Skagit Stream Team
2010/11 Water Quality Report

Citizen Monitoring Summary for the Samish Bay, Padilla Bay, Brickyard Creek, Gages Slough, Trumpeter Basin, Kulshan Creek, Nookachamps Creek, and Fisher Creek Watersheds

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2010/11 Water Quality Report

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I. Introduction

This report summarizes the results of the 2010-2011 Skagit Stream Team Program, the thirteenth consecutive year of data collection by volunteers. From October 2010 through August 2011, seventy-three dedicated citizen volunteers monitored the water quality of freshwater streams that drain into Skagit County's Samish Bay, Padilla Bay, and the Skagit River. This past year, sampling continued in: Upper and Lower Samish River, Brickyard Creek, Gages Slough, Kulshan Creek, Trumpeter Basin, Fisher Creek and Nookachamps Creek—all in the Skagit River watershed, and Bay View Drainage, No Name Slough and Joe Leary Slough in the Padilla Bay watershed. This year, four new sites were sampled in the Upper Nookachamps watershed. In addition to regularly sampled watersheds, the Bay View/No Name Storm Team sampled 19 sites on Bay View Ridge during 14 rain events.

This report is meant to provide valuable background WQ data collected at the highest possible level, but it is NOT intended to provide a legal documentation of water quality violations. All data and methods are available to the public.

Background

The Skagit Stream Team Program was established in 1998 to educate and involve local citizens in the protection and stewardship of local streams. It is sponsored by the Skagit Conservation District (SCD) in partnership with the Padilla Bay National Estuarine Research Reserve (PBNERR), City of Mount Vernon, City of Burlington, City of Sedro-Woolley, and Skagit County. Funding was provided by the Washington State Conservation Commission, the Washington State Department of Ecology's Centennial Clean Water Fund Program, and partnering jurisdictions. Volunteers gave of their own time (unpaid) for the duration of the study.

Skagit Stream Team Objectives

- To inspire community stewardship of water resources by educating local citizens about land use and non-point sources of pollution and involving them in the process of water quality data gathering;
- To develop and implement a routine sampling program that can be used to assess water quality trends, characterize the existing water quality of priority freshwater drainages, and determine how water quality conditions compare to State Standards;
- To document improvements in water quality as a result of the implementation of Best Management Practices on farmlands and the repair and/or replacement of failing septic systems;
- To teach community volunteers the sampling and analytical techniques used by environmental professionals, how to manage the data collected and create a database, and the importance of establishing a long-term water quality monitoring program.

Volunteers measured fecal coliform (FC) bacteria, dissolved oxygen (DO), water temperature, turbidity, and total depth. Some of the questions the study hoped to address were:

- How do water quality conditions compare to State Standards in our priority watersheds?
- Could water quality conditions support aquatic life such as salmon?

II. Methods

Efforts were made to insure high quality data from this volunteer-based study. Quality Assurance/Quality Control (QA/QC) plans and laboratory plans were submitted to and approved by the WA Department of Ecology. These plans have since been updated and revised. Volunteers were given ten hours of training before sampling in the field, and were accompanied by a trainer for their first sampling. All analysis and collection methods are detailed in the QA/QC plan, and are available on request.

The Samish watershed was divided into two upper and two lower teams, and was coached by Jennifer Hinderman, SCD. The Padilla Bay watershed had two teams each on No Name Slough, and Joe Leary Slough, coached by Susan Wood, PBNERR. Nookachamps Creek had two upper and two lower teams coached by Susan Wood. Fisher Creek, Kulshan Creek, and Trumpeter Basin each had two teams coached by Kristi Carpenter. Brickyard Creek and Gages Slough each had two teams coached by Cindy Pierce. Bay View Drainage sites were monitored twice monthly by a Padilla Bay AmeriCorps team, coached by Susan Wood.

At each site, samples were usually taken twice monthly. Temperature, dissolved oxygen (DO), and salinity (when applicable) were measured on-site with an electronic YSI Data Probe. Field measurements and samples were taken just below the surface, in the deepest part of the stream that could be reached. Depth was measured on staff gages or with a weighted measuring tape. Samples were tested for Fecal coliform either at the Padilla Bay volunteer lab (Padilla, Samish, Nookachamps, Fisher Creek samples), taken to Edge Analytical Laboratory (Gages Slough), taken to the Mount Vernon Wastewater Treatment Plant (Trumpeter Basin, Kulshan Creek) or the Sedro Woolley Waste Water Treatment Plant (Brickyard Creek) for analysis. Turbidity samples were either taken back to Padilla Bay's lab to be tested, or measured in the field. Volunteers also recorded water appearance/ color. Quality procedures are outlined in more detail in Appendix C.

Quality control checks by staff were conducted periodically in the lab and in the field to assure that volunteers were using proper and consistent protocols, and to emphasize the importance of quality control measures.

The data was recorded on field sheets (See Appendix D) and transferred to a Microsoft Excel spreadsheet by a volunteer. Padilla Bay staff then went back and verified all the original data with the computer entries, making edits as appropriate. Any anomalies were recorded in the metadata.

In accordance with state standards, average annual FC results were calculated using the geometric mean. “Too Numerous To Count” (TNTC) results were assigned a value of 1600 FC/100 ml. Readings of zero FC were entered as 1 FC/100 ml. Volunteer FC lab tests documented both a high and low reading, from which an average was calculated. Averages were calculated for dissolved oxygen, temperature and turbidity levels.

III. Bay View/No Name Storm Team

A new rain event study for fecal coliform bacteria was launched in the Bay View and No Name Slough drainages, with support from our dedicated Storm Team volunteers. Recent and historical data indicate that bacterial contamination is a significant and ongoing problem throughout these two freshwater drainages that flow to Padilla Bay. In addition, marine water sampling at stations located off the Bay View area shoreline (conducted by the State Department of Health), resulted in the decline of a request for commercial shellfish harvesting on Padilla Bay tidelands, and the closure of Bay View State Park for recreational shellfish harvest in 2005. Assessing water quality during high flows is important since storms can flush large volumes of pollutants into streams. Monitoring many sites throughout the drainage during storm events when high fecal coliform numbers are likely will help detect priority areas for clean up as well as provide data that will complement the Stream Team’s regular ambient monitoring program. Special thanks to our Storm Team volunteers for their ongoing commitment – in the worst of weather.

Complete data are found in Appendix B.

IV. Sites

Samish River Watershed

Figure 1. Map of Samish Sites

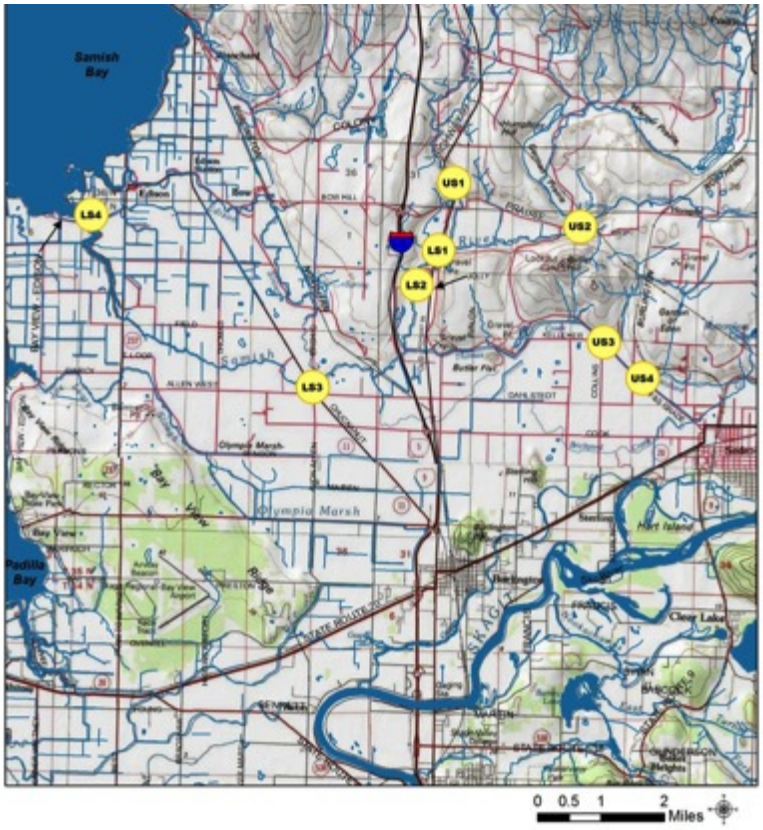


Table 1. Samish Sampling Locations

US #1	Friday Creek @ Pomona Grange Park	N48°33'55.02 W122°20'49.49
US #2	Swede Creek @ Grip Rd	N48°33'17.75 W122°17'16.23
US #3	Thomas Creek @ F&S Grade Rd	N48°31'42.93 W122°16'44.69
US #4	Willard Creek @ 8274 F & S Grade Rd	N48°31'13.65 W122°15'58.07
LS #1	Hwy 99 Bridge over Samish River	N48°31'32.58 W122°20'24.78
LS #2	Samish River @ Jolly Road	N48°32'25.47 W122°20'36.36
LS #3	Chuckanut Bridge over Samish River	N48°31'0.69 W122°22'43.29
LS #4	Mouth of the Samish River (boat dock)	N48°19'11 W122°19'47

Fisher Creek

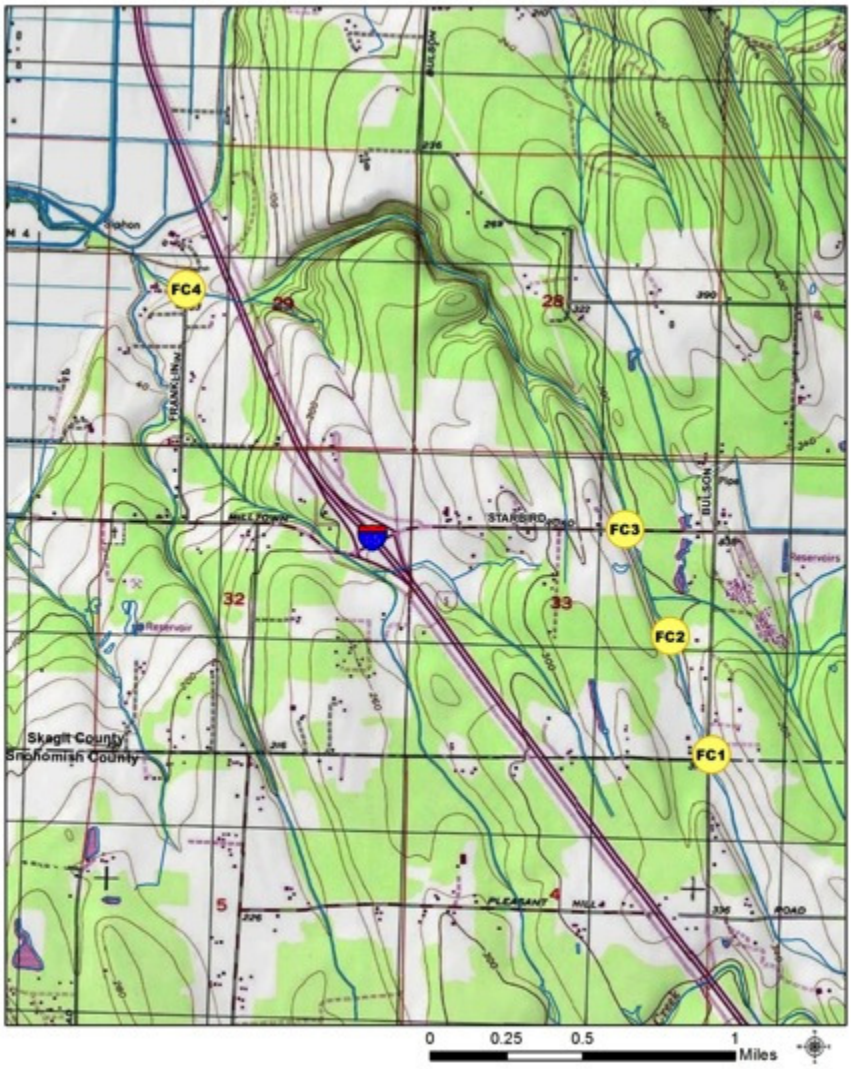


Figure 2. Map of Fisher Creek Sites

Table 2. Fisher Creek Sampling Locations

FC #1	Bulson Road at Skagit/Snohomish County Line	N48°17’53. W122°17’31
FC #2	Private Property Access at 23616 Bulson Road	N48°18’121 W122°17’41
FC #3	Fisher Creek Crossing at Starbird Hill Road	N48°18’30. W122°17’53
FC #4	Fisher Creek at Franklin Road Bridge	N48°19’11 W122°19’47

Nookachamps Creek

Figure 3. Map of Nookachamps Creek Sites

Table 3. Nookachamps Creek Sampling Locations

UN1	Lake McMurray Estates	N48°19'37 W122°13'10
UN2	Big Lake Outflow	N48°23'57 W122°14'24
UN3	Otter Pond Road	N4824'10 W122°13'44
UN4	Knapp Road	N4825'43 W122°15'32
LN1	SR 538 and N Waugh Road	N48°26'10.14 W122°17'29.88
LN2	SR 9 and Babcock	N48°26'45.56 W122°15'8.65
LN3	Swan Road	N48°27'13.79 W122°16'17.84
LN4	Francis Road	N48°28'5.47 W122°17'38.72

No Name Slough

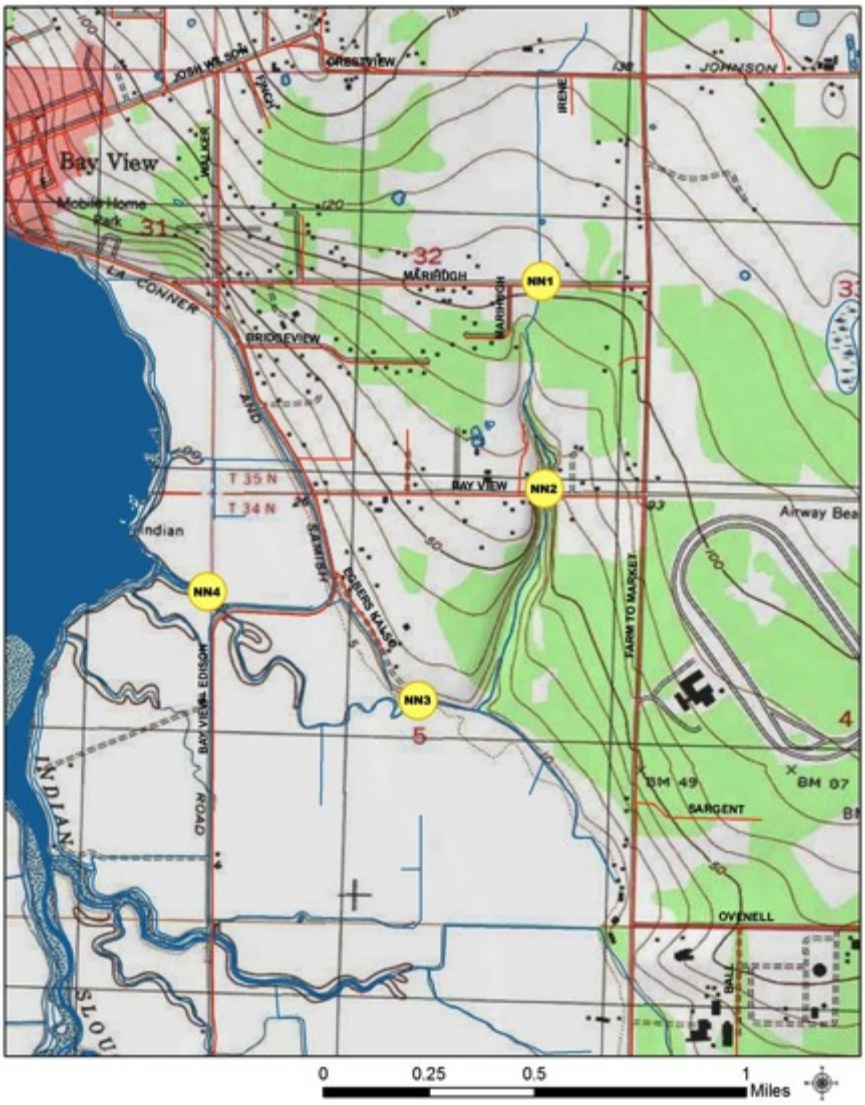


Figure 4. Map of No Name Slough Sites

Table 4. No Name Slough Sampling Locations

NN #1	Marihugh Road Culvert	N48°17’53. W122°17’31
NN #2	Bay View Road Ravine	N48°18’121 W122°17’41
NN #3	Egber’s Field Bridge	N48°18’30. W122°17’53
NN #4	Field Culvert, Bay View-Edison Road	N48°19’11 W122°19’47

