Middle Snake River Watershed Water Quality Monitoring, 2005-2007

Data Summary Report

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Cover photo: Alkali Flat Creek near mouth, looking upstream.

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Data Summary Report

by
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Waterbody Numbers:
WA-35-1020, WA-35-2010, WA-35-1030, WA-35-2013, WA-35-3200,
WA-35-1015, WA-35-3000, WA-35-3100, WA-35-3400, WA-35-3300,
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WRIA: 35

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Abstract

The Washington State Department of Ecology (Ecology) monitored the Middle Snake Watershed, WRIA 35, located in the southeastern corner of Washington, from 2005 through 2007.

In addition to ongoing ambient monitoring on the Snake River and Tucannon River, Ecology completed four new monitoring projects.

- One project focused on effectiveness of new point source controls for Pomeroy's wastewater treatment plant that discharges into Pataha Creek, addressing ammonia, fecal coliform, and the biochemical oxygen demand.
- Another project, in Whitman County, was conducted to establish the baseline condition of streams flowing into the Snake River.
- The other two projects addressed implementation measures taken in Asotin and Garfield Counties to address impacts from grazing operations. The main goal of the Asotin and Garfield County studies was to verify historic and current data collected by other entities and compare that data with data collected by our current procedures.

This report summarizes field and laboratory water quality data collected by Ecology. Field data include pH, conductivity, dissolved oxygen, and temperature. Laboratory data include fecal coliform, turbidity, total suspended solids, biochemical oxygen demand, total persulfate nitrogen, nitrate and nitrite nitrogen, ammonia nitrogen, total phosphorus, and ortho-phosphate. A quality control and quality assurance analysis of the data is included.

Introduction

Study Areas

Watershed Profile

The Middle Snake Watershed, in Water Resource Inventory Area (WRIA) 35 is located in the extreme southeast corner of Washington (Figure 1). WRIA 35 is bordered by the state of Oregon to the south, the state of Idaho to the east, the Palouse Watershed (WRIA 34) to the north, and the Walla Walla (WRIA 32) and Lower Snake (WRIA 33) Watersheds to the west. The basin drains approximately 2,250 square miles within the state of Washington. The Middle Snake Watershed encompasses portions of Asotin, Whitman, Garfield, and Columbia Counties within Washington. Diamond Peak, located in the Blue Mountains at the headwaters of the Tucannon River, is the highest point in the basin with an elevation of 6,380 feet. The confluence of the Snake and Tucannon Rivers is the lowest point at approximately 540 feet. The Middle Snake Watershed is semi-arid. Average annual precipitation ranges from 5 to 10 inches in the lowlands along the Snake River up to 45 inches in the peaks of the Blue Mountains.

The population is approximately 25,000. Of these, 19,256 live in the cities of Asotin or Clarkston and surrounding areas. No major population centers are present in the Whitman County portion of the WRIA. The city of Pomeroy is the most populated area in Garfield County with 1,517 residents. The largest town in the Columbia County portion of the WRIA was Starbuck; in 2000, its population was 130. Private land comprises 76% of the WRIA, the federal government manages 19%, and the state of Washington manages about 5%. (Washington Conservation Commission, 2002).

Historically, the Middle Snake Watershed habitat was prairie, canyon grasslands, and shrub-steppe vegetation. Today, much of the land in the WRIA has been converted to crop and livestock production. Non-irrigated row crops, primarily wheat, and grass-forb plant communities comprise the majority (67%) of vegetative cover in the watershed. Coniferous forests cover approximately 20%; a mixture of shrubs and trees covers 7%.

Primary surface water bodies include the Snake River, Tucannon River, Asotin Creek, and Pataha Creek. Little Goose Dam at river mile 70 (RM 70) and Lower Granite Dam (RM 107) impound the Snake River in WRIA 35. The pool behind Lower Granite Dam extends upstream to the City of Asotin (RM 146). The Snake River is free-flowing from this point up to Hells Canyon Dam (RM 247) located upstream from the upper end of WRIA 35. Groundwater flows through cracks in the basalt layers as well as the porous sediments sandwiched between the basalts, carrying considerable quantities of groundwater that supply water for irrigation and municipal uses

Water Quality Standards and Beneficial Uses

The Federal Clean Water Act requires each state to have its own water quality standards to protect, restore, and preserve water quality. Every two years, states are required to prepare a list of water bodies that do not meet water quality standards. This list is called the 303(d) list. Table 1 lists waterbodies on the 2004 303(d) list for WRIA 35. Figure 1 highlights watersheds monitored for these projects.

Table 1. WRIA 35 303(d) list.

Listing Detail	Water Body Name	Parameter
47040	Alpowa Creek	Dissolved Oxygen
47172	Meadow Creek	Dissolved Oxygen
47173	Meadow Creek	Dissolved Oxygen
47174	Deadman Creek	Dissolved Oxygen
47211	Pataha Creek	Dissolved Oxygen
47212	Pataha Creek	Dissolved Oxygen
10454	Pataha Creek	Fecal Coliform
10455	Pataha Creek	Fecal Coliform
16795	Asotin Creek	Fecal Coliform
16797	Pataha Creek	Fecal Coliform
40548	Pataha Creek	Fecal Coliform
40549	Pataha Creek	Fecal Coliform
40550	Pataha Creek	Fecal Coliform
40551	Pataha Creek	Fecal Coliform
40553	Deadman Creek	Fecal Coliform
40556	Alpowa Creek	Fecal Coliform
42532	Pataha Creek	Fecal Coliform
46000	Meadow Creek	Fecal Coliform
46695	Alkali Flat Creek	Fecal Coliform
46696	Alkali Flat Creek	Fecal Coliform
11141	Pataha Creek	pH
42566	Pataha Creek	pH
42567	Pataha Creek	pH
50347	Alpowa Creek	pH
50438	North Deadman Creek	pH
50473	Meadow Creek	pH
50474	Meadow Creek	pH
50475	Deadman Creek	pH
50518	Pataha Creek	pH
50519	Pataha Creek	pH

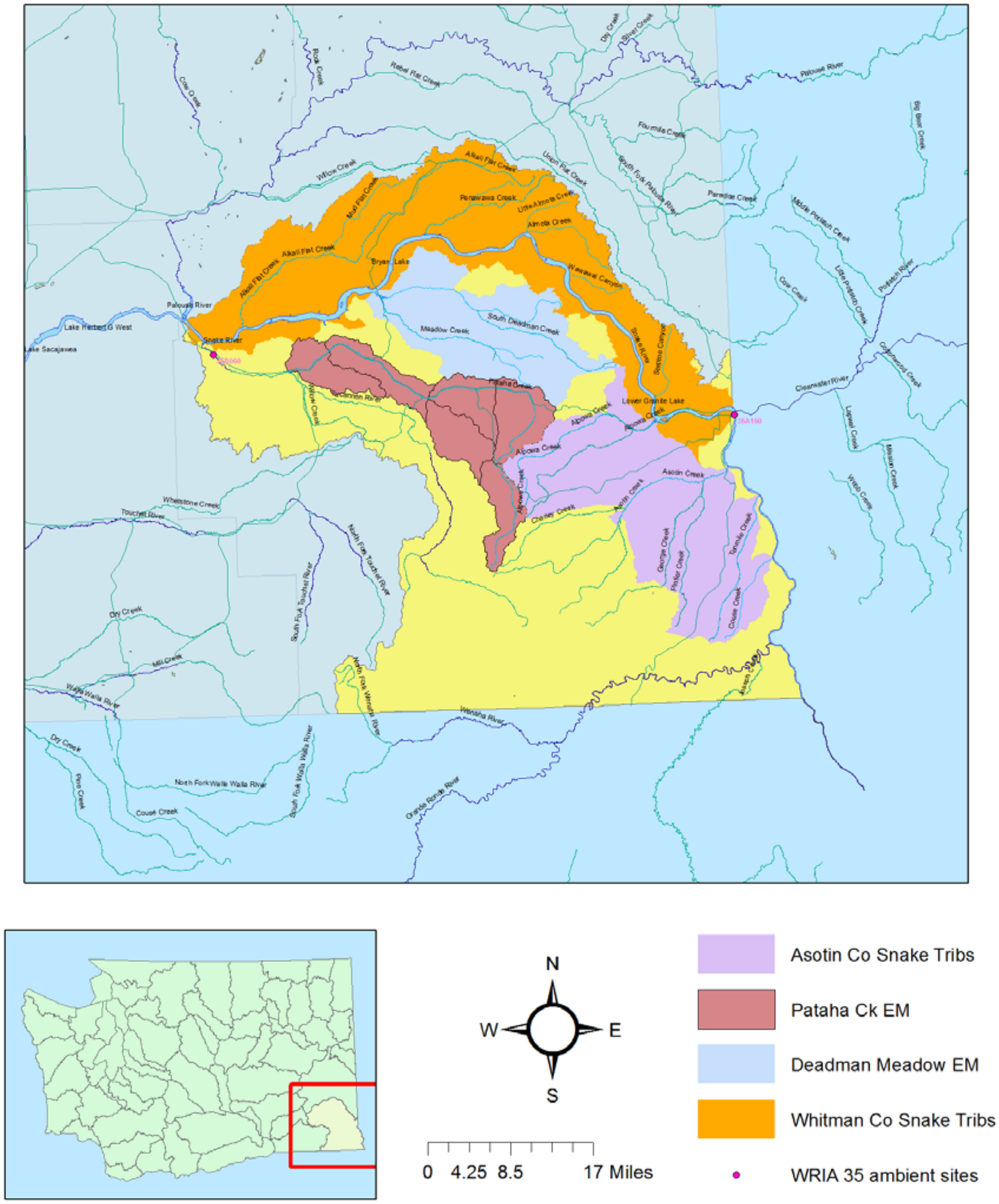


Figure 1. WRIA 35 activities 2005-2007.

Study Design and Methods

Samples were collected as surface grab samples from highway bridges or sampled from the banks of the streams. Temperature was read in-stream, using a long-line thermistor. Samples collected for laboratory analyses were carried back to the van and processed. Continuous temperature data was collected during critical periods for most streams.

Consistency is particularly important in long-term monitoring programs. Normally, procedural or analytical changes will result in improved precision or reduced bias. However, standardized procedures are followed for equipment cleaning, maintenance, and calibration; sample collection, preparation, and shipping; and data management.

Data were collected by Ecology staff, following these standard operating procedures:

- EAP011 Instantaneous Measurement of Temperature in Water
- EAP013 Determining Coordinates Via Hand-held GPS Receivers
- EAP015 Manually Obtaining Surface Water Samples
- EAP023 Collection and Analysis of Dissolved Oxygen (Winkler Method)
- EAP031 Collection and Analysis of pH Samples
- EAP032 Collection and Analysis of Conductivity Samples
- EAP033 Hydrolab DataSonde® and MiniSonde® Multiprobes.
- EAP035 Measurement of Dissolved Oxygen in Surface Water.

Methods for collecting laboratory parameters and field parameters are described in Ecology's field measurements and sampling protocols manual (Ecology, 1993).

Sampling occurred over two years, commencing in June 2005 and ending in September 2007. Sampling locations are listed in Appendix B.

Table 2. Sampling schedule.

Project	Start	End	# Sampling events
Pataha Effectiveness Monitoring	6-2005	11-2005	13
Asotin	6-2006	1-2007	4
Garfield	6-2006	1-2007	4
Whitman Tributaries	10-2006	9-2007	12
Ambient	6-2005	9-2007	28

Table 3 summarizes field and laboratory methods used in these studies.

Table 3. Field and laboratory methods.

Analysis	Method	Expected Range of Concentrations	Method Reporting Limits and/or Resolution
Chloride	EPA 300.0	0.3 – 100 mg/L	0.1 mg/L
Total Suspended Solids	SM 2540D	1 – 10,000 mg/L	1 mg/L
Turbidity	SM 2130	<1 – 7,000 NTU	1 NTU
Alkalinity	SM 2320	20 – 200 mg/L as CaCO3	10 mg/L
Ammonia	SM 4500-NH3H	<0.01 – 30 mg/L	0.01 mg/L
Dissolved Organic Carbon	SM 5310B	<1 – 20 mg/L	1 mg/L
Dissolved Nitrate/Nitrite	SM 4500-NO3 I	<0.01 – 30 mg/L	0.01 mg/L
Total Persulfate Nitrogen	SM 4500-NO3B	0.5 – 50 mg/L	0.025 mg/L
Orthophosphate	SM 4500-P G	0.01 – 5.0 mg/L	0.003 mg/L
Total Phosphorous	SM 4500-P F	0.01 – 10 mg/L	0.005 mg/L
Total Organic Carbon	SM 5310B	<1 – 20 mg/L	1 mg/L
Biochemical Oxygen Demand	SM 5210B	<1 – 14 mg/L	2 mg/L
Water Temperature	EAP033	1-30 ^{o}C	0.01^{o}C
Specific conductivity	EAP033	50-500 uS/cm	0.1 uS/cm
pH	EAP033	6-9 s.u.	0.05 s.u.
Dissolved Oxygen	EAP033	1-12 mg/L	0.01 mg/L
Flow	EAP024	<0.1-10 ft/sec	0.01 ft/sec

SM = Standard Methods (APHA, 2005)
EPA = Approved USEPA analytical method

Results

Pataha Creek

Pataha Creek is managed to meet or exceed numerical water quality criteria to support salmonid migration, rearing, spawning, and harvesting. Exceedances of state water quality standards due to discharge from the Pomeroy wastewater treatment plant (WWTP) led to the development of total maximum daily loads (TMDLs) for ammonia nitrogen (NH3-N), chlorine (Cl), and biochemical oxygen demand (BOD). These TMDLs and associated wasteload and load allocations were approved by EPA in September 1994. The allocations were based on the state water quality criteria for acute (daily maximum) and chronic (monthly average) conditions at the edge of the mixing or dilution zone, to provide protection for human and aquatic organisms. Facility improvements and conversion to UV disinfection eliminated the use of chlorine as a disinfectant in October 2002.

Pataha Creek was monitored twice monthly from June through November 2005. Two sites were selected: one upstream of Fairgrounds Road (Figure 2) and one downstream of Tatman Road (Figure 3) of the Pomeroy WWTP. Samples were tested for pH, conductivity, dissolved oxygen (DO), ammonia, temperature, and BOD. Sample collection methods followed those used by the ambient monitoring program (Ward, 2007). Data from this project are found in Appendix D.

Data from monthly reports generated by the Pomeroy WWTP, in accordance with their National Pollutant Discharge Elimination System (NPDES) permit, were reviewed and graphs of ammonia, dissolved oxygen and biochemical oxygen demand are found in Appendix C.

All data in appendices C and D are available from Ecology's Environmental Information Management online database located at http://www.ecy.wa.gov/eim/. Results may be accessed by searching EIM using the Study ID, JROSL004, or the Study Name, *Pataha Creek Effectiveness Monitoring 2005.*

Figure 2. Fairgrounds Road site.

Figure 3. Tatman Road site.

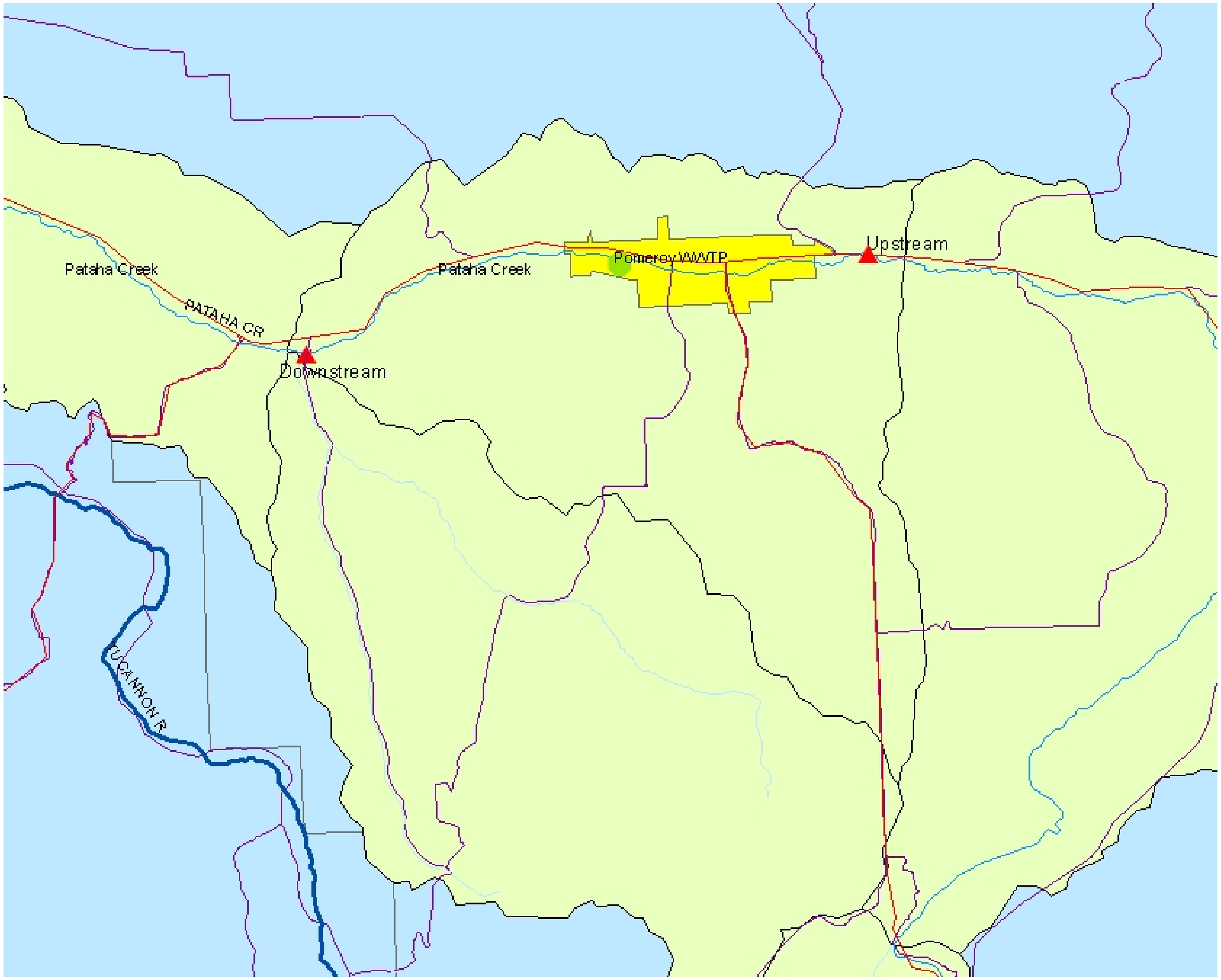


Figure 4. Site map for Pataha Creek effectiveness monitoring.

Whitman County – Snake River Tributaries

The Snake River tributaries in Whitman County occupy a thin strip of land north of the Snake River and south of the Palouse River watershed (Figure 11). In this area, dryland farming is done along the ridge tops and other suitably level terrain, while livestock grazing occurs along the river breaks. There are little historic water quality data available for this area. Several livestock grazing operations using poor management practices have led to riparian area destruction and potential water quality violations. Sediment and runoff from farming operations also impact the water quality of nearby streams. These tributaries were selected for a monitoring project that occurred between October 2006 and October 2007. Data from this project are found in Appendix E.

