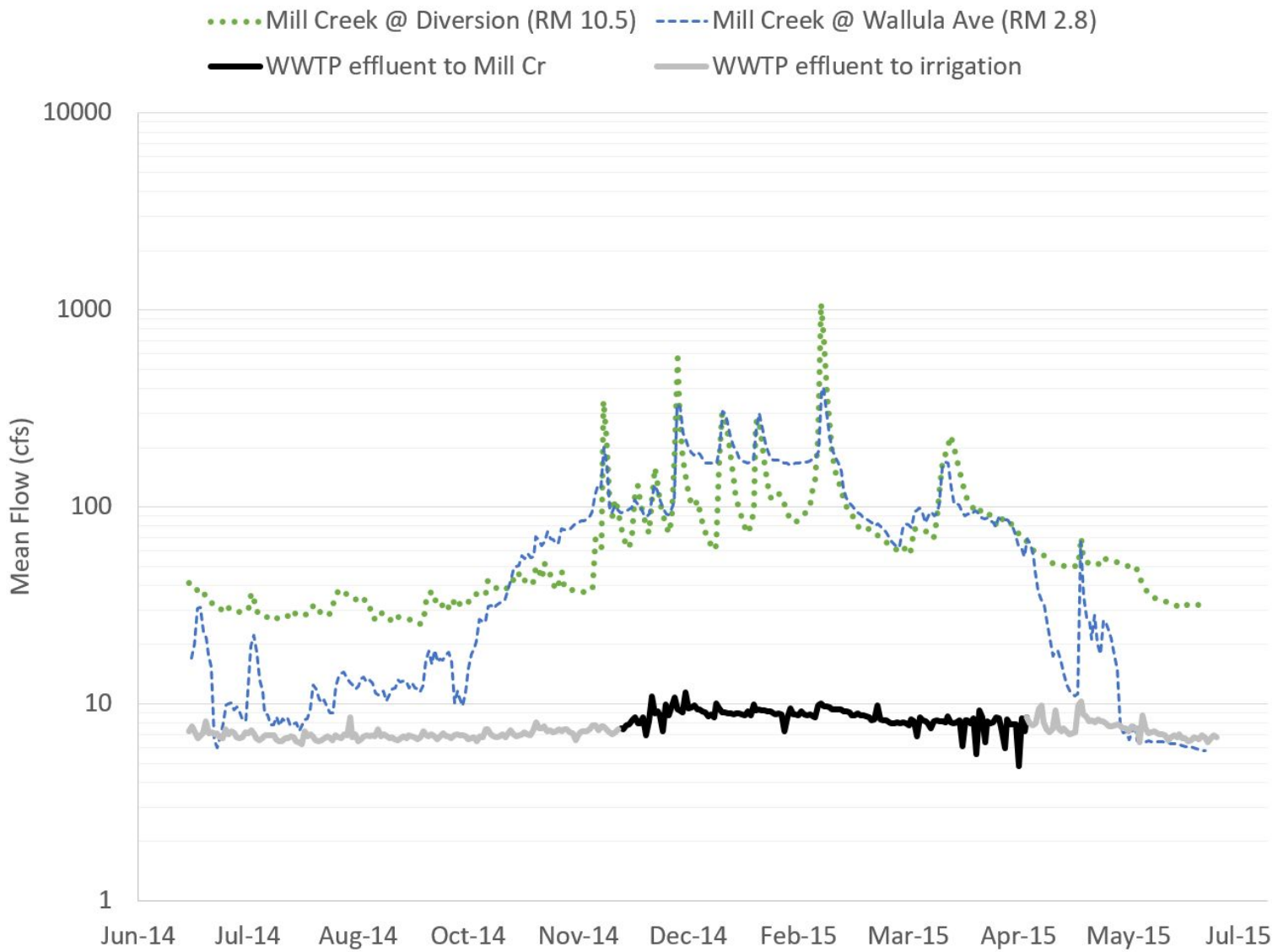

Figure F10: Walla Walla WWTP effluent discharge rates to Mill Creek at RM 5.4, December to April, and irrigation districts, May to November, versus Mill Creek upstream (RM 10.5) and downstream (RM 2.8) flows.

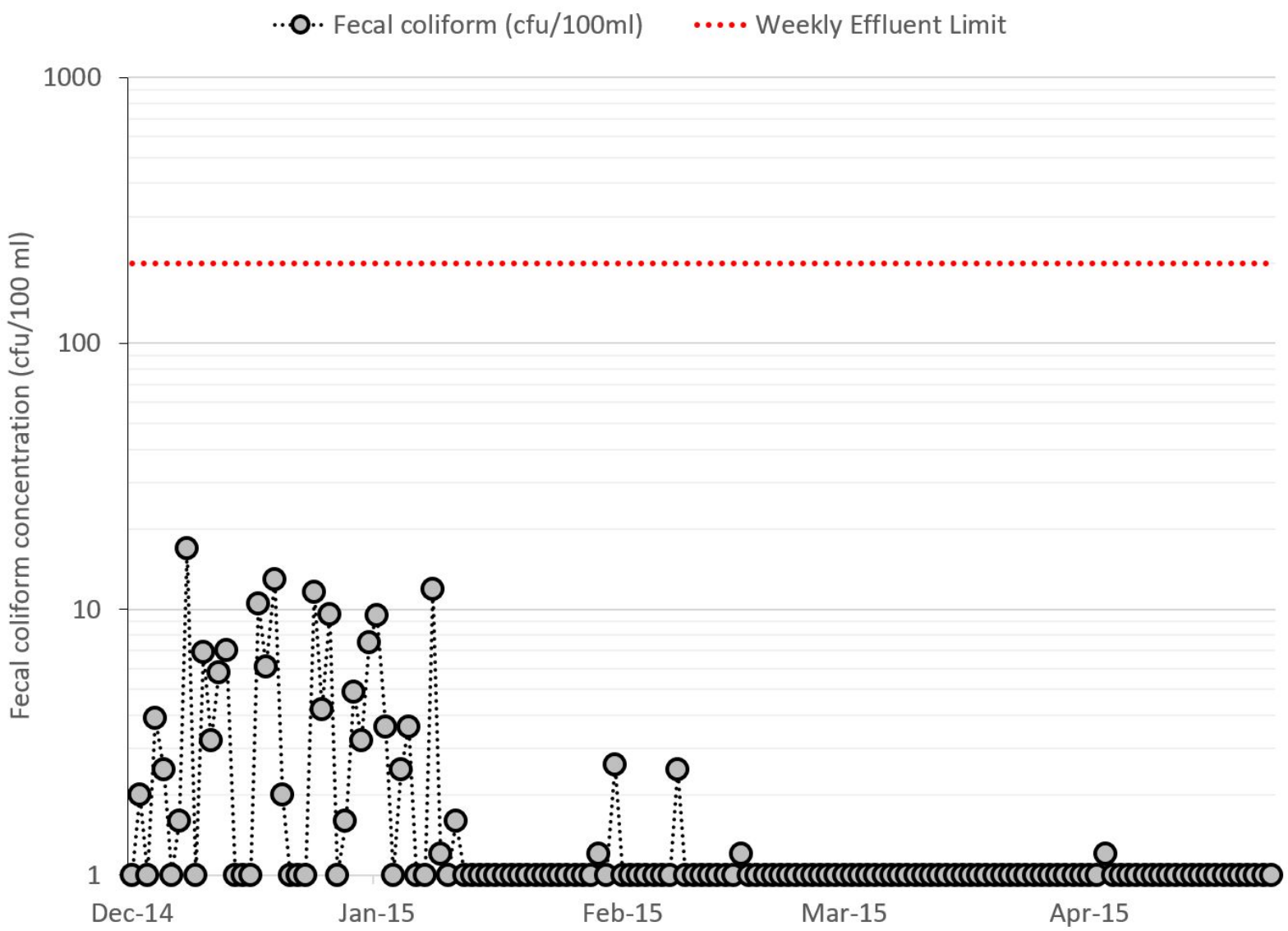

Figure F11: Walla Walla WWTP daily FC concentrations in effluent discharging to Mill Creek at RM 5.4 versus the weekly NPDES permit limit.

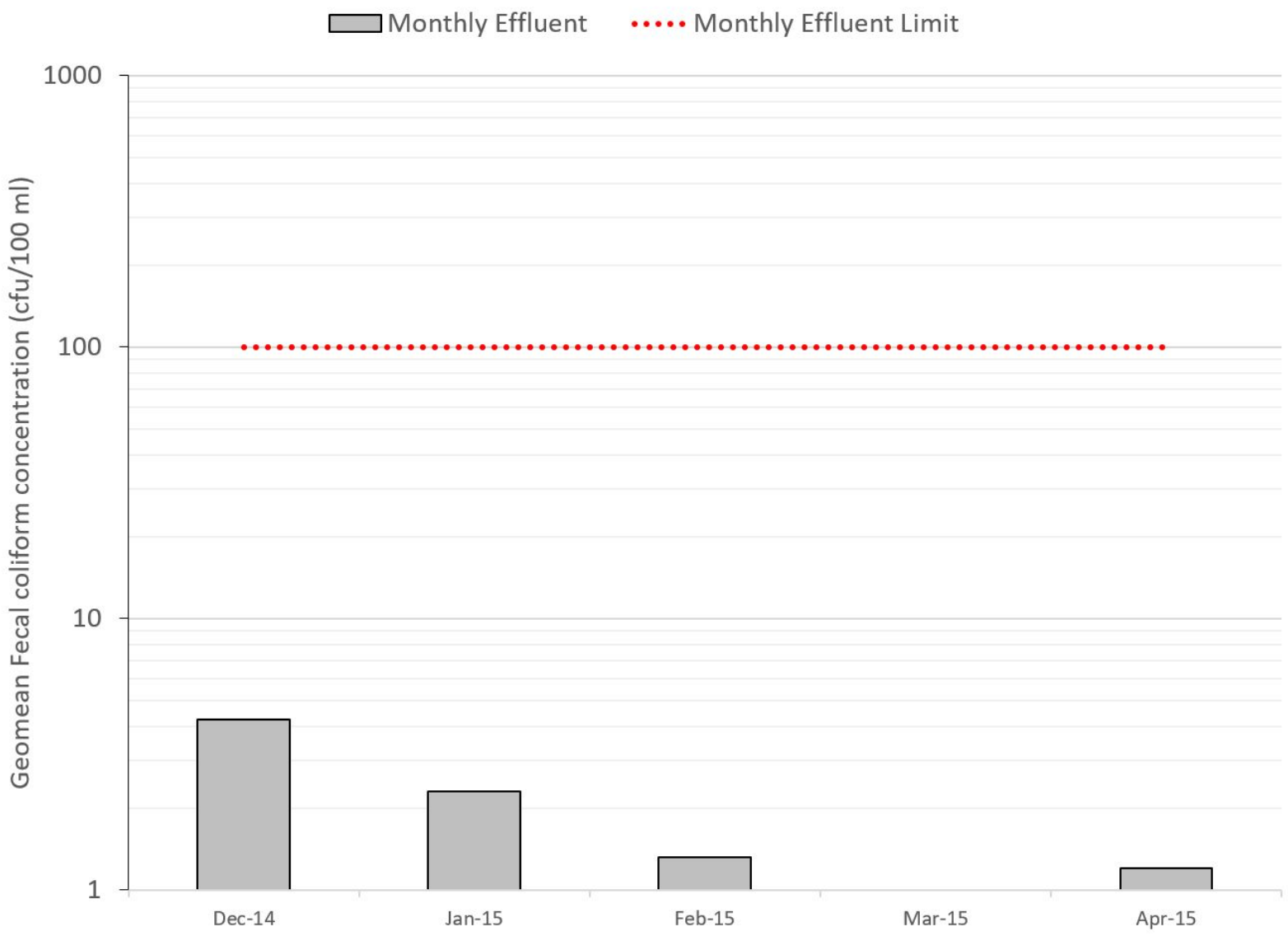

Figure F12: Walla Walla WWTP monthly FC concentrations in effluent discharging to Mill Creek at RM 5.4 versus the monthly NPDES permit limit.

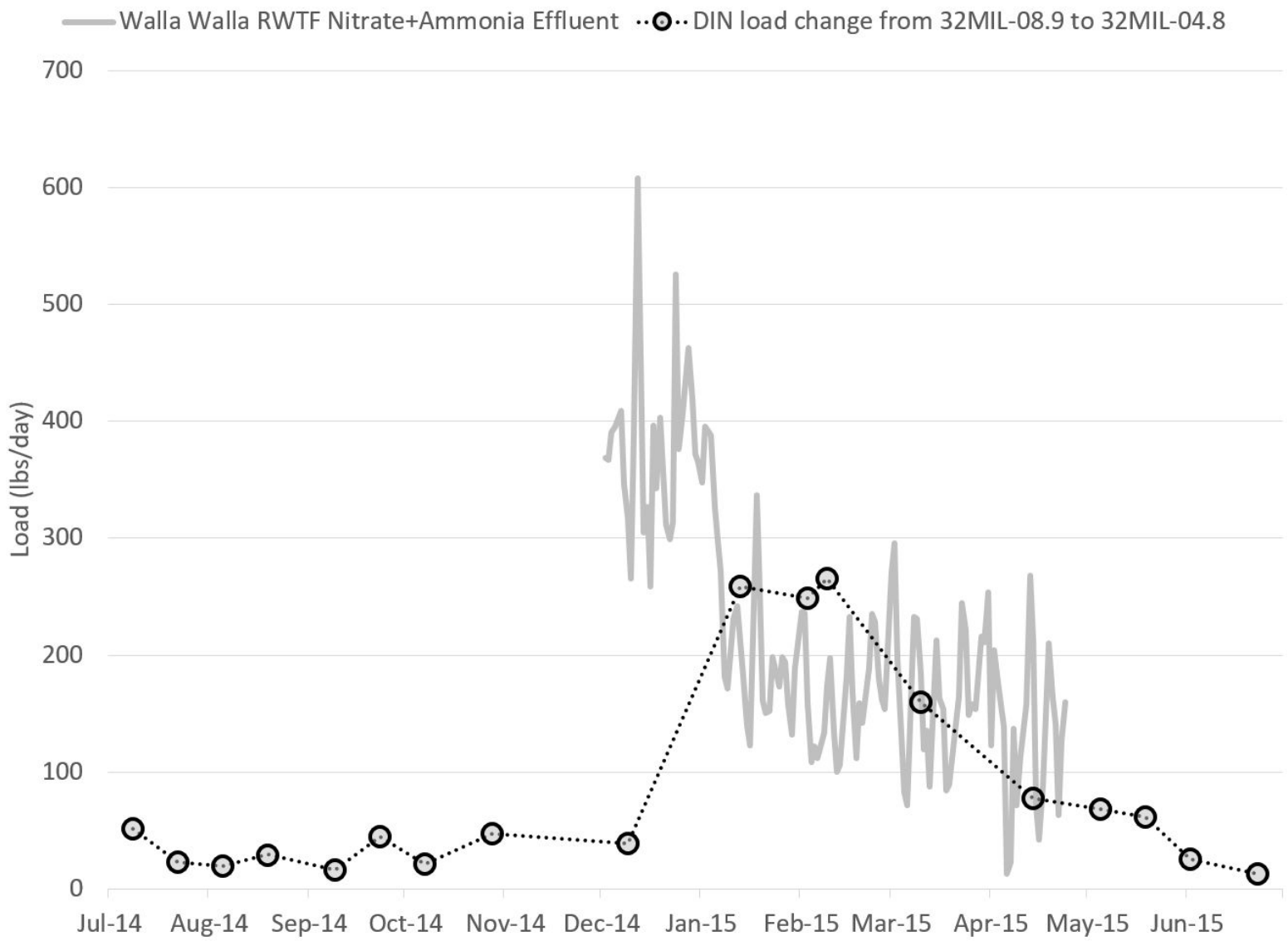

Figure F13: Walla Walla WWTP Nitrate + Ammonia effluent load to Mill Creek at RM 5.4 versus the Mill Creek estimated instream change in DIN load between Wilbur Street at RM 8.9 (32MIL-08.9) and Gose Street at RM 4.8 (32MIL-04.8).