Bay View Drainage

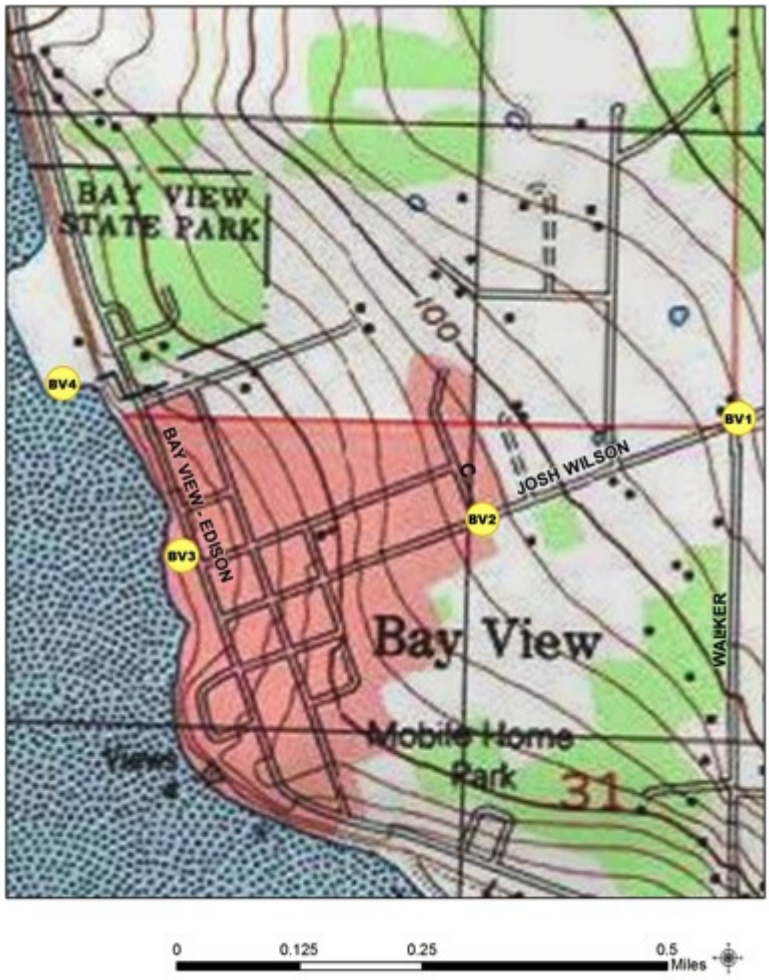


Figure 5. Map of Bay View Sites

Table 5. Bay View Sampling Locations

BV #1	Wilson Road and Walker Road	N48º29'11.94 W122º27'58.92
BV #2	Wilson Road and C Street	N48º29'6.3 W122º28'19.26
BV #3	Culvert at Boat Launch	N48º29'4.02 W122º28'43.2
BV #4	N Beach at Bay View State Park	N48º29'13.02 W122º28'53.04

Joe Leary Slough

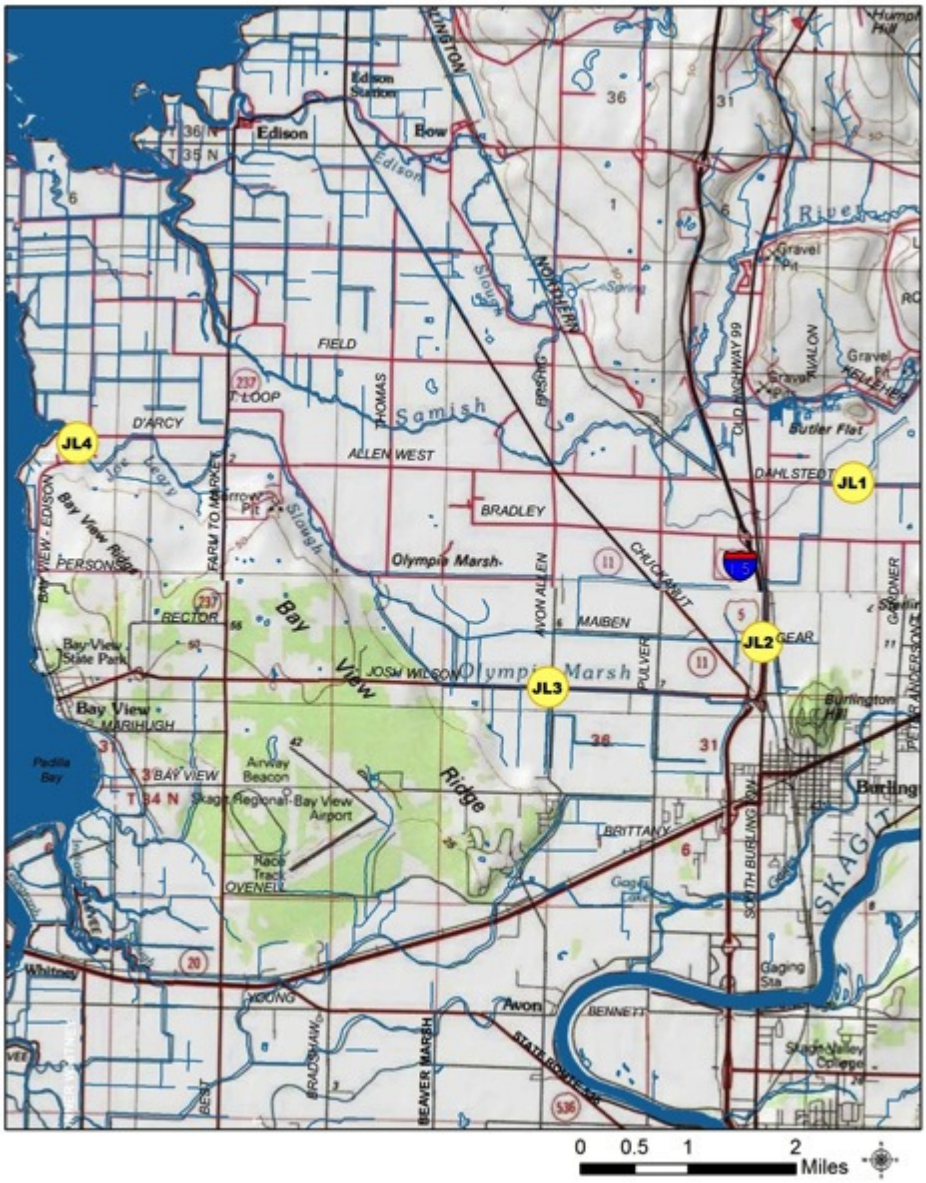
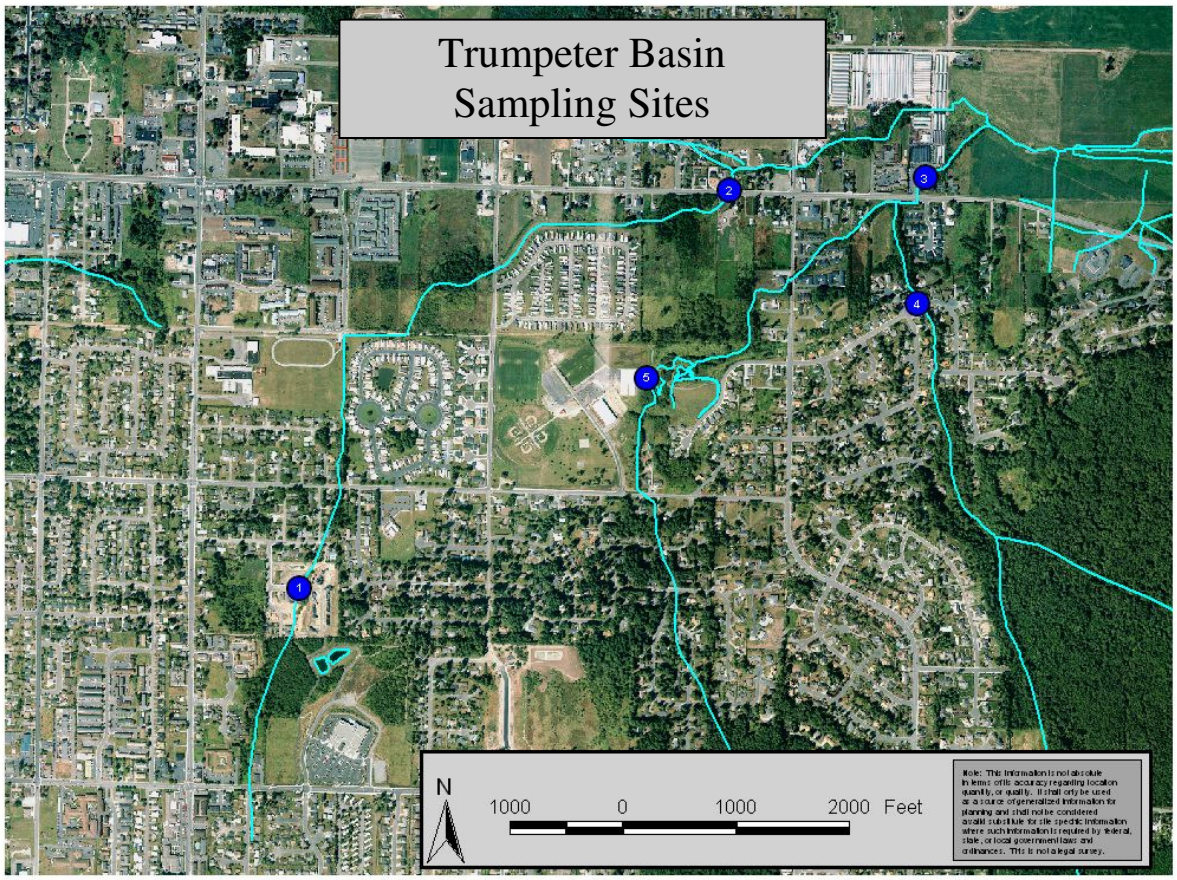


Figure 6. Map of Joe Leary Slough Sites

Table 6. Joe Leary Slough Sampling Locations

JL#1	Dahlstedt Road	N48º30'53.35 W122º19'2.46
JL #2	Hwy 99	N48º29'35.37 W122º20'6.61
JL#3	Wilson Rd and Avon-Allen Rd.	N48º29'11.33 W122º22'41.96
JL #4	Tide Gate	N48º31'4.90 W122º28'27.87



Trumpeter Basin

Figure 7. Map of Trumpeter Basin Sites

Table 7. Trumpeter Basin Sampling Locations, Mount Vernon, WA

TC #1	Stonebridge Adult Community, Logan Creek Bridge	N48º25'33 W122º18'32
TC #2	College Way west of Martin /Waugh Road, Logan Creek	N48º26'09 W122º17'12
TC #3	Summersun Nursery Footbridge, Trumpeter/Thunderbird	N48º26'07 W122º17'17
TC #4	Culvert on Kiowa, Thunderbird	48º25'53 W122º17'12
TC #5	Bakerview Park Footbridge, Trumpeter	N48º25'51 W122º17'48

Kulshan Creek

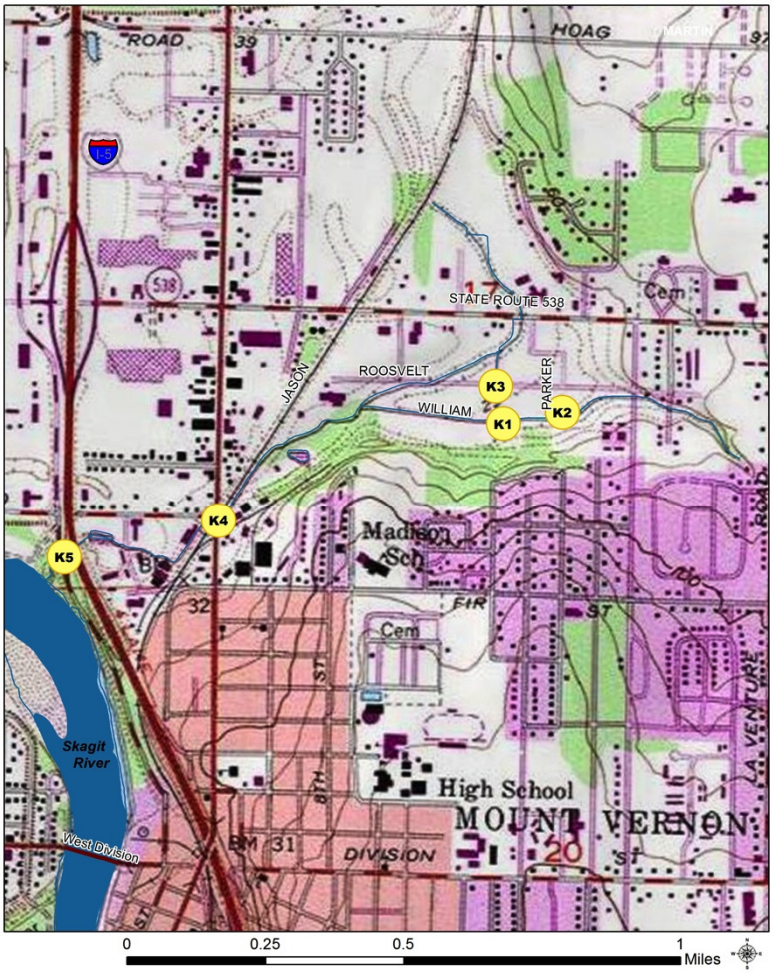


Figure 8. Map of Kulshan Creek Sites

Table 8. Kulshan Creek Sampling Locations, Mount Vernon, WA

KC #1	North end of S 14th /Kulshan Trail	N48º25'59 W122º19'27
KC #2	Parker Way	N48º25'59 W122º19'17
KC #3	S side Roosevelt/1 blk W of Parker Way	N48º26'11 W122º19'25
KC #4	E of Riverside - N of RR crossing	N48º25'54 W122º20'04
KC #5	Freeway Drive at Lions Park	N48º25'43 W122º20'28

Brickyard Creek

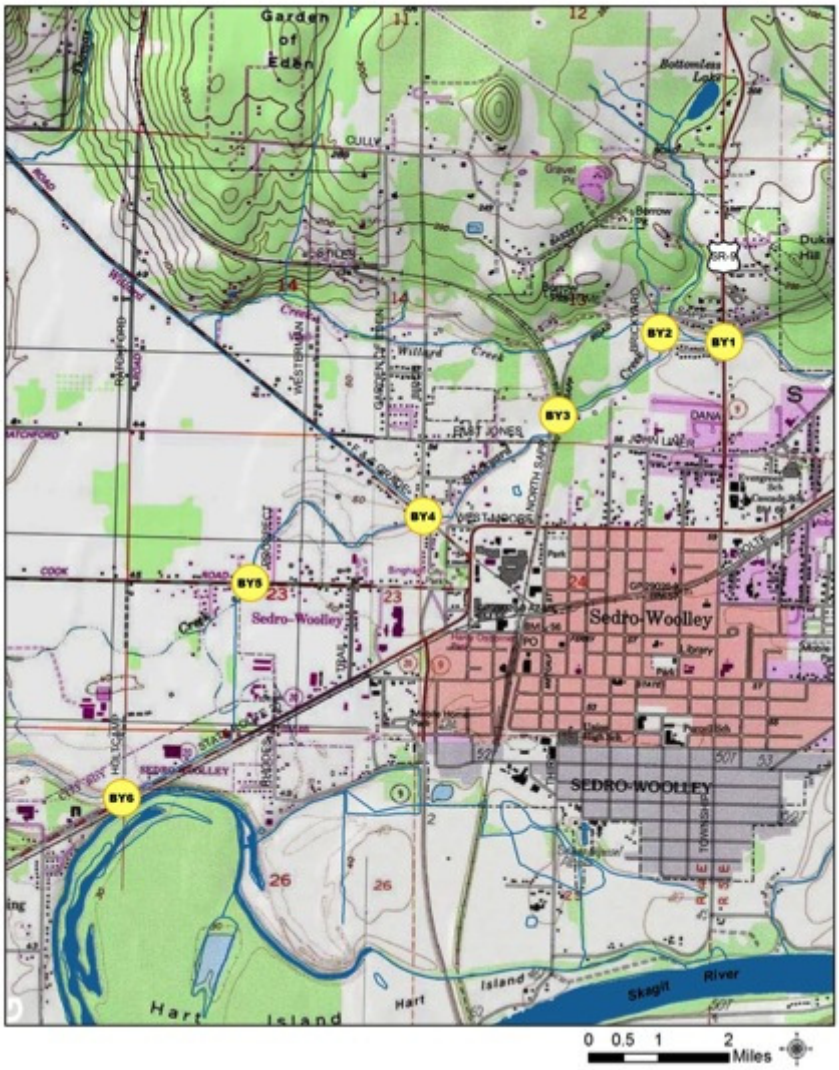


Figure 9. Map of Brickyard Creek Basin Sites

Table 9. Brickyard Creek Sampling Locations, Sedro Woolley, WA

BY #1	721 Township Street	N48° 31'10.4 W122°13'32
BY #2	Logan Estates	N48°31'12 W122°13'49
BY #3	Sapp Road Trestle	N48°30'57 W122°14'16
BY #4	501 F & S Grade Road	N48°30'39 W122°14'52
BY #5	22431 Cook Road	N48°30'27 W122°15'35
BY #6	Holtcamp Road	N48°29'49 W122°16'08