The Snake River Tributaries in Whitman County are similar in several ways. Their headwaters are in or just below intensively farmed dryland fields. They flow through rolling tilled fields until the terrain gives way to steeper-sided canyons that are typically used for grazing. Animals concentrate near the streams for water and supplemental feed during winter months. If trees are present, livestock prefer bedding in those areas, for the cover provided. These factors lead to extremely poor riparian conditions in all the Snake River tributaries. This is evident in this report's cover photo. Alkali Flat Creek was highly modified, with straight channels constraining the upper reaches of the stream and several ponds constructed for livestock watering. All of the streams that flowed through farmed ground appeared to be subjected to large sediment loads. During the project, staff observed that some streams were being dredged, to keep culverts clear and constrain water to existing channels.

Snake River tributaries in Whitman County were sampled once a month. Sampling protocols and monitored analytes mirrored the ambient monitoring program protocols.

The analytes sampled were: Temperature, barometric pressure, pH, conductivity, dissolved oxygen (DO), total suspended solids (TSS), turbidity, fecal coliform (FC), soluble reactive phosphorus (OP), total phosphorus (TP), ammonia nitrogen (NH3-N), nitrate/nitrite nitrogen (NO2/NO3), and total persulfate nitrogen (TPN)

Whitman County streams that were sampled were:

- Steptoe Creek (three sites, Figure 7)
- Wawawai Creek (one site)
- Almota Creek (two sites, Figure 9)
- Little Almota Creek (one site)
- Penewawa Creek (three sites, Figure 10)
- Little Penewawa Creek (one site)
- Alkali Flat Creek (four sites, Figure 8)
- Mud Flat Creek (one site)

Figure 5 illustrates the fecal coliform concentrations for these streams. The fecal coliform standard for these streams is a geometric mean of less than 100 cfu/100 ml or less than 10% of samples exceeding 200 cfu/100 mL. The standard was only achieved at Almota Creek at Klemgard Road. Yet even that site had one high sample (1500 cfu/100 mL). Only three of the sixteen sites met the geometric mean component of the standard. Sometimes the concentrations were dramatically high, as in the case of Alkali Flat Creek above Hay. The geometric mean for that site was over 3500 and the maximum concentration was 28000.

Continuous temperature data graphs are located in Appendix I. Figure 6 summarizes the maximum 7-day rolling average for these streams. The temperature standard (20^{o}C) was not met at the mouths of any of the streams. Streams that are shorter and steeper generally have the lowest temperatures. Alkali Flat Creek is the longest and flattest of the streams monitored. It has the highest density of grazing along its length and has the highest percentage of cropland, including some in irrigation. It has the poorest water quality in all categories of all the Whitman County Snake River tributaries.

In addition to the Whitman County project, monitoring continued at the two long-term ambient stations in WRIA 35. One site (35A150) is located on the Snake River at the Stateline Bridge in Clarkston. The other (35B060) is near the mouth of the Tucannon River, downstream of the town of Starbuck.

Data collected at these stations can be found in Appendix H. Overall, the data collected from these two sites was unremarkable.

All data in Appendices E and H are available from Ecology's Environmental Information Management online database located at http://www.ecy.wa.gov/eim/. Results may be accessed by searching EIM using the Study ID, *AMS001E*, or the Study Name, *Statewide River and Stream Ambient Monitoring-WY 2000 through WY 2009.*

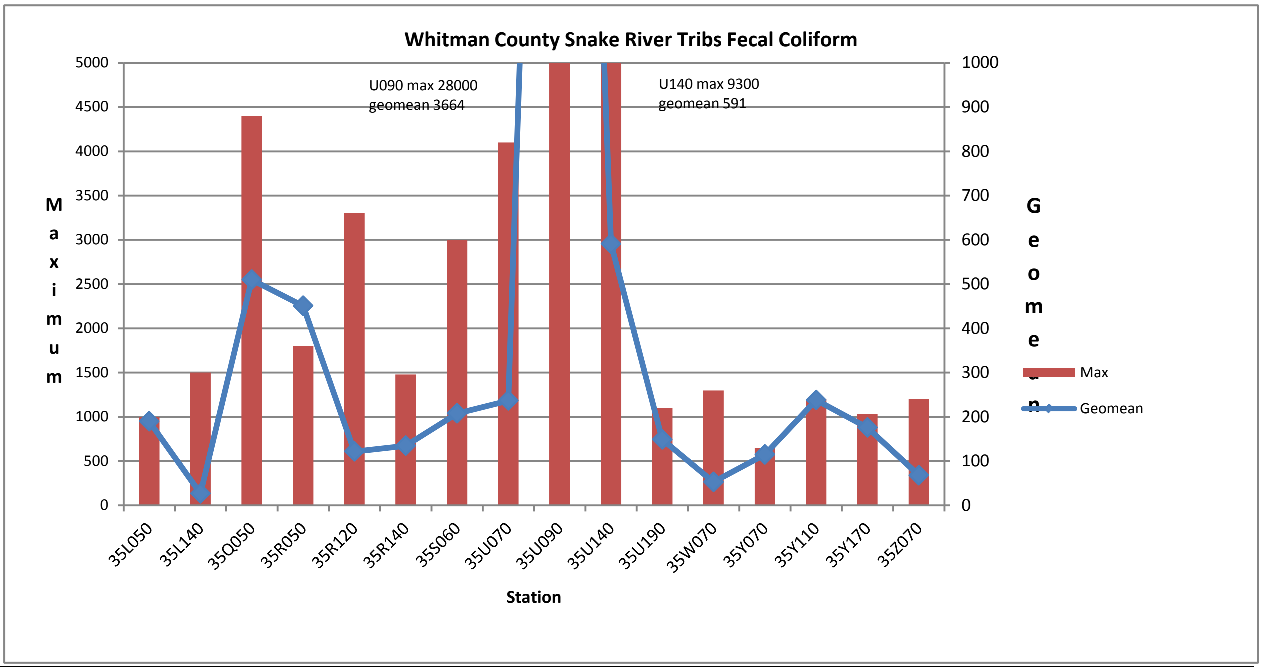


Figure 5. Fecal coliform concentrations in Whitman County Snake River tributaries.

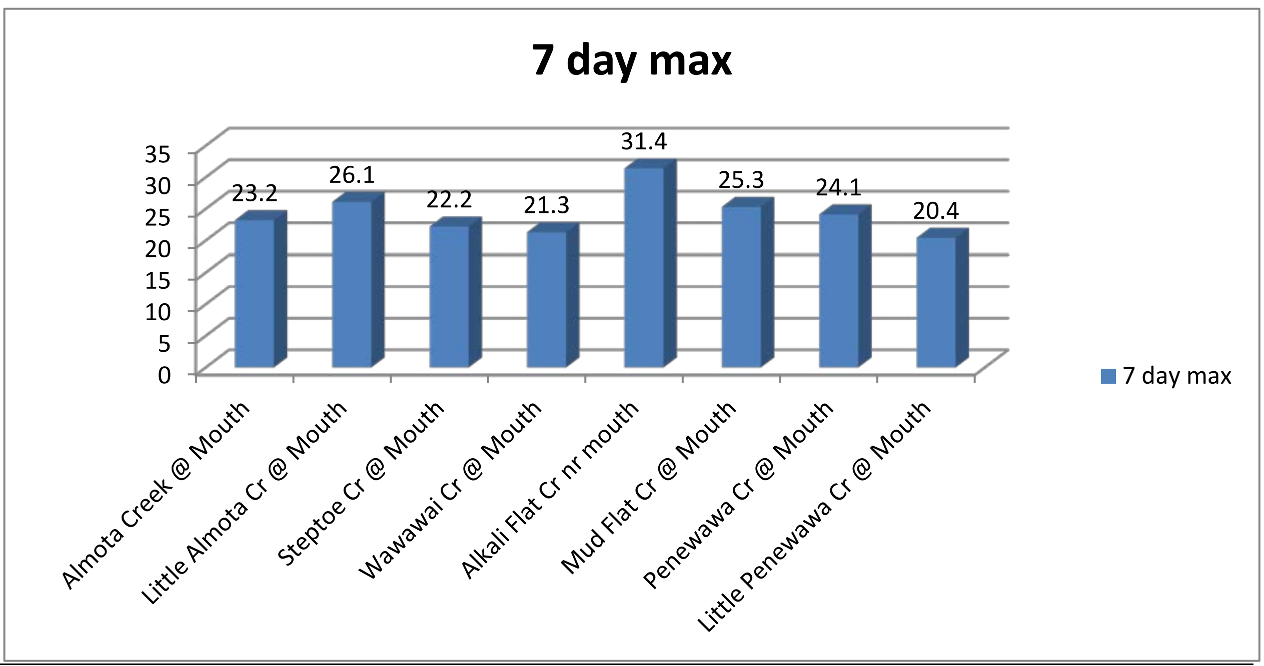


Figure 6. Seven-day maximum temperatures for Whitman County Snake River tributaries.

Figure 7. Steptoe Creek.

Figure 8. Alkali Flat Creek.

Figure 9. Almota Creek.

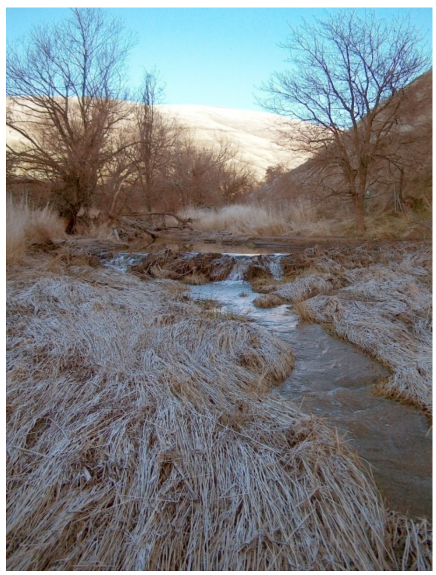


Figure 10. Penewawa Creek.

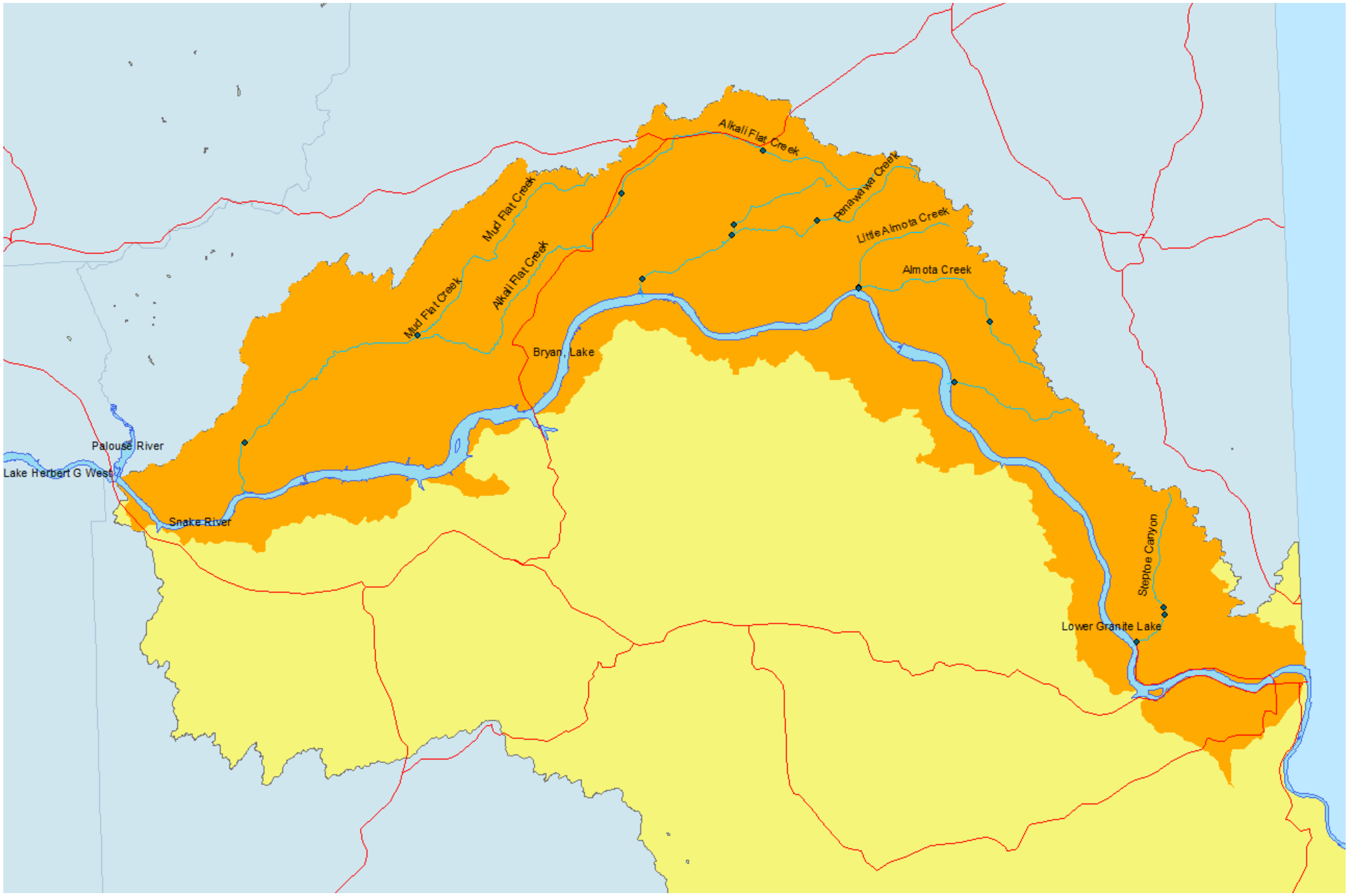


Figure 11. Monitoring sites for Whitman County tributaries to Snake River.

Asotin County

The Asotin County monitoring consisted of four sampling events coinciding with local Conservation District sampling events. These occurred in June, July, and August 2006 and in January 2007. The mouths of Couse and Tenmile Creeks were monitored, as were two sites on Alpowa Creek and three on Asotin Creek. Water samples from these creeks were tested for pH, conductivity, DO, temperature, fecal coliform, and TSS.

Beginning at the fringes of the Blue Mountains, Tenmile Creek quickly drops over 2000 feet on its short journey to the Snake River. The canyon created by the creek provides habitat for a variety of wildlife. Tenmile Creek is also home to threatened Snake River steelhead trout. The Tenmile Creek canyon is important range for cattle. It also provides an excellent location for winter livestock feeding. Livestock that feed at the canyon's base are protected from harsh winter weather. Unfortunately, a century of these activities left the stream corridor in poor condition. Many of the trees along the stream corridor have been damaged or removed, and the stream banks are trampled and overgrazed. Landowners, working with the Asotin County Conservation District (ACCD) and Natural Resource Conservation Service staff (NRCS), have installed over 20 miles of riparian fence and planted thousands of native trees and shrubs in the stream corridor.

Alpowa Creek originates from several springs amid the forested foothills of the Blue Mountains in southeast Washington. For generations, this canyon has been used to graze and feed livestock. The creek provides significant habitat for Snake River steelhead trout, a sea-going salmonid that is included on the federal list of endangered species. Before work began to improve water quality in Alpowa Creek, livestock had uncontrolled access to much of the creek and were fed along its banks. A large portion of the stream (riparian) corridor was in poor condition, and water quality in the stream consistently violated state water quality standards. The creek was fenced, and off-stream water sources were developed to protect the stream and provide water to livestock. Thousands of native trees and shrubs were planted within the stream corridor to help stabilize banks and shade the stream. These actions resulted in the development of more than 10 miles of riparian buffer in the upper watershed.

The plateaus above Couse Creek are farmed for wheat and barley and the canyon is used for range and feeding livestock. Before 2001, livestock in the watershed had uncontrolled access to the creek and were fed at several easy-to-reach locations along the stream. By 2001, the riparian corridor had been degraded considerably. Cooperation between the landowners, the Asotin County Conservation District (ACCD), and Natural Resource Conservation Service resulted in the implementation of over eight miles of riparian buffers. The creek was fenced to protect it from livestock, and off-stream water was provided at several key points. Thousands of native trees and shrubs were planted near the stream to aid in the recovery process. As a result of the projects, a stretch of the creek has begun the recovery process.

. Figure 12. Asotin Creek.

Figure 13. Alpowa Creek.

Asotin Creek originates in the Blue Mountains and is a tributary to the Snake River, draining an area of 208,000 acres. Rainfall ranges from more than 45 inches in the higher elevations to 12 inches in the lower elevations. Melting snow from the Blue Mountains provides much of the annual runoff to the streams and rivers in the subbasin. The water level in many streams diminishes greatly during the summer months. Vegetation in the subbasin is characterized by grasslands and agricultural lands at lower elevations and evergreen forests at higher elevations.

Pasture/rangeland (43%), cropland (26%), and forestland (30%) are the primary land uses by humans in the subbasin. Over 60% of the Asotin Subbasin is in private ownership; most of this land is in the lower portion of the watershed.