College Place Wastewater Treatment Plant

The College Place WWTP releases effluent to Garrison Creek near river mile (RM) 1.0 (Figure F14) under NPDES permit number WA0020656.

The City of College Place operates an activated-sludge WWTP employing sequencing batch reactors that seasonally discharges to Garrison Creek from November through March and sometimes into April.

In response to the TMDL wasteload allocations, during the critical season, May to October, College Place discharges to land treatment for irrigation of crops (Figure F14) to avoid pH water quality violations in the Creek. Based on the potential for discharges during the critical season, the permit sets limits for the effluent discharged to Garrison Creek for May to October. The permit limits for land treatment took effect in March 2014 with the permit renewal (Ecology 2014c).

The land treatment fields, SP-3, SP-4, and SP-5, are underlain by tile drains at 36 inches depth (CES 2017). In a 2014 internal memo (Doremus 2014b), Ecology noted these drains create hydraulic continuity with Garrison Creek and may also cause pollutant continuity with the creek. Their analysis of 2009-2013 monitoring well data, reported in compliance with the NPDES permit, showed groundwater quality is impacted from the land treatment system operations (Doremus 2014b and CES 2017).

The last round of modifications to the College Place WWTP were completed in 2001. In order to meet permit effluent limits and the TMDL wasteload allocations, the College Place WWTP is on schedule to complete required upgrades by December 31, 2023 (Ecology 2015d).

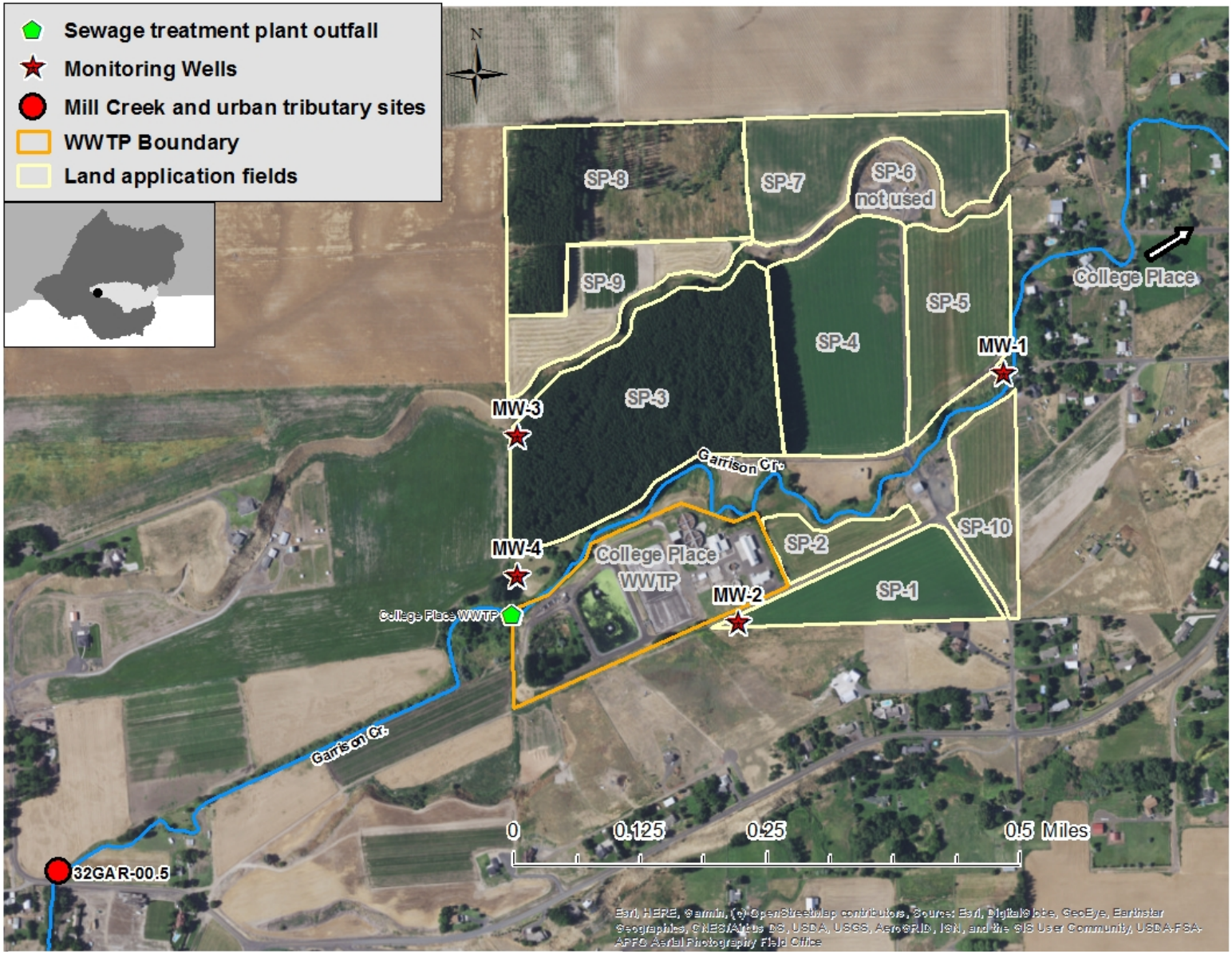

Figure F14: College Place WWTP land application fields and monitoring wells.

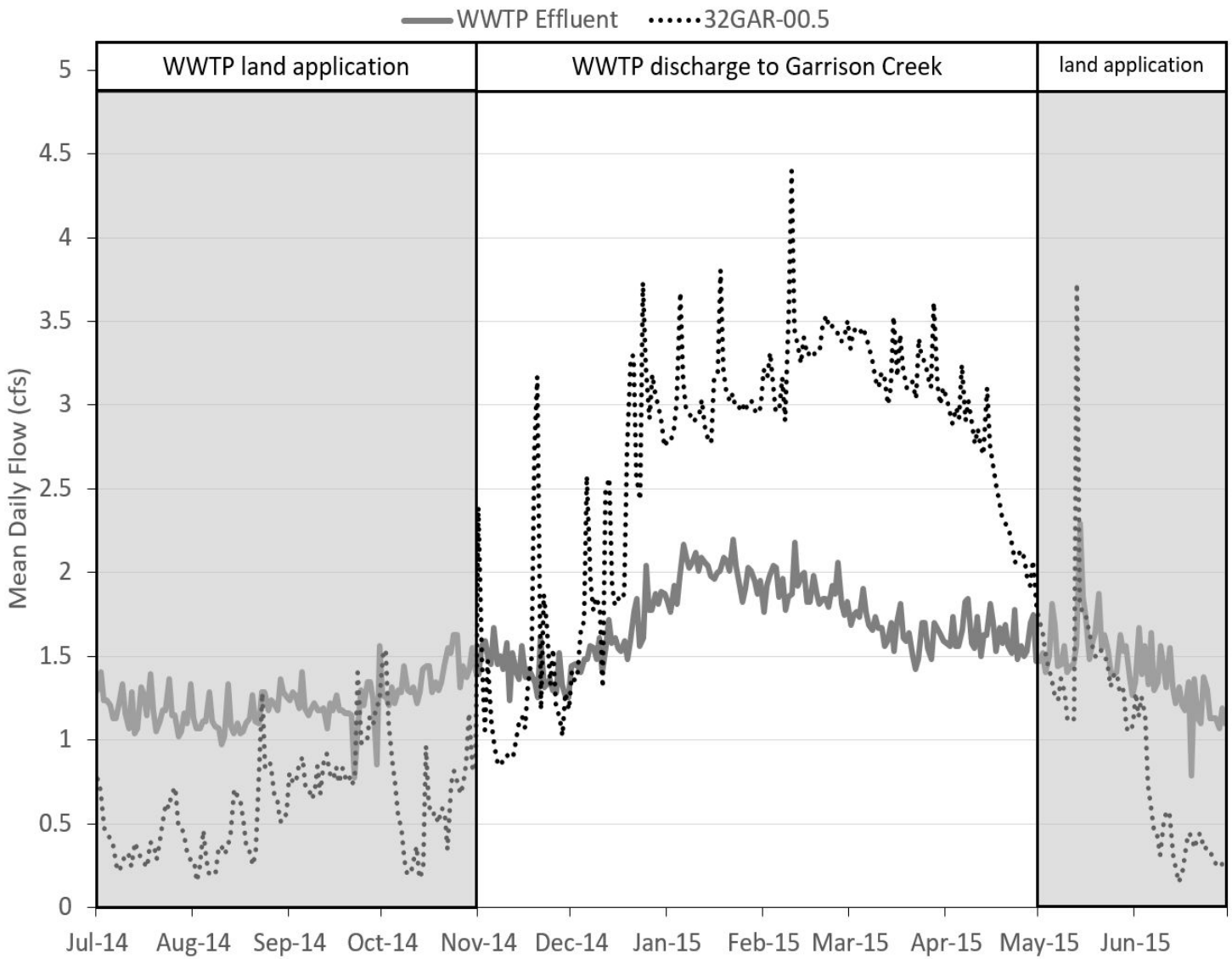

Figure F15: College Place WWTP seasonal effluent discharge to land application and Garrison Creek at RM 1.0 versus WWBWC flow ratings downstream at Garrison Creek at Mission Road at RM 0.5 (32GAR-00.5).

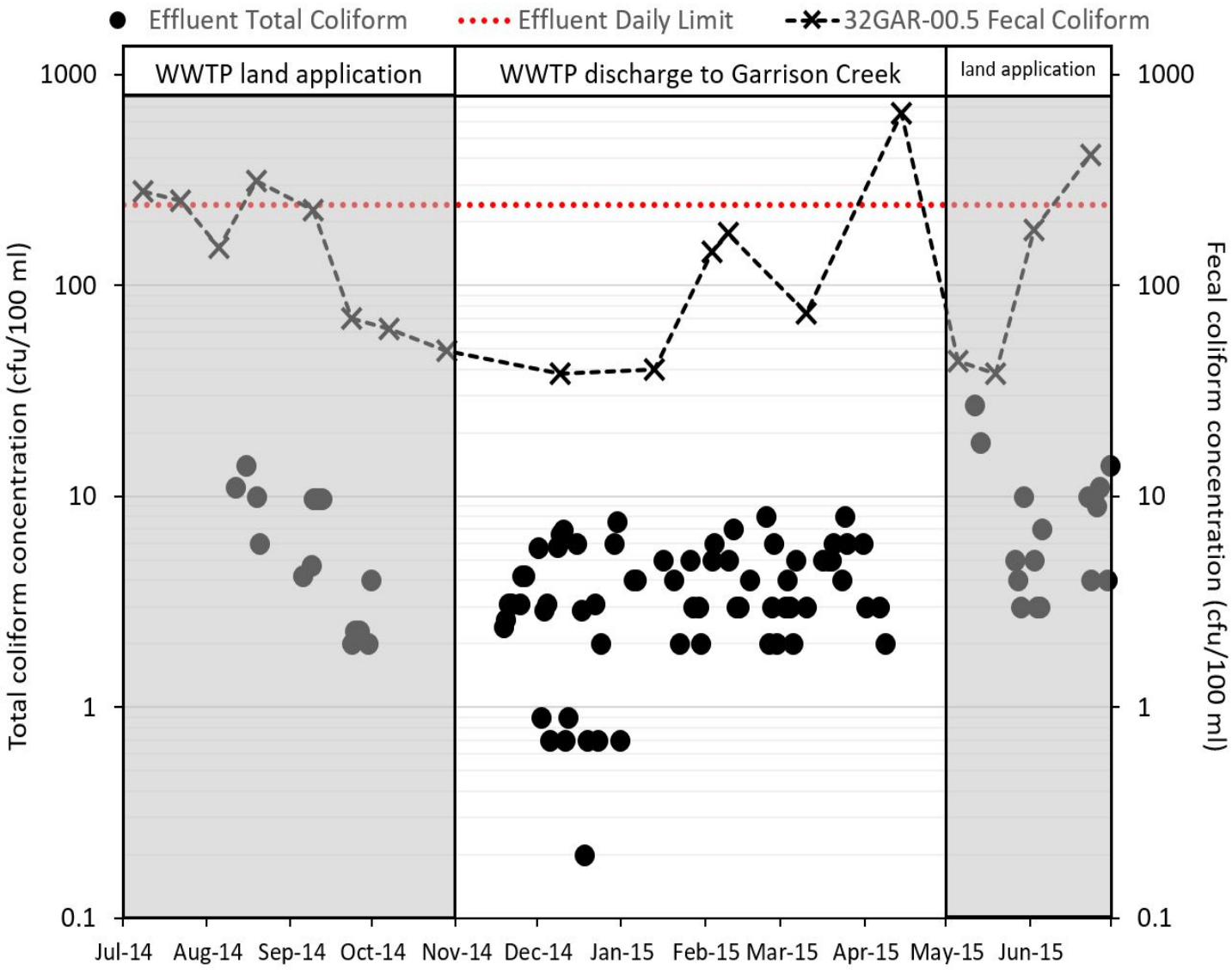

Figure F16: College Place WWTP daily effluent total coliform concentrations and the monthly NPDES permit limit versus downstream FC concentrations at 32GAR-00.5.