Gages Slough

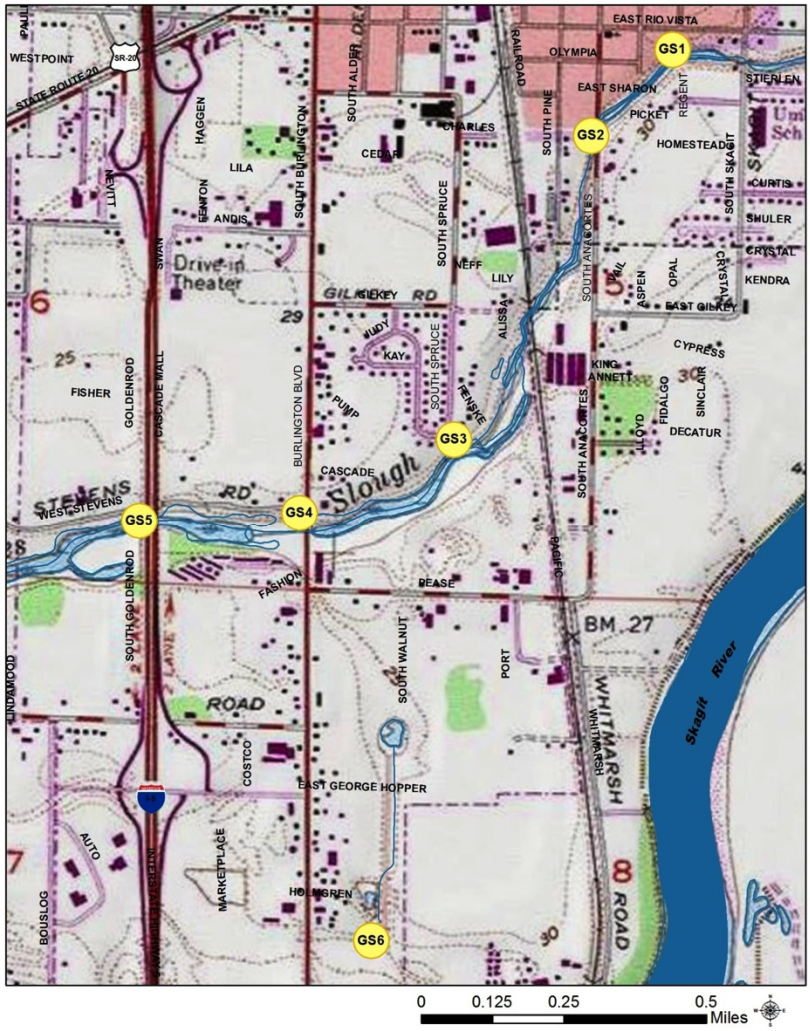


Figure 10. Map of Gages Slough Sites

Table 10. Gages Slough Sampling Locations, Burlington, WA

GS #1	Regent and East Rio Vista Streets	N48°28'16 W122°19'19
GS #2	South Anacortes Street	N48°28'08 W122°19'30
GS #3	South Spruce Street	N48°27'40 W122°19'48
GS #4	Burlington Boulevard	N48°27'33 W122°20'09
GS #5	Goldenrod Road	N48°27'32 W122°20'31
GS #6	Sportsman's Warehouse	N48°26'54 W122°19'58

V. Results

This section presents the data collected in this project and provides a preliminary overview for each parameter followed by details for each watershed and a comparison of annual site averages for the past three sampling seasons. Complete data for all watersheds are provided in Appendix A.

Dissolved Oxygen Standards
Dissolved oxygen (DO) measurements determine how much oxygen is available in the water for fish and other organisms. The state water quality standards for dissolved oxygen are based on aquatic life uses. Streams in this program fall under two categories based on aquatic life use. For the lowland watercourses, Joe Leary Slough, No Name Slough, Bay View, Gages Slough, Brickyard Creek and all Samish sites except Thomas Creek (Upper Samish 3) the minimum standard is 8.0 mg/L for salmon spawning and rearing. For Fisher Creek, Nookachamps Creek, Trumpeter Basin, Kulshan Creek, and Upper Samish Site 3, the standard is 9.5 mg/L required for core summer salmonid habitat. (Higher dissolved oxygen levels are better.)

Annual averages are presented with reference to the state standard for the purpose of comparison, but this data cannot determine whether the water body meets the standard. The standard is based on the lowest single-day measurement, not on the annual average. It is important to note that most of the teams do not monitor during the warmer summer months when DO would likely drop with warmer air and water temperatures.

Temperature Standards
Temperature is a water quality concern in part because warm water holds less dissolved oxygen than cool water. Many northwest fish species require cool temperatures and high oxygen levels at various stages in their life cycle. Warm water temperatures can cause stress to animals that lowers resistance to disease and infections. Many factors affect water temperature. These include large fluctuations in air temperature, changes in the shape of stream channel and lake margins, reductions in overhanging vegetation, cloudiness, and reductions in water flow.

State standards for temperature are based on the 7-day average of the daily maximum temperatures (7-DADMax). For Fisher Creek, Nookachamps Creek, Trumpeter Basin, Kulshan Creek, and Upper Samish Site 3, that maximum is 16°C. All other sites must be less than 17.5ºC to meet standards. (Lower temperatures are better.)

The average temperatures presented below are used for comparison, but this data cannot determine whether the water body meets the standard. Most sites were not monitored during the critical summer warm periods and none were monitored daily in order to obtain a 7-DADMax.

Turbidity Standards
Turbidity data in this report are not referenced to a state standard because that standard is relative to naturally occurring background levels and varies for each stream. For streams with

background levels less than 50 NTU (all of the Stream Team sites), turbidity should not exceed 5 NTU above the background level. Short-term occurrences of high turbidity are not as harmful to aquatic animals as extended periods of moderately elevated turbidity.

Fecal Coliform Standards

To meet state standards, streams must meet two criteria. Part I: The geometric mean of fecal coliform bacteria levels cannot exceed 100 colony-forming units (cfu)/100 ml. A minimum of five samples in the database is needed to calculate the geometric mean. Part II: No more than 10% of the samples can exceed 200 colonies /100 ml.

State regulations for fecal coliform use the geometric mean, which reduces the weight of occasional extreme results or results that don't fall within a reasonable range of the overall sample database This is helpful when analyzing bacteria concentrations, because levels may vary anywhere from 10 to 10,000 fold over a given period.

Upper Samish Results

Figures 11 through 17 below present results from Upper Samish sampling.

For dissolved oxygen, the Willard Creek site had the lowest levels. All sites were below the state standard of 9.5 mg/l in the fall and three dropped below the standard again in the spring. Though the annual averages for sites 1-3 were above 9.5 mg/l, the standard is based on the lowest single day. All sites were similar to last year but lower than 2008-2009.

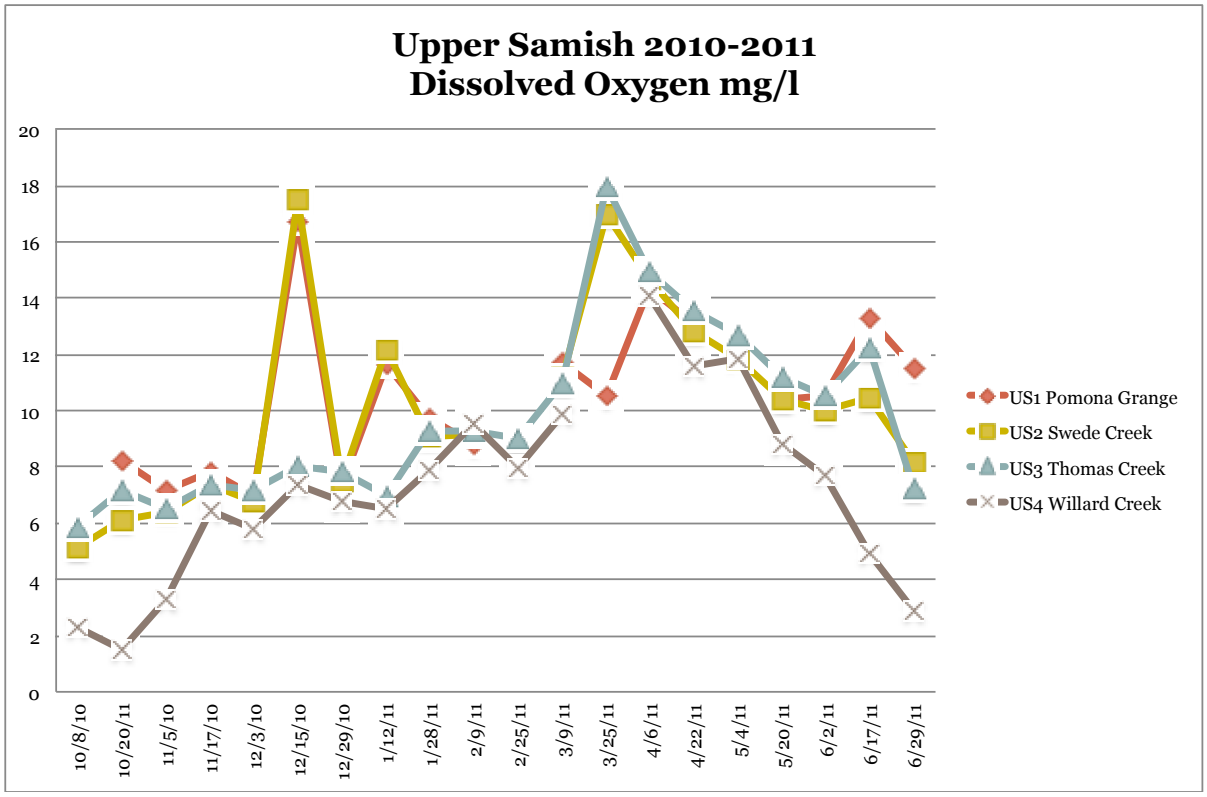


Figure 11. Upper Samish DO: 2010-2011

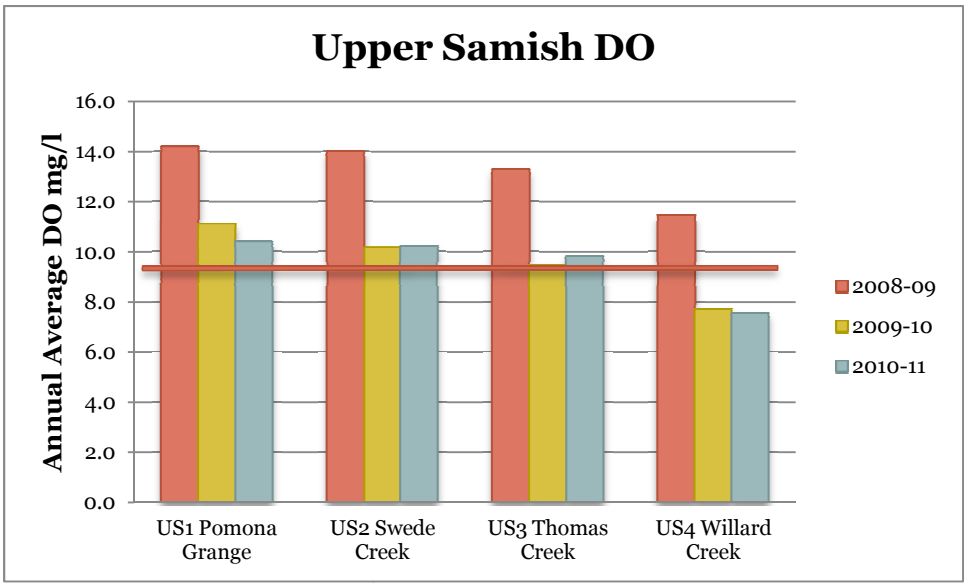


Figure 12. Upper Samish DO: Three year comparison

Though all temperature readings during the sampling season fell within state standard temperatures, sampling stopped before the warm season. Temperatures were similar for all Upper Samish sites. Average annual temperatures were slightly warmer than 2008-09 and slightly cooler than 2009-2010.

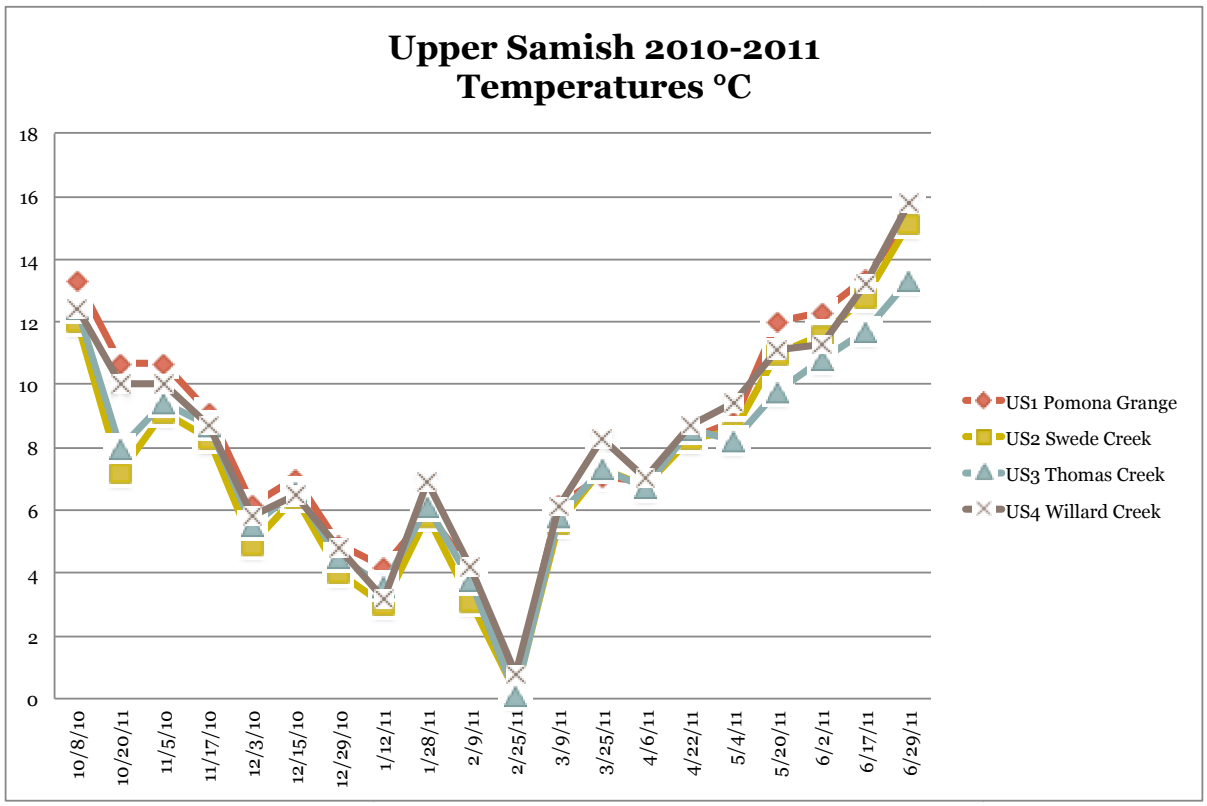


Figure 13. Upper Samish Temperature: 2010-2011

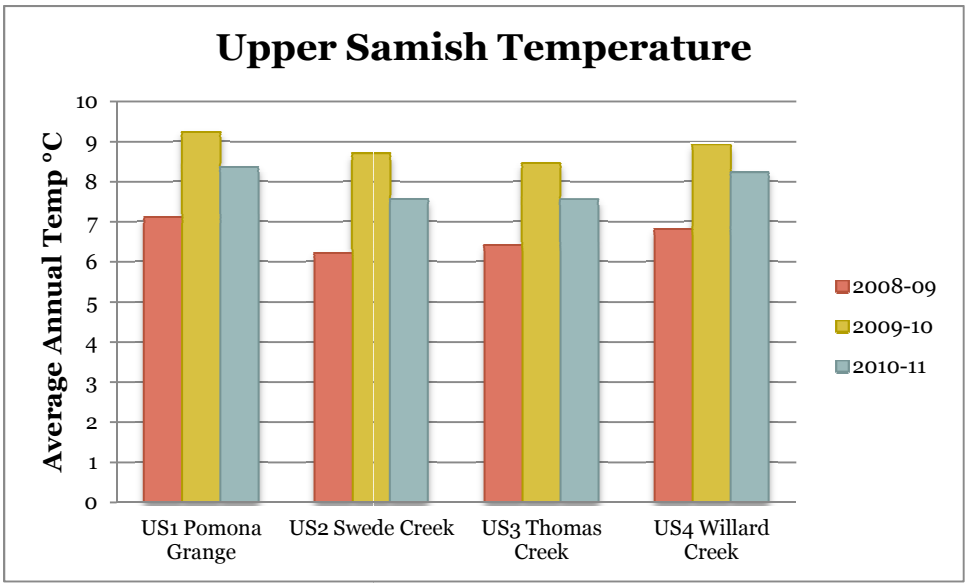


Figure 14. Upper Samish Temperature: Three year comparison

As in previous years, the average turbidity was highest at Site 3, Thomas Creek, but that site also showed the greatest improvement from past years.