All data in appendix G are available from Ecology's Environmental Information Management online database located at http://www.ecy.wa.gov/eim/. Results may be accessed by searching EIM using the Study ID, *JROSL008,* or the Study Name, *Asotin County Implementation Monitoring.*

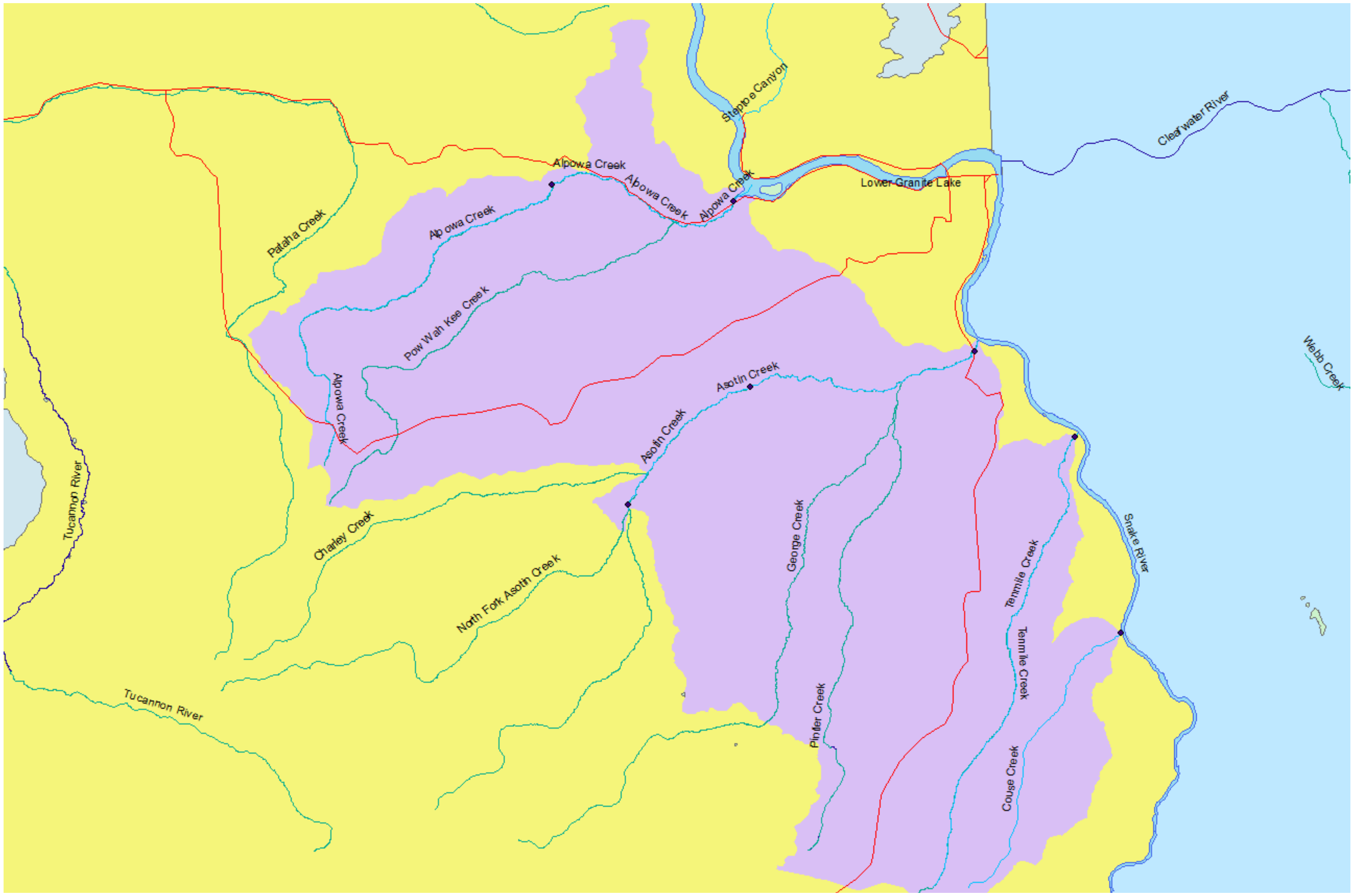
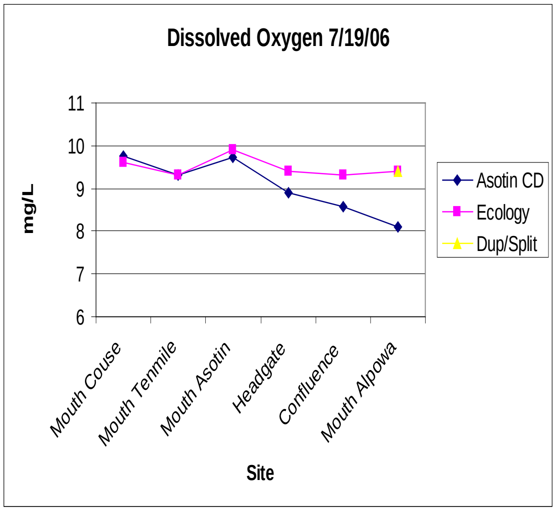


Figure 14. Monitoring sites for Asotin, Alpowa, Couse, and Tenmile Creeks.

Figures 15-20 summarize the data collected by the Conservation District partners and Ecology.



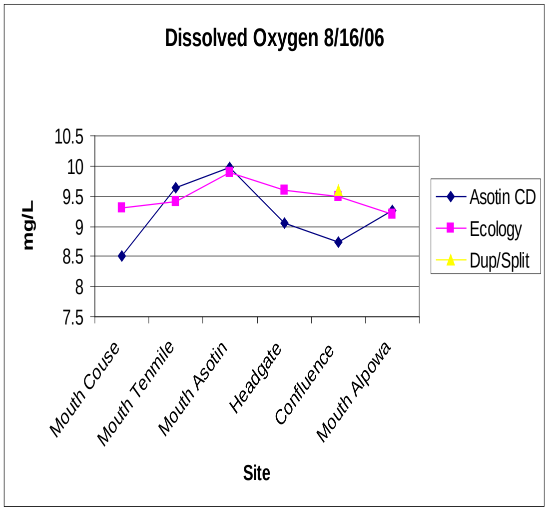
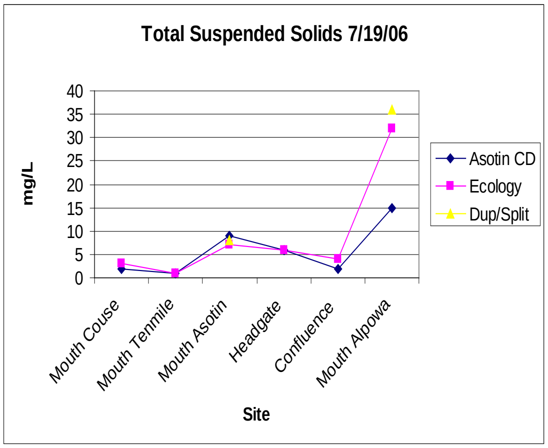


Figure 15. CD/Ecology data comparison DO 7/19. Figure 16. CD/Ecology data comparison DO 8/16.



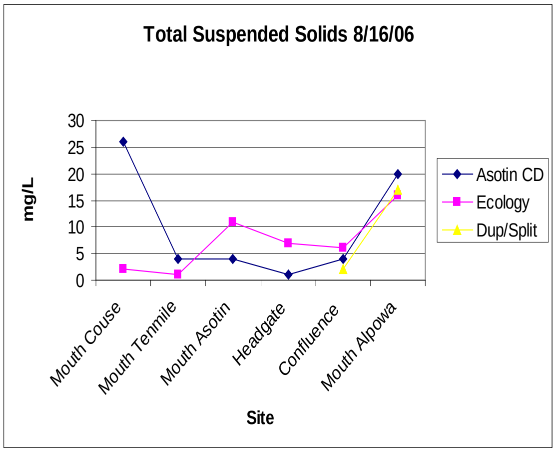
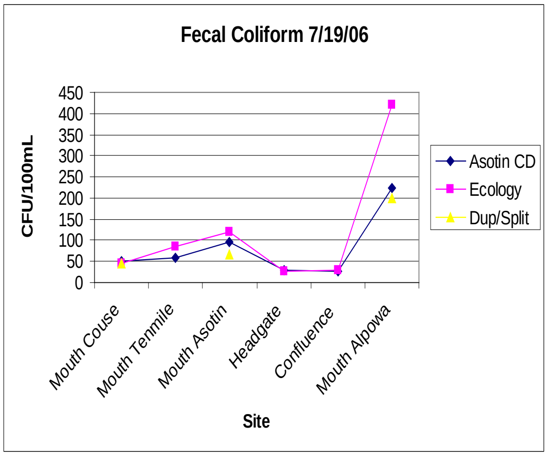


Figure 17. CD/Ecology data comparison TSS 7/19. Figure 18. CD/Ecology data comparison TSS 8/16.



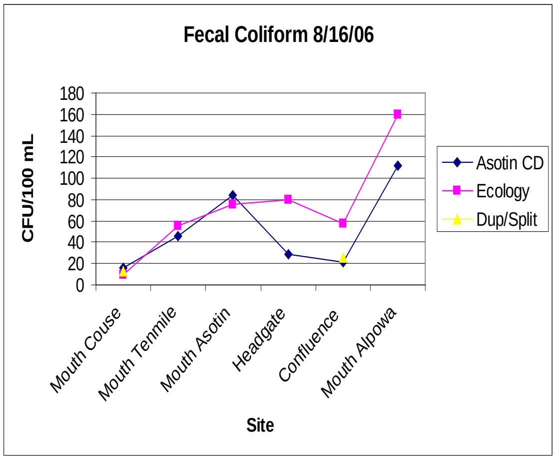


Figure 19. CD/Ecology data comparison FC 7/19. Figure 20. CD/Ecology data comparison FC 8/16.

Garfield County

Deadman and Meadow Creeks flow through rolling hills toward the Snake River in north Garfield County. This is arid country, with rainfall in some areas averaging as little as 11 inches annually. Historically, the surrounding hills were covered in bunchgrass and sage. The meandering creek provided habitat for steelhead trout. Approximately half the watershed today is used for non-irrigated crops such as wheat and barley, and the other half is used for livestock.

In January 2001, Garfield County streams were in poor condition. Much of the vegetation had been eliminated within the stream corridor, due to livestock's winter feeding and uncontrolled access. In addition, the Garfield County streams were failing state water quality standards. Fecal coliform values as high as 40 times the state standard were recorded. In spring 2001, landowners in the watershed began to work with the Pomeroy Conservation District (PCD) and the local Natural Resource Conservation Service office (NRCS) to fence off much of the creek, creating over 25 miles of riparian buffer. Several off-stream water facilities were developed and feeding locations were moved away from Deadman and Meadow creeks to prevent erosion of the stream bank. In addition, trees and shrubs were planted to stabilize banks, shade streams, and improve wildlife habitat.

All data in Appendix F are available from Ecology's Environmental Information Management online database located at http://www.ecy.wa.gov/eim/. Results may be accessed by searching EIM using the Study ID, *JROSL007*, or the Study Name, *Garfield County Implementation Monitoring.*

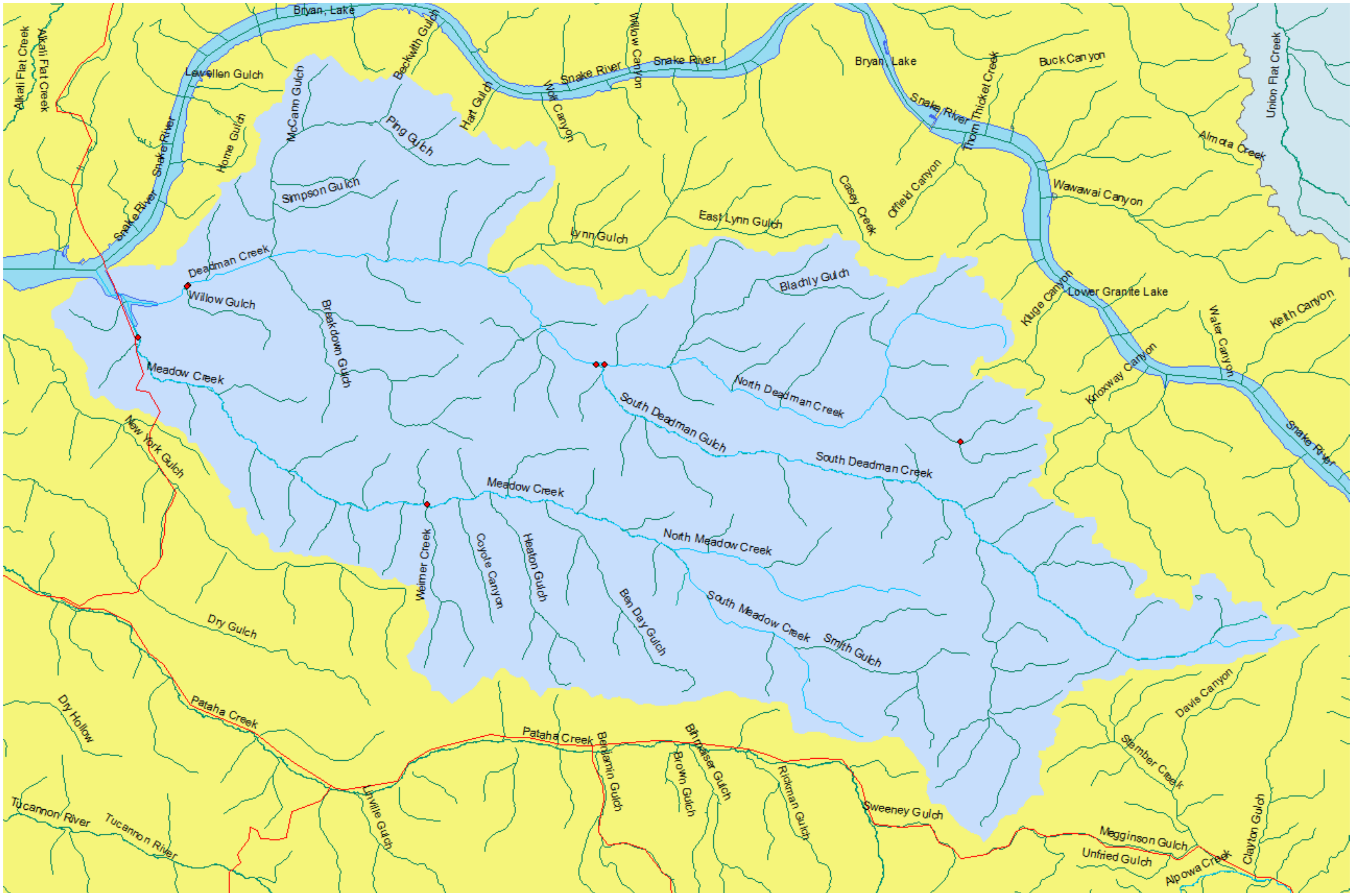


Figure 21. Monitoring locations on Deadman and Meadow Creeks.

Data Quality

Ecology calibrated all field monitoring equipment according to manufacturers' specifications and pre-calibrated and post-checked Hydrolab® meters with certified standards.

Ecology took replicate field samples for laboratory parameter analyses. Field replicates are two samples collected from the same location at the same time. Ecology collects field replicates to check the precision of the entire process of sampling and analysis. The percentage of replicates taken per parameter can be seen in Table 4. Both the frequency of field replicates and precision of the replicated samples met criteria, with the exception of Hydrolab-collected data (pH, conductivity, temperature, and DO). Field crews were remiss at collecting replicate readings from the Hydrolabs for a good portion of the study. Those taken were well within criteria.

Ecology's Manchester Environmental Laboratory (MEL) standard operating procedure (SOP) calls for duplicating a minimum of 5% of all samples (1/20 samples or 1/analytical batch). That goal was exceeded for all parameters. Duplicate precision was met for all parameters. (Table 5)

Ecology compared Hydrolab® DO grab sample results and Winkler titration results using percent relative standard deviation (RSD) (Table 4). The average RSD was 1.42%, with only 8 of 139 replicated samples exceeding 5% RSD. Datalogger graphs show where Ecology checked DO for accuracy by performing Winkler titrations (Appendix E).

Conductivity and pH checks were generally within the specified target accuracy. Two conductivity post-calibrations failed and were rejected. Both were from the September 2009 synoptic run. Three other conductivity post-cal measurements were slightly outside preferred criteria, and data was qualified. Only three pH post-cal measurements were slightly outside criteria and resulted in associated data being qualified.

While the overall bias after post-calibration was only -1.7%, Hydrolab® DO grab results fell outside quality objectives (5% RSD) 35% of the time. Six exceedances resulted in rejected data, eleven resulted in qualified data.

Ecology found it appropriate to correct all continuous datalogger DO values using Winkler results (Appendix E).

The correction of datalogger DO minimizes bias and improves the relationship between datalogger and Winkler DO data, giving a more accurate picture of the sites' diel DO characteristics. Hydrolab® DO grab data reported in this publication have not been corrected (Appendix C).

All data collected during the TMDL study are arranged by site and date and presented in the following appendices:

- Appendix B describes sample locations.
- Appendix C contains field meter and Winkler dissolved oxygen measurements.
- Appendix D lists laboratory data provided by MEL.
- Appendix E shows continuous temperature plots collected using On-Site TidBits.
- Appendix F contains streamflow measurements.
- Appendix G plots of pH, temperature, DO and conductivity as collected from diel deployment of Hydrolab Multiprobe Datasondes®.
- Appendix H summarizes case narratives provided by MEL.

Table 4. Field replicate summary showing relative percent deviation (RPD) and relative standard deviation (RSD) statistics.

Parameter	Number Samples	Number Replicates	% replicated	Average RPD	Average RSD	Precision target (RSD)
Lab						
Ammonia as N	249	15	6.0	8.5	6.0	10%
Nitrate-Nitrite as N	223	11	4.9	8.6	6.1	10%
Ortho-Phosphate	223	11	4.9	4.6	3.3	10%
Total Persulfate Nitrogen	223	11	4.9	11.3	8.0	10%
Total Phosphorus	223	11	4.9	15.9	11.3	10%
Total Suspended Solids	273	18	6.6	70.8	50.1	10%
Fecal Coliform bacteria	299	24	8.0	35.6	25.1	35%
Turbidity	273	19	7.0	56.4	39.9	25%
BOD	27	4	14.8	0	0	25%
Field						
Conductivity	298	23	7.7	0.3	0.2	10%
pH	298	23	7.7	0.5	0.4	$\pm$0.2 pH units
Temperature	298	23	7.7	0.8	0.6	$\pm 0.3^{o}$ C
Winkler DO	297	21	7.1	4.7	3.3	5%

No replicates for temperature exceeded 0.3 C criteria.
No replicates for pH exceeded 0.2 criteria.
BOD was not calculated, as all sample results were below detection limits.

Table 5. Laboratory duplicate summary showing relative percent deviation (RPD) and relative standard deviation (RSD) statistics.

Parameter	Number duplicates	Average RPD	Average RSD	Target RSD
Ammonia-N	15	1.3	0.9	10
Nitrite/Nitrate-N	16	0.5	0.4	10
Orthophosphorus	15	1.3	0.9	10
Turbidity	20	6.5	4.6	10
Total Phosphorus	8	1.2	0.9	10
Total Persulfate Nitrogen	15	1.2	0.8	10
Total Suspended Solids	29	13.1	9.3	10
Fecal Coliform	29	31.4	22.2	35

All data in Appendices D through H are available from Ecology's Environmental Information Management (EIM) online database located at http://www.ecy.wa.gov/eim/. Results may be accessed by searching EIM using the Study ID referenced in the appendix.

MEL performed all laboratory analyses within specified holding times, using appropriate quality assurance measures unless noted with qualifier codes (Table 6). Qualifiers place specific conditions on the laboratory data. Data reported with qualifiers should be used with caution, and data variability must be taken into consideration when interpreting results and applying data to other analyses. All other data reported by MEL may be used without qualification.

Table 6. Data qualifier codes.

Qualifier	Definition
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
U	The analyte was not detected at or above the reported sample quantitation limit.
UJ	The analyte was not detected at or above the reported sample quantitation limit. The reported quantitation limit is approximate.
E	The reported result is an estimate because it exceeds the calibration range.
G	The value is likely greater than the result reported; the result is an estimated minimum value.
Y	Value is a replicate taken in a side-by-side method in the field.

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Appendices

Appendix A. Glossary, Acronyms, and Abbreviations

Glossary

Clean Water Act: A federal act passed in 1972 that contains provisions to restore and maintain the quality of the nation's waters. Section 303(d) of the Clean Water Act establishes the TMDL program.

Conductivity: A measure of water's ability to conduct an electrical current. Conductivity is related to the concentration and charge of dissolved ions in water.

Diel: Of, or pertaining to, a 24-hour period.

Dissolved oxygen (DO): A measure of the amount of oxygen dissolved in water.

National Pollutant Discharge Elimination System (NPDES): National program for issuing, modifying, revoking and reissuing, terminating, monitoring, and enforcing permits, and imposing and enforcing pretreatment requirements under the Clean Water Act. The NPDES program regulates discharges from wastewater treatment plants, large factories, and other facilities that use, process, and discharge water back into lakes, streams, rivers, bays, and oceans.