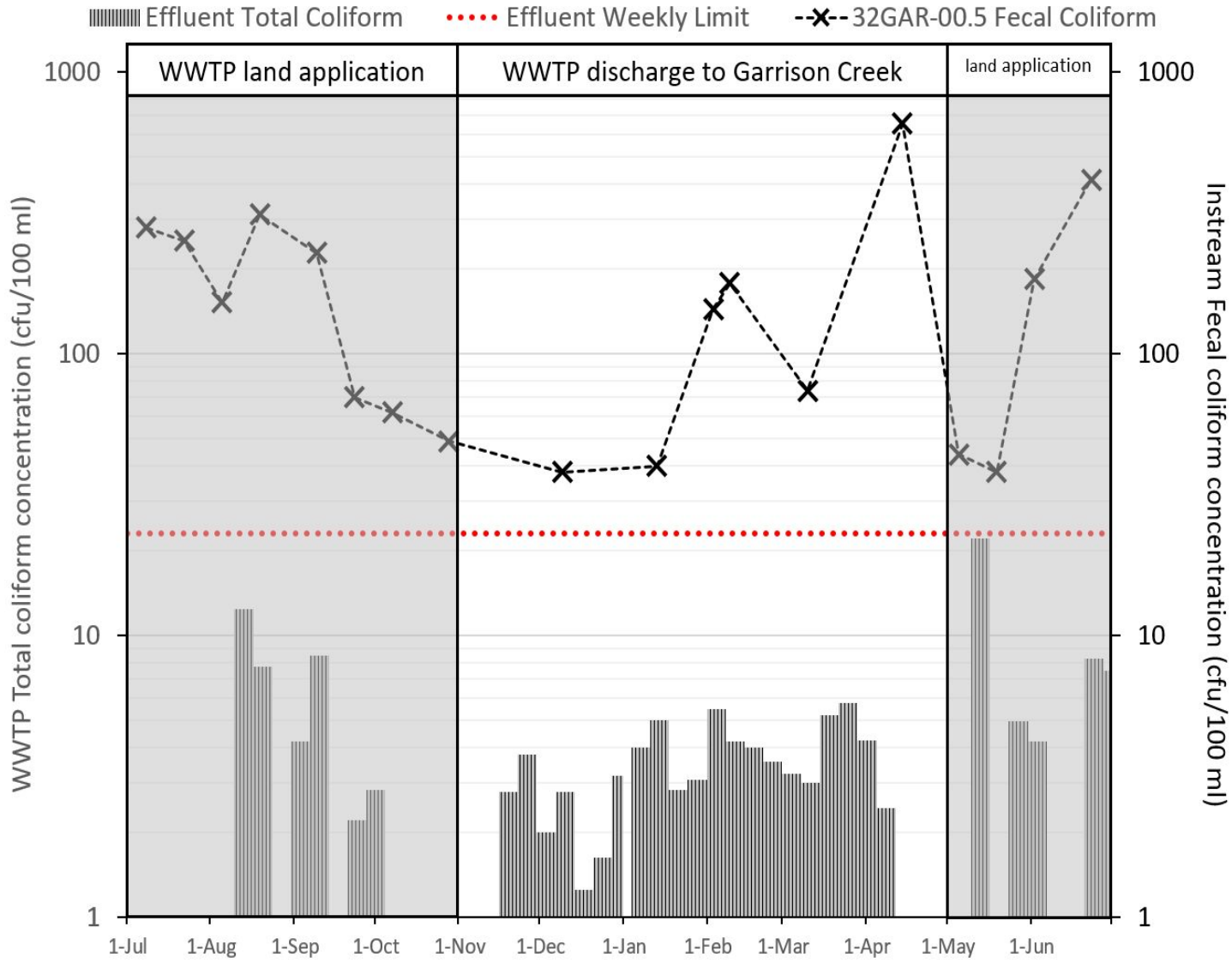

Figure F17: College Place WWTP weekly effluent total coliform concentrations and the weekly NPDES permit limit versus FC concentrations downstream at 32GAR-00.5.

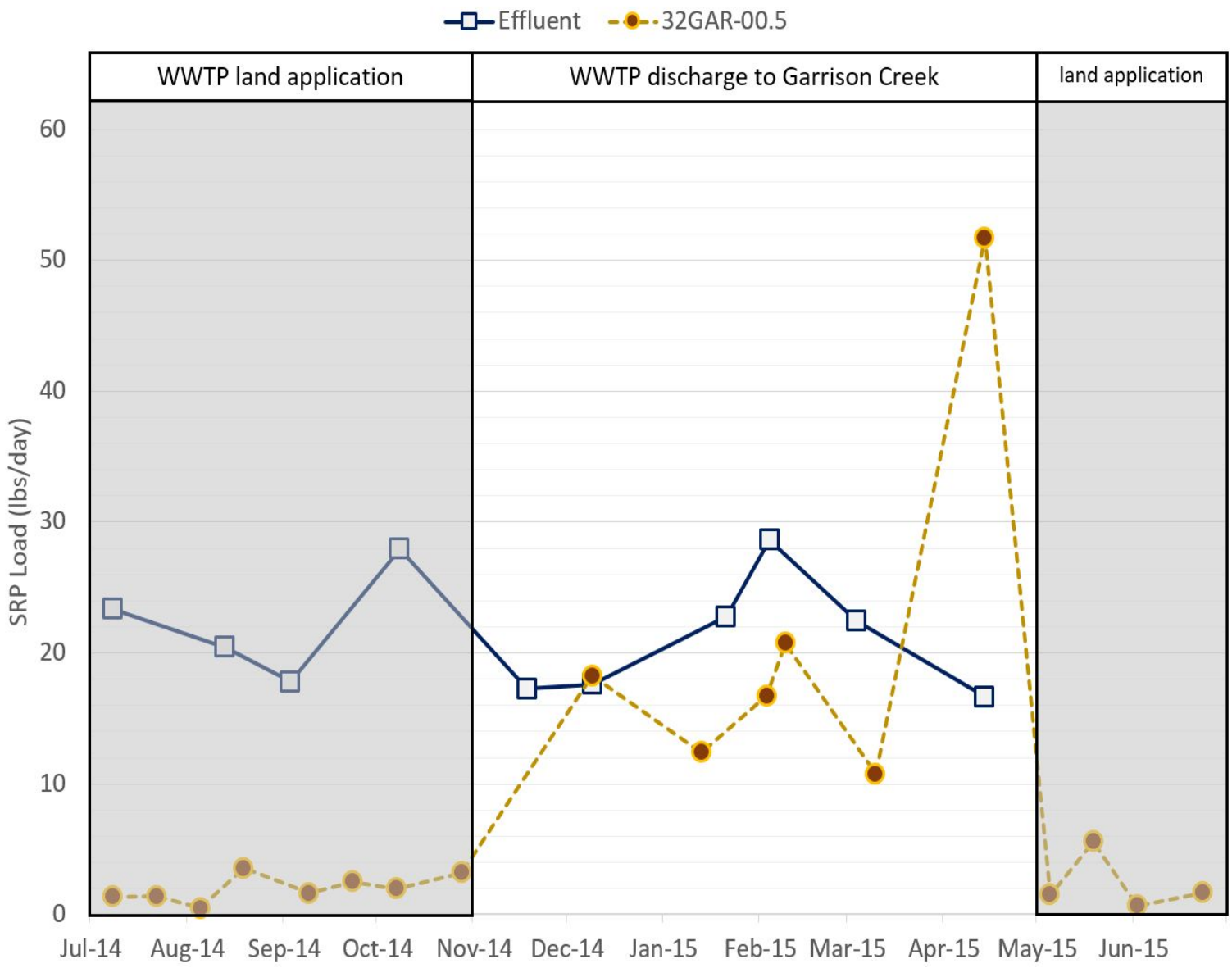

Figure F18: College Place WWTP SRP effluent loads versus SRP loads downstream at 32GAR-00.5.

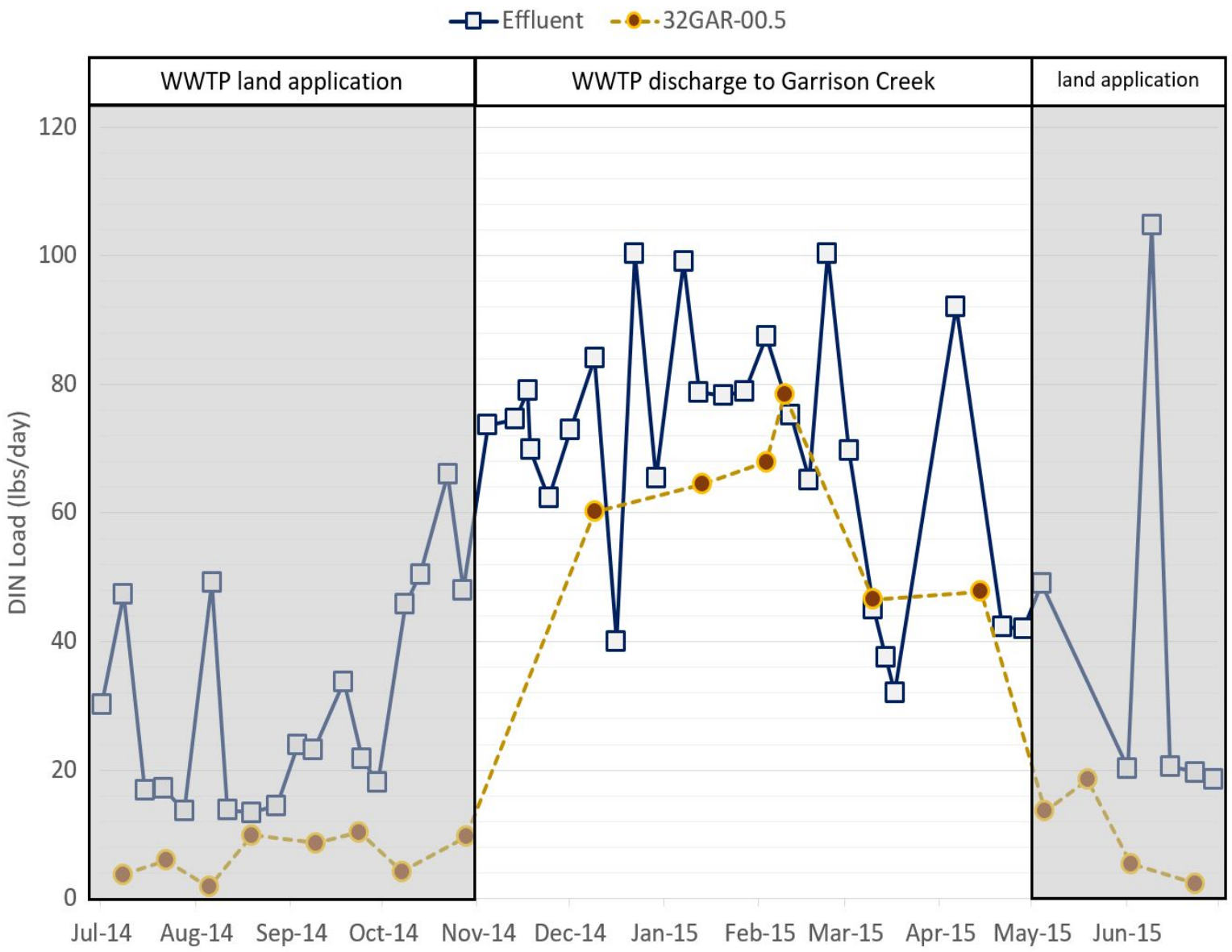

Figure F19: College Place WWTP DIN effluent loads versus DIN loads downstream at 32GAR-00.5.

Appendix G. Eastern Washington Phase II Stormwater: Municipal Separate Storm Sewer System (MS4) permits

Appendix G summarizes Walla Walla County MS4 stormwater permit reporting requirements during this project.

City of Walla Walla (WAR046508)

The City of Walla Walla maintained a list of illicit discharges and enforcement actions in 2015 (City of Walla Walla 2016). The information provided in these reports was insufficient to determine if any particular illicit discharge affected water-quality for specific water-quality samples.

Between March and November 2015, the City of Walla Walla received 21 public complaints of potential illicit discharges. The city investigated and confirmed 12 discharges and took appropriate actions to mitigate them or prevent reoccurrence.

Walla Walla County (WAR046509)

Walla Walla County field assessed one priority waterbody, Doan Creek, for evidence of illicit discharges in 2015. Visual inspections and mapping were limited to the portions of the creek within the Phase II Permit area. The inspections found no illicit connections or outfalls (Walla Walla County 2017).

Washington State Department of Transportation (WAR043000)

This permit requires WSDOT to implement the following actions to improve water quality in the Walla Walla River Basin.

- The US 12 project will re-route 97 percent of the highway's traffic volume to the plateau located well above the Walla Walla River.
- WSDOT will implement infiltration and/or dispersion to address the pollutants covered under this TMDL, where feasible.
- WSDOT will follow the current Integrated Roadside Vegetation Management Plan (South Central Region, Area 4) within the Walla Walla TMDL boundary.

Walla Walla Water District #2 (ST0008040)

This permit requires the district to discharge wastewater to lined wastewater stabilization ponds for evaporation (Ecology 2015e).