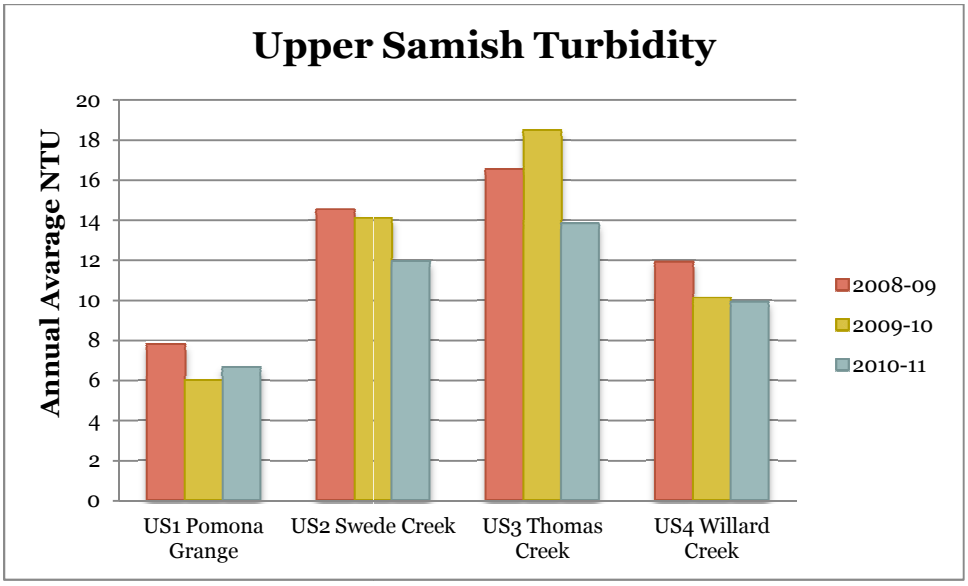


Figure 15. Upper Samish Turbidity: Three year comparison

Upper Samish site 3, Thomas Creek, again had the highest levels of fecal coliform (Figure 16 below). All sites showed a spike in levels in May, corresponding to rain events. Average Fecal coliform levels (geometric mean) were much lower than last year: all below 100 cfu/100ml. Sites 1 and 3 had over 10% of the samples over 200 CFU/100ml. Sites 2 and 4 did meet Part 2 of the standard.

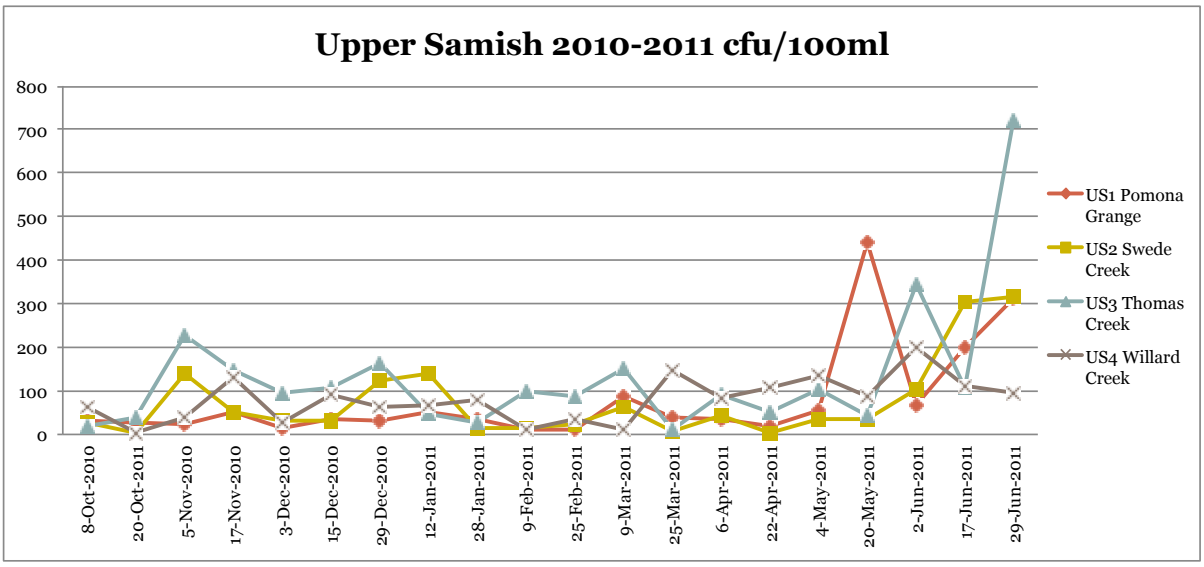


Figure 16. Upper Samish Fecal Coliform: 2010-2011

Compared with the previous year, fecal coliform geometric mean levels remained low for Site 1, and were greatly improved for Sites 2-4.

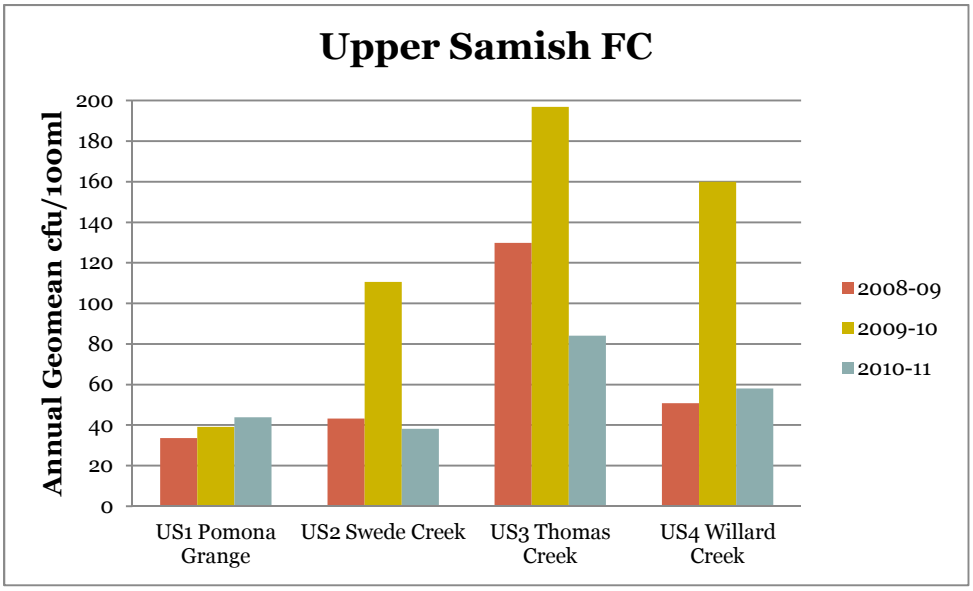


Figure 17. Upper Samish Fecal Coliform: Three year comparison

Lower Samish Results

Figures 18 through 24 below present results from Lower Samish sampling.

Dissolved oxygen levels (Figure 18 below) were usually highest upstream and lowest downstream, as would be expected. They fell below the optimum level of 9.5mg/l at all sites in spring and fall. Note a few instances of high DO. Unusually high DO levels (above 15 mg/L) may be caused by daytime plant growth due to excessive nutrient levels. This is often followed by low DO levels at night when plants respire.

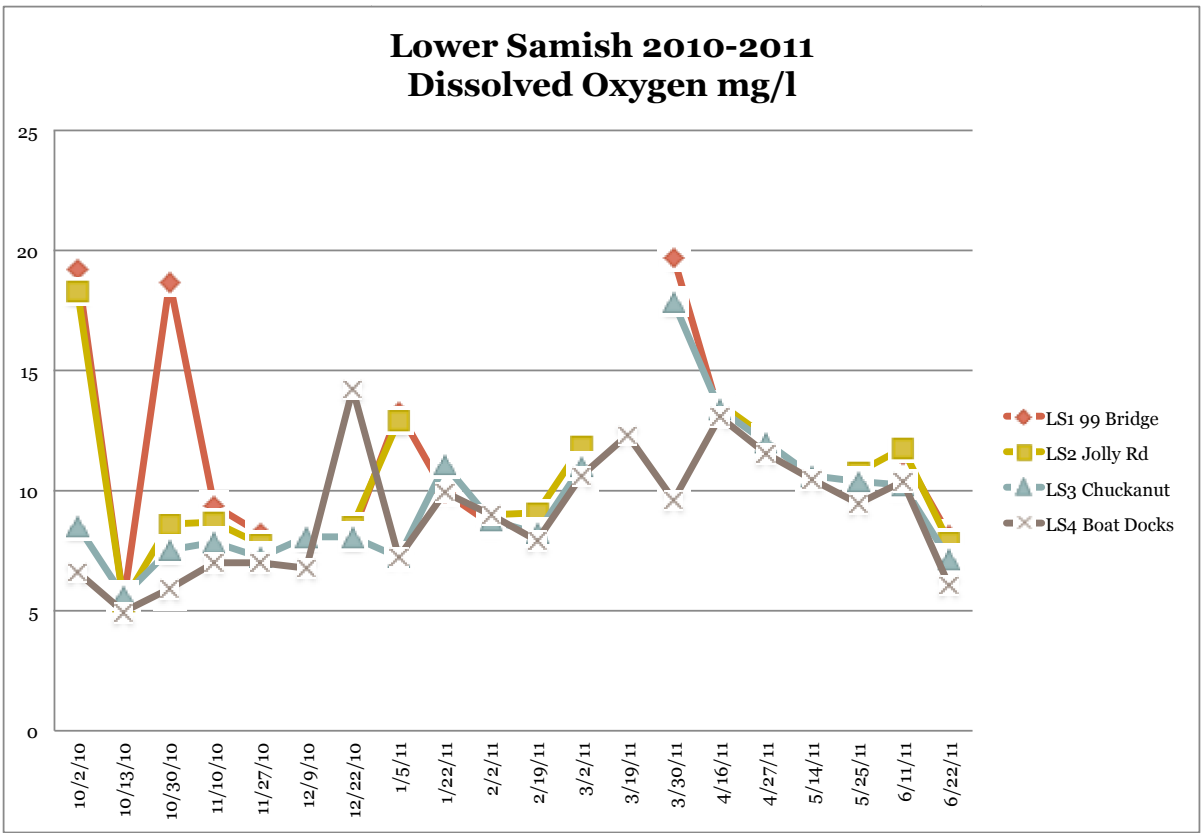


Figure 18. Lower Samish DO: 2010-2011

Compared with the past two years, dissolved oxygen levels dropped at Sites 2-4, with Site 4 showing the most change and averaging below the 9.5°C standard. The red line in Figure 19 is for reference only. Though the annual averages for sites 1-3 were above 9.5 mg/l, the standard is based on the lowest single day, not on an annual average.

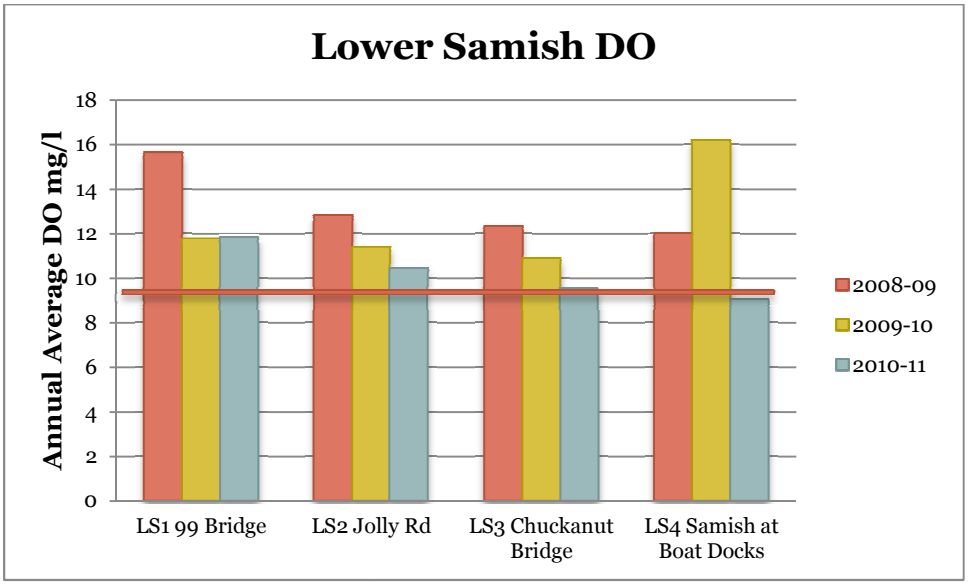


Figure 19. Lower Samish DO: Three-year comparison

Though all temperature readings during the sampling season fell within state standard temperatures, sampling stopped before the warm season. Temperatures were similar for all Lower Samish sites, with annual averages varying less than 1°C.

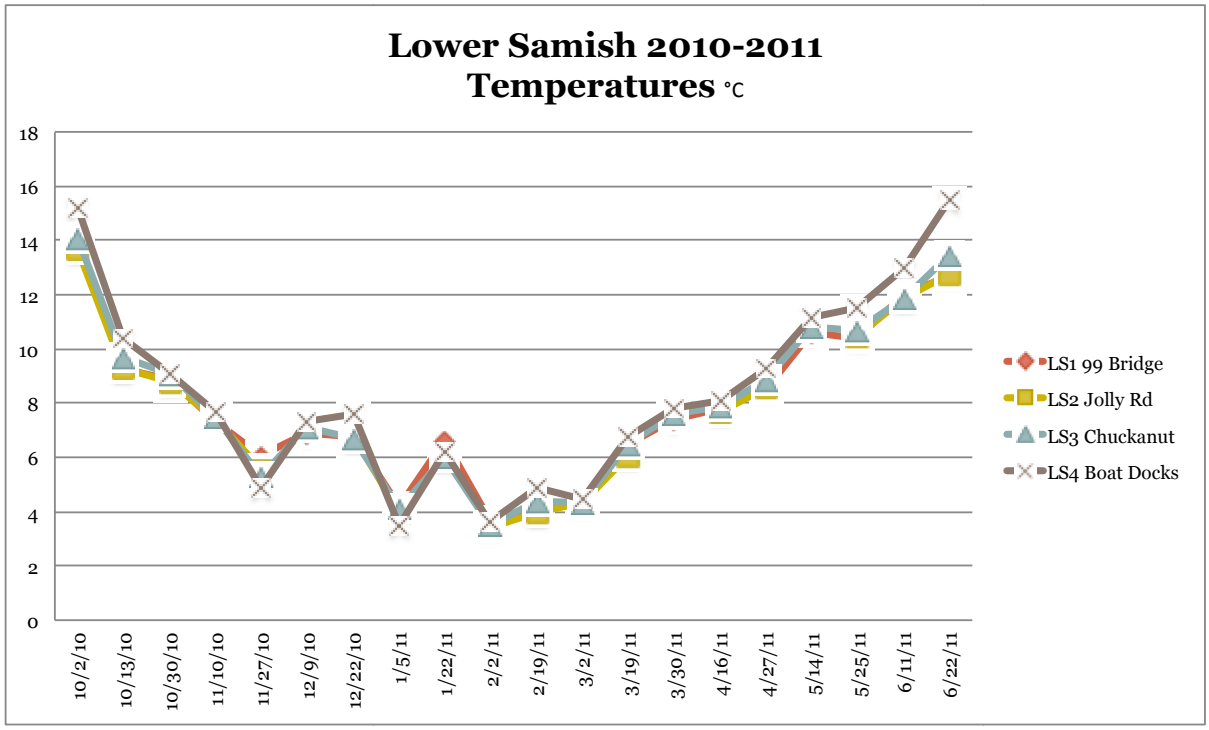


Figure 20. Lower Samish Temperature: 2010-2011

Compared to the previous two years, average annual temperatures were slightly cooler than 2009-2010 and about the same as 2008-2009.