Parameter: Water quality constituent being measured (analyte). A physical, chemical, or biological property whose values determine environmental characteristics or behavior.

pH: A measure of the acidity or alkalinity of water. A low pH value (0 to 7) indicates that an acidic condition is present, while a high pH (7 to 14) indicates a basic or alkaline condition. A pH of 7 is considered to be neutral. Since the pH scale is logarithmic, a water sample with a pH of 8 is ten times more basic than one with a pH of 7.

Point source: Sources of pollution that discharge at a specific location from pipes, outfalls, and conveyance channels to a surface water. Examples of point source discharges include municipal wastewater treatment plants, municipal stormwater systems, industrial waste treatment facilities, and construction sites that clear more than 5 acres of land.

Riparian: Relating to the banks along a natural course of water.

Salmonid: Fish that belong to the family *Salmonidae*. Any species of salmon, trout, or char.

Total Maximum Daily Load (TMDL): Water cleanup plan. A distribution of a substance in a waterbody designed to protect it from exceeding water quality standards. A TMDL is equal to the sum of all of the following: (1) individual wasteload allocations for point sources, (2) the load allocations for nonpoint sources, (3) the contribution of natural sources, and (4) a Margin of Safety to allow for uncertainty in the wasteload determination. A reserve for future growth is also generally provided.

Watershed: A drainage area or basin in which all land and water areas drain or flow toward a central collector such as a stream, river, or lake at a lower elevation.

303(d) list: Section 303(d) of the federal Clean Water Act requires Washington State to periodically prepare a list of all surface waters in the state for which beneficial uses of the water – such as for drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants. These are water quality limited estuaries, lakes, and streams that fall short of state surface water quality standards, and are not expected to improve within the next two years.

Acronyms and Abbreviations

BOD	Biochemical oxygen demand
COND	Conductivity
DO	Dissolved oxygen
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management database
EPA	U.S. Environmental Protection Agency
FC	Fecal coliform
MEL	Manchester Environmental Laboratory
RM	River mile
RPD	Relative percent difference
RSD	Relative standard deviation
SOP	Standard operating procedures
SUSSOL	Total suspended solids (also TSS)
TMDL	(See Glossary above)
TSS	Total suspended solids
Turb	Turbidity
WAC	Washington Administrative Code
WRIA	Water Resources Inventory Area
WWTP	Wastewater treatment plant

Units of Measurement

°C	degrees centigrade
cfs	cubic feet per second
mg/L	milligrams per liter (parts per million)
NTU	nephelometric turbidity units
s.u.	standard units
uS/cm	microsiemens per centimeter, a unit of conductivity

Appendix B. Sample Locations

Location ID	Location Name	Latitude	Longitude	Project
35A150	Snake River@ Interstate bridge	46.4207	117.0357	Ambient
35B060	Tucannon River @ Powers	*46.5376*	118.1555	Ambient
35F050	Pataha Creek nr mouth	46.5122	117.973	Whitman
35L050	Almota Creek @ mouth	46.7027	117.4679	Whitman
35L140	Almota Creek @ Klemgard Road	46.676	117.3382	Whitman
35Q050	Little Almota Creek @ mouth	46.7028	117.4679	Whitman
35R050	Steptoe Creek @ mouth	46.4524	117.2046	Whitman
35R120	Steptoe Creek blw Stewart	46.4702	117.176	Whitman
35R140	Steptoe Creek abv Stewart	46.4749	117.1763	Whitman
35S060	Wawawai Creek @ mouth	46.6357	117.376	Whitman
35U070	Alkali Flat Creek nr mouth	46.6113	118.0803	Whitman
35U090	Alkali Flat Creek abv Hay	46.6801	117.91	Whitman
35U140	Alkali Flat Creek @ Little Alkali Road	46.7735	117.7021	Whitman
35U190	Alkali Flat Creek @ Penewawa Road	46.7999	117.5588	Whitman
35W070	Mud Flat Creek @ mouth	46.6815	117.9102	Whitman
35Y070	Penewawa Creek nr mouth	46.7143	117.6835	Whitman
35Y110	Penewawa Creek @ Looney Bridge	46.7418	117.5931	Whitman
35Y170	Penewawa Creek abv Goose Creek	46.7499	117.5066	Whitman
35Z070	Little Penewawa Creek @ mouth	46.7497	117.5891	Whitman
35D070	Asotin Creek @2nd Street	46.3407	117.056	Asotin
W35AOC-4	Asotin Creek @ Headgate Park	46.3265	117.2077	Asotin
W35AOC-9	Asotin Creek blw confluence N & S Forks	46.2885	117.2820	Asotin
35H050	Couse Creek @ mouth	46.2047	116.9676	Asotin
35J050	Tenmile Creek @ mouth	46.2966	116.9922	Asotin
35K050	Alpowa Creek nr mouth	46.4118	117.2134	Asotin
ALP2	Alpowa Creek nr Knotgrass Road	46.4244	117.3340	Asotin
35M060	Deadman Creek @ Willow Gulch	46.6184	117.7607	Garfield
35SFDeadman	South Fork Deadman Creek @ mouth	46.3900	117.5822	Garfield
35NFDeadman	North Fork Deadman Creek @ mouth	46.5898	117.5787	Garfield
35BellPlain	NF Deadman Creek @ Bell Plain Road	46.5776	117.4575	Garfield
35N050	Meadow Creek nr mouth	46.6028	117.7832	Garfield
35Weimer	Meadow Creek @ Weimer Gulch	46.5491	117.6589	Garfield
35F100 (US)	Pataha Creek @ Fairgrounds Road	46.4750	117.5561	Pataha
35F095 (DS)	Pataha Creek @ Tatman Road	46.4618	117.6899	Pataha

Appendix C. Pomeroy WTP DMR Data

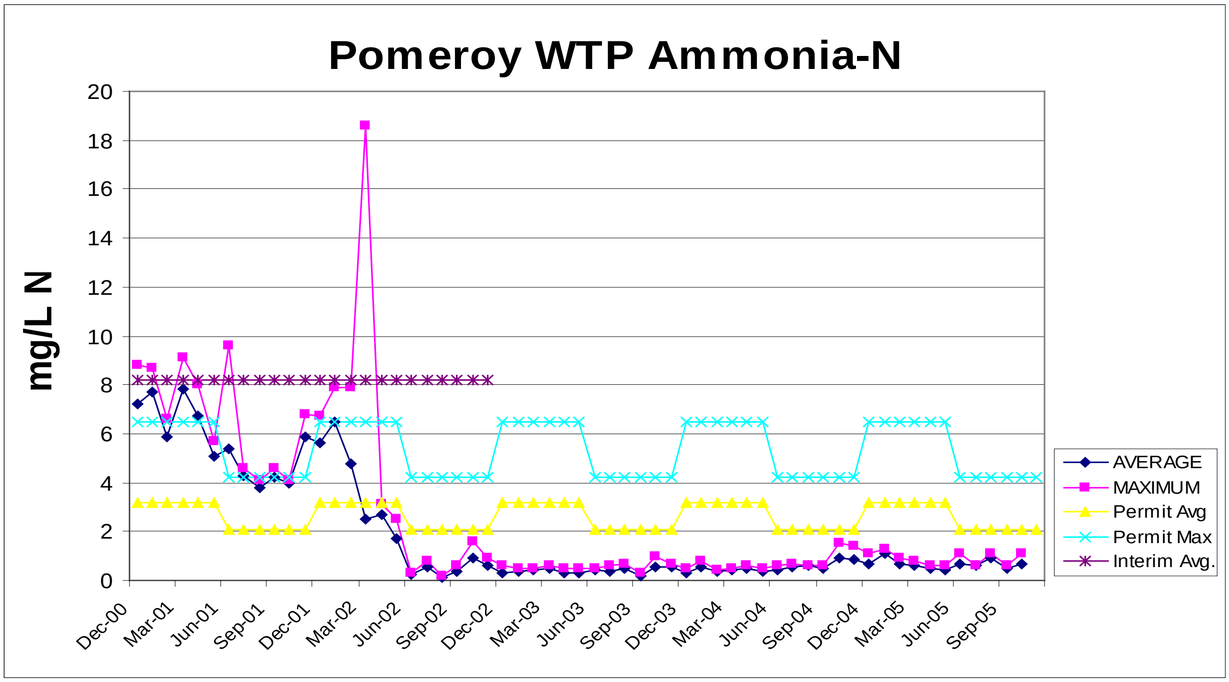

Figure C-1. Pomeroy WTP effluent ammonia-N.

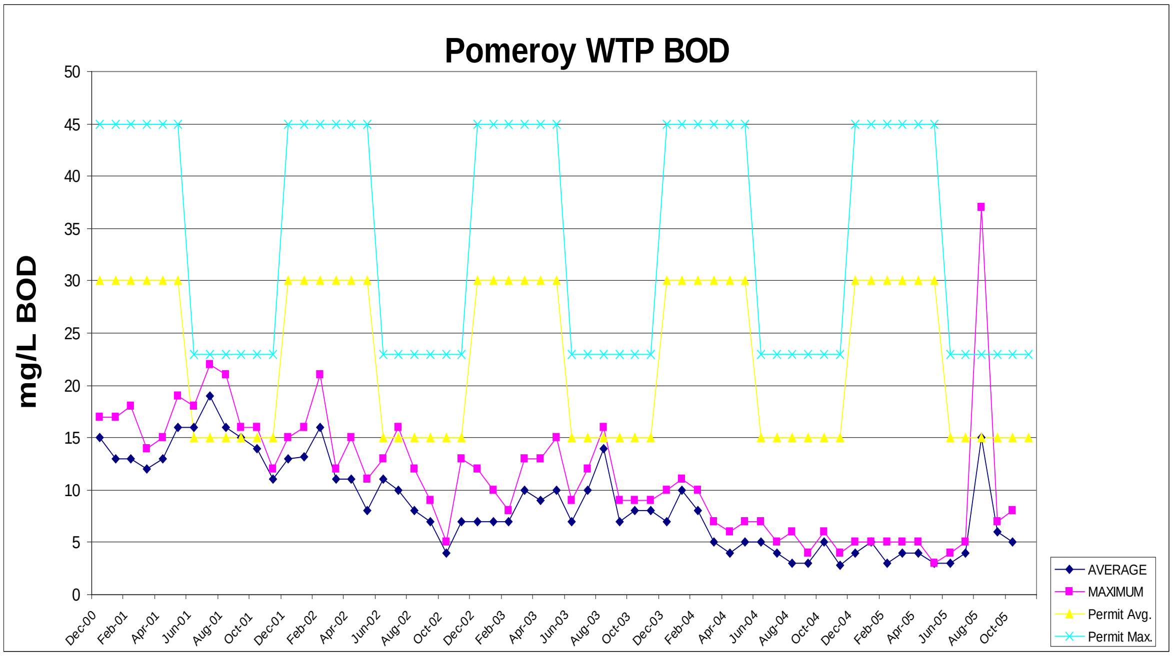

Figure C-2. Pomeroy WTP effluent BOD.

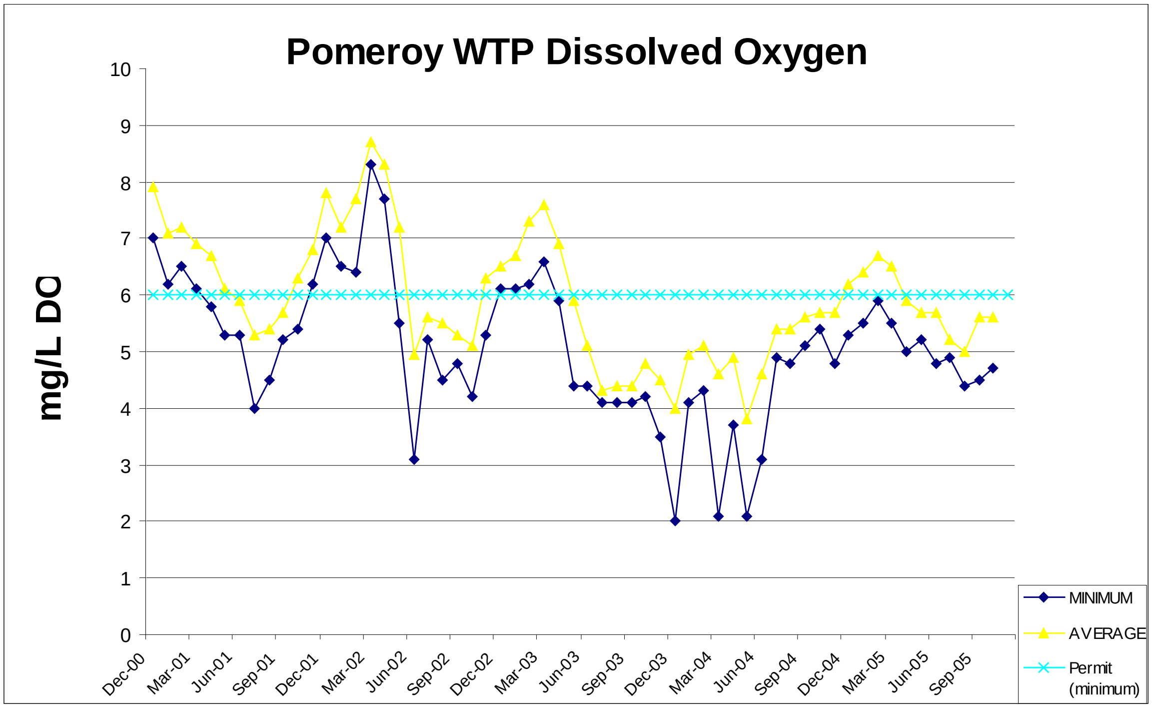

Figure C-3. Pomeroy WTP DO.

Appendix D. Pataha Creek Monitoring Data (EIM Study ID, JROSL004)

Site Name	Date	Time	Rep	Ammonia mg/L		BOD mg/L		Cond uS/cm		FC #/100mL		Oxygen mg/L	pH	Temp deg C
35F100	6/1/2005	10:45:00		0.01	U	4	U	191		200		9.9	8.26	13.5
35F100	6/15/2005	11:00:00		0.01	U	4	U	203		120		10.1	8.22	14.1
35F100	6/15/2005	11:00:00	Y	0.01	U	4	U			130		10		
35F100	6/29/2005	11:50:00		0.01	U	2	U	204		250		9.8	8.16	16.3
35F100	7/6/2005	11:45:00		0.01	U	2	UJ	214		290	J	9.2	8.19	17.4
35F100	7/20/2005	12:15:00		0.014		2	U	218		1600	J	9.5	8.27	17.4
35F100	8/10/2005	13:30:00		0.015		2	U	213		1000		9.2	8.23	18.1
35F100	8/24/2005	10:35:00		0.013		2	U	217		610		9.5	8.04	14.2
35F100	9/7/2005	13:15		0.01	U	2	U	219		730			8.1	16.1
35F100	9/21/2005	11:40:00		0.01	U	2	U	205		190		10.1	8.01	13.5
35F100	10/12/2005	13:25:00		0.01	U	2	U	218		43		9.7	8.01	13.2
35F100	10/26/2005	11:35:00		0.01	U	2	U	222		140		8.6	7.78	11.6
35F100	11/2/2005	10:50:00		0.01	U	2	U	228		600		10.1	8.04	11
35F100	11/2/2005	11:00:00	Y	0.01	U	2	U	350		350		10	8.2	11
35F100	11/16/2005	10:50:00		0.01	U	2	U	223		21		10.3	7.93	10
35F095	6/1/2005	10:15:00		0.01		4	U	229		400		9.4	8.13	13.6
35F095	6/1/2005	10:15:00	Y	0.01	U	4	U	229		300		9.4	8.13	13.5
35F095	6/15/2005	11:25:00		0.01	U	4	U	96		244		9.6	8.19	13.7
35F095	6/29/2005	12:17:00		0.01	U	3		245		330		9	8.18	16.8
35F095	7/6/2005	12:10:00		0.01	U	2		263		310	J	8.6	8.25	19.2
35F095	7/20/2005	12:40:00		0.011		2	U	260		540		8.7	8.28	18.4
35F095	8/10/2005	14:15:00		0.228		2	U	287		3600		8.7	8.23	19.5
35F095	8/24/2005	10:55:00		0.01	U	2	U	270		370		9.9	8.14	13.7
35F095	8/24/2005	10:55:00	Y	0.01	U	2	U	269		560		9.9	8.22	13.8
35F095	9/7/2005	12:20:00		0.01	U	2	U	258		54			8.15	14.1
35F095	9/21/2005	12:10:00		0.01	U	2	U	239		69		10.1	8.14	11.1
35F095	10/12/2005	13:50:00		0.01	U	2	U	255		39		10.3	8.2	11.9
35F095	10/26/2005	11:55:00		0.01	U	2	U	265		120		9.6	7.93	10.2
35F095	11/2/2005	11:20:00		0.01	U	2	U	264		74		10.5	8.15	8.6
35F095	11/16/2005	11:20:00		0.01	U	2	U	264		27		11.7	8.2	5.8
35F095	11/16/2005	11:20:00	Y	0.01	U	2	U	266		39		11.6	8.21	5.8

Appendix E. Whitman Tributaries Monitoring Data (EIM Study ID, AMS001E)

Alk	Alkalinity, Total as $CaCO_3$	mg/L
BOD	Biochemical Oxygen Demand	mg/L
Cl	Chloride	mg/L
NH3	Ammonia Nitrogen	mg/L
NO2/NO3	Nitrate and Nitrite Nitrogen	mg/L
OP	Orthophosphate	mg/L
TP	Total Phosphorus	mg/L
TPN	Total Persulfate Nitrogen	mg/L
TSS	Total Suspended Solids	mg/L