Appendix H. Walla Walla (WRIA 32) Category 4A 303(d) Listings for Bacteria, Dissolved Oxygen, and pH

Table H1. Walla Walla (WRIA 32) Category 4A 303(d) listings for bacteria, dissolved oxygen, and pH for the Walla Walla River TMDL

Listing ID	NHD reach code	Medium	Parameter	Waterbody Name
12381	17070102001577	Water	Bacteria	GARRISON CREEK
16784	17070102000275	Water	Bacteria	TOUCHET RIVER
16787	17070102000231	Water	Bacteria	TOUCHET RIVER
16789	17070102000027	Water	Bacteria	WALLA WALLA RIVER
41245	17070102000265	Water	Bacteria	TOUCHET RIVER
41246	17070102000271	Water	Bacteria	TOUCHET RIVER
41635	17070102000142	Water	Bacteria	COTTONWOOD CREEK
41636	17070102009525	Water	Bacteria	DRY CREEK
41638	17070102000154	Water	Bacteria	MILL CREEK
41646	17070102000417	Water	Bacteria	MUD CREEK
41647	17070102000351	Water	Bacteria	PATIT CREEK
41649	17070102000141	Water	Bacteria	YELLOWHAWK CREEK
41666	17070102000077	Water	Bacteria	WALLA WALLA RIVER
41667	17070102000079	Water	Bacteria	WALLA WALLA RIVER
41671	17070102000391	Water	Bacteria	RUSSELL CREEK
41710	17070102000151	Water	Bacteria	MILL CREEK
41713	17070102000031	Water	Bacteria	WALLA WALLA RIVER
46228	17070102000084	Water	Bacteria	WALLA WALLA RIVER
11099	17070102000231	Water	Dissolved Oxygen	TOUCHET RIVER
11102	17070102000309	Water	Dissolved Oxygen	TOUCHET RIVER
11113	17070102000027	Water	Dissolved Oxygen	WALLA WALLA RIVER
41335	17070102000279	Water	Dissolved Oxygen	COPPEI CREEK
41337	17070102009525	Water	Dissolved Oxygen	DRY CREEK
41338	17070102001577	Water	Dissolved Oxygen	GARRISON CREEK
41347	17070102000351	Water	Dissolved Oxygen	PATIT CREEK
41350	17070102000311	Water	Dissolved Oxygen	TOUCHET RIVER, S.F.
41364	17070102000307	Water	Dissolved Oxygen	TOUCHET RIVER
41366	17070102000019	Water	Dissolved Oxygen	WALLA WALLA RIVER
41370	17070102001485	Water	Dissolved Oxygen	WALLA WALLA RIVER
41374	17070102000084	Water	Dissolved Oxygen	WALLA WALLA RIVER
41441	17070102000156	Water	Dissolved Oxygen	MILL CREEK
41442	17070102000160	Water	Dissolved Oxygen	MILL CREEK
41443	17070102000168	Water	Dissolved Oxygen	MILL CREEK
41444	17070102000322	Water	Dissolved Oxygen	TOUCHET RIVER, N.F.

Listing ID	NHD reach code	Medium	Parameter	Waterbody Name
41469	17070102000151	Water	Dissolved Oxygen	MILL CREEK
41472	17070102000031	Water	Dissolved Oxygen	WALLA WALLA RIVER
47256	17070102000244	Water	Dissolved Oxygen	TOUCHET RIVER
47269	17070102000072	Water	Dissolved Oxygen	WALLA WALLA RIVER
77920	17070102000278	Water	Dissolved Oxygen	TOUCHET RIVER
77921	17070102000292	Water	Dissolved Oxygen	TOUCHET RIVER
77922	17070102000316	Water	Dissolved Oxygen	TOUCHET RIVER, S.F.
77923	17070102000348	Water	Dissolved Oxygen	TOUCHET RIVER, N.F.
11096	17070102000231	Water	pH	TOUCHET RIVER
11103	17070102000309	Water	pH	TOUCHET RIVER
11114	17070102000027	Water	pH	WALLA WALLA RIVER
11119	17070102000156	Water	pH	MILL CREEK
41164	17070102000154	Water	pH	MILL CREEK
41178	17070102000233	Water	pH	TOUCHET RIVER
41179	17070102000238	Water	pH	TOUCHET RIVER
41180	17070102000244	Water	pH	TOUCHET RIVER
41181	17070102000250	Water	pH	TOUCHET RIVER
41183	17070102000265	Water	pH	TOUCHET RIVER
41185	17070102000275	Water	pH	TOUCHET RIVER
41186	17070102000293	Water	pH	TOUCHET RIVER
41187	17070102000299	Water	pH	TOUCHET RIVER
41188	17070102000303	Water	pH	TOUCHET RIVER
41189	17070102000307	Water	pH	TOUCHET RIVER
41191	17070102000019	Water	pH	WALLA WALLA RIVER
41194	17070102001485	Water	pH	WALLA WALLA RIVER
41327	17070102000151	Water	pH	MILL CREEK
50580	17070102000072	Water	pH	WALLA WALLA RIVER
50584	17070102000084	Water	pH	WALLA WALLA RIVER
70949	17070102000278	Water	pH	TOUCHET RIVER
70950	17070102000292	Water	pH	TOUCHET RIVER

Appendix I. Fecal Coliform 90-Day Comparisons to the January 2019 Updated *Primary Contact Recreation* standard

Table I1. Touchet River basin 3-month rolling geometric mean of FC concentrations, July 2014 to June 2015. [2]

EM Site ID	July to September 2014	August to October 2014	December 2014 to February 2015	January to March 2015	February to April 2015	March to May 2015	April to June 2015
32SFT-08.8	28	20	12	12	9	3	9
32SFT-00.3	***114***	63	11	20	26	16	66
32NFT-00.0	69	35	9	17	18	16	43
32TOU-52.2	62	35	29	41	32	12	19
32TOU-51.2	***124***	40	***145***	***177***	95	***154***	***300***
32COP-00.5	***353***	***294***	88	***170***	***202***	***177***	***230***
32TOU-40.5	***149***	84	85	73	36	23	58
32TOU-34.2	***224***	***130***	70	69	36	27	57
32TOU-25.0	45	27	60	60	46	27	34
32TOU-17.8	60	34	44	80	34	18	30
32TOU-07.0	82	26	30	28	14	8	30
32TOU-02.0	***259***	94	39	31	14	10	50

Table I2. Mill Creek 3-month rolling geometric mean of FC concentrations, July 2014 to June 2015. [2]

EM Site ID	July to September 2014	August to October 2014	December 2014 to February 2015	January to March 2015	February to April 2015	March to May 2015	April to June 2015
32MIL-24.6	56	23	1	1	2	2	4
32MIL-11.5	83	70	16	24	23	9	31
32MIL-08.9	***238***	97	***271***	***294***	***144***	37	65
32MIL-04.8	29	27	***124***	***128***	***117***	28	12
32MIL-00.5	84	79	83	81	39	12	44

[2] Geometric mean results in ***Bold Italic Shade*** exceed the Primary Contact Recreation criteria for fecal coliform (less than or equal to 100 cfu/100 mL within a 90-day period).

Table I3. Walla Walla urban-area tributaries 3-month rolling geometric mean of FC concentrations, July 2014 to June 2015. [3]

EM Site ID	July to September 2014	August to October 2014	December 2014 to February 2015	January to March 2015	February to April 2015	March to May 2015	April to June 2015
32YEL-03.5	***128***	***179***	***106***	84	99	75	***133***
32RUS-00.1	***169***	***1224***	98	***189***	***290***	***441***	***503***
32COT-01.0	***118***	***154***	30	52	66	49	55
32YEL-00.2	***450***	***293***	***237***	***194***	***129***	***122***	***220***
32GAR-00.5	***194***	***115***	60	93	***188***	95	***106***

Table I4. Walla Walla rural-area tributaries 3-month rolling geometric mean of FC concentrations, July 2014 to June 2015. [3]

EM Site ID	July to September 2014	August to October 2014	December 2014 to February 2015	January to March 2015	February to April 2015	March to May 2015	April to June 2015
32ELW-00.7	***344***	***378***	100	***132***	***157***	***255***	***239***
32WLW-00.8	***788***	***432***	15	33	68	***124***	***272***
32DRY-00.1	85	43	29	67	58	69	***247***
32MUD-00.5	***170***	83	29	35	41	35	***114***
32PIN-01.4	***348***	271	152	161	121	141	***225***

Table I5. Walla Walla River 3-month rolling geometric mean of FC concentrations, July 2014 to June 2015. [3]

EM Site ID	July to September 2014	August to October 2014	December 2014 to February 2015	January to March 2015	February to April 2015	March to May 2015	April to June 2015
32WAL-39.6	***122***	***105***	27	77	40	22	62
32WAL-36.5	***288***	***273***	31	61	71	90	***157***
32WAL-32.8	***206***	91	54	97	52	20	51
32WAL-22.7	98	34	52	59	38	43	76
32WAL-15.6	72	36	59	72	60	43	51
32WAL-09.3	56	52	60	56	53	19	19

[3] Geometric mean results in ***Bold Italic Shade*** exceed the Primary Contact Recreation criteria for fecal coliform (less than or equal to 100 cfu/100 mL within a 90-day period).

Appendix J. Data Distribution Tests

We conducted a Shapiro-Wilks test on the log-transformed FC and nutrient parameter data to test for lognormality. The majority of data for both FC and nutrients failed to reject the null hypothesis at α=0.10, indicating data were not different from lognormal. The exception to this rule, low-flow season organic phosphorus results, included several non-detect concentrations. We assumed that organic phosphorus also matched a lognormal distribution as a high portion of results fell below detectable concentrations and the remaining results, when detected, showed a "long-tail" towards higher values, as is common in lognormal distributions. SRP, which is a component parameter in the calculation for organic phosphorus, also showed a lognormal distribution (Table J1).

Table J1. Percentage of sites per season and parameter that failed to reject the null hypothesis of log-normality using the Shapiro-Wilks test for normality at α=0.10.

Parameter	Low-flow season % lognormal	High-flow season % lognormal
FC	85%	79%
DIN	58%	79%
SRP	79%	88%
OrgN	83%	83%
OrgP	0%	0%

Appendix K. Laboratory Results

Table K1: FC and nutrient laboratory sample results.

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32COP-00.5	7/8/2014	11:00	150	0.054	0.335	0.070	0.581	0.107
32COP-00.5	7/22/2014	10:47	202	0.065	0.283	0.079	0.504	0.111
32COP-00.5	8/5/2014	11:15	1608	0.024	0.171	0.069	0.370	0.103
32COP-00.5	8/19/2014	11:15	154	0.046	0.208	0.078	0.358	0.103
32COP-00.5	9/9/2014	11:55	422	0.010 U	0.195	0.057 J	0.309	0.092
32COP-00.5	9/23/2014	11:39	606	0.033 J	0.327	0.090	0.521	0.128
32COP-00.5	10/7/2014	10:25	62	0.030 J	0.263	0.075	0.387	0.086
32COP-00.5	10/28/2014	10:36	164	0.024 J	0.100	0.070	0.191	0.070
32COP-00.5	12/9/2014	10:50	172	0.010 U	0.556	0.044	0.662	0.065
32COP-00.5	1/13/2015	10:58	70	0.011	0.476	0.048	0.583	0.072
32COP-00.5	2/3/2015	10:50	56	0.010 U	0.398	0.034	0.494	0.052
32COP-00.5	2/10/2015	9:58	800	0.061	0.578	0.062	0.832	3.010
32COP-00.5	3/10/2015	10:55	266	0.014	0.606	0.036	0.687	0.045
32COP-00.5	4/14/2015	10:23	140	0.011	0.267	0.027	0.368	0.061
32COP-00.5	5/5/2015	10:22	138	0.038	0.515	0.043	0.646	0.056
32COP-00.5	5/19/2015	10:27	190	0.046	0.329	0.065 J	0.498	0.084
32COP-00.5	6/2/2015	10:45	348	0.039	0.272	0.081	0.428	0.098
32COP-00.5	6/23/2015	10:05	305	0.039	0.378	0.064	0.544	0.096
32COT-01.0	7/9/2014	13:40	63	0.010 U	0.852	0.055	0.918	0.052
32COT-01.0	7/23/2014	11:53	128	0.010 UJ	0.805 J	0.054 J	0.893 J	0.048 J
32COT-01.0	8/6/2014	10:50	217	0.010 U	0.748	0.053	0.855	0.053
32COT-01.0	8/20/2014	12:10	109	0.010 U	0.663	0.062	0.740	0.056
32COT-01.0	1/15/2015	8:37	26	0.010 U	1.060	0.036	1.150	0.040
32COT-01.0	2/4/2015	11:15	35	0.010 U	0.553	0.034	0.660	0.048
32COT-01.0	2/11/2015	11:08	650	0.020	0.507	0.045	0.652	0.244
32COT-01.0	3/11/2015	10:30	12	0.010 U	1.170	0.054	1.240	0.048
32COT-01.0	4/15/2015	12:06	71	0.010 U	0.505	0.030	0.576	0.036
32COT-01.0	5/6/2015	10:50	63			0.056		0.056
32COT-01.0	5/20/2015	11:29	104	0.019	1.080	0.055	1.180	0.050
32COT-01.0	6/3/2015	11:35	56	0.017	1.000	0.058	1.070	0.054
32COT-01.0	6/24/2015	10:40	25	0.017	0.983	0.055	1.080	0.047
32DRY-00.1	7/8/2014	16:20	180	0.040	4.800	0.152	5.120	0.171
32DRY-00.1	7/22/2014	16:00	94	0.035 J	9.080 J	0.123 J	9.360 J	0.121 J
32DRY-00.1	8/7/2014	10:30	101	0.044	9.040	0.129	9.660	0.131
32DRY-00.1	8/19/2014	16:20	119	0.023	5.260	0.117	5.300	0.112