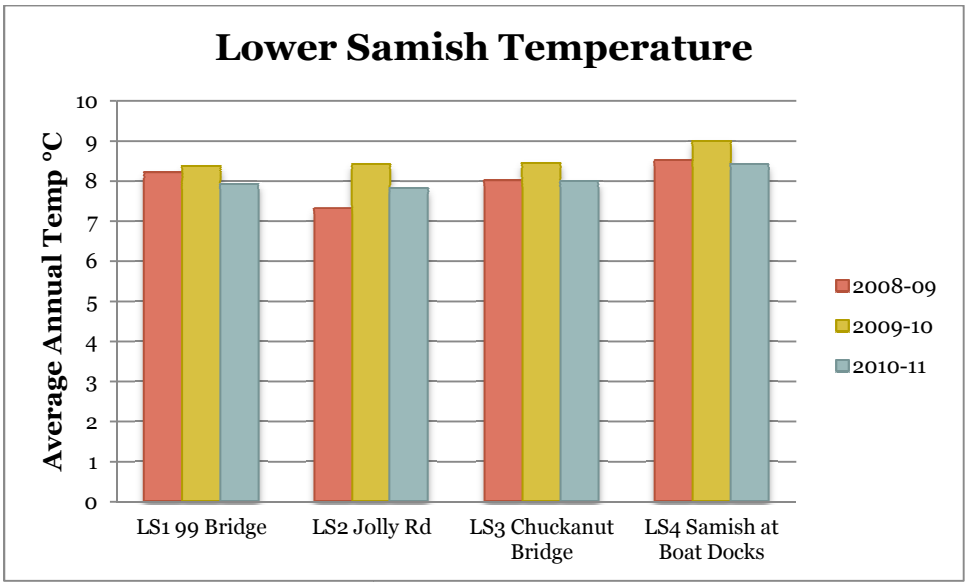


Figure 21. Lower Samish Temperature: Three-year comparison

Turbidity levels for Lower Samish sites were all higher than 2009-2010 levels but lower than levels two years ago. Variation between sites was similar to patterns in the previous two years, with lowest turbidity at Site 2. The highest levels this year were at Site 3.

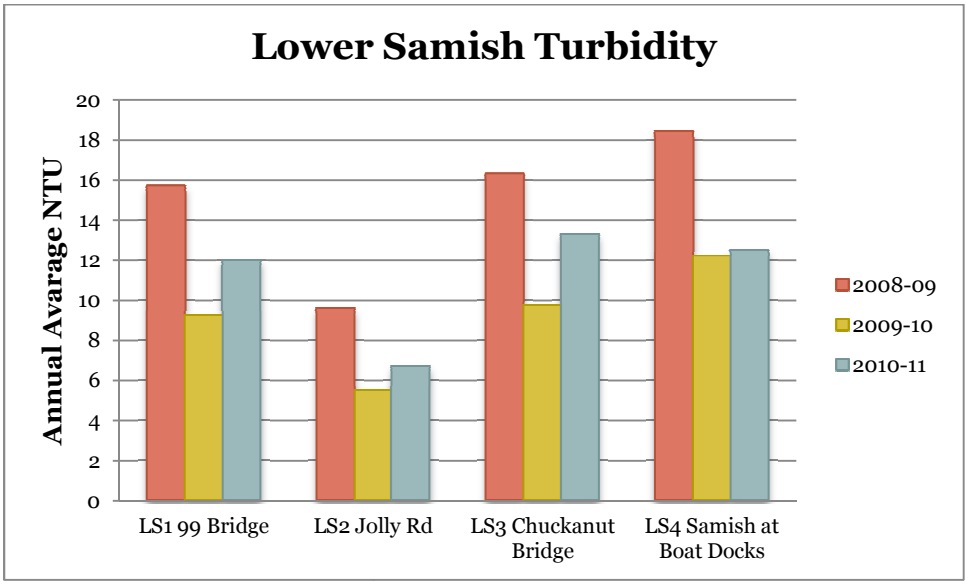


Figure 22. Lower Samish Turbidity: Three-year comparison

Fecal Coliform levels for the Lower Samish were generally low with extreme spikes during rain events. The March 30 sample was taken in heavy rain with flooding conditions. (Site 2 at Jolly Road was inaccessible.) Geometric mean averages for all four sites were below 100 cfu/100 ml. For all four sites, fewer than 10% of the samples were over 200 cfu/100 ml. So, all Lower Samish sites met both parts of the state standards for fecal coliform.

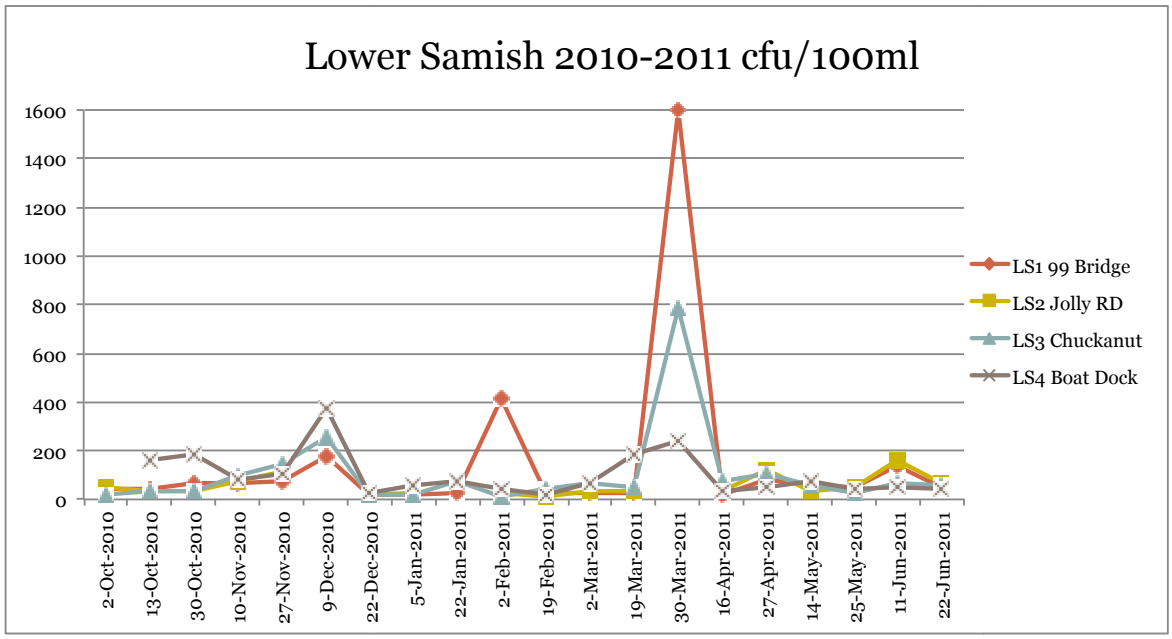


Figure 23. Lower Samish Fecal Coliform: 2010-2011

Lower Samish fecal coliform levels have increased slightly over the past three years, but geometric means all still meet the state standard. Levels at all four sites were higher than the previous two years.

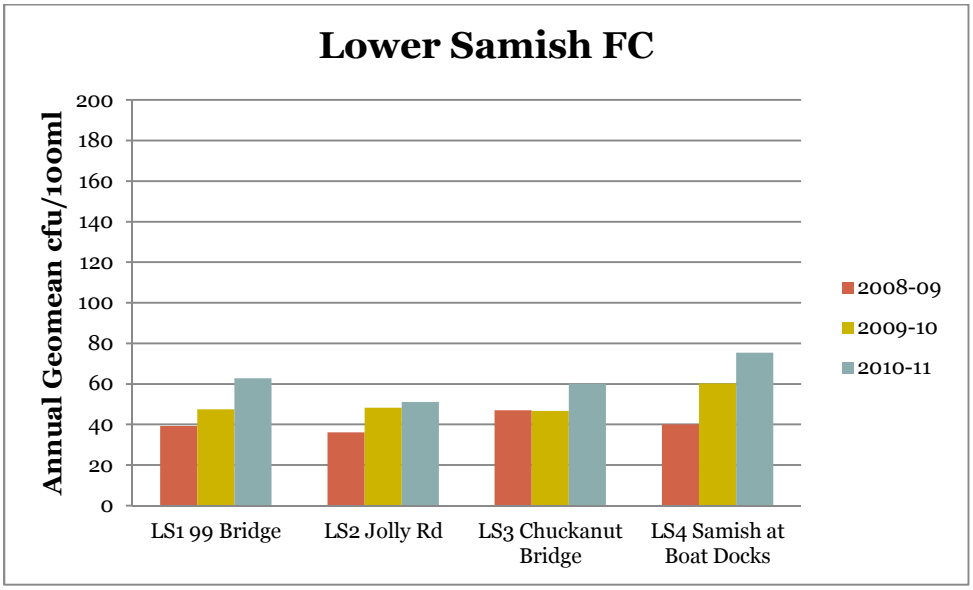


Figure 24. Lower Samish Fecal Coliform: Three-year comparison

Fisher Creek Results

Figures 25 through 31 below present results from Fisher Creek sampling.

For dissolved oxygen (Figure 19 below), many measurements were below the standard of 9.5mg/l during the first half of the year but increased during the winter. There were uncharacteristically low dissolved oxygen levels measured at all sites on February 10 though no field notes indicate a possible reason. (Water temperatures were very low: between 2.1 and 2.7°C.)

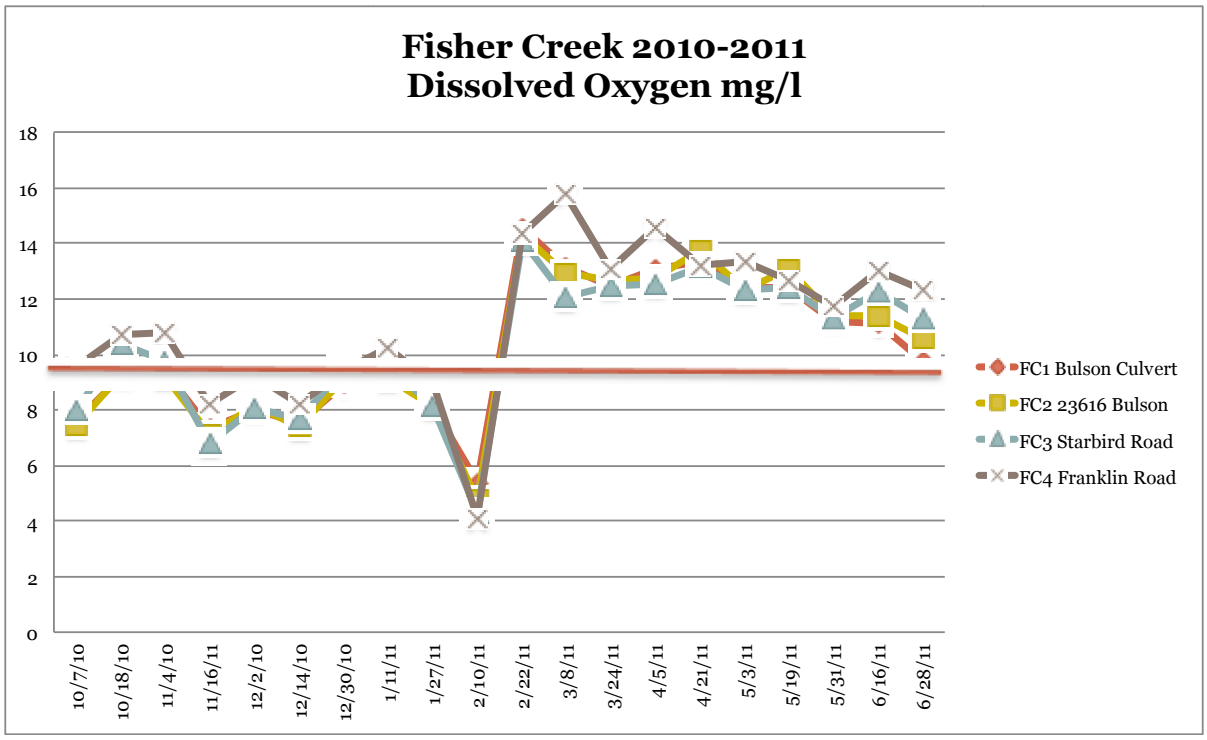


Figure 25. Fisher Creek DO: 2010-2011

Though the annual averages for all sites were above 9.5 mg/l, the standard is based on the lowest single day. All sites were similar to last year and higher than 2008-2009.

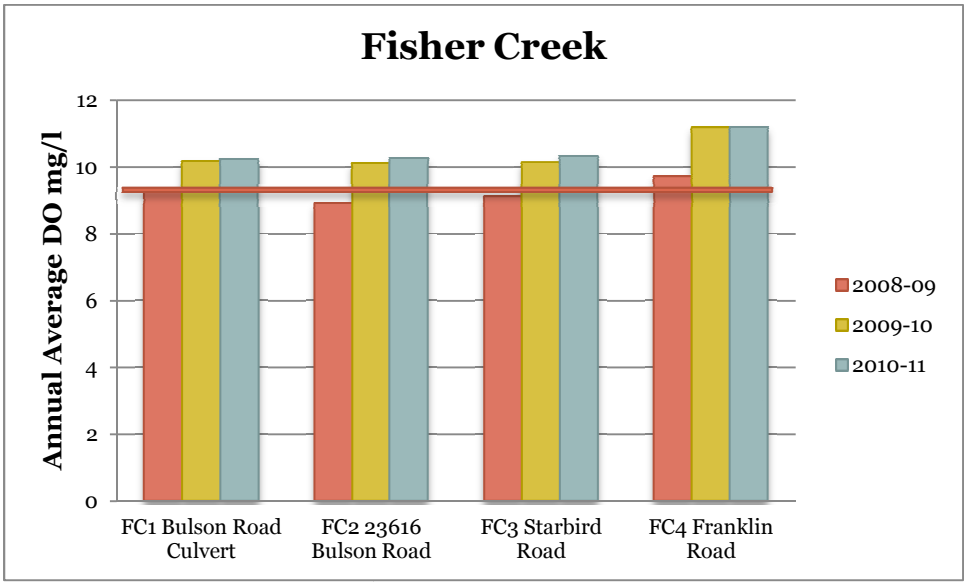


Figure 26. Fisher Creek DO: Three-year comparison

Temperatures for Fisher Creek (Figure 27 below) were similar for all sites, dropping in the winter and rising in the spring. Though all temperature readings during the sampling season fell within state standard temperatures, sampling stopped before the warm season.

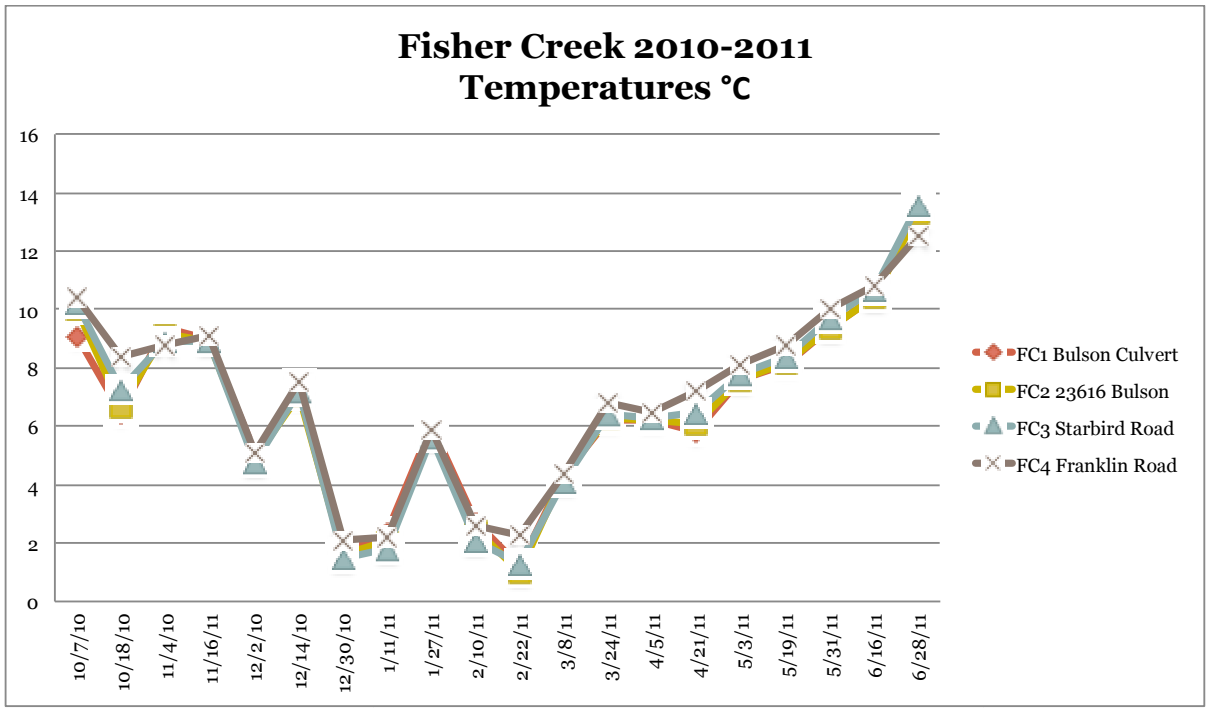


Figure 27. Fisher Creek Temperature: 2010-2011

Compared to the past two years, Fisher Creek temperatures were cooler than 2009-2010 and warmer than 2008-2009.