COND	Conductivity
SUSSOL	Total Suspended Solids (also TSS)
TURB	Turbidity

Site ID	date	time	COND (umhos/cm)	FC (#/100ml)		NH3_N (mg/L)		NO2_NO3 (mg/L)		OP_DIS (mg/L)	OXYGEN (mg/L)		PH (pH)	PRESS (mm/Hg)	SUSSOL (mg/L)		TEMP (deg C)	TP_P_ICP (mg/L)	TPN (mg/L)	TURB (NTU)	
35L050	10/9/2006	12:25	293	100		0.01	U	0.425		0.0835			7.96	739.6	13		11.2	0.0803	0.502	3.1	
35L050	11/6/2006	12:35	299	69		0.01	U	0.418		0.0978	8.58		7.87	728.0	8		13.7	0.111	0.589	4.3	
35L050	12/11/2006	13:40	293	28		0.01	U	1.2		0.0993	11.06		8.02	735.1	16		6.9	0.097	1.3	2.8	
35L050	1/22/2007	13:40	290	330	J	0.015		3.38		0.123	11.41		8.27	739.1	8		7.2	0.143	3.96	11	
35L050	2/20/2007	12:45	302	370		0.01	U	5.28		0.133	11.05		8.2	724.4	27		7.9	0.147	6.41	18	
35L050	3/12/2007	13:20	289	310		0.01	U	4.06		0.108	10.65		8.36	732.8	19		12.3	0.125	3.9	11	
35L050	4/9/2007	12:40	287	1000		0.015		3.09		0.122	10.05		8.32	724.9	59		12.5	0.175	3.25	32	
35L050	5/14/2007	14:30	290	92		0.01	U	1.09		0.106	8.67		8.29	735.3	41		17.9	0.131	1.28	28	
35L050	6/18/2007	14:35	285	270		0.01	U	0.375		0.0874	8.35		8.1	731.3	21		18.3	0.101	0.513	14	
35L050	7/16/2007	15:50	286	310		0.01	U	0.306		0.0915	7.46		8.16	725.9	20		22.7	0.0848	0.45	6.3	
35L050	8/21/2007	14:20	293	280		0.01	U	0.26		0.0862	8.5		8.04	731.0	10		18.3	0.0863	0.387	3.8	
35L050	9/4/2007	14:05	290	140		0.01	U	0.229		0.0783	8.48		8.11	726.2	6		18.2	0.0765	0.338	9.3	
35L140	10/9/2006	11:40	309	31		0.014		5.3		0.165			8.15	704.6	796		6.4	0.376	4.65	220	
35L140	11/6/2006	11:35	333	25		0.01	U	3.85		0.318	8.28		8	694.4	84		11.4	0.404	4.13	12	
35L140	12/11/2006	12:55	317	16		0.011		3.59		0.247	11.47		8.17	699.5	20		3.9	0.329	4.07	11	
35L140	2/20/2007	11:55	367	5		0.01	U	9.46		0.183	11.45		8.18	689.9	17		4.6	0.206	10.3	12	
35L140	3/12/2007	12:30	350	3		0.01	U	6.9		0.154	10.55		8.03	698.2	26		9	0.202	7.44	14	
35L140	4/9/2007	11:55	333	9		0.01	U	4.72		0.194	10.87		8.38	689.1	17		8.9	0.262	4.26	13	
35L140	5/14/2007	13:40	328	51		0.013		3.45		0.174	9.59		8.37	701.3	31		14.3	0.225	4.57	14	
35L140	6/18/2007	13:40	317	56		0.013		3.99		0.182	8.85		8.13	696.7	30		13.4	0.229	4.57	7.6	
35L140	7/16/2007	15:00	305	1500	J	0.113		3.44		0.282	6.26		7.88	694.2	210		18.9	0.38	6.46	130	
35Q050	10/9/2006	12:40	316	55		0.02	U	1.07		0.0798			8.45	739.4	12		10.8	0.0798	1.14	2.6	
35Q050	11/6/2006	13:05	335	200		0.016		1.39		0.0892	9.09		8.1	727.7	16		14.6	0.104	1.94	2.4	
35Q050	12/11/2006	13:55	315	47		0.01	U	2.65		0.122	11.57		8.29	735.1	3		6.8	0.119	2.86	1.5	
35Q050	1/22/2007	13:55	322	2900	J	0.039		4.47		0.167	12.12		8.4	739.1	18		6.7	0.212	6.39	17	
35Q050	2/20/2007	13:00	310	1000		0.013		5.71		0.137	11.15		8.37	724.9	97		8.2	0.2	6.5	80	
35Q050	3/12/2007	13:40	302	4400		0.014		4.63		0.137	9.94		8.41	732.5	65		13.2	0.179	4.67	60	
35Q050	4/9/2007	12:55	302	1500		0.01	U	4.21		0.178	9.84		8.67	724.9	110		14.2	0.247	5.26	100	
35Q050	5/14/2007	14:50	314	3200		0.063		3.24		0.199	8.57		8.5	735.1	67		19.3	0.263	3.16	50	
35Q050	6/18/2007	14:52	303	530		0.01	U	1.3		0.102	8.25		8.4	731.3	21		19.4	0.129	1.4	13	
35Q050	7/16/2007	16:10	297	570		0.01	U	0.434		0.113	7.16		8.39	725.9	14		25.9	0.11	0.58	5.3	
35Q050	8/21/2007	14:40	307	160		0.01	U	0.412		0.0906	8.1		8.4	730.5	10		20.7	0.0935	0.525	4.9	
35Q050	9/4/2007	14:20	304	200		0.01	U	0.328		0.0791	8.18		8.45	725.9	10		20.6	0.081	0.467	3.9	
35R050	11/6/2006	10:15	439	23		0.01	U	0.248		0.154	7.07		7.66	726.9	165		12.7	0.22	0.449	85	J
35R050	12/11/2006	11:40	401	800	J	0.037		0.741		0.172	11.16		8.2	733.3	88		6.4	0.19	0.969	27	
35R050	1/22/2007	11:45	398	110		0.01	U	1.6		0.151	12.02		8.19	736.9	3		4.6	0.225	2.62	65	
35R050	2/20/2007	10:40	389	510		0.01	U	2.36		0.144	10.05		8.26	723.1	137		7.5	0.167	2.19	29	
35R050	3/12/2007	11:00	388	1600	J	0.01	U	1.21		0.118	9.54		8.22	731.5	17		11.1	0.137	2.25	2.7	
35R050	4/9/2007	10:35	374	1800		0.01	U	0.536		0.109	9.64		8.4	722.4	520		11.9	0.145	0.732	32	
35R050	5/14/2007	10:55	396	470		0.01	U	0.187		0.0983	9.38		8.33	735.6	16		13.5	0.117	0.33	7.1	
35R050	6/18/2007	10:50	408	670		0.01	U	0.105		0.102	8.35		8.23	729.0	69		16.3	0.133	0.266	19	
35R050	7/16/2007	12:05	462	830		0.084		0.15		0.0822	0.99		8.01	726.7	199		21.4	0.129	0.488	19	

Site ID	date	time	COND (umhos/cm)	FC (#/100ml)		NH3_N (mg/L)		NO2_NO3 (mg/L)		OP_DIS (mg/L)	OXYGEN (mg/L)		PH (pH)	PRESS (mm/Hg)	SUSSOL (mg/L)		TEMP (deg C)	TP_P_ICP (mg/L)	TPN (mg/L)	TURB (NTU)	
35R120	10/9/2006	9:55	376	11		0.02	U	0.01	U	0.0592			8.3	732.8	4		9.8	0.0556	0.096	0.5	U
35R120	11/6/2006	9:55	382	16		0.01	U	0.357		0.115	9.09		8.14	717.8	5		12.5	0.124	0.523	1.1	
35R120	12/11/2006	11:15	360	280	J	0.044		0.839		0.139	11.57		8.37	724.2	3		6.3	0.144	1.07	0.6	
35R120	1/22/2007	11:10	360	66		0.01	U	1.73		0.121	12.82	J	8.57	728.2	32	J	4.6	0.139	2.29	7.5	
35R120	2/20/2007	10:20	373	15		0.01	U	2.61		0.118	11.45		8.41	713.2	8		7.6	0.126	2.16	5	
35R120	3/12/2007	10:40	366	1400	J	0.01	U	1.92		0.0954	10.35		8.38	722.9	11		11.7	0.107	1.92	2.5	
35R120	4/9/2007	10:05	354	500		0.01	U	0.82		0.0851	10.76		8.62	713.0	10		12.2	0.114	0.921	3.5	
35R120	5/14/2007	10:30	377	3300		0.013		0.124		0.109	9.59		8.55	726.9	42		15.4	0.159	3.02	13	
35R120	6/18/2007	10:25	350	120		0.01	U	0.01	U	0.0465	9.85		8.82	720.6	1		17.7	0.0542	0.12	0.7	
35R120	7/16/2007	11:25	365	200		0.01	U	0.01	U	0.0537	8.35		8.66	719.1	20		24.6	0.0551	0.14	2.5	
35R120	8/21/2007	10:45	383	130	J	0.016		0.01	U	0.065	9		8.37	720.3	2		19.6	0.0651	0.15	1.2	
35R120	9/4/2007	10:35	400	31		0.01	U	0.205		0.187	8.58		8.41	716.3	5		18.9	0.203	0.447	5.3	
35S060	10/9/2006	10:50	296	56		0.01	U	1.31		0.0696	10.8		8.3	739.6	3		9.7	0.0661	1.42	3	
35S060	11/6/2006	11:00	315	40		0.01	U	0.972		0.0435	9.19		8.08	726.4	23		14.5	0.0487	1.15	2	
35S060	12/11/2006	12:20	309	41		0.01	U	2.8		0.087	11.57		8.31	733.0	2		6.9	0.0844	2.86	0.6	
35S060	1/22/2007	12:30	324	43		0.01	U	3.89		0.092	11.71		8.42	736.9	20		7.5	0.105	3.9	6.5	
35S060	2/20/2007	11:20	322	53		0.01	U	4.15		0.0869	11.15		8.38	722.6	24		8.8	0.0924	4.88	11	
35S060	3/12/2007	11:40	307	78		0.01	U	3.78		0.0635	10.25		8.42	731.0	21		12.4	0.0876	3.21	7.5	
35S060	4/9/2007	11:20	308	490		0.01	U	3.31		0.0861	10.76		8.49	722.9	39		11.4	0.108	3.47	8.2	
35S060	5/14/2007	13:05	301	3000		0.024		2.34		0.105	9.69		8.43	733.8	92		14.5	0.134	2.57	45	J
35S060	6/18/2007	12:50	290	320		0.01	U	1.68		0.0877	9.45		8.37	728.7	72		15.4	0.115	1.77	18	
35S060	7/16/2007	14:10	277	2000		0.01	U	1.56		0.0937	7.66		8.4	724.2	313		20.5	0.131	1.58	95	
35S060	8/21/2007	13:15	286	2800	J	0.01	U	1.25		0.079	8.3		8.35	727.7	311		17.4	0.0998	1.39	230	J
35S060	9/4/2007	12:55	279	150		0.01	U	1.1		0.0765	8.68		8.43	723.1	61		17.6	0.0823	1.24	26	
35U070	10/10/2006	11:40	474	64		0.02	U	0.05		0.014	13.33		8.58	735.8	2		8.6	0.0137	0.17	1.4	
35U070	11/7/2006	12:10	477	560		0.022		0.61		0.0704	10.8		8.46	723.1	6		16	0.0884	0.929	1.9	
35U070	12/12/2006	12:15	471	43		0.013		1.2		0.0666	13.6		8.66	738.1	5		6.4	0.0721	1.37	1.4	
35U070	1/23/2007	11:50	517	4100	J	0.058		1.72		0.0904	12.62		8.48	740.4	29		5.8	0.119	2.89	13	
35U070	2/21/2007	12:20	540	280		0.022		3		0.115	12.66		8.42	731.0	33		5.7	0.148	3.57	29	
35U070	3/13/2007	13:20	495	100		0.01	U	1.1		0.0397	13.86		8.79	735.3	14		12	0.0554	1.33	8.9	
35U070	4/10/2007	12:00	479	300		0.01	U	0.429		0.011	14.05		8.96	731.0	13		11.6	0.0266	0.607	6.8	
35U070	5/15/2007	12:15	437	54		0.01	U	0.021		0.023	14.59		9.23	731.5	9		21.8	0.0411	0.265	5.3	
35U070	6/20/2007	12:00	418	360		0.01	U	0.01	U	0.029	12.13		9.05	731.5	10		25	0.046	0.263	5	
35U070	7/17/2007	11:45	410	1400		0.01	U	0.01	U	0.023	12.93		8.96	729.0	7		25.2	0.0291	0.28	1.6	
35U070	8/22/2007	12:00	453	110		0.014		0.01	U	0.015	12.2		8.77	729.5	2		23	0.0196	0.23	0.9	
35U070	9/5/2007	11:15	453	200		0.01	U	0.01	U	0.014	12.82		8.64	729.5	2		20.1	0.0137	0.18	1.3	

Site ID	date	time	COND (umhos/cm)	FC (#/100ml)		NH3_N (mg/L)		NO2_NO3 (mg/L)		OP_DIS (mg/L)	OXYGEN (mg/L)		PH (pH)	PRESS (mm/Hg)	SUSSOL (mg/L)		TEMP (deg C)	TP_P_ICP (mg/L)	TPN (mg/L)	TURB (NTU)	
35U090	10/10/2006	10:35	744	540		0.025		3.12		0.028			8.17	723.9	376	J	4.5	0.198	2.74	55	
35U090	11/7/2006	11:05	757	22000	J	0.108		1.84		0.176	5.25		7.93	713.7	66		14.6	0.324	3.39	40	
35U090	12/12/2006	11:20	561	5800	J	0.134		4.08		0.112	10.96		8.2	725.7	125		6.3	0.217	4.12	57	
35U090	1/23/2007	11:00	574	28000	J	0.104		5.3		0.232	11.51		8.31	729.0	111		6.6	0.391	5.22	36	
35U090	2/21/2007	11:20	671	370		0.052		4.7		0.176	11.05		8.15	718.6	43		6	0.223	4.72	28	
35U090	3/13/2007	12:25	545	2600	J	0.037		4.59		0.077	13.36		8.79	723.9	70		11.7	0.179	5.64	36	
35U090	4/10/2007	11:10	529	2100		0.013		4.88		0.0426	13.12		8.77	719.1	10		12	0.101	5.49	8.8	
35U090	5/15/2007	11:20	682	8900		0.109		2.03		0.0638	10.3		8.53	720.6	24		23.9	0.121	4.09	14	
35U090	6/20/2007	11:00	657	9300		0.057		0.037		0.0371	9.05		8.33	720.1	22		25.8	0.0889	0.755	4.5	
35U090	7/17/2007	10:50	706	2400		0.057		0.01	U	0.0508	3.08		7.69	718.8	144		21.9	0.0686	0.648	4.4	
35U090	8/22/2007	11:00	706	1800		0.017		0.01	U	0.026	7.4		8	717.8	246		22.2	0.0717	0.321	80	
35U090	9/5/2007	10:15	709	4200		0.01	U	0.01	U	0.023	8.28		8.15	717.6	40		18.3	0.0352	0.29	27	
35U140	10/10/2006	9:50	627	330		0.01	U	0.012		0.063	11.61		8.39	715.0	485		4.3	0.192	0.312	110	
35U140	11/7/2006	10:20	824	2200		0.13		1.79		0.637	5.75		8.15	705.1	180		14.4	0.969	3.73	250	
35U140	12/12/2006	10:30	719	1400		0.252		3.35		0.73	11.47		8.56	717.6	69		0.3	0.803	4.02	160	
35U140	2/21/2007	10:25	888	60		0.027		4.01		0.306	12.56		8.48	710.9	121		3.4	0.406	4.11	65	
35U140	3/13/2007	10:25	826	440		0.01	U	2.86		0.215	12.26		8.56	715.0	51		8.2	0.335	3.66	34	
35U140	4/10/2007	10:35	750	180		0.012	J	3.74		0.0906	15.58		8.79	709.2	10		7.3	0.158	3.54	7.9	
35U140	5/15/2007	10:45	647	1300		0.194		1.29		0.0906	11.22		8.58	712.0	312		19.3	0.272	1.97	160	
35U140	6/20/2007	10:20	592	150		0.01	U	0.01	U	0.0552	8.85		8.4	711.5	28		21.8	0.112	0.481	6.3	
35U140	7/17/2007	10:15	661	9300	J	0.254		0.014		0.206	4.97		7.99	708.4	48		21.7	0.387	1.12	75	
35U190	11/7/2006	8:30	652	1100		0.102		2.75		0.248	5.55		8	701.8	22		13.3	0.384	3.06	15	
35U190	12/12/2006	8:35	657	300		0.024		4.73		0.174	11.37		8.39	712.5	18		4	0.23	4.59	17	
35U190	1/23/2007	9:00	797	51		0.022		3.99		0.195	11.01		8.06	715.5	28		3.2	0.344	3.46	20	
35U190	2/21/2007	8:30	757	21		0.01	U	3.96		0.228	11.35		8.05	707.1	48		1.4	0.269	4.49	25	
35U190	3/13/2007	8:45	767	31		0.01	U	3.8		0.238	9.24		8.07	711.5	72		6.2	0.359	4.7	70	
35U190	4/10/2007	8:35	758	48		0.01	U	3.59		0.187	11.48		8.16	705.6	40		4.8	0.31	4.41	18	
35U190	5/15/2007	8:30	623	880	J	0.01	U	3.21		0.0338	10.91		8.24	712.5	8		12.4	0.0533	2.89	5.4	
35U190	6/20/2007	8:26	657	530		0.01	U	0.1		0.0436	7.16		8.03	709.7	332		16.5	0.0729	0.409	4.4	
35W070	10/10/2006	10:55	537	5		0.01	U	5.25		0.022	11.21		8.05	725.7	8		6	0.0214	4.57	1.5	
35W070	11/7/2006	11:30	563	8		0.048		4.83		0.0969	7.27		7.88	714.2	45		14	0.123	4.57	1.7	
35W070	12/12/2006	11:40	533	4		0.01	U	5.66		0.11	11.26		8.12	727.5	3		5.9	0.126	5.23	1.3	
35W070	1/23/2007	11:15	543	45		0.03		5.71		0.0821	11.41		8.21	730.0	6		6.8	0.098	5.04	5.6	
35W070	2/21/2007	11:40	529	16		0.019		6.34		0.0813	11.95		8.24	719.8	22		4.9	0.0925	6.57	16	
35W070	3/13/2007	12:45	528	96		0.01	U	5.29		0.0499	11.55		8.41	725.2	14		10.5	0.0586	5.62	8.3	
35W070	4/10/2007	11:30	519	120		0.01	U	5.55		0.027	11.89		8.55	721.1	6		8.7	0.0413	4.68	2.8	
35W070	5/15/2007	11:45	515	170		0.016		5.3		0.0666	9.08		8.32	721.6	34		15.7	0.0819	5.26	8.1	
35W070	6/20/2007	11:25	511	1300		0.01	U	4.31		0.044	8.25		8.23	722.4	25		17.5	0.0662	3.76	2.6	
35W070	7/17/2007	11:05	510	230		0.01	U	2.81		0.0395	7.66		8.13	720.1	70		18.3	0.0534	3.19	33	
35W070	8/22/2007	11:20	517	80		0.01	U	3.35		0.0437	8.5		8.13	719.6	55		14.6	0.0666	4.47	85	J
35W070	9/5/2007	10:40	514	88		0.01	U	3.41		0.0348	8.68		8.23	719.1	182		14.6	0.043	3.6	54	