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32DRY-00.1	9/9/2014	18:10	43	0.021	9.930	0.161	10.000	0.156
32DRY-00.1	9/23/2014	16:30	42	0.034 J	3.070	0.107	3.110	0.107
32DRY-00.1	10/7/2014	14:30	14	0.017 J	4.090	0.116	4.170	0.124
32DRY-00.1	10/28/2014	15:55	20	0.016 J	4.790	0.121	4.950	0.114
32DRY-00.1	12/9/2014	13:55	27	0.014	1.560	0.081	1.700	0.108
32DRY-00.1	1/15/2015	11:32	30	0.015	1.840	0.082	1.990	0.111
32DRY-00.1	2/3/2015	14:15	29	0.010 U	2.220	0.078	2.510	0.104
32DRY-00.1	2/10/2015	14:02	345	0.045	1.340	0.114	1.550	1.350
32DRY-00.1	3/10/2015	14:35	68	0.010 U	3.320	0.063	3.350	0.078
32DRY-00.1	4/14/2015	15:10	17	0.013	1.760	0.052	1.920	0.076
32DRY-00.1	5/5/2015	14:40	62	0.022	3.090	0.073	3.060	0.089
32DRY-00.1	5/19/2015	16:26	318	0.078	4.270	0.157	4.460	0.172
32DRY-00.1	6/2/2015	15:05	460	0.029	1.840	0.141	2.000	0.149
32DRY-00.1	6/23/2015	14:00	410	0.020	3.220	0.085	3.470	0.090
32ELW-00.7	7/9/2014	15:00	380	0.010 U	0.199	0.055	0.335	0.067
32ELW-00.7	7/23/2014	12:55	49	0.011 J	0.217 J	0.055 J	0.339 J	0.064 J
32ELW-00.7	8/6/2014	12:10	314	0.024	0.213	0.049	0.424	0.060
32ELW-00.7	8/20/2014	13:34	656	0.010 U	0.205	0.057	0.277	0.065
32ELW-00.7	9/10/2014	11:30	792	0.010 U	0.281	0.046	0.355	0.051
32ELW-00.7	9/24/2014	11:05	548	0.010 U	0.373	0.051	0.426	0.060
32ELW-00.7	10/8/2014	10:55	112	0.010 U	0.431	0.050	0.518	0.057
32ELW-00.7	10/29/2014	11:08	293	0.010 U	0.485	0.057	0.531	0.059
32ELW-00.7	12/10/2014	11:15	134	0.023	0.508	0.058	0.587	0.094
32ELW-00.7	1/15/2015	9:24	100	0.024	0.564	0.062	0.631	0.108
32ELW-00.7	2/4/2015	12:10	74	0.016	0.631	0.062	0.707	0.096
32ELW-00.7	2/11/2015	12:06	203	0.018	0.667	0.064	0.751	0.111
32ELW-00.7	3/11/2015	11:15	200	0.010 U	0.564	0.047	0.615	0.108
32ELW-00.7	4/15/2015	12:56	202	0.010 U	0.362	0.052	0.442	0.083
32ELW-00.7	5/6/2015	11:40	434	0.016	0.438	0.061	0.495	0.098
32ELW-00.7	5/20/2015	12:22	240	0.021	0.428	0.057	0.529	0.087
32ELW-00.7	6/3/2015	13:45	566	0.017	0.412	0.058	0.490	0.075
32ELW-00.7	6/24/2015	11:26	55	0.010 U	0.477	0.069	0.560	0.079
32GAR-00.5	7/9/2014	15:55	280	0.027	2.160	0.814	2.350	0.765
32GAR-00.5	7/23/2014	13:27	252	0.018 J	1.620 J	0.386 J	1.810 J	0.408 J
32GAR-00.5	8/6/2014	12:50		0.018	1.620	0.441	1.790	0.441
32GAR-00.5	8/7/2014	7:50	152					
32GAR-00.5	8/20/2014	14:02	312	0.033	2.440	0.899	2.730	0.856
32GAR-00.5	9/9/2014	19:14	228	0.011	1.800	0.342	1.950	0.309
32GAR-00.5	9/24/2014	12:11	70	0.036 J	1.890	0.469	2.060	0.460

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32GAR-00.5	10/8/2014	11:30	62	0.040 J	3.680	1.730	3.990	1.720
32GAR-00.5	10/29/2014	11:40	49	0.010 U	2.130	0.715	2.290	0.704
32GAR-00.5	12/10/2014	11:40	38	0.049	4.430	1.360	4.850	1.330
32GAR-00.5	1/15/2015	10:02	40	0.029	3.760	0.730	4.370	0.707
32GAR-00.5	2/4/2015	12:35	144	0.034	4.190	1.040	4.760	1.040
32GAR-00.5	2/11/2015	12:35	178	0.040	4.310	1.150	4.980	1.200
32GAR-00.5	3/11/2015	11:45	72	0.015	2.860	0.664	4.040	0.623
32GAR-00.5	4/15/2015	13:36	670	0.091	3.440	3.820	4.190	3.960
32GAR-00.5	5/6/2015	12:00	44	0.020	1.830	0.207	1.800	0.216
32GAR-00.5	5/20/2015	13:06	38	0.025	2.260	0.687	2.360	0.687
32GAR-00.5	6/3/2015	14:25	184	0.018	1.360	0.171	1.460	0.216
32GAR-00.5	6/24/2015	11:51	415	0.060	1.480	1.090	1.780	1.260
32MIL-00.5	7/9/2014	16:36	110	0.014	1.810	0.112	1.980	0.138
32MIL-00.5	7/23/2014	13:52	87	0.010 J	1.560 J	0.103 J	1.690 J	0.103 J
32MIL-00.5	8/6/2014	14:20	66	0.012	0.925	0.110	1.080	0.110
32MIL-00.5	8/20/2014	14:28	230	0.011	1.120	0.112	1.250	0.108
32MIL-00.5	9/10/2014	12:50	16	0.010	1.610	0.089	1.690	0.087
32MIL-00.5	9/24/2014	12:42	152	0.024 J	1.600	0.088	1.670	0.093
32MIL-00.5	10/8/2014	12:15	78	0.018 J	2.080	0.084	2.820	0.084
32MIL-00.5	10/29/2014	12:05	87	0.010 U	1.010	0.058	1.070	0.058
32MIL-00.5	12/10/2014	12:15	62	0.029	0.653	0.085	0.747	0.091
32MIL-00.5	1/15/2015	10:50	92	0.010 U	0.757	0.161	0.855	0.161
32MIL-00.5	2/4/2015	13:15	101	0.010 U	0.783	0.134	0.879	0.133
32MIL-00.5	2/10/2015	15:16	775	0.034	0.459	0.081	0.629	1.170
32MIL-00.5	3/11/2015	12:20	6	0.010 U	1.060	0.071	1.140	0.070
32MIL-00.5	4/15/2015	14:18	5	0.010 U	0.366	0.076	0.492	0.090
32MIL-00.5	5/6/2015	12:35	18	0.025	1.760	0.152	1.830	0.163
32MIL-00.5	5/20/2015	13:36	44	0.024	1.660	0.170	1.720	0.176
32MIL-00.5	6/3/2015	14:52	110	0.019	2.000	0.127	2.510	0.126
32MIL-00.5	6/24/2015	12:39	42	0.020	1.320	0.111	1.420	0.110
32MIL-04.8	7/10/2014	8:25	39 J	0.043	0.506	0.069	0.826	0.099
32MIL-04.8	7/24/2014	8:15	61	0.013	0.378	0.020	0.552	0.034
32MIL-04.8	8/6/2014	13:55	10	0.021	0.425	0.046	0.697	0.076
32MIL-04.8	8/21/2014	8:21	56	0.017	0.559	0.029	0.714	0.039
32MIL-04.8	9/10/2014	12:24	10	0.016	0.281	0.036	0.424	0.048
32MIL-04.8	9/25/2014	7:29	42	0.028 J	0.482	0.031	0.587	0.039
32MIL-04.8	10/8/2014	11:55	22	0.012 J	0.348	0.037	0.477	0.046
32MIL-04.8	10/29/2014	15:06	80	0.010 U	0.166	0.031	0.234	0.037
32MIL-04.8	12/10/2014	12:00	80	0.021	0.247	0.036	0.338	0.048

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32MIL-04.8	1/15/2015	15:35	72	0.010 U	0.511	0.087	0.638	0.093
32MIL-04.8	2/4/2015	13:00	330	0.015	0.501	0.143	0.619	0.148
32MIL-04.8	2/9/2015	16:51	235	0.015	0.493	0.116	0.613	0.141
32MIL-04.8	3/11/2015	12:05	48	0.017	0.668	0.037	0.790	0.049
32MIL-04.8	4/16/2015	7:42	50	0.010 U	0.247	0.072	0.330	0.082
32MIL-04.8	5/6/2015	12:20	18	0.038	0.710	0.095	0.894	0.119
32MIL-04.8	5/19/2015	16:54	14	0.032	0.603	0.203	0.794	0.220
32MIL-04.8	6/3/2015	13:05	3	0.026	0.699	0.213	0.884	0.225
32MIL-04.8	6/24/2015	12:22	26	0.047	0.379	0.045	0.609	0.070
32MIL-08.9	7/9/2014	10:35	890 J	0.011	0.010 U	0.034	0.279	0.073
32MIL-08.9	7/23/2014	10:20	306	0.020 J	0.010 UJ	0.015 J	0.149 J	0.027 J
32MIL-08.9	8/6/2014	9:45	128	0.010 U	0.010 U	0.015	0.174	0.026
32MIL-08.9	8/20/2014	10:58	276	0.010 U	0.010 U	0.014	0.107	0.020
32MIL-08.9	9/10/2014	9:40	84	0.010 U	0.010 U	0.011	0.072	0.016
32MIL-08.9	9/24/2014	9:18	226	0.010 U	0.010 U	0.018	0.079 J	0.025
32MIL-08.9	10/8/2014	9:30	24	0.010 U	0.010 U	0.015	0.088	0.020
32MIL-08.9	10/29/2014	9:06	53	0.010 U	0.010 U	0.020	0.038	0.022
32MIL-08.9	12/10/2014	9:35	127	0.010 U	0.184	0.031	0.251	0.052
32MIL-08.9	1/14/2015	13:35	260	0.011	0.223	0.037	0.301	0.045
32MIL-08.9	2/4/2015	9:40	604	0.010 U	0.238	0.030	0.291	0.040
32MIL-08.9	2/11/2015	9:18	570	0.010 U	0.247	0.040	0.335	0.228
32MIL-08.9	3/11/2015	9:20	84	0.018	0.202	0.021	0.262	0.022
32MIL-08.9	4/15/2015	9:50	15	0.012	0.077	0.019	0.152	0.027
32MIL-08.9	5/6/2015	9:15	46	0.021	0.044	0.012	0.145	0.019
32MIL-08.9	5/20/2015	9:19	32	0.021	0.042	0.015	0.174	0.028
32MIL-08.9	6/3/2015	9:42	117	0.010 U	0.010 U	0.015	0.099	0.029
32MIL-08.9	6/24/2015	9:20	106	0.016	0.012	0.015	0.120	0.026
32MIL-11.5	7/9/2014	9:35	37	0.011	0.050	0.030	0.158	0.047
32MIL-11.5	7/23/2014	9:36	112	0.010 UJ	0.010 UJ	0.028 J	0.091 J	0.038 J
32MIL-11.5	8/6/2014	9:20	63	0.018	0.011	0.024	0.104	0.035
32MIL-11.5	8/20/2014	10:30	113	0.010 U	0.010 U	0.028	0.069	0.035
32MIL-11.5	9/10/2014	9:23	46	0.010 U	0.010 U	0.023	0.056	0.030
32MIL-11.5	9/24/2014	9:02	242	0.010 U	0.010 U	0.025	0.053 J	0.036
32MIL-11.5	10/8/2014	9:15	33	0.021 J	0.010	0.023	0.302	0.029
32MIL-11.5	10/29/2014	8:43	44	0.010 U	0.010 U	0.026	0.041	0.027
32MIL-11.5	12/10/2014	9:10	19	0.016	0.196	0.034	0.271	0.040
32MIL-11.5	1/14/2015	13:14	11	0.014	0.194	0.043	0.264	0.038
32MIL-11.5	2/4/2015	9:20	19	0.014	0.222	0.032	0.282	0.034
32MIL-11.5	2/11/2015	8:55	415	0.010 U	0.243	0.041	0.337	0.204

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32MIL-11.5	3/11/2015	9:05	4	0.010 U	0.188	0.028	0.221	0.029
32MIL-11.5	4/15/2015	9:30	9	0.010 U	0.091	0.022	0.157	0.029
32MIL-11.5	5/6/2015	9:00	6	0.012	0.030	0.019	0.087	0.024
32MIL-11.5	5/20/2015	9:05	28	0.010 U	0.027	0.025	0.094	0.033
32MIL-11.5	6/3/2015	9:15	48	0.019	0.061	0.034	0.123	0.080
32MIL-11.5	6/24/2015	9:00	114	0.012	0.016	0.031	0.084	0.052
32MIL-24.6	7/9/2014	8:45	21	0.010 U	0.114	0.049	0.130	0.047
32MIL-24.6	7/23/2014	8:20	63	0.010 UJ	0.130 J	0.050 J	0.173 J	0.046 J
32MIL-24.6	8/6/2014	8:20	330	0.015	0.106	0.049	0.150	0.045
32MIL-24.6	8/20/2014	9:58	42	0.010 U	0.110	0.055	0.126	0.046
32MIL-24.6	9/10/2014	8:20	44	0.015	0.129	0.053	0.149	0.048
32MIL-24.6	9/24/2014	8:22	39	0.014 J	0.138	0.049	0.159	0.047
32MIL-24.6	10/8/2014	8:30	1	0.010 U	0.141	0.053	0.153	0.049
32MIL-24.6	10/29/2014	8:06	6	0.012 J	0.133	0.049	0.152	0.047
32MIL-24.6	12/10/2014	8:20	4	0.010 U	0.151	0.044	0.190	0.042
32MIL-24.6	1/14/2015	12:15	1 U	0.010 U	0.099	0.045	0.124	0.040
32MIL-24.6	2/4/2015	8:30	1	0.010 U	0.127	0.042	0.159	0.037
32MIL-24.6	2/11/2015	8:15	4	0.010 U	0.092	0.034	0.164	0.046
32MIL-24.6	3/11/2015	8:20	1 U	0.010 U	0.124	0.047	0.135	0.041
32MIL-24.6	4/15/2015	8:55	18	0.010 U	0.082	0.037	0.115	0.036
32MIL-24.6	5/6/2015	8:10	1	0.014	0.108	0.042	0.129	0.039
32MIL-24.6	5/20/2015	8:25	2	0.016	0.108	0.045	0.139	0.043
32MIL-24.6	6/3/2015	8:22	7	0.016	0.109	0.048	0.180	0.047
32MIL-24.6	6/24/2015	8:15	14	0.015	0.125	0.051	0.144	0.046
32MUD-00.5	7/8/2014	16:50	570	0.194	0.364	0.208	1.030	0.244
32MUD-00.5	7/22/2014	16:30	130	0.026 J	0.102 J	0.112 J	0.337 J	0.140 J
32MUD-00.5	8/6/2014	15:20	240	0.040	0.105	0.084	0.330	0.108
32MUD-00.5	8/19/2014	16:35	143	0.021	0.069	0.117	0.397	0.134
32MUD-00.5	9/9/2014	18:30	164	0.010 U	0.010 U	0.073	0.165	0.079
32MUD-00.5	9/23/2014	16:48	58	0.012 J	0.097	0.092	0.332	0.102
32MUD-00.5	10/7/2014	14:45	24	0.011 J	0.120	0.059	0.282	0.067
32MUD-00.5	10/28/2014	16:08	42	0.015 J	0.165	0.129	0.322	0.127
32MUD-00.5	12/9/2014	14:10	13	0.031	0.850	0.105	1.050	0.113
32MUD-00.5	1/15/2015	11:55	18	0.076	1.330	0.131	1.590	0.165
32MUD-00.5	2/3/2015	14:30	99	0.042	1.280	0.131	1.620	0.156
32MUD-00.5	2/10/2015	13:36	50	0.023	0.912	0.177	1.300	0.201
32MUD-00.5	3/10/2015	14:50	16	0.032	0.729	0.108	1.050	0.173
32MUD-00.5	4/14/2015	14:52	34	0.011	0.328	0.090	0.551	0.120
32MUD-00.5	5/5/2015	15:00	34	0.013	0.612	0.139	0.786	0.155