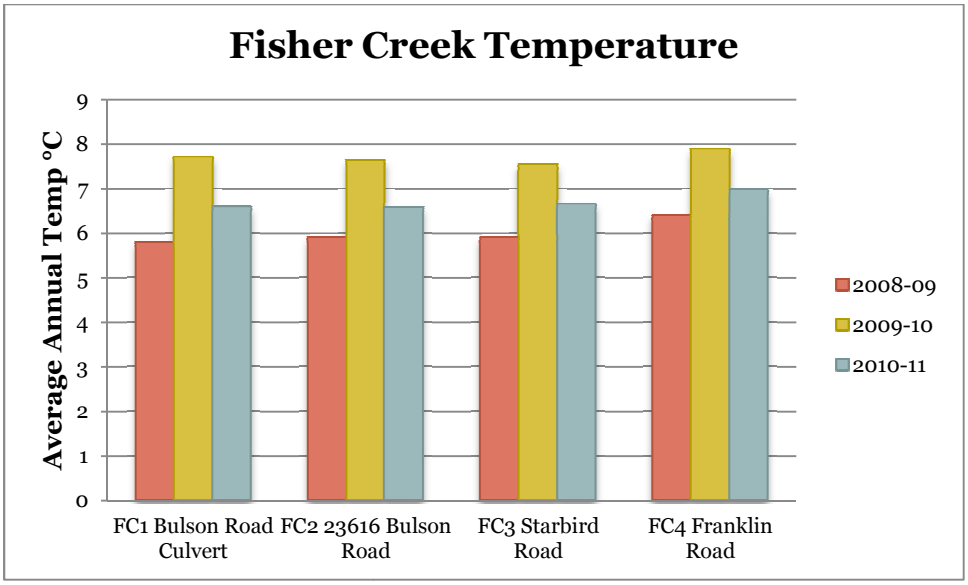


Figure 28. Fisher Creek Temperature: Three-year comparison

Turbidity for Fisher Creek (Figure 29 below) was similar to the previous two years. The highest levels were at site 4, Franklin Road.

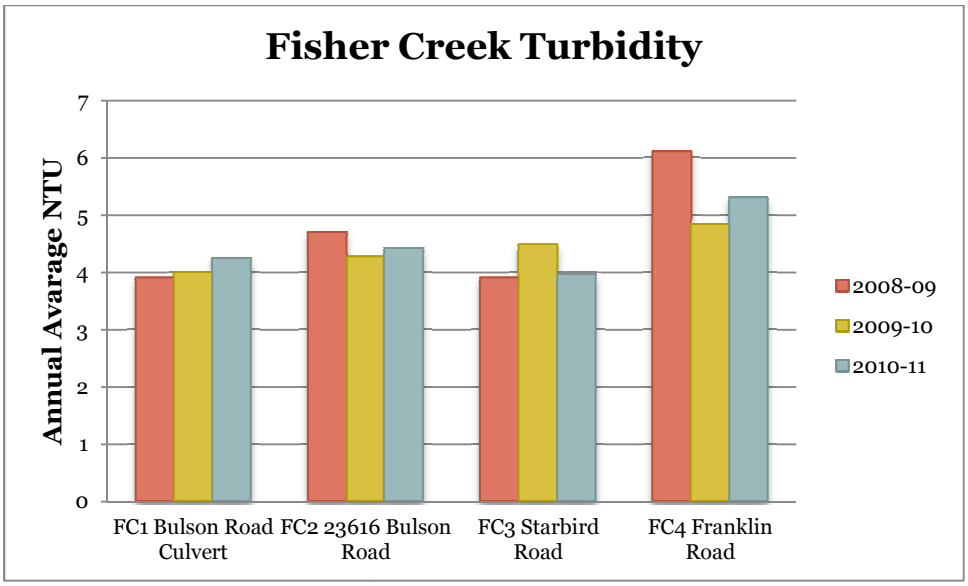


Figure 29. Fisher Creek Turbidity: Three-year comparison

Each Fisher Creek fecal coliform numbers were consistently low during most of the sampling year, with a high spike in mid October and again in May and June. Annual geometric means for all four sites were well below 100 cfu/100ml and all four sites had fewer than 10% of the counts above 200 cfu/100ml.

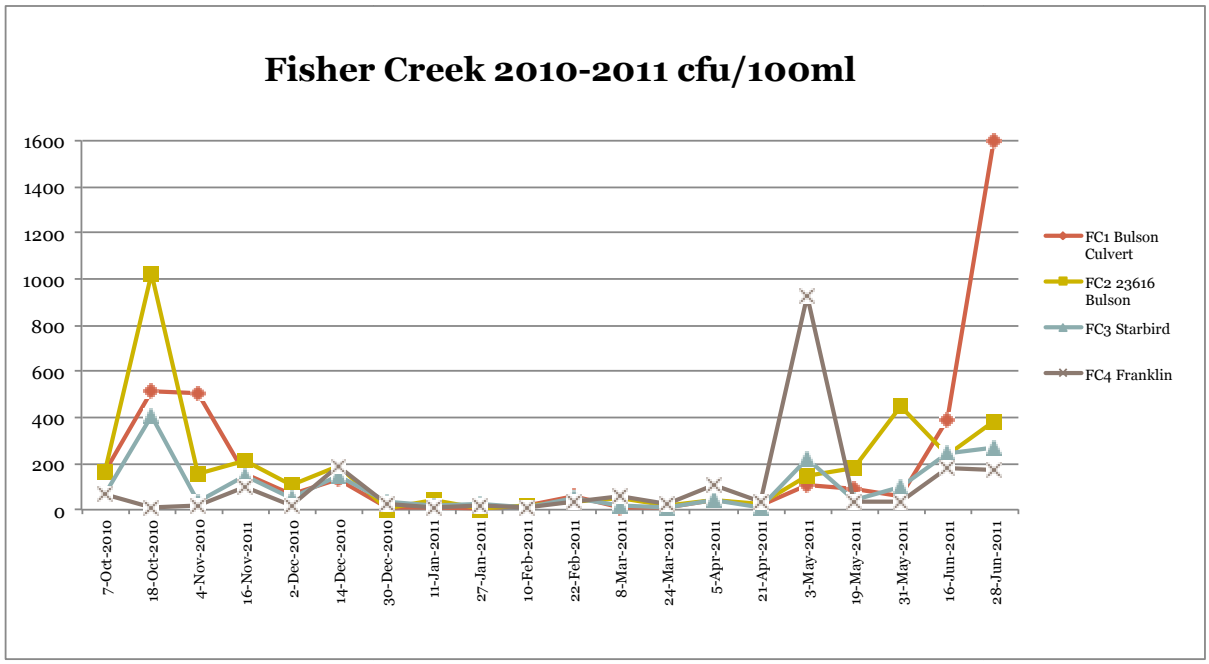


Figure 30. Fisher Creek Fecal Coliform: 2010-2011

Figure 31 below shows geomeans over three years. All sites were lower than 2009-10 and either lower or about the same as 2008-2009.

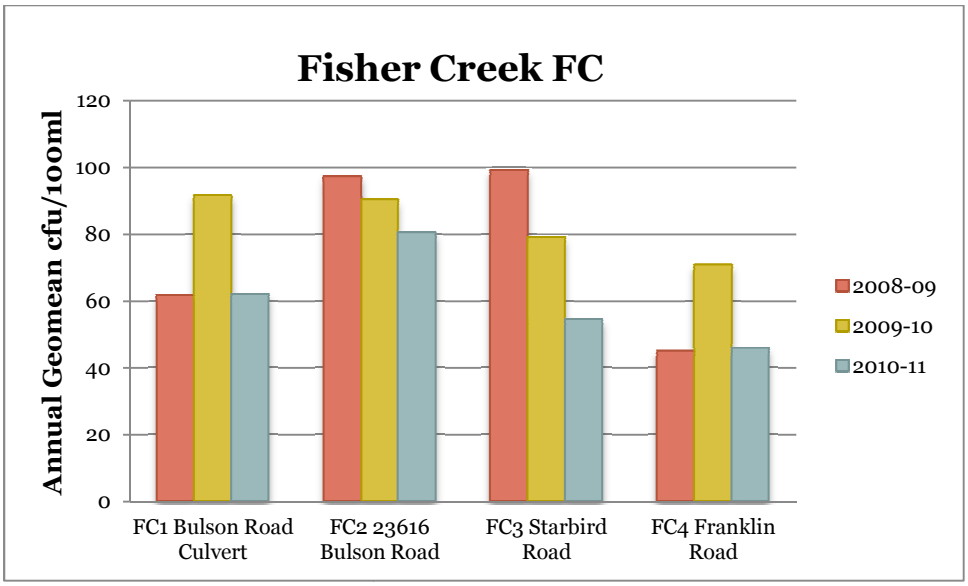


Figure 31. Fisher Creek Fecal Coliform: Three-year comparison

Upper Nookachamps Results

Figures 32 through 38 below present results from Upper Nookachamps Creek sampling. This was the first year for sampling, so there are no multi-year comparisons.

Site 2, Big Lake Outflow, consistently had the highest dissolved oxygen levels, nearly always higher than the standard 9.5°C. Site 1, Lake McMurray Estates had the lowest levels, with some very low levels in October and November. These unusually low numbers were not accompanied by high temperatures or high turbidity, which is sometimes the case.

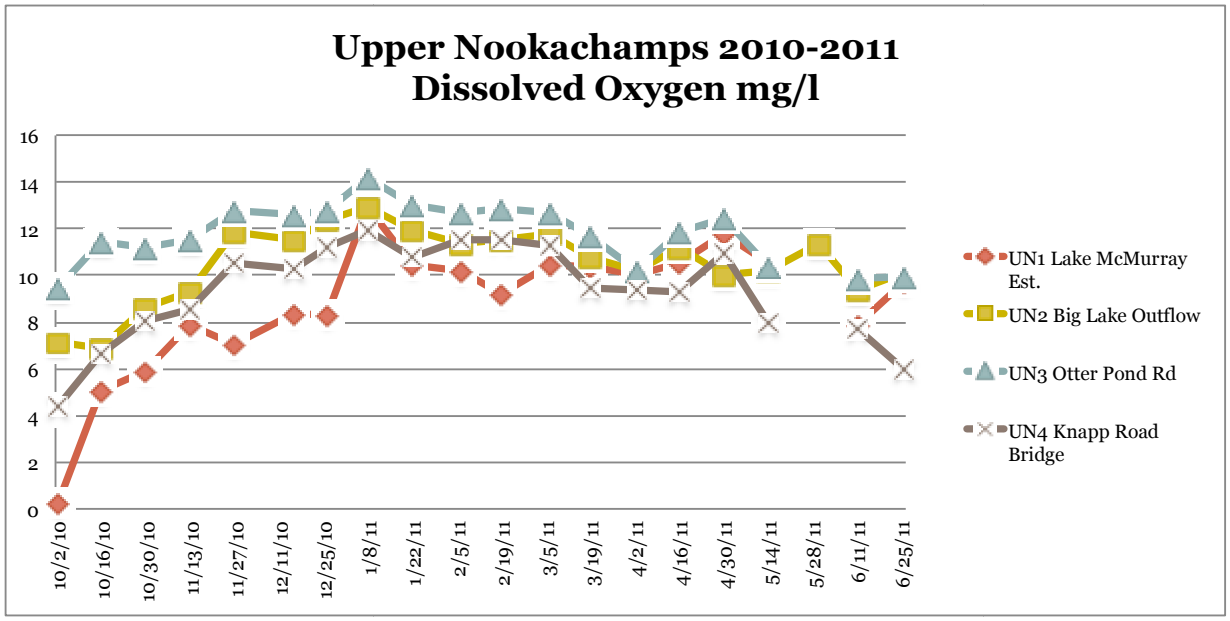


Figure 32. Upper Nookachamps DO: 2010-2011

The Upper Nookchamps was not sampled in 2008-2009 or 2009-2010, so there is no three-year comparison for this watershed. Annual averages were lowest for site 1 and highest for site 2. The 9.5°C line in Figure 33 is for reference only. State standards are based on the single lowest measurement, not on annual averages. No samples were taken during the warmest season when dissolved oxygen levels would presumably be lowest.

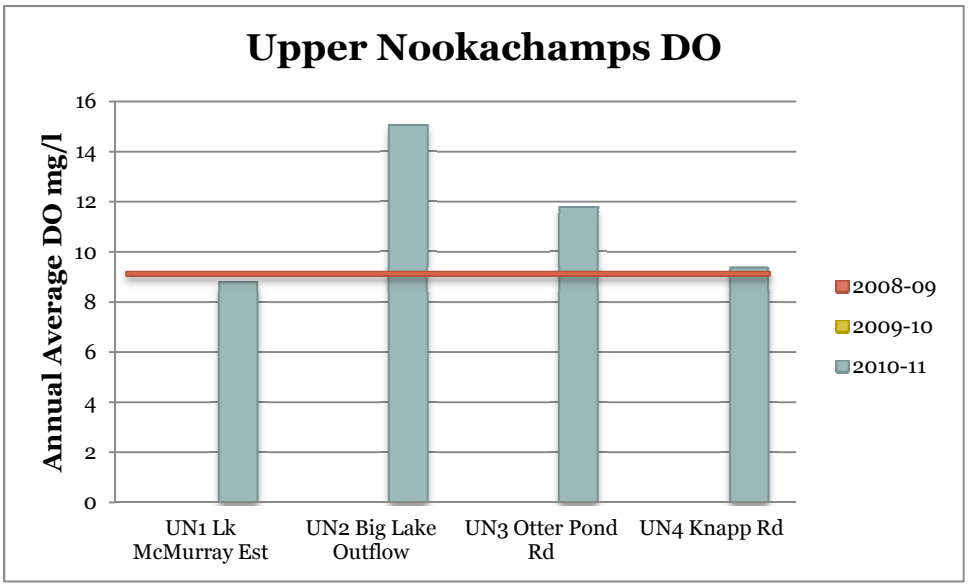


Figure 33. Upper Nookachamps DO: annual average

Temperatures for the Upper Nookachamps sites followed seasonal air temperatures. Site 2, Big Lake Outflow was above the state standard on the first and last sampling day.

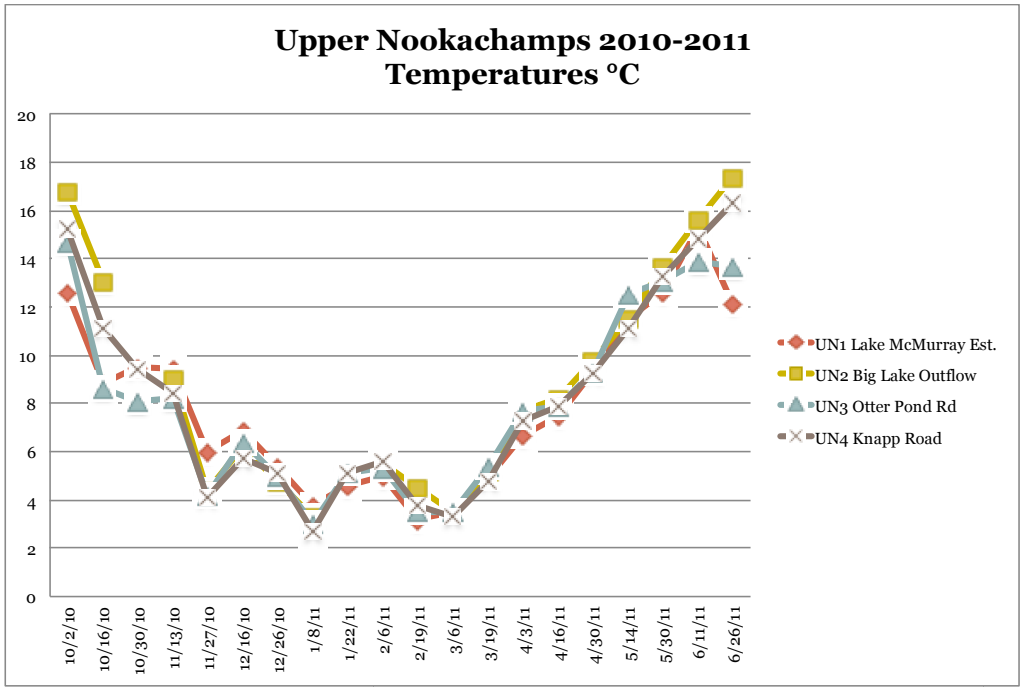


Figure 34. Upper Nookachamps Temperature: 2010-2011

Average temperatures for Upper Nookachamps sites were similar, between 8°C and 9°C. State standards are not based on average annual temperature.