Site ID	date	time	COND (umhos/cm)	FC (#/100ml)		NH3_N (mg/L)		NO2_NO3 (mg/L)		OP_DIS (mg/L)	OXYGEN (mg/L)		PH (pH)	PRESS (mm/Hg)	SUSSOL (mg/L)		TEMP (deg C)	TP_P_ICP (mg/L)	TPN (mg/L)	TURB (NTU)	
35Y070	10/10/2006	9:10	406	80		0.01	U	1.34		0.0673	11.11		8.27	735.3	20		7.8	0.0754	1.45	2.4	
35Y070	11/7/2006	9:40	428	96		0.01	U	1.3		0.134	8.58		8.18	724.7	13		14.4	0.158	1.64	4.8	
35Y070	12/12/2006	9:55	424	75		0.012		2.67		0.134	11.16		8.4	737.4	33		7.3	0.158	2.81	22	
35Y070	1/23/2007	10:10	440	24		0.024		4.02		0.113	12.02		8.56	739.4	41		6.3	0.153	4.29	23	
35Y070	2/21/2007	9:40	434	67		0.01	U	5.3		0.127	12.56		8.42	731.5	92		4	0.173	4.24	60	
35Y070	3/13/2007	9:55	433	390		0.01	U	3.54		0.0993	11.15		8.56	735.1	49		9.7	0.14	3.63	30	
35Y070	4/10/2007	9:55	412	110		0.01	U	3.02		0.0554	12		8.75	729.5	20	J	8.2	0.0824	3.46	11	
35Y070	5/15/2007	10:00	404	200		0.021		2.11		0.0994	10		8.56	732.3	52		15.3	0.131	3.13	23	
35Y070	6/20/2007	9:43	389	620		0.01	U	1.37		0.0798	8.95		8.49	731.3	20		17.5	0.102	1.83	6.4	
35Y070	7/17/2007	9:40	377	650		0.01	U	0.797		0.0902	8.25		8.35	728.2	32		19.4	0.0978	0.958	11	
35Y070	8/22/2007	9:45	387	46		0.01	U	0.812		0.0831	8.8		8.3	729.7	13		16	0.0849	0.905	5.1	
35Y070	9/5/2007	9:20	382	37		0.01	U	0.708		0.0678	8.68		8.42	728.7	20		16.2	0.0727	0.853	4.8	
35Y110	10/10/2006	8:35	441	92		0.02	U	3.73		0.0899	11.61		8.36	725.2	8		5.5	0.0934	2.83	6.2	
35Y110	11/7/2006	9:15	456	20		0.01	U	2.3		0.182	8.48		8.17	714.5	4		13	0.224	2.6	1.4	
35Y110	12/12/2006	9:35	436	39		0.022		3.86		0.168	11.67		8.44	726.4	36		6.5	0.221	4.15	55	
35Y110	1/23/2007	9:40	463	36		0.01	U	4.97		0.137	12.72		8.57	729.0	20		4.8	0.159	4.87	18	
35Y110	2/21/2007	9:15	457	100		0.01	U	5.8		0.146	12.96		8.45	721.6	100		2.4	0.199	5.48	60	
35Y110	3/13/2007	9:25	450	1200	J	0.01	U	4.96		0.125	11.35		8.55	725.2	74		8.3	0.18	6	55	
35Y110	4/10/2007	9:20	426	300		0.01	U	4.83		0.106	12.2		8.6	718.6	24		7	0.162	5.18	20	
35Y110	5/15/2007	9:30	428	380	J	0.016		3.77		0.117	10.3		8.54	723.4	48		13.6	0.155	3.31	34	
35Y110	6/20/2007	9:10	413	640		0.01	U	2.87		0.0981	9.85		8.53	721.6	11		15.8	0.127	2.88	7.1	
35Y110	7/17/2007	8:55	412	360		0.01	U	1.59		0.0908	8.95		8.41	719.6	2		17.9	0.092	1.76	2.1	
35Y110	8/22/2007	9:15	423	570		0.01	U	1.74		0.0945	9		8.26	721.4	1	U	14.3	0.104	1.66	0.9	
35Y110	9/5/2007	8:55	421	1100		0.01	U	1.6		0.0756	8.28		8.29	719.1	1	U	14.7	0.0839	1.58	0.7	
35Y170	10/9/2006	13:25	463	200		0.01	U	5.87		0.131			8.05	716.5	29		9.9	0.142	5.17	5.6	
35Y170	11/6/2006	13:45	465	15		0.01	U	4.61		0.209	7.47		7.98	706.4	85		13.7	0.252	5.15	4.9	
35Y170	12/11/2006	14:30	461	16		0.016		5.88		0.204	10.86		8.2	712.5	53		5.7	0.233	6.03	50	
35Y170	1/22/2007	14:25	465	46		0.027		7.14		0.181	11.51		8.35	716.5	27		6.5	0.229	6.79	17	
35Y170	2/20/2007	13:30	455	70		0.043		7.02		0.189	10.95		8.31	702.6	414		6.8	0.325	8.36	140	
35Y170	3/12/2007	14:10	435	250		0.025		8.56		0.169	9.64		8.26	709.9	520		12.7	0.345	7.03	260	
35Y170	4/9/2007	13:25	420	710		0.024		8.2		0.164	9.53		8.37	702.3	1310		12.4	0.525	7.69	700	
35Y170	5/14/2007	15:30	419	1030		0.052		5.76		0.135	7.55		8.33	712.5	80		21.7	0.193	5.19	34	
35Y170	6/18/2007	15:22	415	410		0.01	U	5.1		0.104	7.36		8.22	709.4	14		21	0.138	4.27	5.7	
35Y170	7/16/2007	16:40	453	460		0.01	U	2.79		0.0973	6.16		8.04	704.9	4		23.3	0.0997	3.04	2.2	
35Y170	8/21/2007	15:00	470	970		0.025		2.55		0.12	5.6		7.88	707.6	52		20.9	0.148	2.28	3.1	
35Y170	9/4/2007	14:50	450	170		0.01	U	1.56		0.0701	6.36		7.97	703.8	17		21.5	0.0958	1.93	4.5	

Site ID	date	time	COND (umhos/cm)	FC (#/100ml)		NH3_N (mg/L)		NO2_NO3 (mg/L)		OP_DIS (mg/L)	OXYGEN (mg/L)		PH (pH)	PRESS (mm/Hg)	SUSSOL (mg/L)		TEMP (deg C)	TP_P_ICP (mg/L)	TPN (mg/L)	TURB (NTU)	
35Z070	10/10/2006	8:10	440	200		0.02	U	2.89		0.0775	11.21		8.28	722.4	7		7	0.0819	3.21	2	
35Z070	11/7/2006	8:55	468	26		0.01	U	2.17		0.112	8.88		8.22	713.2	18		13.3	0.148	2.9	9.9	J
35Z070	12/12/2006	9:15	481	8		0.013		3		0.105	11.26		8.43	724.2	20		6.7	0.133	3.13	16	
35Z070	1/23/2007	9:25	488	4		0.01	U	3.75		0.0904	12.12		8.57	726.2	79		5.8	0.126	3.26	28	
35Z070	2/21/2007	9:00	495	9		0.01	U	3.56		0.0969	12.56		8.47	719.1	51		3.4	0.117	3.73	40	
35Z070	3/13/2007	9:10	486	5		0.01	U	3.74		0.0636	11.35		8.56	722.9	25		8.2	0.0834	3.77	9.7	
35Z070	4/10/2007	9:00	471	47		0.01	U	2.84		0.0608	11.79		8.6	716.8	15		6.7	0.0911	3.3	4.3	J
35Z070	5/15/2007	9:10	452	80	J	0.01	U	2.75		0.0796	10.2		8.46	722.1	72		12.2	0.106	2.41	15	
35Z070	6/20/2007	8:50	430	1200	J	0.012		2.6		0.0765	9.05		8.42	719.8	73		14.7	0.11	2.62	27	
35Z070	7/17/2007	8:37	412	900		0.01	U	1.95		0.098	8.65		8.33	718.8	25		17	0.105	2.08	8.8	
35Z070	8/22/2007	8:55	420	420		0.012		2.01		0.09	9.1		8.27	720.3	37		14.2	0.101	2.05	45	
35Z070	9/5/2007	8:25	420	830		0.01	U	2.19		0.0861	9.09		8.34	717.0	19		14.2	0.095	2.11	6.2	

Appendix F. Garfield Monitoring (EIM Study ID, JROSL007)

Site Name	Date	Time	Rep	Cond		FC		Oxygen		pH		Press	SUSSOL		Temp	Turb	
				umhos/cm		#/100mL		mg/L		pH		in/Hg	mg/L		deg C	NTU	
35Weimer	6/19/2006	12:40:00		324		130		8		8.02		28.61	51	J	14.4	24	
35Weimer	7/18/2006	11:20:00		334		360		7.6		8.11		28.84	65		16.7	22	
35Weimer	7/18/2006	11:30:00	Y	335		450		7.5		8.1		28.84	23		16.5	4.9	
35Weimer	8/15/2006	10:25:00		329		790		7.9		8.17		28.92	53		15	24	J
35M060	6/19/2006	10:40:00		391		280		8.7		8.32		28.97	18		16.4	10	
35M060	7/18/2006	12:00:00		374		220		8.5		8.33		29.22	18		18.9	6.2	
35M060	8/15/2006	10:55:00		480		130		8.2		8.45		29.28	38		15.3	19	
35M060	8/15/2006	11:05:00	Y	476		160		8.3		8.45		29.26	307		15.4	90	
35M060	1/30/2007	10:50:00		386		2				8.31			8		1.9	8.4	
35M060	1/30/2007	11:00:00	Y	390		2				8.35			8		1.9	9	
35N050	6/19/2006	13:00:00		348		540		8.2		8.01		29	30		18.3	13	
35N050	6/19/2006	13:05:00	Y	349		490		8.1		8.06		29.01	14		18.4	2.6	
35N050	7/18/2006	11:50:00		354		2100		8.2		8.13		29.23	62		20.1	11	
35N050	8/15/2006	10:42:00		372		700		9		8.33		29.3	47	J	17.7	370	J
35N050	1/30/2007	10:40:00		330		37				8.22			49		4	9.5	J
35NFDEADMAN	6/19/2006	11:05:00		341		120		9		8.25		28.52	14		15	4.3	
35NFDEADMAN	7/18/2006	10:50:00		339		130		8.8		8.27		28.81	69		16.1	6.9	
35NFDEADMAN	8/15/2006			334		160		8.8		8.39		28.88	95		15	17	
35NFDEADMAN	1/30/2007	10:00:00		314		100				8.22			13		7.8	4.6	
35SFDeadman	6/19/2006	11:20:00		357		230		9		8.37		28.54	8		15.9	4.6	
35SFDeadman	7/18/2006	11:00:00		407		1000		8.4		8.36		28.81	8		17	3	
35SFDeadman	1/30/2007	10:10:00		354		2				8.23			8		1.6	3.9	J
35BELLPLAIN	6/19/2006	11:40:00		417		120	J	9.2		8.32		27.73	99		11.9	15	
35BELLPLAIN	7/18/2006	10:25:00		403		590		9		8.39		28.04	24		13.4	9.5	
35BELLPLAIN	8/15/2006	9:30:00		392		710		9		8.54		28.1	37		13.4	23	
35BELLPLAIN	1/30/2007	9:40:00		399		6				7.95			169		2.1	32	

Appendix G. Asotin Monitoring (EIM Study ID, JROSL008)

Site				Cond		FC		Oxygen		pH		Press		SUSSOL		Temp		Turb	
Name	Date	Time	Rep	uS/cm		#/100mL		mg/L		pH		in/Hg		mg/L		deg C		NTU	
35D070	6/20/2006	12:30:00		97		44		10.4		8.4		28.94		11		15		2.3	
35D070	7/19/2006	9:40:00		119		120		9.9		7.89		29.14		7		17.1		2.7	
35D070	8/16/2006	11:50:00		125		76		9.9		8.83		29.2		11		17.5		1	
35D070	1/29/2007	13:30:00	Y	119		27				8.18				2		4.4		1	
35D070	1/29/2007	13:20:00		118		35				8.1				4		4.3		0.8	
W35ASOC-4	6/20/2006	12:05:00		85		16		9.9		7.97		28.46		8		13.2		2.6	
W35ASOC-4	7/19/2006	11:55:00		104		27		9.4		8.08		28.7		6		16.7		2.1	
W35ASOC-4	8/16/2006	11:25:00		113		80		9.6		8.59		28.76		7		15.7		1.8	
W35ASOC-4	1/29/2007	13:00:00		104		4				7.98				6		4.1		1.2	
W35ASOC-9	6/20/2006	11:40:00		73		12		10		8.01		28.04		4		11.9		1.3	
W35ASOC-9	7/19/2006	11:35:00		90		29		9.3		8.16		28.29		4		15.6		1.5	
W35ASOC-9	8/16/2006	10:50:00		96		26		9.5		8.51		28.35		2		14.5		1.1	
W35ASOC-9	8/16/2006	10:50:00	Y	96		57		9.6		8.47		28.36		6		14.6		1.7	
W35ASOC-9	1/29/2007	12:35:00		91		1				8.28				18		4.5		0.9	
35H050	6/20/2006	10:30:00		246		15		9.6		8.15		28.94		3		14.3		2.1	
35H050	7/19/2006	10:30:00		263		45		9.6		7.96		29.1		3		16.6		1.5	
35H050	8/16/2006	9:45:00		270		10		9.3		8.6		29.18		2		16.8		1	
35H050	1/29/2007	11:20:00		256		1	U			7.91				5		5.3		0.6	
35J050	6/20/2006	10:55:00		241		80		9.6		8.36		28.94		2		15.4		0.7	
35J050	7/19/2006	10:50:00		257		84		9.3		8.34		29.11		1	U	17.2		0.5	U
35J050	8/16/2006	10:10:00		259		55		9.4		8.7		29.18		1	U	17.2		0.5	U
35J050	1/29/2007	11:45:00		245		460				8.32				2		5.7		0.7	
35K050	6/20/2006	13:40:00		225		360		9.7		8.46		28.84		47		16.1		14	
35K050	7/19/2006	13:20:00		226		420		9.4		8.62		29.02		32		18.2		9.4	
35K050	7/19/2006	13:20:00	Y	227		200		9.4		8.64		29.02		36		18.5		9.6	
35K050	8/16/2006	12:35:00		228		320		9.2		8.71		29.17		16		16.7		4	
35K050	1/29/2007	14:30:00		217		160				8.24				43		4.4		11	
ALP2	6/20/2006	14:10:00		195		740		9		8.34		28.37		39		16.3		7.4	

Site Name	Date	Time	Rep	Cond		FC		Oxygen		pH		Press		SUSSOL		Temp		Turb	
				uS/cm		#/100mL		mg/L		pH		in/Hg		mg/L		deg C		NTU	
ALP2	6/20/2006	14:05:00	Y	197		650		9		8.34		28.38		42		16.4		9.9	
ALP2	7/19/2006	13:50:00	U	198		830		8.9		8.52		28.54		12		18		3	
ALP2	8/16/2006	13:05:00	U	195		370		9.5		8.72		28.72		15		16.4		3.5	
ALP2	1/29/2007	14:10:00	U	189		29				8.13				18		6.8		7.8	

Appendix H. Ambient Monitoring Sites Results (EIM Study ID, AMS001E)

Site Name	date	time	COND (umhos/cm)		FC (#/100ml)		NH3_N (mg/L)		NO2_NO3 (mg/L)		OP_DIS (mg/L)		OXYGEN (mg/L)		PH (pH)		PRESS (mm/Hg)		SUSSOL (mg/L)		TEMP (deg C)		TP_P_ICP (mg/L)		TPN (mg/L)		TURB (NTU)	
35A150	6/8/2005	13:40	183		3		0.01	U	0.264		0.02		10.2		8.02		727.964		9		14.3		0.109		0.391		4.7	
35A150	7/13/2005	13:30	195		10		0.01	U	0.113		0.0058		9.89		8.88		742.696		11		21.3		0.0182		0.24		3.6	
35A150	8/3/2005	13:40	286		3		0.013		0.324		0.037		8.06		8.12		746.76		5		22		0.0574		0.566		1.5	
35A150	9/14/2005	13:15	329		9		0.01		0.415		0.0576		9.06		8.45		739.14		2		20		0.0778		0.597		1	
35A150	10/5/2005	15:30	337		14		0.01	U	0.573		0.0846		9.44		8.26		734.06	J	4		15.4		0.0922		0.758		1.7	
35A150	11/9/2005	15:05	371		4		0.01	U	0.641		0.0475		10.6		8.3		735.076		4		9.9		0.0613		0.765		1.4	
35A150	12/7/2005	14:40	402		15		0.01	U	0.821		0.0558		12.4		8.39		742.188		2		4.6		0.072		0.945		1.2	
35A150	1/11/2006	15:30	412		23		0.039		1.15		0.0567		12.5		8.39		729.234		12		3.9		0.159		1.51		7.8	
35A150	2/8/2006	15:30	340		3		0.069		1.06		0.0884		12.4		8.25		738.886		2		4		0.111		1.29		7.2	
35A150	3/8/2006	15:20	312		6		0.022		0.894		0.0498		12.17		8.31		726.694		6		4.9		0.0709		1.07		6.3	
35A150	4/12/2006	15:35	202		3		0.039		0.443		0.0533		11.8		8.18		732.79		39	J	9.8		0.0832		0.651		21	
35A150	5/3/2006	15:05	175		15		0.012		0.266		0.0313		11.1		8.15		735.584		42	J	11.8		0.058		0.413		19	
35A150	6/7/2006	15:45	111		25		0.01	U	0.105		0.021		9.8		8.11		729.996		32		15.6		0.0371		0.2		13	
35A150	7/12/2006	15:40	184		27		0.011		0.177		0.022		8.58		8.33		737.362		21				0.0406		0.327		20	
35A150	8/9/2006	15:45	244		21	J	0.01	U	0.308		0.0343		7.94		8.41		743.966		3		23.1		0.0454		0.515		2.2	
35A150	9/13/2006	14:45	336		6		0.01	U	0.496		0.0581		8.28		8.47		739.648		4		20.5		0.0649		0.716		1.6	
35A150	10/4/2006	14:10	348		35		0.01	U	0.57		0.0664		9				729.742		4		17.1		0.0767		0.753		1.8	
35A150	11/15/2006	14:10	288		14		0.229		0.561		0.0436		11.21		8.29		727.202		6		8.3		0.0577		0.764		3.6	
35A150	12/6/2006	13:00	353		20		0.01	U	0.76		0.0429		12.42		8.35		741.172		3		4.6		0.0488		0.89		1.3	
35A150	1/10/2007	13:55	400		4		0.043		1.04		0.0376		12.52		8.39		729.742		4		4.4		0.0467		1.26		3.2	
35A150	2/14/2007	13:15	339		4		0.011		1.05		0.042		12.95		8.29		733.552		8		3.7		0.055		1.18		8.9	
35A150	3/7/2007	13:35	365		1		0.01	U	0.946		0.0313		12.62		8.55		731.266		5		5.1		0.0452		0.937		3.1	
35A150	4/4/2007	13:30	226		2		0.014		0.399		0.021		11.02		8.5		734.06		11		8.6		0.0347		0.519		5.4	
35A150	5/14/2007	11:50	135		27		0.01	U	0.168		0.011		10.51		8.45		735.33		24		13.3		0.0227		0.278		8.8	
35A150	6/18/2007	11:30	168		9		0.01	U	0.148		0.0096		9.05		8.35		728.98		9		17.5		0.0172		0.28		3	
35A150	7/16/2007	12:45	289		8		0.016		0.352		0.0325		7.46		8.31		725.424		4		22.8		0.0425		0.553		1.8	
35A150	8/21/2007	11:45	332		14	J	0.015		0.412		0.0604		7.9		8.32		727.964		2		20.7		0.0735		0.607		1.5	
35A150	9/4/2007	11:25	354		9		0.012		0.467		0.0674		8.08		8.47		723.646		4		22.6		0.0772		0.693		1.4	