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32MUD-00.5	5/19/2015	15:19	78	0.013	0.321	0.196	0.615	0.211
32MUD-00.5	6/4/2015	7:38	388	0.023	0.165	0.251	0.463	0.274
32MUD-00.5	6/23/2015	14:09	165	0.038	0.179	0.179	0.435	0.200
32NFT-00.0	7/8/2014	9:45	44 J	0.012	0.099	0.040	0.157	0.040
32NFT-00.0	7/22/2014	9:20	60	0.010 U	0.063	0.043	0.118	0.042
32NFT-00.0	8/5/2014	9:00	107	0.016	0.058	0.040	0.104	0.038
32NFT-00.0	8/19/2014	9:13	56	0.016	0.059	0.044	0.100	0.039
32NFT-00.0	9/9/2014	9:40	110	0.010 U	0.018	0.036 J	0.065	0.034
32NFT-00.0	9/23/2014	9:45	60	0.020 J	0.059	0.039	0.128 J	0.044
32NFT-00.0	10/7/2014	8:50	9	0.010 U	0.087	0.041	0.229	0.043
32NFT-00.0	10/28/2014	9:15	5	0.018 J	0.023	0.039	0.067	0.033
32NFT-00.0	12/9/2014	9:15	9	0.010 U	0.131	0.035	0.187	0.039
32NFT-00.0	1/13/2015	9:11	7	0.010 U	0.157	0.039	0.196	0.041
32NFT-00.0	2/3/2015	9:50	12	0.010 U	0.152	0.035	0.191	0.037
32NFT-00.0	2/10/2015	8:48	102	0.016	0.195	0.049	0.296	0.385
32NFT-00.0	3/10/2015	9:00	10	0.010 U	0.151	0.037	0.171	0.034
32NFT-00.0	4/14/2015	9:08	8	0.010 U	0.064	0.033	0.113	0.039
32NFT-00.0	5/5/2015	8:45	15	0.016	0.064	0.034	0.114	0.035
32NFT-00.0	5/19/2015	9:03	57	0.010 U	0.044	0.035 J	0.081	0.035
32NFT-00.0	6/2/2015	8:57	76	0.013	0.047	0.038	0.097	0.044
32NFT-00.0	6/23/2015	8:37	54	0.018	0.041	0.032	0.097	0.032
32PIN-01.4	7/10/2014	9:12	1200 J	0.041	0.362	0.088	0.721	0.116
32PIN-01.4	7/23/2014	15:50	245	0.033	0.154	0.070	0.545	0.096
32PIN-01.4	8/7/2014	8:55	500	0.111	0.046	0.082	0.672	0.151
32PIN-01.4	8/20/2014	15:48	596	0.022	0.202	0.032	0.545	0.066
32PIN-01.4	9/10/2014	13:48	280	0.031	0.270	0.079	0.763	0.099
32PIN-01.4	9/24/2014	14:21	72	0.032 J	0.721	0.018	0.884	0.026
32PIN-01.4	10/7/2014	15:00	192	0.017 J	0.322	0.129	0.571	0.150
32PIN-01.4	10/29/2014	12:40	340	0.018 J	0.218	0.056	0.305	0.070
32PIN-01.4	12/9/2014	14:25	74	0.012	0.732	0.047	0.846	0.077
32PIN-01.4	1/15/2015	12:55	214	0.013	1.420	0.096	1.630	0.108
32PIN-01.4	2/4/2015	14:35	222	0.010 U	1.310	0.089	1.470	0.128
32PIN-01.4	2/10/2015	13:24		0.054	0.748	0.134	0.984	1.870
32PIN-01.4	3/10/2015	15:00	88	0.028	1.170	0.073	1.240	0.108
32PIN-01.4	4/14/2015	14:40	90	0.010 U	0.545	0.046	0.710	0.070
32PIN-01.4	5/6/2015	14:10	96	0.049	0.758	0.049	1.050	0.077
32PIN-01.4	5/19/2015	15:05	513	0.040	1.070	0.083	1.280	0.117
32PIN-01.4	6/4/2015	8:18	235	0.019	0.672	0.058	0.774	0.075
32PIN-01.4	6/23/2015	14:30	220	0.012	0.010 U	0.034	0.426	0.065

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32RUS-00.1	7/9/2014	12:00	200	0.013	4.300	0.165	4.520	0.182
32RUS-00.1	7/23/2014	11:29	142	0.010 UJ	5.180 J	0.128 J	5.460 J	0.136 J
32RUS-00.1	10/29/2014	10:15	1224	0.010 U	2.140	0.295	2.480	0.344
32RUS-00.1	12/10/2014	10:15	82	0.028	2.200	0.126	2.430	0.148
32RUS-00.1	1/14/2015	15:05	92	0.019	3.160	0.106	3.460	0.119
32RUS-00.1	2/4/2015	10:45	124	0.022	3.710	0.098	4.000	0.124
32RUS-00.1	2/11/2015	10:42	665	0.047	1.650	0.099	1.850	1.060
32RUS-00.1	3/11/2015	10:10	168	0.010	4.730	0.097	4.690	0.099
32RUS-00.1	4/15/2015	11:05	512	0.012	2.730	0.074	2.880	0.143
32RUS-00.1	5/6/2015	10:15	652	0.019	4.250	0.117	4.210	0.131
32RUS-00.1	5/20/2015	10:55	675	0.020	4.080	0.142	4.530	0.164
32RUS-00.1	6/3/2015	10:40	300	0.020	4.120	0.149	4.200	0.156
32RUS-00.1	6/24/2015	10:15	485	0.034	4.850	0.141	5.210	0.142
32SFT-00.3	7/8/2014	9:10	100 J	0.010 U	0.076	0.031	0.149	0.046
32SFT-00.3	7/22/2014	9:04	94	0.010 U	0.101	0.032	0.153	0.030
32SFT-00.3	8/5/2014	8:50	57	0.010 U	0.345	0.034	0.414	0.032
32SFT-00.3	8/19/2014	9:01	167	0.010 U	0.100	0.036	0.150	0.031
32SFT-00.3	9/9/2014	9:19	86	0.010 U	0.109	0.034 J	0.141	0.031
32SFT-00.3	9/23/2014	9:24	291	0.018 J	0.058	0.030	0.145	0.035
32SFT-00.3	10/7/2014	8:35	5	0.010 U	0.086	0.035	0.129	0.034
32SFT-00.3	10/28/2014	8:55	52	0.026 J	0.025	0.029	0.100	0.025
32SFT-00.3	12/9/2014	9:05	10	0.015	0.071	0.023	0.156	0.029
32SFT-00.3	1/13/2015	8:55	13	0.010 U	0.075	0.025	0.134	0.030
32SFT-00.3	2/3/2015	9:45	10	0.010 U	0.042	0.018	0.092	0.021
32SFT-00.3	2/10/2015	8:35	324	0.017	0.184	0.044	0.314	0.573
32SFT-00.3	3/10/2015	8:55	4	0.011	0.065	0.023	0.123	0.022
32SFT-00.3	4/14/2015	8:58	35	0.010 U	0.020	0.022	0.080	0.028
32SFT-00.3	5/5/2015	8:30	7	0.016	0.040	0.024	0.095	0.026
32SFT-00.3	5/19/2015	8:46	67	0.016	0.039	0.027 J	0.089	0.029
32SFT-00.3	6/2/2015	8:45	184	0.010	0.040	0.026	0.091	0.029
32SFT-00.3	6/23/2015	8:26	218	0.018	0.113	0.031	0.165	0.030
32SFT-08.8	7/8/2014	8:15	16 J	0.010 U	0.050	0.026	0.101	0.027
32SFT-08.8	7/22/2014	8:26	19	0.018	0.033	0.029	0.090	0.028
32SFT-08.8	8/5/2014	8:05	30	0.018	0.040	0.028	0.103	0.027
32SFT-08.8	8/19/2014	8:27	26	0.010 U	0.021	0.030	0.157	0.068
32SFT-08.8	9/9/2014	8:44	47	0.010 U	0.010 U	0.027 J	0.201	0.022
32SFT-08.8	9/23/2014	8:55	44	0.010 U	0.010 U	0.025	0.051 J	0.028
32SFT-08.8	10/7/2014	7:55	6	0.010 U	0.010 U	0.026	0.039	0.024
32SFT-08.8	10/28/2014	7:58	6	0.010 U	0.010 U	0.027	0.043	0.022

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32SFT-08.8	12/9/2014	8:30	52	0.010 U	0.054	0.022	0.130	0.031
32SFT-08.8	1/13/2015	8:21	4	0.010 U	0.038	0.025	0.097	0.030
32SFT-08.8	2/3/2015	8:45	8	0.013	0.068	0.022	0.126	0.024
32SFT-08.8	2/10/2015	8:03	56	0.013	0.093	0.034	0.201	0.274
32SFT-08.8	3/10/2015	8:10	13	0.011	0.035	0.023	0.090	0.023
32SFT-08.8	4/14/2015	8:24	1	0.010	0.016	0.023	0.066	0.028
32SFT-08.8	5/5/2015	7:55	5	0.010 U	0.024	0.022	0.066	0.026
32SFT-08.8	5/19/2015	8:09	2	0.010 U	0.014	0.022 J	0.043	0.023
32SFT-08.8	6/2/2015	8:13	28	0.015	0.010	0.023	0.064	0.025
32SFT-08.8	6/23/2015	7:50	22	0.010 U	0.011	0.024	0.046	0.024
32TOU-02.0	7/8/2014	15:12	340	0.012	0.010 U	0.055	0.238	0.065
32TOU-02.0	7/22/2014	14:25	244	0.023	0.018	0.028	0.352	0.048
32TOU-02.0	8/5/2014	15:05	316	0.033	0.029	0.046	0.413	0.062
32TOU-02.0	8/19/2014	15:00	488	0.022	0.036	0.059	0.244	0.066
32TOU-02.0	9/9/2014	15:59	244	0.010 U	0.010 U	0.031	0.178	0.036
32TOU-02.0	9/23/2014	15:10	96	0.022 J	0.010 U	0.024	0.193	0.033
32TOU-02.0	10/7/2014	14:00	8	0.019 J	0.018	0.026	0.158	0.030
32TOU-02.0	10/28/2014	14:24	24	0.013 J	0.012	0.041	0.097	0.039
32TOU-02.0	12/9/2014	13:35	31	0.010 U	0.175	0.040	0.257	0.054
32TOU-02.0	1/15/2015	14:00	92	0.011	0.306	0.052	0.380	0.068
32TOU-02.0	2/3/2015	14:00	21	0.016	0.315	0.044	0.396	0.059
32TOU-02.0	2/10/2015	12:42	80	0.028	0.267	0.057	0.368	0.547
32TOU-02.0	3/10/2015	14:15	6	0.010 U	0.320	0.044	0.354	0.057
32TOU-02.0	4/14/2015	13:47	4	0.010 U	0.039	0.030	0.132	0.046
32TOU-02.0	5/5/2015	14:20	12	0.018	0.019	0.039	0.156	0.051
32TOU-02.0	5/19/2015	13:42	37	0.014	0.012	0.045	0.150	0.061
32TOU-02.0	6/2/2015	14:30	92	0.015	0.010 U	0.054	0.175	0.062
32TOU-02.0	6/23/2015	13:33	152	0.011	0.010 U	0.026	0.202	0.038
32TOU-07.0	7/8/2014	14:34	17	0.011	0.010 U	0.037	0.232	0.047
32TOU-07.0	7/22/2014	14:02	111	0.011	0.010 U	0.030	0.309	0.050
32TOU-07.0	8/5/2014	14:45	127	0.018	0.010 U	0.060	0.326	0.075
32TOU-07.0	8/19/2014	14:48	157	0.012	0.010 U	0.056	0.189	0.063
32TOU-07.0	9/9/2014	15:40	347	0.011	0.010 U	0.031	0.135	0.036
32TOU-07.0	9/23/2014	14:51	23	0.014 J	0.010 U	0.029	0.161	0.038
32TOU-07.0	10/7/2014	13:35	2	0.010 U	0.010 U	0.026	0.146	0.030
32TOU-07.0	10/28/2014	14:05	1	0.015 J	0.010	0.041	0.087	0.038
32TOU-07.0	12/9/2014	13:20	7	0.010 U	0.173	0.041	0.249	0.052
32TOU-07.0	1/13/2015	13:40	215	0.018	0.278	0.049	0.361	0.073
32TOU-07.0	2/3/2015	13:45	18	0.010 U	0.288	0.045	0.357	0.056