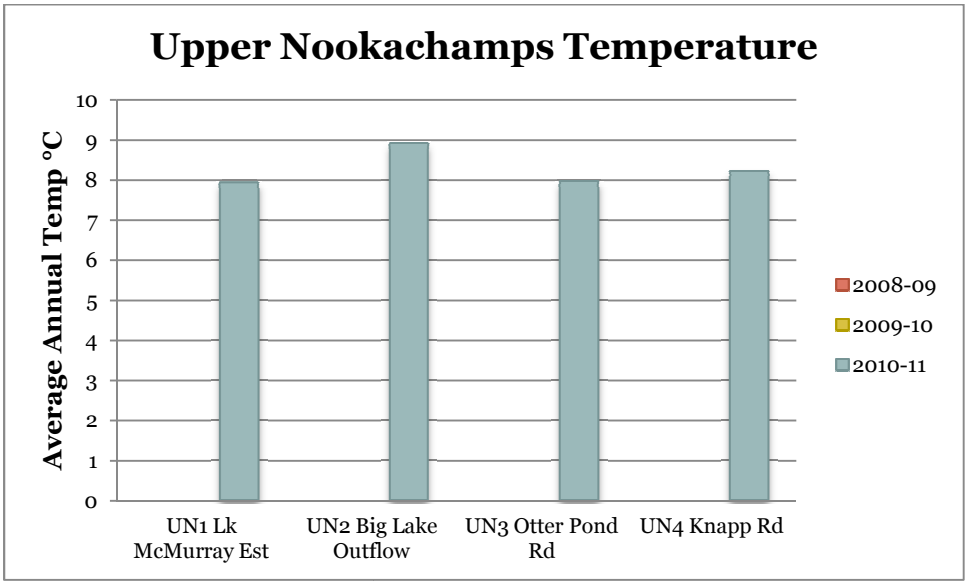


Figure 35. Upper Nookachamps Temperature: Annual average

Turbidity was lowest upstream and highest downstream, with Site 4 average twice as high as Site 1.

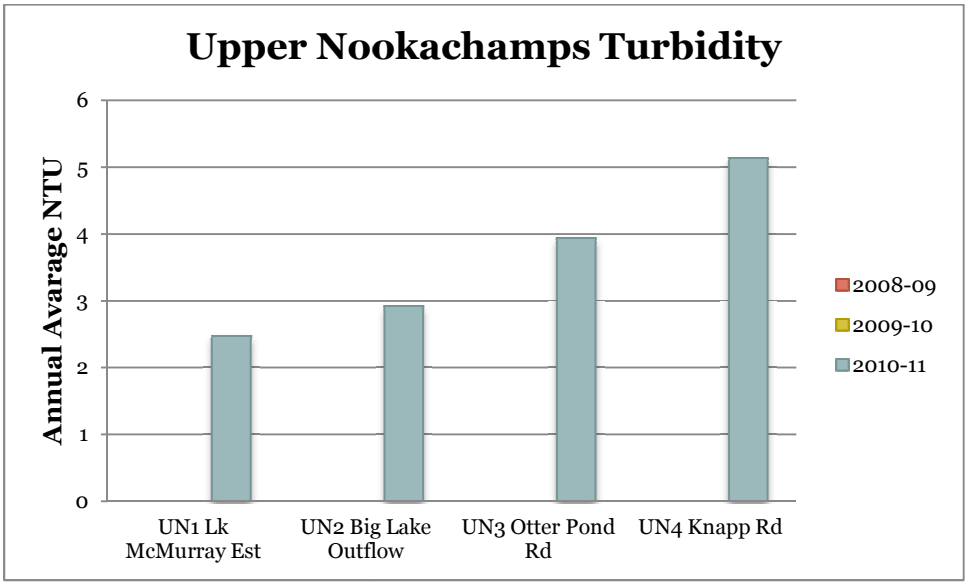


Figure 36. Upper Nookachamps Turbidity: Annual average

While fecal coliform levels (Figure 37 below) were sometimes high at Site 4, Knapp Road, the other Upper Nookachamps sites were consistently below the state standard of 100 cfu/100ml.

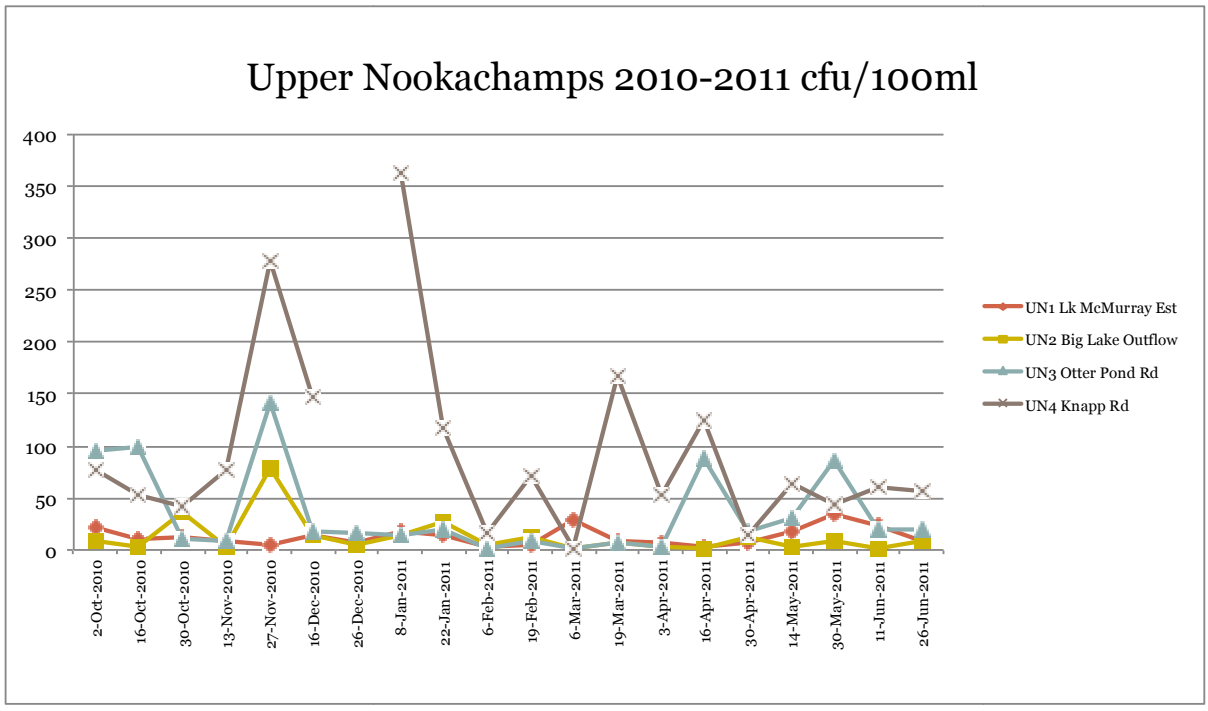


Figure 37. Upper Nookachamps Fecal Coliform: 2010-2011

Annual geometric means for fecal coliform were well below the state standard of 100 cfu/100ml for all Upper Nookachamps sites. Sites 1-3 met the standard of <10% of samples below 200 cfu/100ml. Though Site 4 had 2 out of 19 samples over 200 cfu/100ml (10.5%), it should be noted that one sample was missing for Site 4. Fecal coliform levels for the other 3 sites were low on December 26. Had a sample been taken, it is likely Site 4 would have met the state standards.

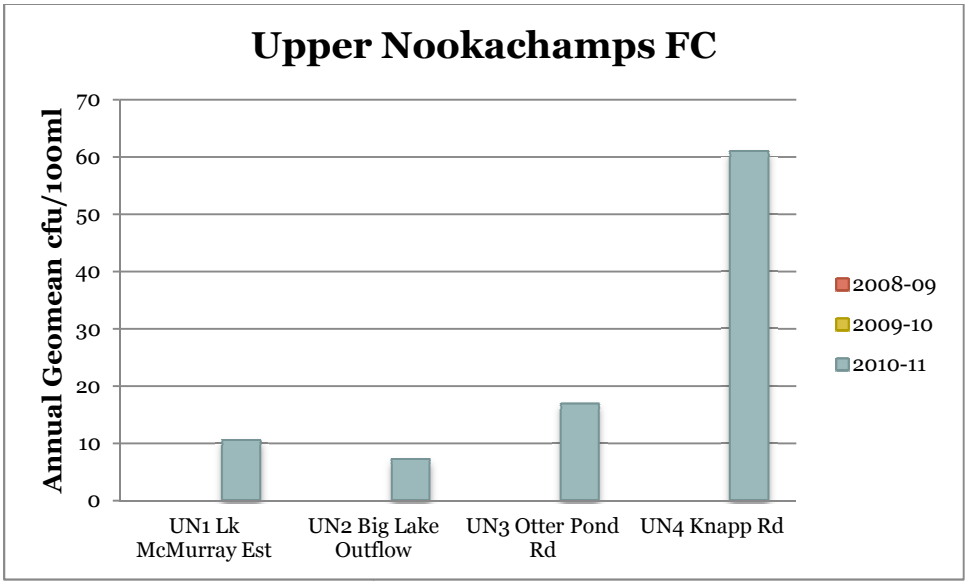


Figure 38. Upper Nookachamps Fecal Coliform: Annual average

Lower Nookachamps Results

Figures 39 through 45 below present results from Lower Nookachamps Creek sampling. This is the second year of sampling on the Lower Nookachamps.

All Lower Nookachamps sites had similar dissolved oxygen levels, below the state standard of 9.5°C on October 5, May 3 and June 28. Samples were above generally fell between 10 and 14 mg/l for most of the season.

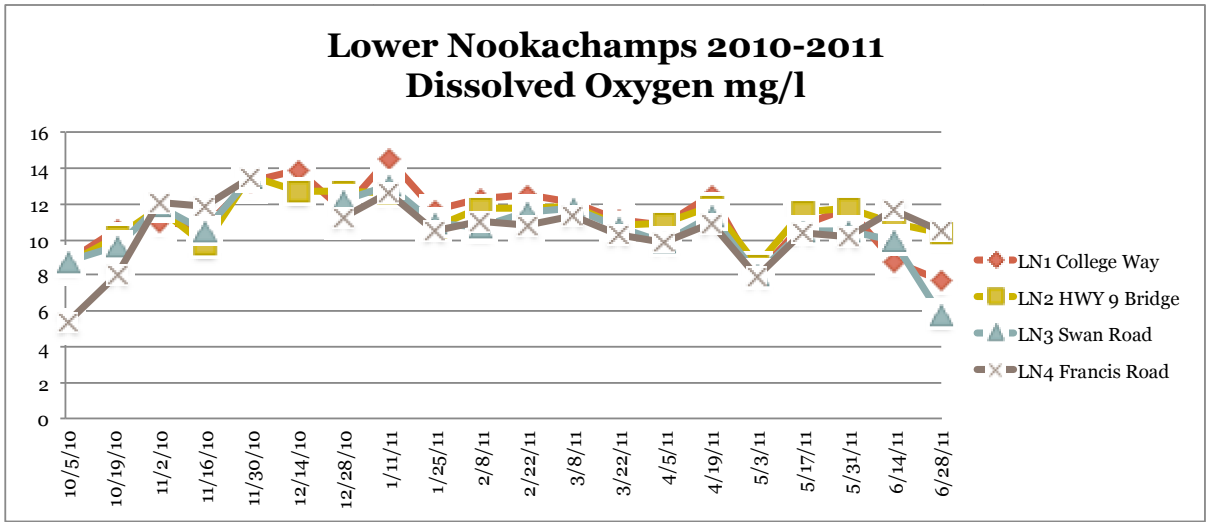


Figure 39. Lower Nookachamps DO: 2010-2011

Compared with the 2009-2010 sampling season, Dissolved oxygen levels were the same for Site 1, slightly higher for Sites 2 and 3, and significantly higher for Site 4. Standards are not based on the annual average.

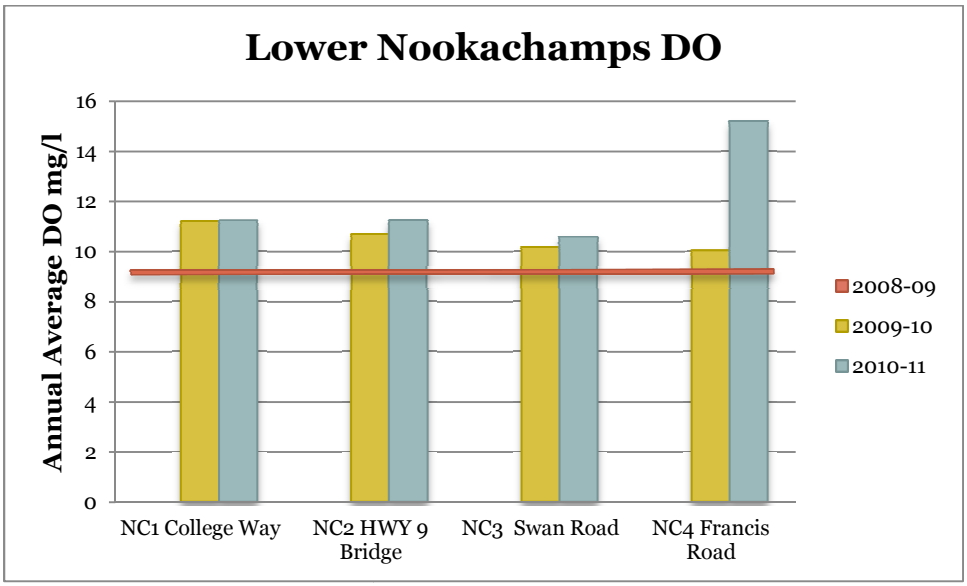


Figure 40. Lower Nookachamps DO: Two-year average

Temperatures for all samples at all sites were below the optimum level of 16°C. No samples were taken during the summer when temperatures may have risen above the state standard.

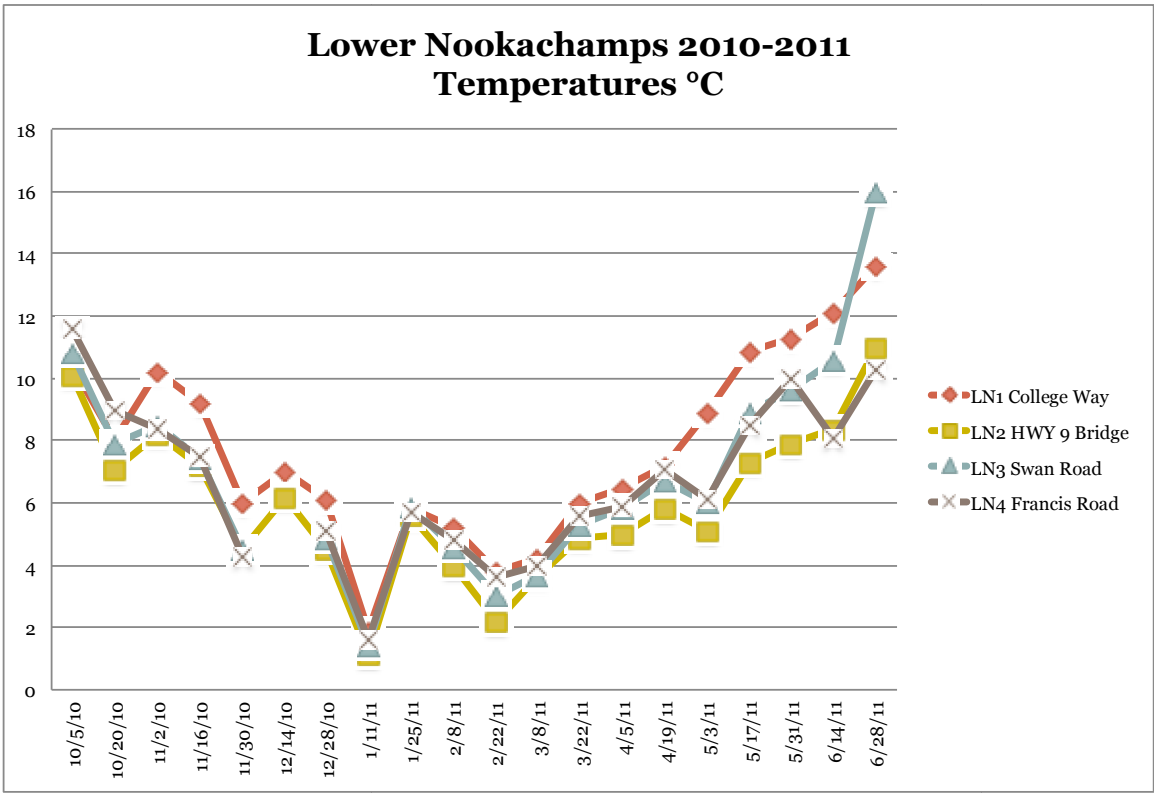


Figure 41. Lower Nookachamps Temperature: 2010-2011

Compared to 2009-2010, average annual temperatures were slightly cooler. State standards are not based on the annual average

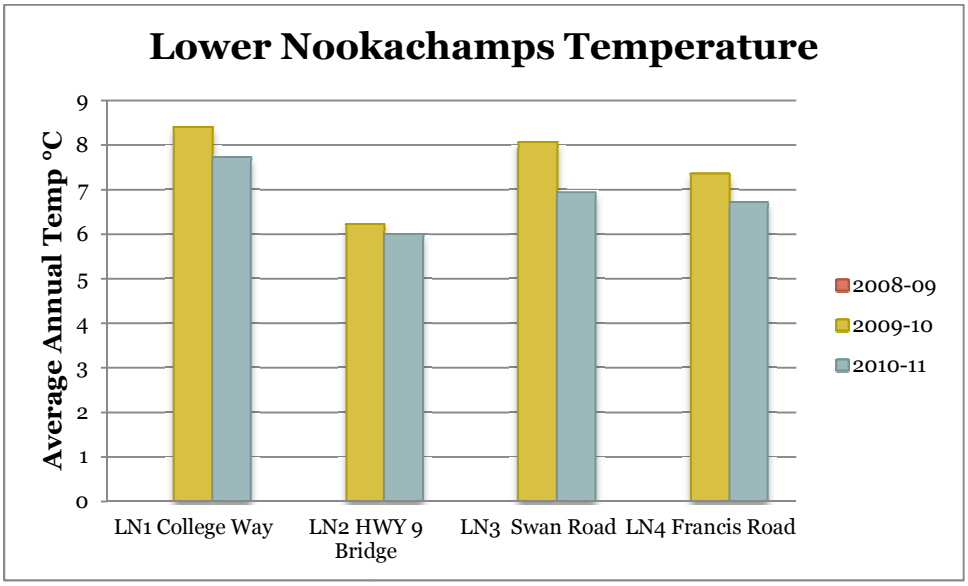


Figure 42. Lower Nookachamps Temperature: Two-year comparison

Turbidity levels in 2010-2011 were lower in Sites 1-3, and slightly higher in Site 4 compared to 2009-2010.