Site Name	date	time	COND (umhos/cm)		FC (#/100ml)		NH3_N (mg/L)		NO2_NO3 (mg/L)		OP_DIS (mg/L)		OXYGEN (mg/L)		PH (pH)		PRESS (mm/Hg)		SUSSOL (mg/L)		TEMP (deg C)		TP_P_ICP (mg/L)		TPN (mg/L)		TURB (NTU)	
35B060	6/7/2005	7:00	131		120	J	0.01	U	0.102		0.0327		10.3		7.94		748.792		9		12.4		0.038		0.19		2.6	
35B060	7/12/2005	10:00	169		40		0.01	U	0.099		0.036		9.38		8.2		752.348		5		19.6		0.0402		0.2		1.3	
35B060	8/2/2005	8:51	175		52		0.01	U	0.036		0.025		9.74		8.07		753.11		5		19.1		0.0335		0.13		1.4	
35B060	9/13/2005	10:00	175		170		0.01	U	0.104		0.029		11.02		8.3		752.856		8		15.1		0.0393		0.17		1.8	
35B060	10/4/2005	9:35	162		23		0.01	U	0.182		0.0408		10.72		8.05		759.46		5		11.9		0.0479		0.269		1.4	
35B060	11/9/2005	11:57	147		9		0.01	U	0.167		0.0405		12.85		8.21		759.46		3		6.8		0.0392		0.21		1	
35B060	12/6/2005	9:05	152		15		0.01	U	0.268		0.0401		12.65		8.04		768.1		7		5		0.0424		0.287		2.1	
35B060	1/10/2006	10:13	128		36		0.01	U	0.414		0.0535		11.44		7.94		743.458		10		8.4		0.0592		0.61		3.3	
35B060	2/7/2006	9:05	121		19		0.01	U	0.383		0.0463		13.06		7.9		762.762		7		4.3		0.053		0.489		3.1	
35B060	3/8/2006	9:27	120		12		0.01	U	0.234		0.0383		12.47		7.93		751.078		7		6.5		0.046		0.299		2.8	
35B060	4/11/2006	8:34	103		41		0.01	U	0.34		0.0496		11.44		7.75		748.792		39		7.9		0.0744		0.449		16	
35B060	5/9/2006	10:00	97		14		0.01	U	0.063		0.0325		12.16		8.17		758.19		10		9.5		0.0379		0.14		3.1	
35B060	6/7/2006	9:14	92		57		0.01	U	0.102		0.0431		9.79		7.86		748.03		20		16		0.0523		0.18		5.1	
35B060	7/18/2006	8:55	150		37		0.01	U	0.171		0.0478		9.27		8.1		753.11		6		17.7		0.0495		0.24		1.4	
35B060	8/15/2006	9:57	157		36	J	0.01	U	0.01	U	0.023		10.3		8.46		748.03		5		18.3		0.0222		0.097		1.3	
35B060	9/12/2006	9:00	161		13		0.01	U	0.159		0.0428		10		7.99		754.38		5		14.2		0.0398		0.22		1.3	
35B060	10/10/2006	9:50	151		16		0.01	U	0.116		0.0335		12.37		8.2		758.444		2		8.8		0.0309		0.17		0.9	
35B060	11/13/2006	10:15	135		12		0.01	U	0.24		0.0433		11.32		7.89		741.426		8		8.5		0.0487		0.339		3	
35B060	12/12/2006	9:04	128		20		0.01	U	0.446		0.0488		11.85		8.02		753.11		11		7.2		0.0489		0.5		2.7	
35B060	1/9/2007	9:20	136		17	J	0.01	U	0.977		0.0516		12.65		7.91		748.284	J	17		6.3		0.0628		1.07		9	
35B060	2/6/2007	8:10	138		140	J	0.014		0.707		0.0661		12.32		7.92		752.094		58		4.7		0.128		0.753		180	
35B060	3/6/2007	8:55	137		14		0.01	U	0.575		0.0388		12.24		7.93		756.92		8		6.4		0.0438		0.649		3.9	
35B060	4/10/2007	9:12	109		95		0.01	U	0.197		0.032		13.06		7.96		753.618		16		7.8		0.0388		0.283		6.5	
35B060	5/7/2007	9:05	108		28		0.01	U	0.037		0.019		10.91		8.06		757.936		12		12.2		0.0266		0.13		2.7	
35B060	6/11/2007	10:00	127		150		0.01	U	0.09		0.0374		10.4		8.21		751.84		11		15.3		0.042		0.18		3.8	
35B060	7/10/2007	9:32	165		81		0.01	U	0.187		0.0455		9.59		8.15		750.062		5		20.4		0.0565		0.291		1.7	
35B060	8/13/2007	9:30	174		44	J	0.01	U	0.05		0.028		10.3		8.3		753.36		6		17.6		0.0275		0.13		1.9	
35B060	9/12/2007	8:45	170		14	J	0.01	U	0.126		0.0322		9.59		7.91		751.078		4		15.8		0.0308		0.22		1.2	

Appendix I. WRIA 35 Temperature Plots

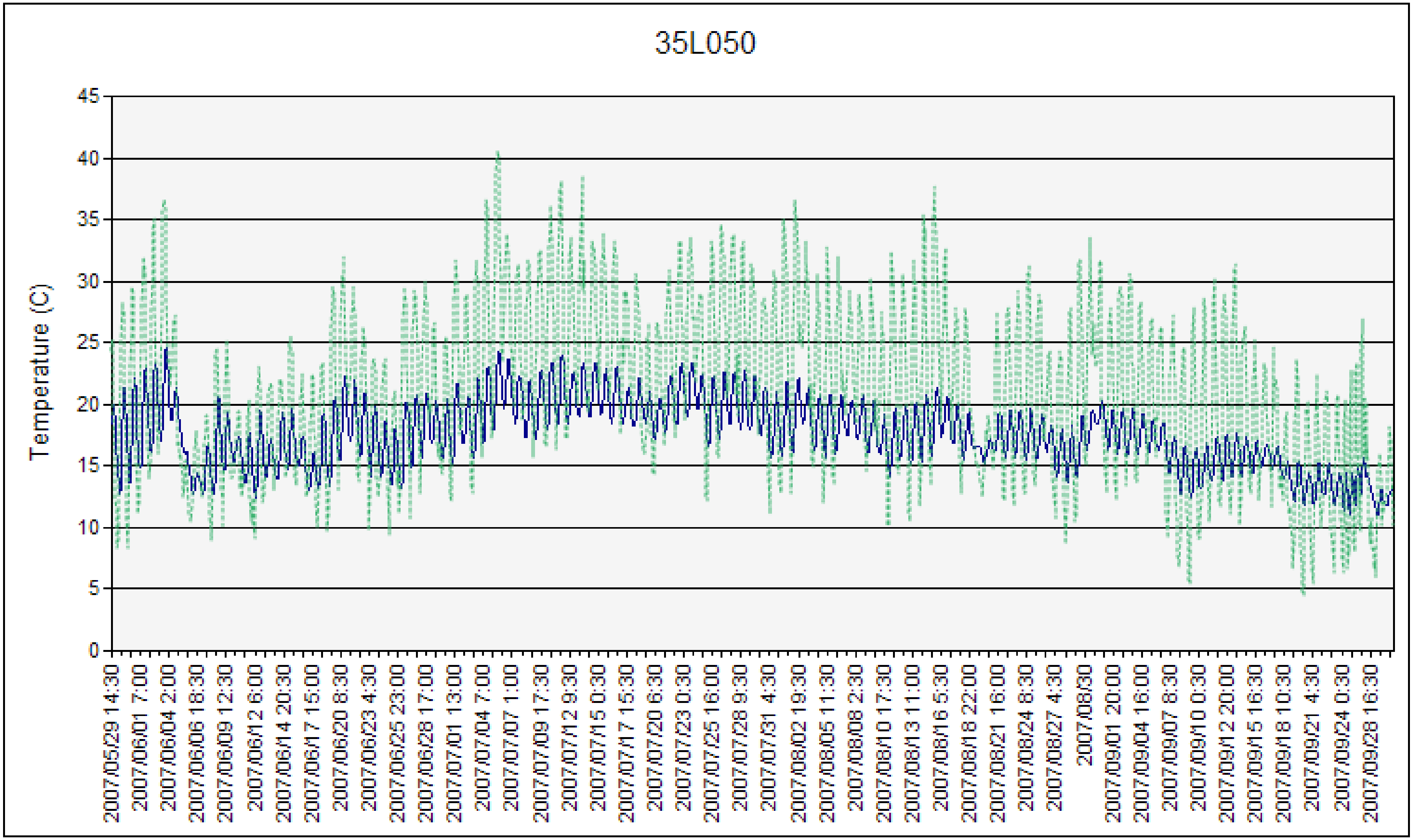

Figure I-1. Almota Creek @ Mouth.

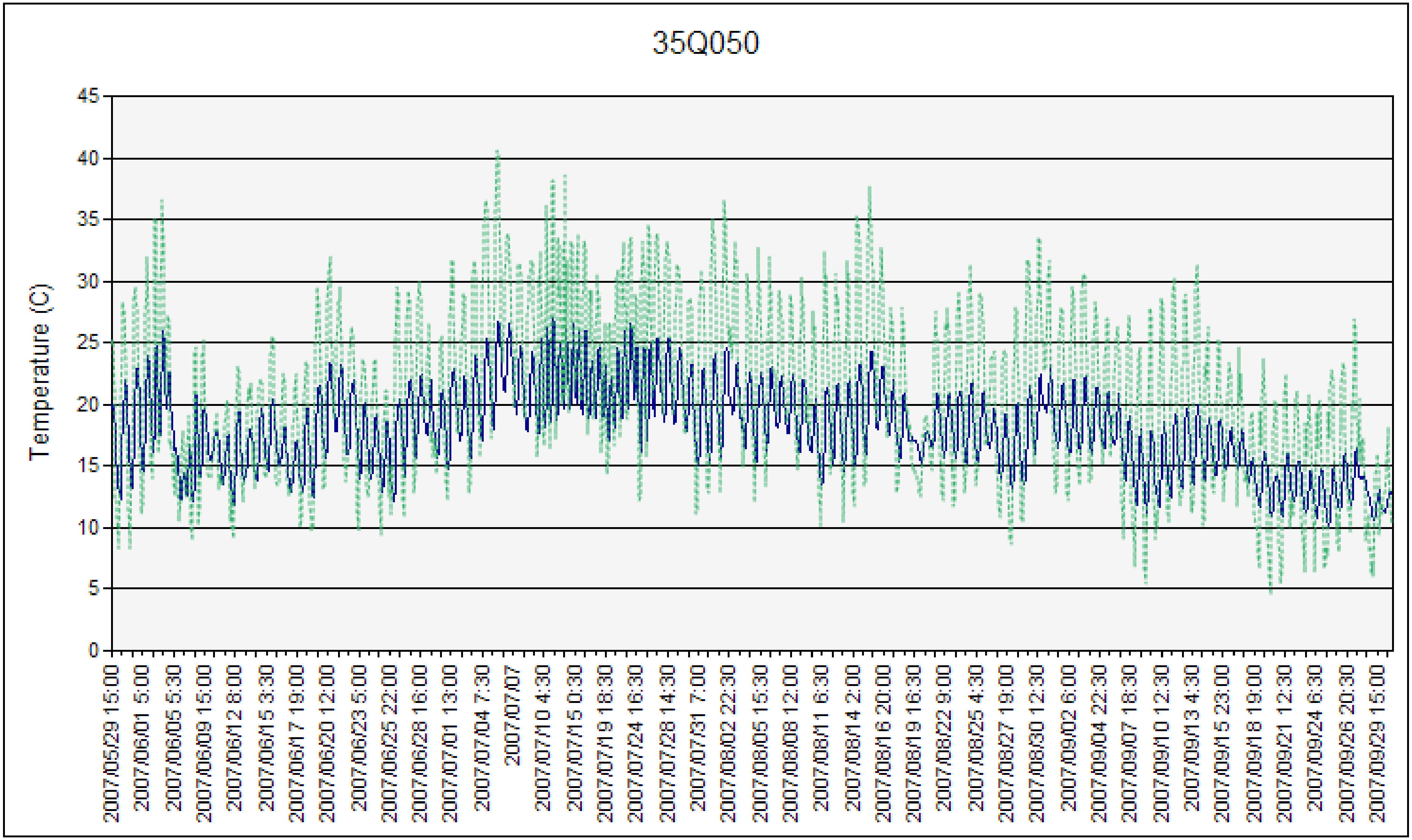

Figure I-2. Little Almota Creek @ mouth.

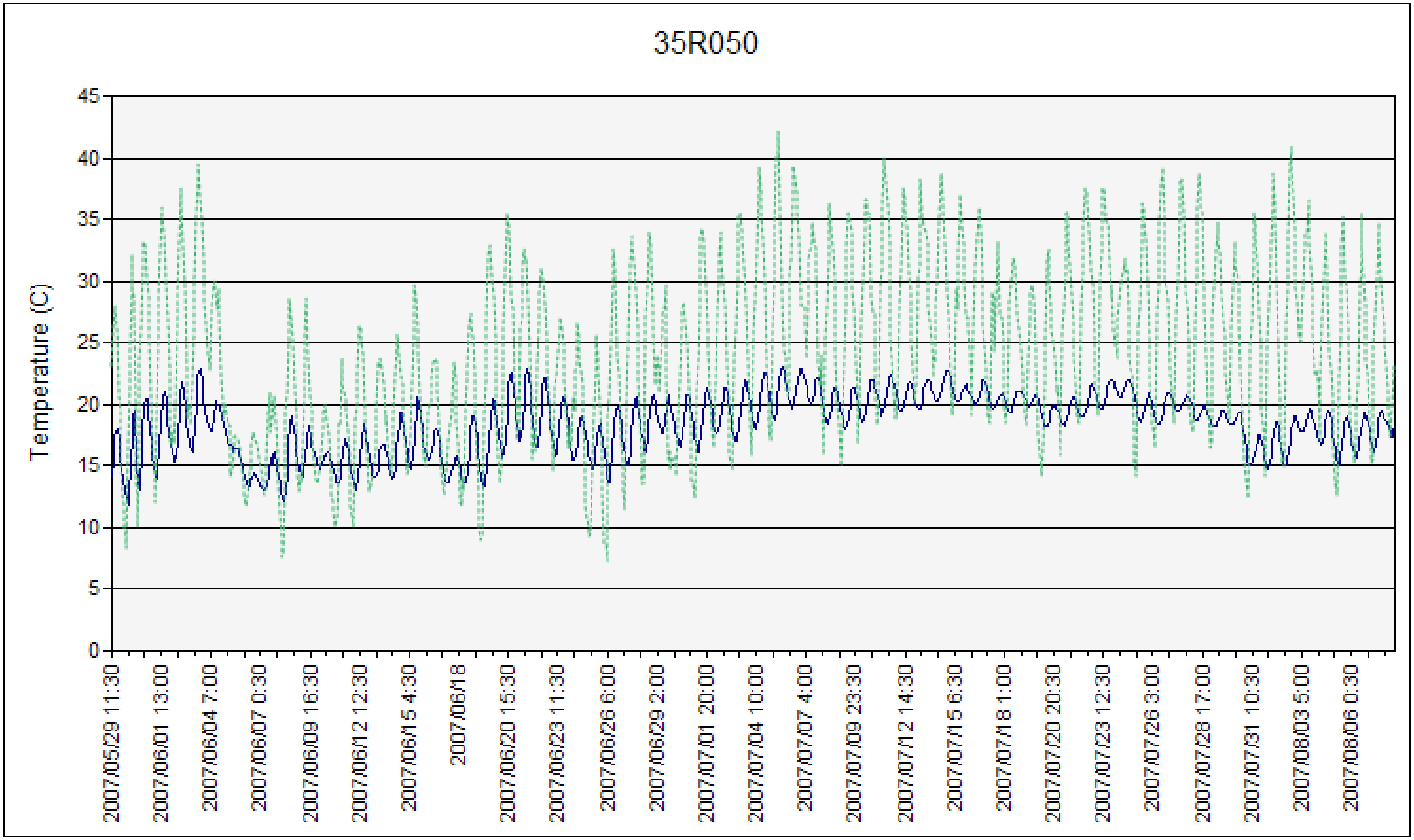

Figure I-3. Steptoe Creek @ Mouth.

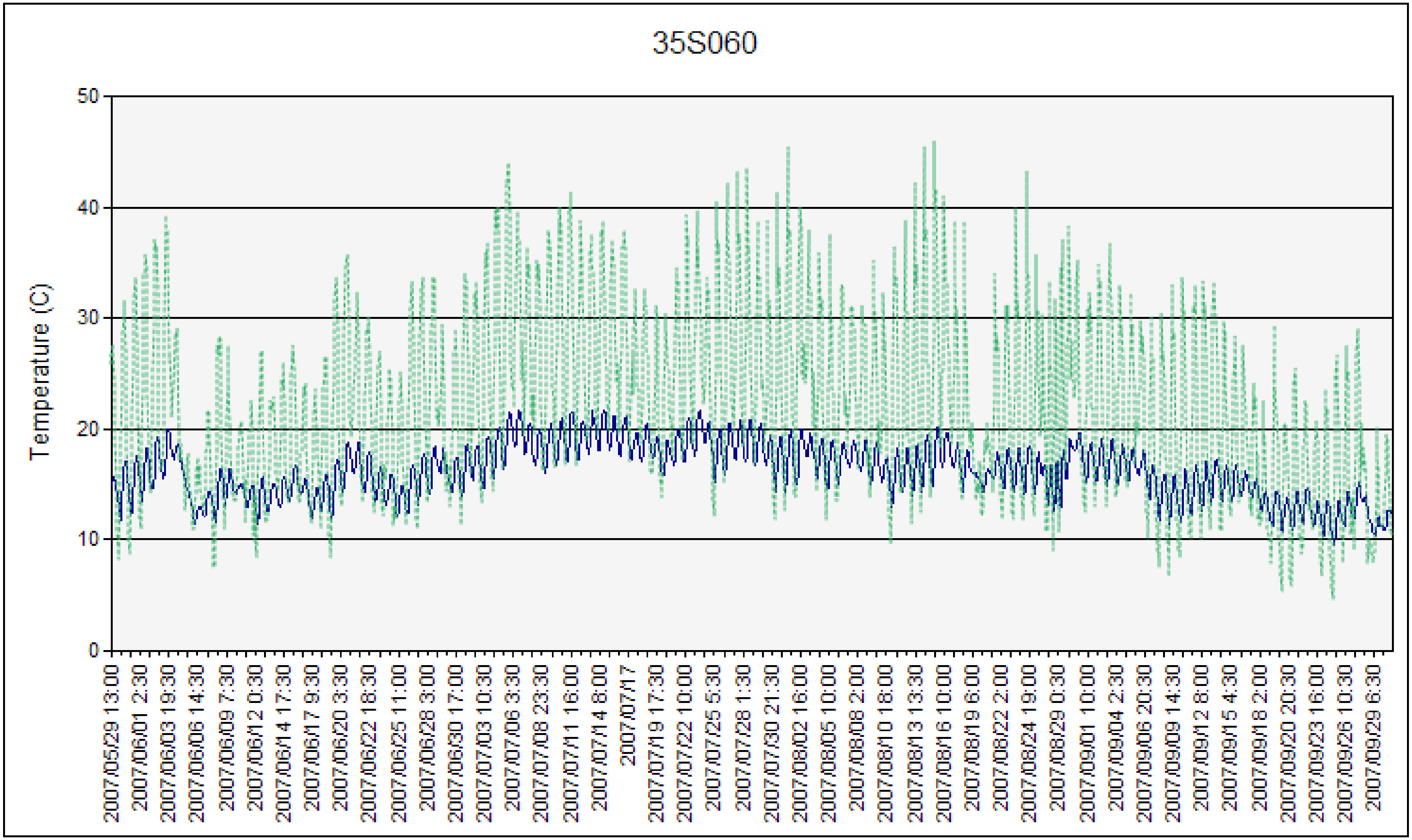

Figure I-4. Wawawai Creek @ Mouth.