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32TOU-07.0	2/10/2015	12:25	310	0.044	0.302	0.055	0.416	0.748 J
32TOU-07.0	3/10/2015	14:00	1 U	0.012	0.313	0.045	0.355	0.058
32TOU-07.0	4/14/2015	13:30	13	0.014	0.045	0.032	0.154	0.048
32TOU-07.0	5/5/2015	14:03	42	0.010 U	0.010 U	0.043	0.138	0.056
32TOU-07.0	5/19/2015	13:27	17	0.012	0.010 U	0.045	0.119	0.057
32TOU-07.0	6/2/2015	13:45	20	0.010 U	0.010 U	0.048	0.137	0.055
32TOU-07.0	6/23/2015	13:15	54	0.020	0.010 U	0.020	0.197	0.031
32TOU-17.8	7/8/2014	13:45	28	0.010 U	0.010 U	0.055	0.165	0.067
32TOU-17.8	7/22/2014	13:40	38	0.010 U	0.010 U	0.062	0.206	0.085
32TOU-17.8	8/5/2014	14:15	106	0.010 U	0.010 U	0.072	0.214	0.089
32TOU-17.8	8/19/2014	14:21	140	0.012	0.010 U	0.068	0.164	0.073
32TOU-17.8	9/9/2014	15:04	81	0.010 U	0.010 U	0.047	0.108	0.051
32TOU-17.8	9/23/2014	14:40	36	0.017 J	0.010 U	0.046	0.157	0.053
32TOU-17.8	10/7/2014	13:05	4	0.010 U	0.010 U	0.042	0.236	0.044
32TOU-17.8	10/28/2014	13:36	9	0.010 U	0.010 U	0.047	0.058	0.046
32TOU-17.8	12/9/2014	12:50	12	0.010 U	0.185	0.043	0.273	0.055
32TOU-17.8	1/13/2015	13:10	441	0.019	0.275	0.050	0.356	0.073
32TOU-17.8	2/3/2015	13:15	16	0.010 U	0.298	0.046	0.367	0.056
32TOU-17.8	2/10/2015	11:50	420	0.063	0.433	0.046	0.635	1.770
32TOU-17.8	3/10/2015	13:30	14	0.014	0.317	0.046	0.406	0.054
32TOU-17.8	4/14/2015	13:00	15	0.010 U	0.071	0.033	0.160	0.047
32TOU-17.8	5/5/2015	13:35	21	0.017	0.031	0.039	0.152	0.051
32TOU-17.8	5/19/2015	13:12	24	0.016	0.015	0.047	0.132	0.060
32TOU-17.8	6/2/2015	13:23	54	0.015	0.013	0.046	0.125	0.054
32TOU-17.8	6/23/2015	12:47	31	0.015	0.011	0.034	0.142	0.042
32TOU-25.0	7/22/2014	12:50	38	0.010 U	0.010 U	0.063	0.135	0.074
32TOU-25.0	8/5/2014	13:30	45	0.014	0.010 U	0.065	0.145	0.072
32TOU-25.0	8/19/2014	13:40	120	0.019	0.011	0.058	0.140	0.064
32TOU-25.0	9/9/2014	14:15	35	0.010 U	0.010 U	0.047	0.094	0.050
32TOU-25.0	9/23/2014	13:47	25	0.017 J	0.010 U	0.050	0.124 J	0.057
32TOU-25.0	10/7/2014	12:25	5	0.010 U	0.010 U	0.044	0.080	0.045
32TOU-25.0	10/28/2014	12:35	16	0.013 J	0.010 U	0.048	0.071	0.044
32TOU-25.0	12/9/2014	12:15	21	0.010 U	0.191	0.043	0.268	0.053
32TOU-25.0	1/13/2015	12:37	399	0.018	0.278	0.049	0.356	0.067
32TOU-25.0	2/3/2015	12:45	26	0.010 U	0.294	0.044	0.363	0.053
32TOU-25.0	2/10/2015	11:15	320	0.055	0.436	0.055	0.619	1.340
32TOU-25.0	3/10/2015	12:35	4	0.012	0.345	0.044	0.399	0.050
32TOU-25.0	4/14/2015	12:26	133	0.015	0.109	0.030	0.201	0.044
32TOU-25.0	5/5/2015	12:15	17	0.010 U	0.068	0.047	0.195	0.058

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32TOU-25.0	5/19/2015	12:17	60	0.017	0.087	0.054 J	0.201	0.065
32TOU-25.0	6/2/2015	12:53	50	0.010 U	0.010 U	0.051	0.102	0.059
32TOU-25.0	6/23/2015	12:00	25	0.010 U	0.010 U	0.040	0.103	0.046
32TOU-34.2	7/8/2014	11:50	88	0.010 U	0.033	0.058	0.160	0.071
32TOU-34.2	7/22/2014	11:38	173	0.010 U	0.010 U	0.064	0.120	0.071
32TOU-34.2	8/5/2014	12:30	245	0.018	0.010	0.068	0.121	0.076
32TOU-34.2	8/19/2014	12:28	432	0.010 U	0.010 U	0.064	0.090	0.070
32TOU-34.2	9/9/2014	12:50	288	0.010 U	0.010 U	0.048	0.077	0.052
32TOU-34.2	9/23/2014	12:47	270	0.010 U	0.010 U	0.050	0.116 J	0.056
32TOU-34.2	10/7/2014	11:40	12	0.010 U	0.010 U	0.044	0.081	0.047
32TOU-34.2	10/28/2014	11:46	48	0.014 J	0.010 U	0.044	0.076	0.042
32TOU-34.2	12/9/2014	11:30	23	0.010 U	0.200	0.042	0.270	0.053
32TOU-34.2	1/13/2015	12:10	476	0.013	0.276	0.048	0.355	0.058
32TOU-34.2	2/3/2015	11:35	32	0.010 U	0.294	0.043	0.357	0.050
32TOU-34.2	2/10/2015	10:44	245	0.045	0.423	0.064	0.586	1.270
32TOU-34.2	3/10/2015	11:45	6	0.010 U	0.385	0.046	0.410	0.047
32TOU-34.2	4/14/2015	12:00	36	0.010 U	0.137	0.037	0.220	0.047
32TOU-34.2	5/5/2015	11:20	32	0.025	0.149	0.034	0.265	0.045
32TOU-34.2	5/19/2015	11:55	76	0.017	0.187	0.053 J	0.280	0.062
32TOU-34.2	6/2/2015	11:45	40	0.010 U	0.053	0.051	0.143	0.056
32TOU-34.2	6/23/2015	10:55	108	0.010 U	0.010 U	0.049	0.110	0.060
32TOU-40.5	7/8/2014	11:22	140	0.011	0.098	0.056	0.205	0.062
32TOU-40.5	7/22/2014	11:00	166	0.011	0.010 U	0.051	0.130	0.058
32TOU-40.5	8/5/2014	11:40	223	0.014	0.010	0.061	0.129	0.066
32TOU-40.5	8/19/2014	11:30	158	0.017	0.010 U	0.056	0.108	0.062
32TOU-40.5	9/9/2014	12:22	74	0.010 U	0.010 U	0.046 J	0.071	0.051
32TOU-40.5	9/23/2014	12:00	177	0.017 J	0.015	0.054	0.124 J	0.065
32TOU-40.5	10/7/2014	10:45	31	0.016 J	0.025	0.044	0.104	0.046
32TOU-40.5	10/28/2014	10:56	24	0.010 U	0.010 U	0.043	0.056	0.041
32TOU-40.5	12/9/2014	11:10	53	0.010 U	0.196	0.042	0.277	0.051
32TOU-40.5	1/13/2015	11:11	589	0.013	0.278	0.047	0.347	0.053
32TOU-40.5	2/3/2015	11:10	20	0.010 U	0.291	0.042	0.352	0.045
32TOU-40.5	2/10/2015	10:14	300	0.040	0.390	0.066	0.569	1.310
32TOU-40.5	3/10/2015	11:10	8	0.010 U	0.389	0.046	0.427	0.046
32TOU-40.5	4/14/2015	10:52	35	0.010 U	0.178	0.035	0.262	0.049
32TOU-40.5	5/5/2015	10:35	19	0.018	0.130	0.031	0.218	0.038
32TOU-40.5	5/19/2015	10:45	54	0.018	0.189	0.048 J	0.285	0.062
32TOU-40.5	6/2/2015	10:59	50	0.015	0.154	0.058	0.247	0.063
32TOU-40.5	6/23/2015	10:25	217	0.020	0.038	0.045	0.142	0.057

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32TOU-51.2	7/8/2014	10:30	500	0.010	0.140	0.068	0.216	0.071
32TOU-51.2	7/22/2014	10:13	214	0.010 U	0.079	0.061	0.149	0.062
32TOU-51.2	8/5/2014	10:35	128	0.010 U	0.071	0.092	0.133	0.098
32TOU-51.2	8/19/2014	10:20	96	0.017	0.095	0.089	0.166	0.089
32TOU-51.2	9/9/2014	10:55	34	0.010 U	0.134	0.076 J	0.189	0.076
32TOU-51.2	9/23/2014	11:17	80	0.021 J	0.161	0.076	0.256	0.086
32TOU-51.2	10/7/2014	9:40	6	0.010 U	0.141	0.069	0.182	0.069
32TOU-51.2	10/28/2014	10:15	21	0.010 U	0.088	0.058	0.130	0.054
32TOU-51.2	12/9/2014	10:00	25	0.022	0.179	0.041	0.261	0.047
32TOU-51.2	1/13/2015	10:33	1620	0.036	0.187	0.045	0.263	0.049
32TOU-51.2	2/3/2015	10:30	75	0.017	0.230	0.043	0.291	0.046
32TOU-51.2	2/10/2015	9:35	134	0.019	0.217	0.054	0.316	0.577
32TOU-51.2	3/10/2015	9:50	60	0.016	0.258	0.049	0.305	0.048
32TOU-51.2	4/14/2015	9:57	134	0.014	0.114	0.045	0.185	0.053
32TOU-51.2	5/5/2015	9:30	1532	0.032	0.102	0.061	0.181	0.066
32TOU-51.2	5/19/2015	10:03	46	0.011	0.102	0.051 J	0.166	0.056
32TOU-51.2	6/2/2015	10:25	673	0.033	0.153	0.074	0.241	0.076
32TOU-51.2	6/23/2015	9:30	170	0.021	0.141	0.061	0.198	0.064
32TOU-52.2	7/22/2014	10:00	63	0.010 U	0.044	0.038	0.116	0.037
32TOU-52.2	8/5/2014	9:30	49	0.010 U	0.026	0.035	0.089	0.037
32TOU-52.2	8/19/2014	10:00	60	0.010 U	0.027	0.039	0.079	0.036
32TOU-52.2	9/9/2014	10:30	78	0.010 U	0.010	0.032 J	0.051	0.030
32TOU-52.2	9/23/2014	11:00	65	0.014 J	0.034	0.038	0.103 J	0.043
32TOU-52.2	10/7/2014	9:15	7	0.013 J	0.060	0.035	0.150	0.036
32TOU-52.2	10/28/2014	9:45	17	0.017 J	0.017	0.035	0.075	0.030
32TOU-52.2	12/9/2014	9:30	19	0.010 U	0.131	0.033	0.198	0.039
32TOU-52.2	1/13/2015	9:45	44	0.011	0.175	0.038	0.234	0.041
32TOU-52.2	2/3/2015	10:15	30	0.010 U	0.173	0.035	0.223	0.038
32TOU-52.2	2/10/2015	9:15	156	0.017	0.212	0.051	0.309	0.600
32TOU-52.2	3/10/2015	9:15	14	0.010 U	0.209	0.036	0.245	0.035
32TOU-52.2	4/14/2015	9:30	17	0.010 U	0.099	0.032	0.157	0.038
32TOU-52.2	5/5/2015	9:00	11	0.010 U	0.066	0.031	0.128	0.034
32TOU-52.2	5/19/2015	9:30	9	0.012	0.067	0.032 J	0.117	0.036
32TOU-52.2	6/2/2015	10:15	40	0.019	0.090	0.038	0.153	0.041
32TOU-52.2	6/23/2015	9:00	34	0.010 U	0.058	0.030	0.105	0.030
32WAL-09.3	7/10/2014	11:30	77	0.023	0.416	0.064	0.679	0.145
32WAL-09.3	7/24/2014	10:02	52	0.038	0.623	0.035	0.944	0.076
32WAL-09.3	8/7/2014	10:00	248	0.011	0.024	0.026	0.370	0.040
32WAL-09.3	8/21/2014	9:48	320	0.010 U	0.010 U	0.020	0.231	0.028

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32WAL-09.3	9/10/2014	14:42	2	0.010 U	0.010 U	0.006	0.206	0.017
32WAL-09.3	9/25/2014	9:15	48	0.010 U	0.010 U	0.004	0.183	0.010
32WAL-09.3	10/8/2014	14:05	46	0.011 J	0.010 U	0.004	0.337	0.028
32WAL-09.3	10/29/2014	14:14	58	0.010 U	0.189	0.009	0.288	0.014
32WAL-09.3	12/10/2014	13:45	37	0.023	0.475	0.081	0.559	0.088
32WAL-09.3	1/15/2015	14:58	73	0.020	0.609	0.078	0.726	0.089
32WAL-09.3	2/5/2015	9:15	78	0.010 U	0.564	0.064	0.651	0.081
32WAL-09.3	2/9/2015	15:25	80	0.018	0.441	0.055	0.537	0.106
32WAL-09.3	3/11/2015	13:40	22	0.014	0.832	0.063	0.901	0.077
32WAL-09.3	4/16/2015	8:56	56	0.010 U	0.354	0.033	0.472	0.050
32WAL-09.3	5/6/2015	15:08	3	0.052	0.425	0.050	0.580	0.080
32WAL-09.3	5/20/2015	15:15	35	0.081	0.710	0.081	0.929	0.116
32WAL-09.3	6/4/2015	12:05	28	0.034	0.248	0.070	0.455	0.098
32WAL-09.3	6/24/2015	14:05	45	0.032	0.256	0.052	0.567	0.076
32WAL-15.6	7/10/2014	11:00	120	0.023	0.719	0.062	0.970	0.075
32WAL-15.6	7/24/2014	9:27	175	0.017	0.809	0.017	1.090	0.040
32WAL-15.6	8/7/2014	9:35	129	0.022	0.474	0.010	0.781	0.022
32WAL-15.6	8/21/2014	10:22	80	0.019	0.175	0.031	0.414	0.048
32WAL-15.6	9/10/2014	15:24	13	0.010 U	0.059	0.013	0.239	0.021
32WAL-15.6	9/25/2014	8:44	51	0.010 U	0.232	0.013	0.357	0.021
32WAL-15.6	10/8/2014	13:35	21	0.010 U	0.392	0.017	0.634	0.029
32WAL-15.6	10/29/2014	13:40	14	0.010 U	0.305	0.038	0.377	0.040
32WAL-15.6	12/10/2014	13:30	34	0.011	0.427	0.064	0.503	0.069
32WAL-15.6	1/15/2015	14:25	82	0.011	0.623	0.077	0.736	0.089
32WAL-15.6	2/5/2015	8:45	75	0.010 U	0.572	0.062	0.660	0.083
32WAL-15.6	2/9/2015	15:50	77	0.014	0.434	0.053	0.519	0.121
32WAL-15.6	3/11/2015	13:20	56	0.022	0.766	0.064	0.849	0.077
32WAL-15.6	4/16/2015	8:20	40	0.017	0.307	0.039	0.437	0.057
32WAL-15.6	5/6/2015	14:45	31	0.024	0.508	0.048	0.625	0.070
32WAL-15.6	5/20/2015	14:37	51	0.064	0.648	0.079	0.833	0.101
32WAL-15.6	6/4/2015	11:33	60	0.021	0.311	0.061	0.475	0.082
32WAL-15.6	6/24/2015	13:37	74	0.038	0.538	0.049	0.843	0.065
32WAL-22.7	7/10/2014	10:15	92 J	0.018	1.130	0.094	1.440	0.120
32WAL-22.7	7/24/2014	8:50	592	0.015	0.058	0.101	0.226	0.106
32WAL-22.7	8/7/2014	8:30	284	0.026	0.378	0.114	0.620	0.120
32WAL-22.7	8/21/2014	9:11	128	0.012	0.267	0.105	0.462	0.104
32WAL-22.7	9/10/2014	14:12	16	0.011	0.119	0.049	0.259	0.053
32WAL-22.7	9/25/2014	8:00	28	0.013 J	0.395	0.067	0.493	0.070
32WAL-22.7	10/8/2014	13:10	6	0.020 J	0.620	0.088	0.834	0.095

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32WAL-22.7	10/29/2014	13:18	16	0.010 U	0.514	0.046	0.584	0.055
32WAL-22.7	12/10/2014	13:00	33	0.014	0.655	0.081	0.746	0.089
32WAL-22.7	1/15/2015	13:15	65	0.013	0.792	0.099	0.916	0.110
32WAL-22.7	2/4/2015	14:05	66	0.010 U	0.667	0.072	0.753	0.093
32WAL-22.7	2/9/2015	16:21	47	0.014	0.479	0.055	0.580	0.140
32WAL-22.7	3/11/2015	13:00	59	0.012	1.110	0.073	1.210	0.087
32WAL-22.7	4/15/2015	15:06	12	0.014	0.651	0.041	0.788	0.052
32WAL-22.7	5/6/2015	13:50	37	0.067	0.958	0.075	1.170	0.102
32WAL-22.7	5/19/2015	14:09	130	0.065	1.000	0.103	1.190	0.130
32WAL-22.7	6/4/2015	8:50	108	0.023	0.561	0.098	0.746	0.118
32WAL-22.7	6/23/2015	15:00	64	0.014	0.252	0.084	0.479	0.092
32WAL-32.8	7/9/2014	17:00	260	0.012	0.580	0.078	0.744	0.102
32WAL-32.8	7/23/2014	14:05	1204	0.017 J	0.410 J	0.066 J	0.559 J	0.090 J
32WAL-32.8	8/6/2014	14:50	300	0.017	0.250	0.065	0.405	0.073
32WAL-32.8	8/20/2014	14:45	216	0.024	0.243	0.064	0.363	0.070
32WAL-32.8	9/9/2014	18:53	50	0.018	0.481	0.054	0.609	0.058
32WAL-32.8	9/24/2014	13:00	76	0.015 J	0.805	0.066	0.858	0.073
32WAL-32.8	10/8/2014	12:45	38	0.018 J	0.799	0.067	0.899	0.069
32WAL-32.8	10/29/2014	12:15	62	0.012 J	0.800	0.060	0.852	0.059
32WAL-32.8	12/10/2014	12:35	38	0.027	0.566	0.077	0.654	0.081
32WAL-32.8	1/15/2015	11:05	74	0.010 U	0.695	0.091	0.798	0.090
32WAL-32.8	2/4/2015	13:40	57	0.010 U	0.538	0.065	0.614	0.070
32WAL-32.8	2/10/2015	14:36	760	0.044	0.506	0.088	0.695	1.960
32WAL-32.8	3/11/2015	12:40	28	0.010 U	0.960	0.067	1.030	0.068
32WAL-32.8	4/15/2015	14:30	6	0.010 U	0.461	0.065	0.591	0.077
32WAL-32.8	5/6/2015	13:15	22	0.019	1.500	0.114	1.570	0.121
32WAL-32.8	5/20/2015	14:00	43	0.026	1.110	0.127	1.260	0.137
32WAL-32.8	6/3/2015	15:15	94	0.018	0.923	0.099	1.040	0.111
32WAL-32.8	6/24/2015	12:57	76	0.038	0.382	0.068	0.547	0.083
32WAL-36.5	7/9/2014	15:30	220	0.015	0.411	0.061	0.557	0.081
32WAL-36.5	7/23/2014	13:10	394	0.010 UJ	0.228 J	0.050 J	0.336 J	0.065 J
32WAL-36.5	8/6/2014	12:25	146	0.022	0.244	0.046	0.381	0.056
32WAL-36.5	8/20/2014	13:47	534	0.018	0.167	0.053	0.279	0.055
32WAL-36.5	9/10/2014	11:47	306	0.010 U	0.226	0.039	0.287	0.045
32WAL-36.5	9/24/2014	11:22	278	0.014 J	0.393	0.051	0.493	0.062
32WAL-36.5	10/8/2014	11:15	298	0.012 J	0.414	0.047	0.557	0.053
32WAL-36.5	10/29/2014	11:30	208	0.014 J	0.291	0.040	0.338	0.046
32WAL-36.5	12/10/2014	11:30	44	0.017	0.301	0.040	0.366	0.046
32WAL-36.5	1/15/2015	9:45	18	0.010 U	0.466	0.044	0.530	0.047

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32WAL-36.5	2/4/2015	12:20	37	0.010 U	0.343	0.039	0.411	0.046
32WAL-36.5	2/11/2015	12:21	415	0.010 U	0.402	0.049	0.502	0.539
32WAL-36.5	3/11/2015	11:30	50	0.015	0.562	0.038	0.601	0.042
32WAL-36.5	4/15/2015	13:15	34	0.014	0.356	0.031	0.434	0.037
32WAL-36.5	5/6/2015	11:50	282	0.040	0.918	0.064	1.010	0.078
32WAL-36.5	5/20/2015	12:45	138	0.019	0.577	0.051	0.675	0.067
32WAL-36.5	6/3/2015	14:00	146	0.020	0.547	0.057	0.638	0.066
32WAL-36.5	6/24/2015	11:41	106	0.013	0.437	0.049	0.516	0.054
32WAL-39.6	7/9/2014	14:15	170	0.012	0.240	0.044	0.321	0.047
32WAL-39.6	7/23/2014	12:24	77	0.010 UJ	0.125 J	0.043 J	0.201 J	0.048 J
32WAL-39.6	8/6/2014	11:35	140	0.010 U	0.098	0.037	0.163	0.040
32WAL-39.6	8/20/2014	12:35	105	0.018	0.090	0.042	0.162	0.042
32WAL-39.6	9/10/2014	10:48	192	0.010 U	0.086	0.034	0.129	0.038
32WAL-39.6	9/24/2014	10:14	88	0.010 U	0.137	0.036	0.178	0.042
32WAL-39.6	10/8/2014	10:25	67	0.010 U	0.150	0.035	0.193	0.037
32WAL-39.6	10/29/2014	10:31	81	0.011 J	0.072	0.035	0.107	0.036
32WAL-39.6	12/10/2014	10:45	17	0.010 U	0.184	0.037	0.241	0.039
32WAL-39.6	1/15/2015	8:53	57	0.015	0.249	0.039	0.318	0.040
32WAL-39.6	2/4/2015	11:40	20	0.010 U	0.170	0.036	0.228	0.040
32WAL-39.6	2/11/2015	11:25	450	0.010 U	0.304	0.047	0.398	0.586
32WAL-39.6	3/11/2015	10:55	68	0.010 U	0.196	0.036	0.226	0.035
32WAL-39.6	4/15/2015	12:24	4	0.010 U	0.049	0.025	0.111	0.030
32WAL-39.6	5/6/2015	11:10	21	0.017	0.397	0.037	0.449	0.043
32WAL-39.6	5/20/2015	11:43	38	0.012	0.177	0.034	0.237	0.039
32WAL-39.6	6/3/2015	12:12	127	0.012	0.223	0.042	0.269	0.048
32WAL-39.6	6/24/2015	11:35	148	0.023	0.148	0.037	0.203	0.040
32WLW-00.8	7/9/2014	16:22	750 J	0.032	0.066	0.146	0.387	0.193
32WLW-00.8	7/23/2014	13:41	805	0.031 J	0.066 J	0.139 J	0.361 J	0.188 J
32WLW-00.8	8/6/2014	14:30	1430	0.040	0.117	0.128	0.468	0.182
32WLW-00.8	8/20/2014	14:15	940	0.030	0.144	0.288	0.527	0.317
32WLW-00.8	9/10/2014	13:05	405	0.025	0.139	0.085	0.405	0.110
32WLW-00.8	9/24/2014	12:28	730	0.024 J	0.329	0.088	0.619	0.118
32WLW-00.8	10/8/2014	12:30	150	0.023 J	0.199	0.075	0.407	0.093
32WLW-00.8	10/29/2014	11:52	109	0.014 J	0.285	0.095	0.436	0.100
32WLW-00.8	12/10/2014	12:25	14	0.024	1.250	0.073	1.360	0.071
32WLW-00.8	1/15/2015	10:25	12	0.013	1.790	0.059	1.940	0.057
32WLW-00.8	2/4/2015	13:30	19	0.010	1.810	0.058	1.980	0.063
32WLW-00.8	2/11/2015	12:52	135	0.021	1.710	0.068	1.940	0.083
32WLW-00.8	3/11/2015	12:30	40	0.010 U	1.000	0.047	1.130	0.092

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32WLW-00.8	4/15/2015	13:59	210	0.019	0.890	0.057	1.070	0.097
32WLW-00.8	5/6/2015	12:55	92	0.027	0.591	0.068	0.714	0.108
32WLW-00.8	5/20/2015	13:20	306	0.028	0.399	0.099	0.566	0.135
32WLW-00.8	6/3/2015	14:41	340	0.024	0.292	0.126	0.497	0.152
32WLW-00.8	6/24/2015	12:47	570	0.033	0.174	0.117	0.413	0.185
32YEL-00.2	7/9/2014	14:40	380	0.012	0.308	0.056	0.441	0.092
32YEL-00.2	7/23/2014	12:39	165	0.010 UJ	0.143 J	0.047 J	0.281 J	0.060 J
32YEL-00.2	8/6/2014	11:55	840	0.016	0.201	0.089	0.373	0.111
32YEL-00.2	8/20/2014	12:49	710	0.014	0.086	0.059	0.201	0.069
32YEL-00.2	9/10/2014	11:11	550	0.014	0.105	0.050	0.199	0.084
32YEL-00.2	9/24/2014	10:48	405	0.010 U	0.084	0.040	0.172	0.059
32YEL-00.2	10/8/2014	10:40	34	0.019 J	0.087	0.036	0.165	0.049
32YEL-00.2	10/29/2014	10:56	140	0.010 U	0.148	0.038	0.208	0.041
32YEL-00.2	12/10/2014	11:05	189	0.010 U	0.478	0.042	0.557	0.052
32YEL-00.2	1/15/2015	9:10	580	0.016	1.220	0.049	1.250	0.061
32YEL-00.2	2/4/2015	11:55	122	0.010 U	0.996	0.046	1.110	0.063
32YEL-00.2	2/11/2015	11:50	335	0.017	0.792	0.058	0.960	0.409
32YEL-00.2	3/11/2015	11:03	60	0.013	1.150	0.033	1.230	0.040
32YEL-00.2	4/15/2015	12:40	114	0.013	0.891	0.036	1.010	0.061
32YEL-00.2	5/6/2015	11:25	136	0.014	0.594	0.041	0.660	0.068
32YEL-00.2	5/20/2015	12:15	240	0.024	0.625	0.050	0.701	0.091
32YEL-00.2	6/3/2015	13:30	42	0.016	0.507	0.053	0.575	0.082
32YEL-00.2	6/24/2015	11:17	1720 G	0.024	0.394	0.080	0.577	0.107
32YEL-03.5	7/9/2014	11:15	150	0.012	0.138	0.038	0.239	0.068
32YEL-03.5	7/23/2014	10:58	27	0.010 UJ	0.066 J	0.033 J	0.161 J	0.052 J
32YEL-03.5	8/6/2014	10:10	85	0.015	0.076	0.040	0.175	0.064
32YEL-03.5	8/20/2014	11:40	400	0.016	0.035	0.038	0.117	0.047
32YEL-03.5	9/10/2014	10:03	298	0.010 U	0.032	0.026	0.085	0.033
32YEL-03.5	9/24/2014	9:55	106	0.010 U	0.032	0.028	0.101 J	0.042
32YEL-03.5	10/8/2014	10:00	226	0.010 U	0.034	0.025	0.084	0.038
32YEL-03.5	10/29/2014	9:44	136	0.010 U	0.031	0.026	0.075	0.031
32YEL-03.5	12/10/2014	9:50	172	0.010 U	0.223	0.034	0.304	0.046
32YEL-03.5	1/14/2015	14:30	60	0.010 U	0.423	0.041	0.525	0.047
32YEL-03.5	2/4/2015	10:15	116	0.011	0.415	0.035	0.487	0.042
32YEL-03.5	2/11/2015	10:14	198	0.016	0.924	0.056	1.060	0.104
32YEL-03.5	3/11/2015	9:40	36	0.010 U	0.338	0.021	0.375	0.030
32YEL-03.5	4/15/2015	10:29	114	0.010 U	0.209	0.020	0.275	0.037
32YEL-03.5	5/6/2015	9:45	64	0.028	0.117	0.024	0.194	0.045
32YEL-03.5	5/20/2015	10:10	122	0.023	0.150	0.031	0.227	0.062

Station ID	Date	Time	FC	NH_3	NO_2NO_3	SRP	TN	TP
32YEL-03.5	6/3/2015	10:25	178	0.019	0.172	0.041	0.237	0.064
32YEL-03.5	6/24/2015	9:50	224	0.019	0.144	0.039	0.222	0.059
Unknown Ditch @ Last Chance Rd	6/24/2015	12:01	232	0.017	0.074	0.047	0.178	0.074

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List of Acronyms

DIN	dissolved inorganic nitrogen
DMR	Discharge Monitoring Report
DO	dissolved oxygen
Ecology	Washington State Department of Ecology
EM	effectiveness monitoring
FC	fecal coliform bacteria
GM	geometric mean
MEL	Manchester Environmental Laboratory
NH_3	ammonia
NO_2NO_3	nitrites plus nitrates
NPDES	National Pollutant Discharge Elimination System (see glossary)
OrgN	organic nitrogen
OrgP	organic phosphorus
RM	river mile
RSD	relative standard deviation
SOP	standard operating procedures
SRP	soluble reactive phosphorus
TMDL	Total Maximum Daily Load (see glossary)
TN	total nitrogen
TP	total phosphorus
USGS	U.S. Geological Survey
WQIP	Water Quality Implementation Plan
WRIA	Water Resource Inventory Area
WWBWC	Walla Walla Basin Watershed Council
WWRWTS	Walla Walla Regional Water Testing Services
WWTP	wastewater treatment plant