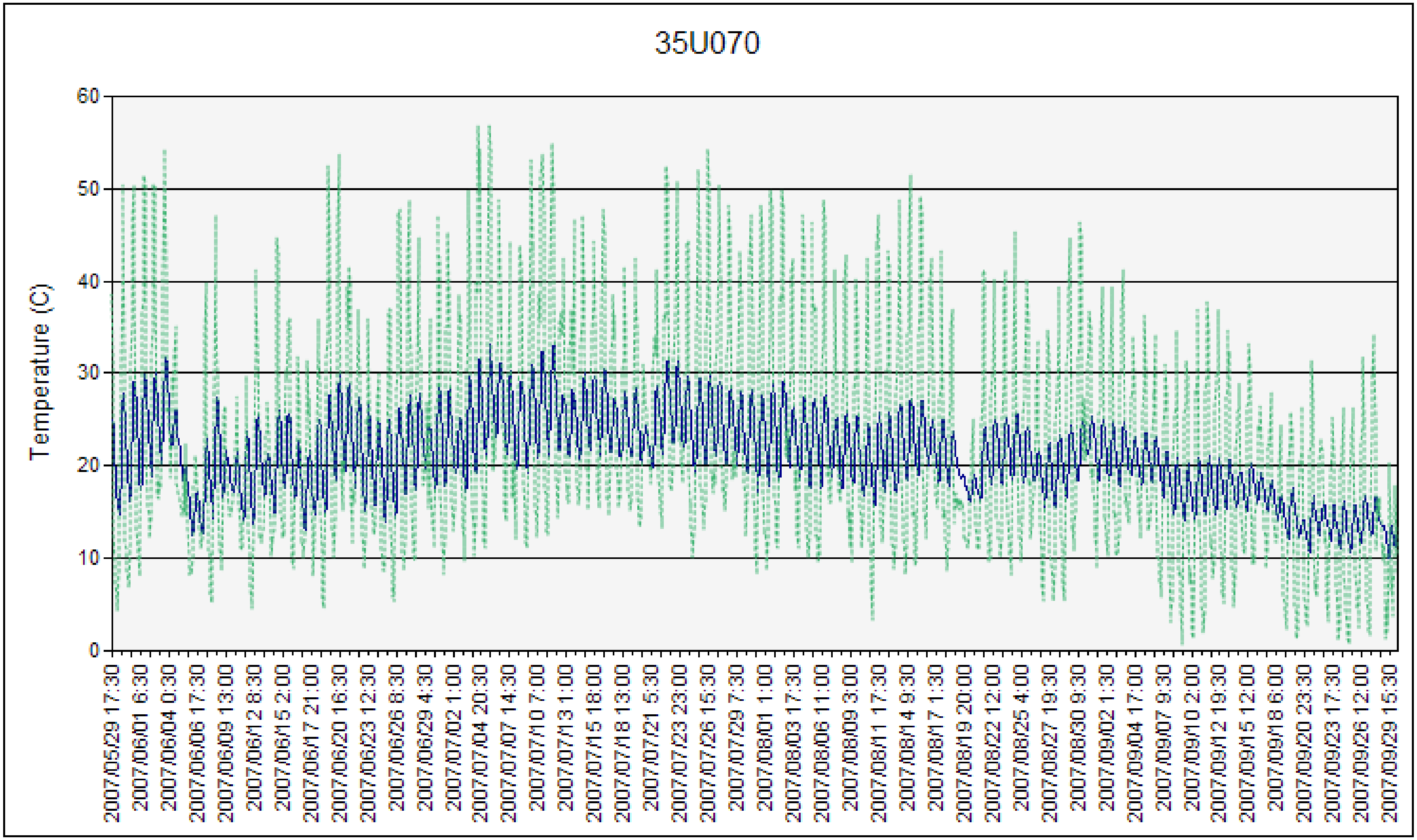

Figure I-5. Alkali Flat Creek nr Mouth.

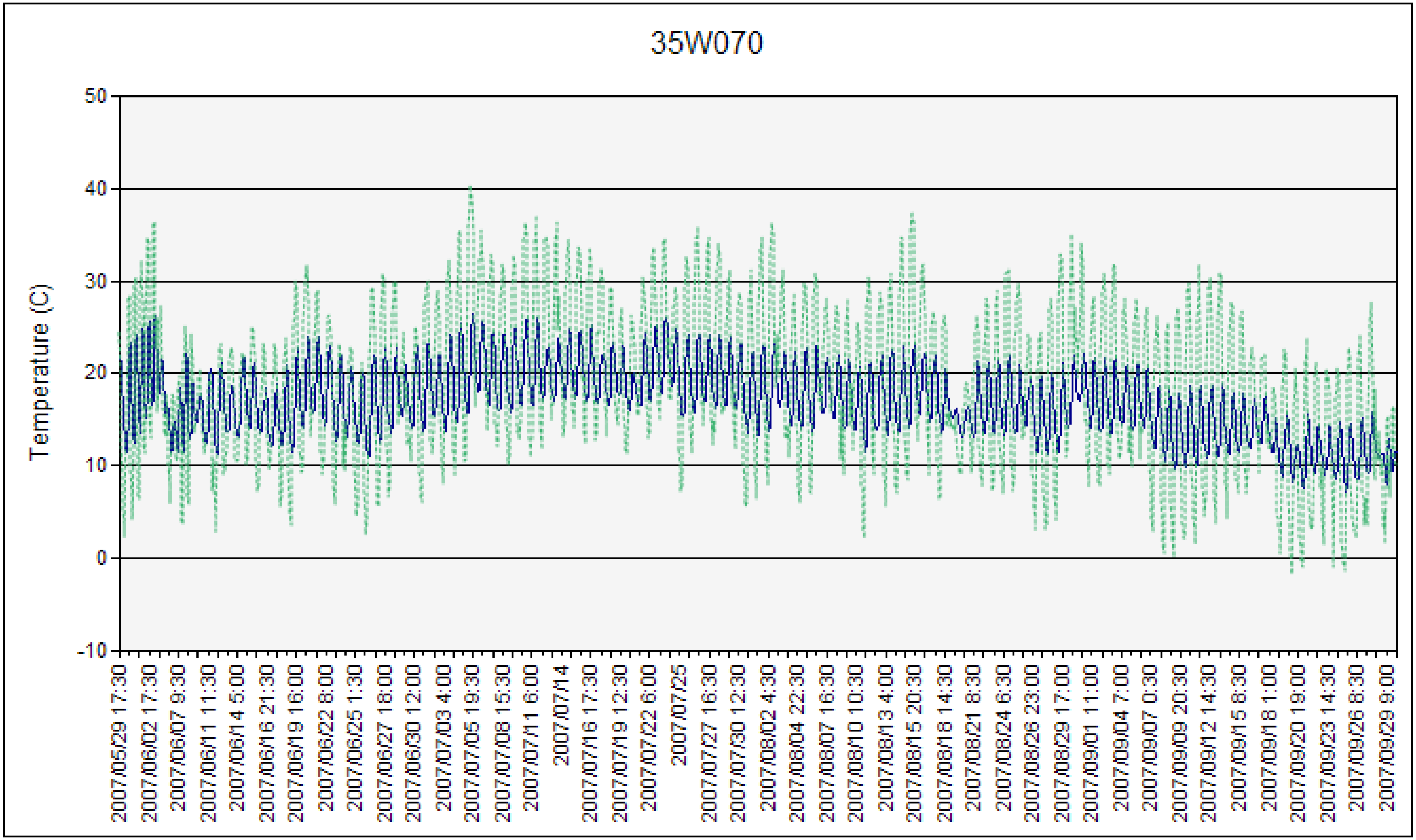

Figure I-6. Mud Flat Creek @ Mouth.

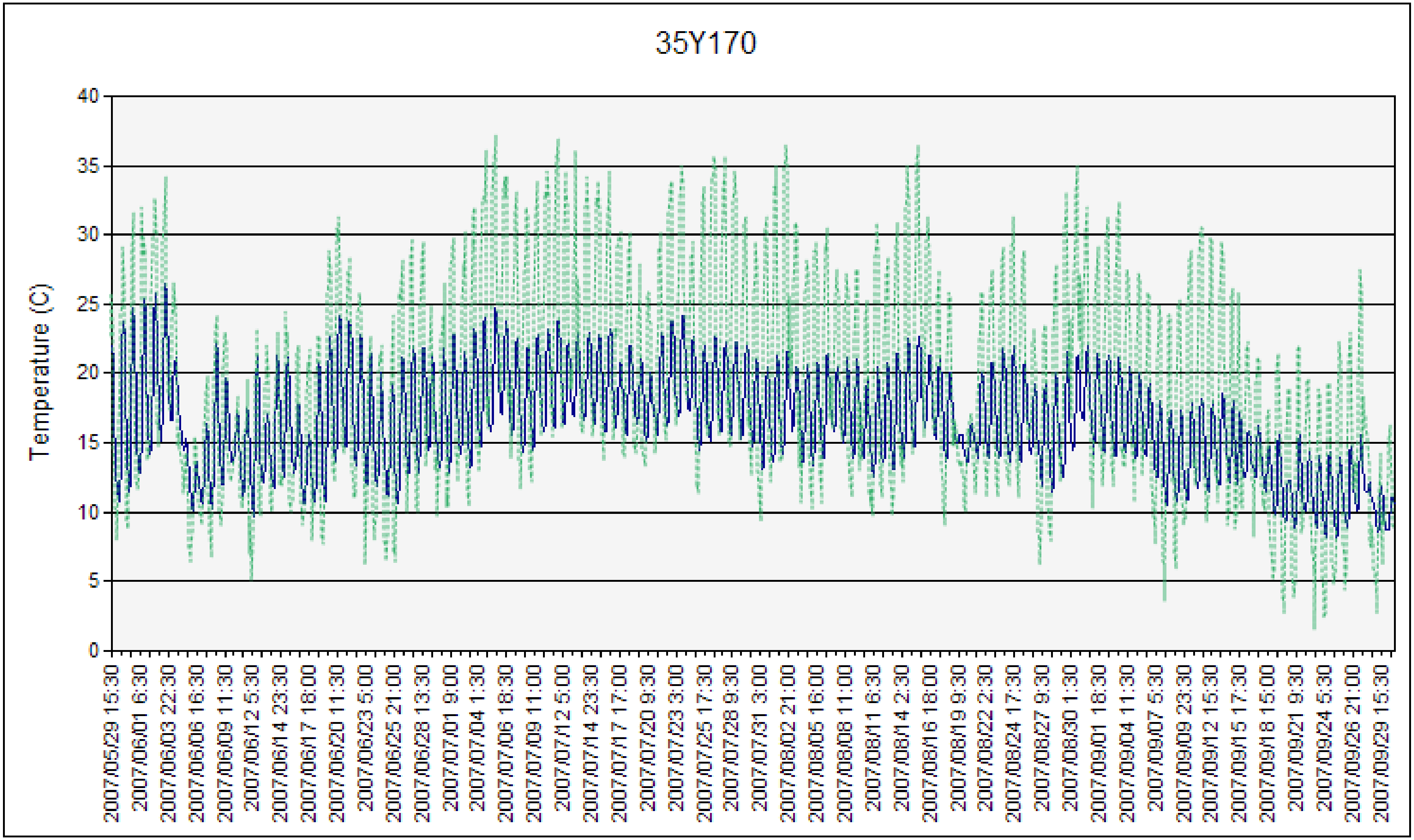

Figure I-7. Penewawa Creek abv Goose Creek.

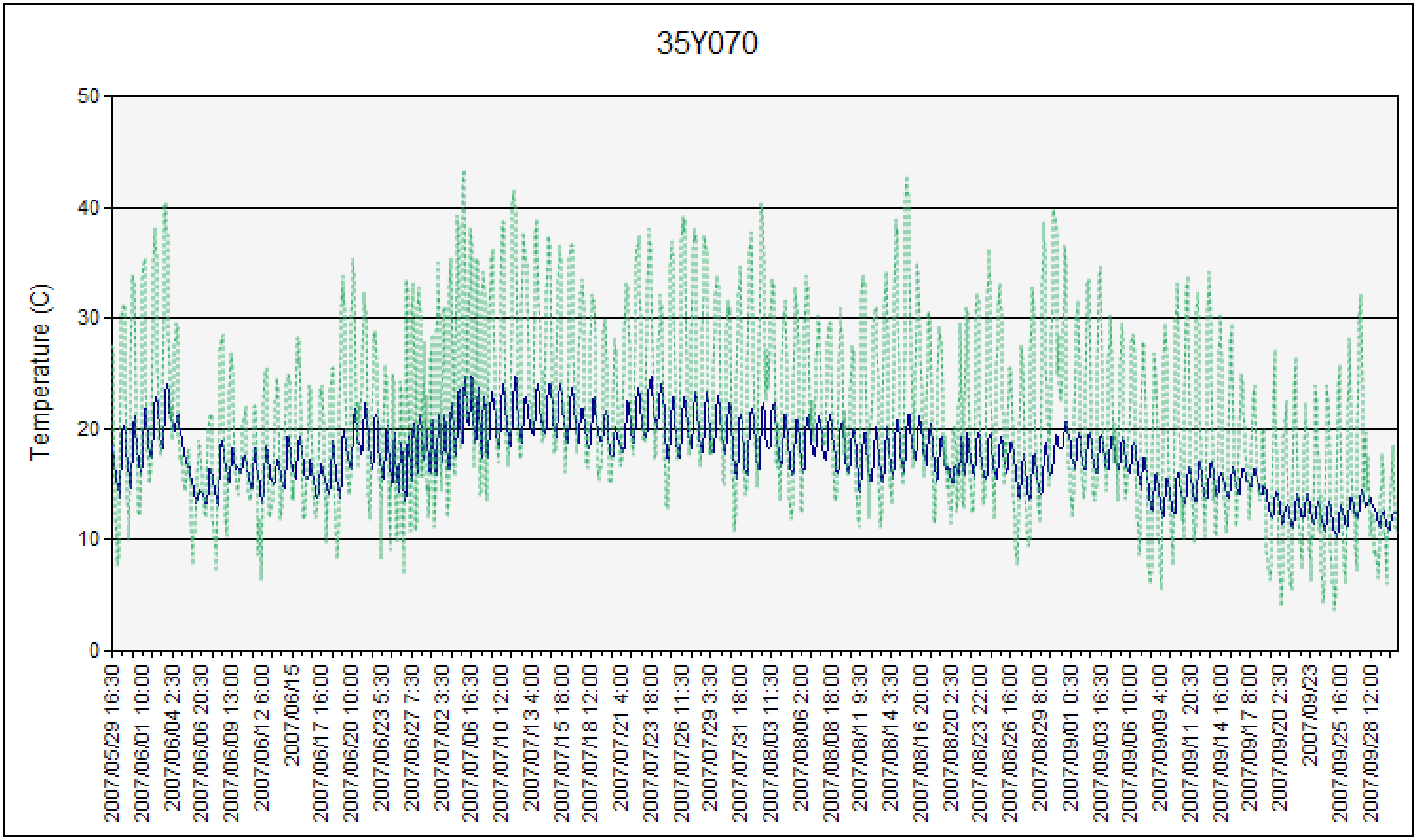

Figure I-8. Penewawa Creek @ Mouth.

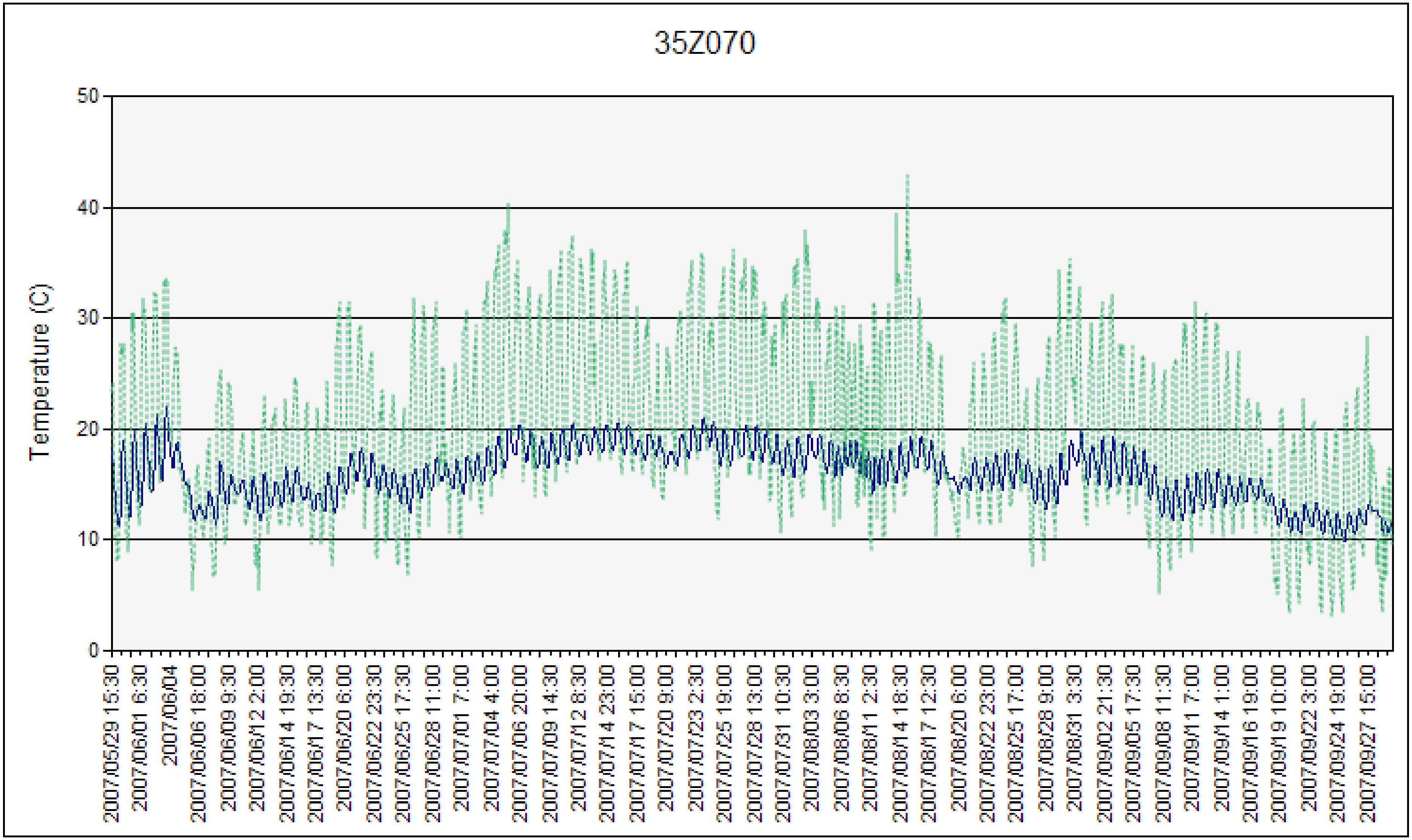

Figure I-9. Little Penewawa Creek @ Mouth.