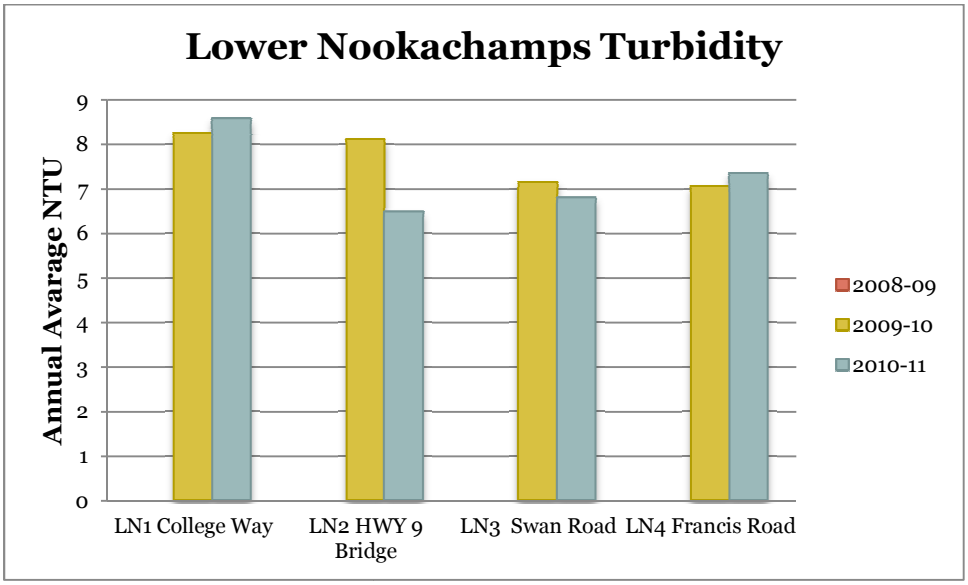


Figure 43. Lower Nookachamps Turbidity: Two-year comparison

Fecal coliform levels were highly variable at Site 1, College Way. Sites 2-4 were more consistent and mostly under 200 cfu/100ml. Site 1 did not meet the state standard for geometric mean less than 100 cfu/100ml, and did not meet the <10% over 200 cfu/100ml standard. Site 2 met the standard for geometric mean but did not meet the <10% over 200 cfu/100ml standard. Sites 3 and 4 met both requirements.

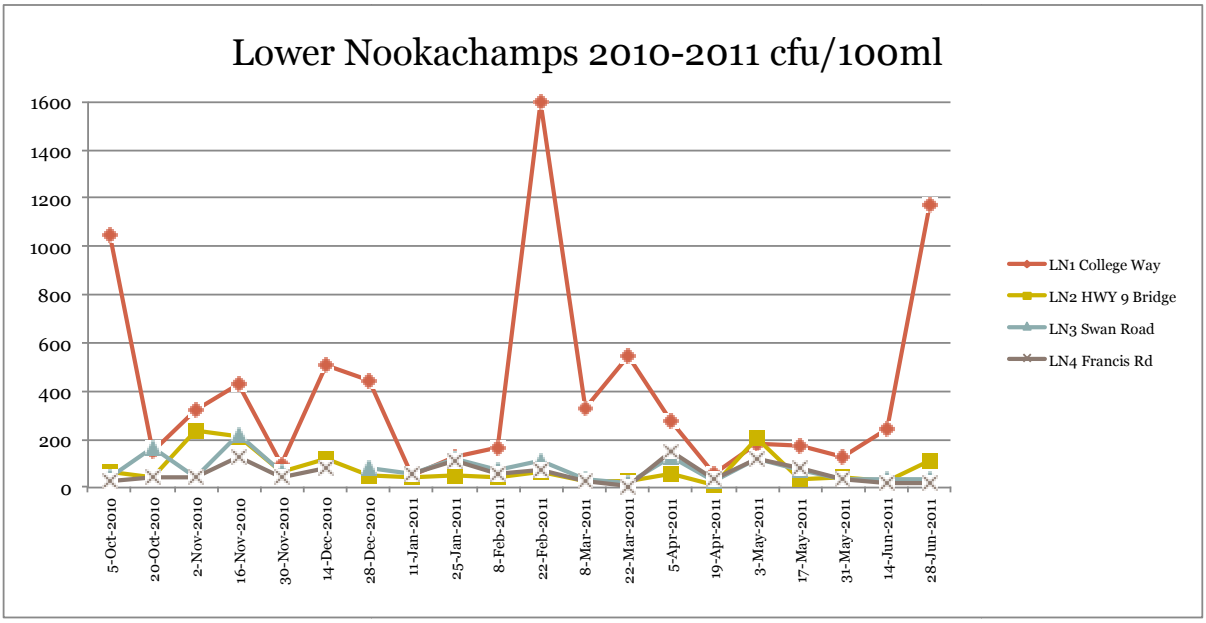


Figure 44. Lower Nookachamps Fecal Coliform: 2010-2011

Compared to 2009-2010, the annual geometric mean for fecal coliform was higher for Site 1 and lower for Sites 2-4. Site 1 continues to have very high levels of fecal coliform bacteria.

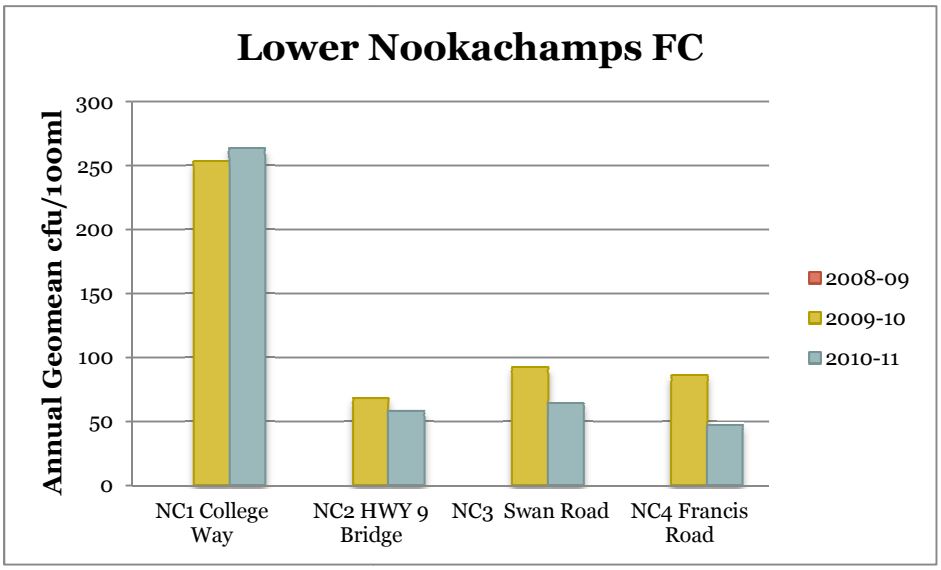


Figure 45. Lower Nookachamps Fecal Coliform: Two-year comparison

No Name Slough Results

Figures 46 through 52 below present results from No Name Slough sampling.

Dissolved oxygen levels fell below the state standard of 8mg/l for all sites at some point during the sampling season. Site 4 consistently had the lowest DO.

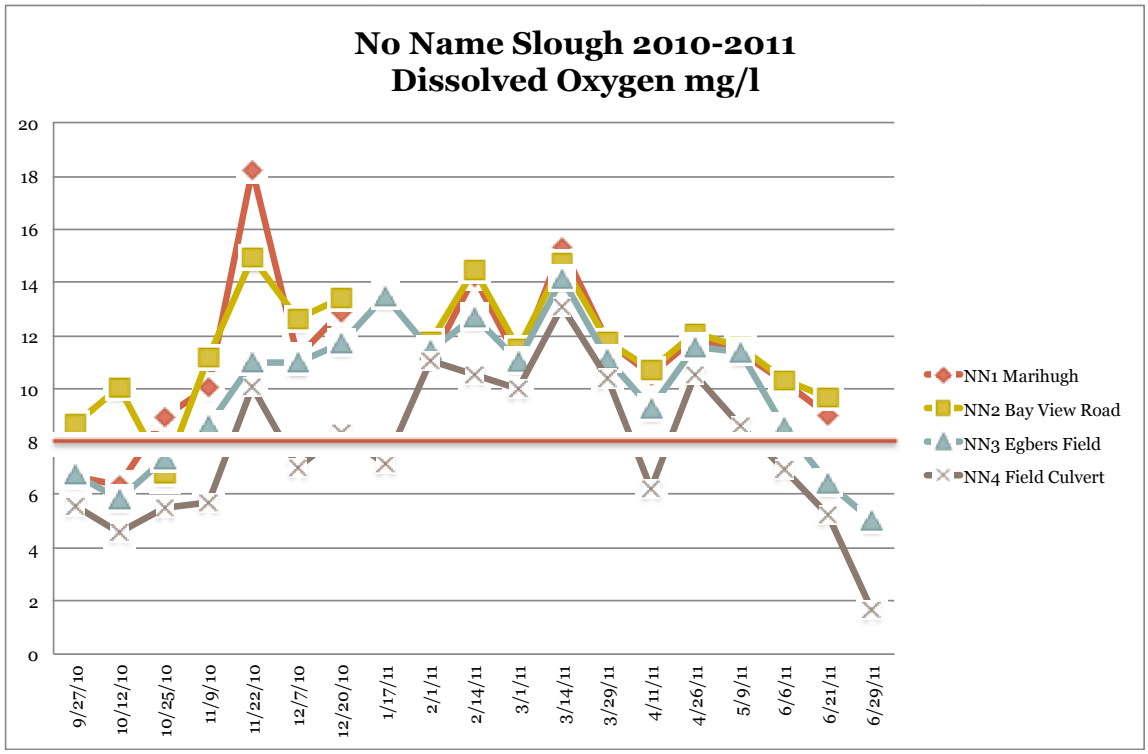


Figure 46. No Name Slough DO: 2010-2011

Compared with the past 2 years, average dissolved oxygen levels were higher for all sites. State standards are not based on the annual average. The orange line in Figure 47 below is for reference only.

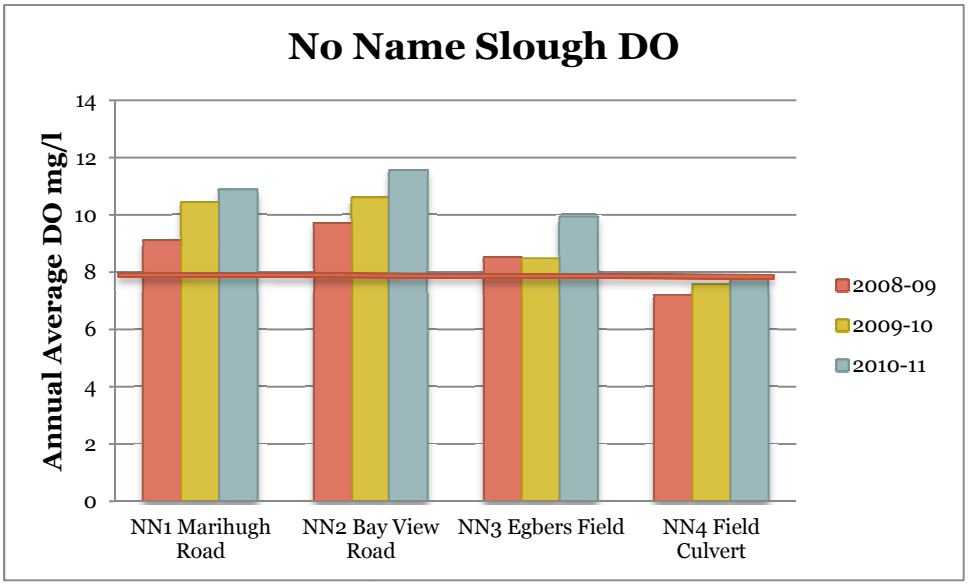


Figure 47. No Name Slough DO: Three-year comparison

Temperatures for all No Name samples at Sites 1-3 were below the optimum level of 17.5°C. Site 4 was above this temperature in June 2011. No samples were taken during the warmest summer season when temperatures may have been above the state standard.

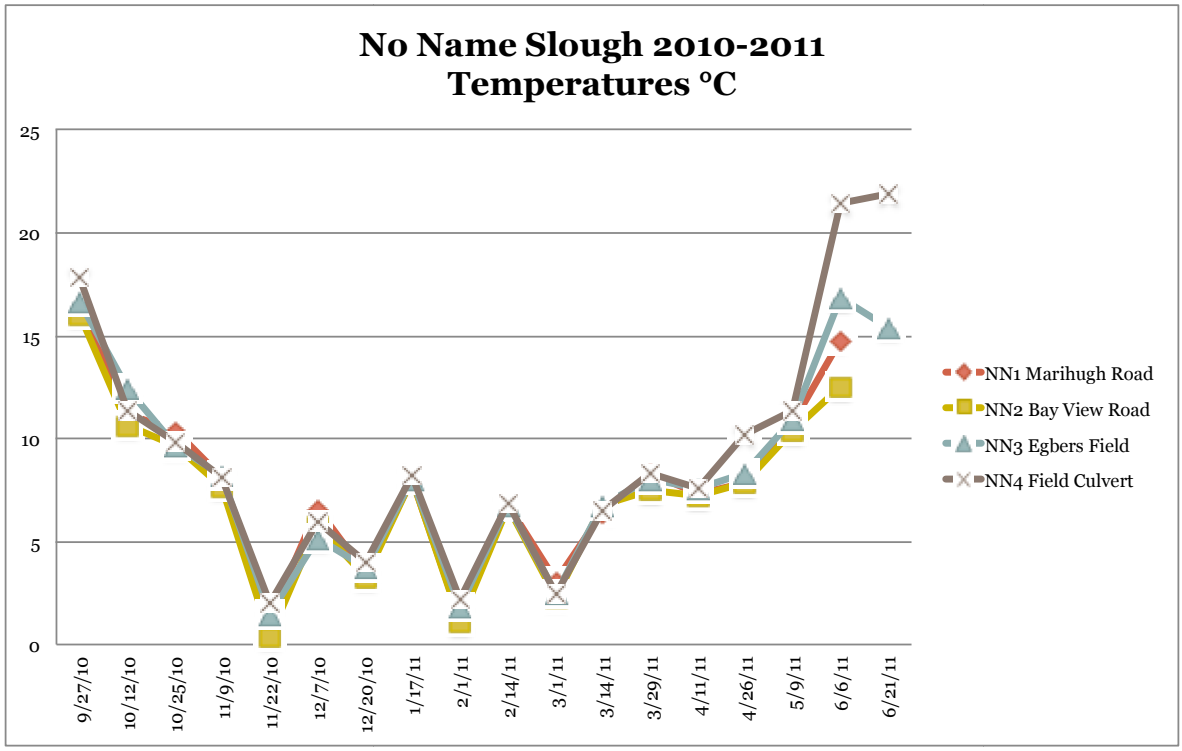


Figure 48. No Name Slough Temperature: 2010-2011

Compared to the previous two years, average annual temperatures were all cooler than 2009-2010. Sites 1 and 2 were cooler than 1008-2009. Sites 3 and 4 were slightly warmer than 2008-2009. State standards are not based on the annual average.

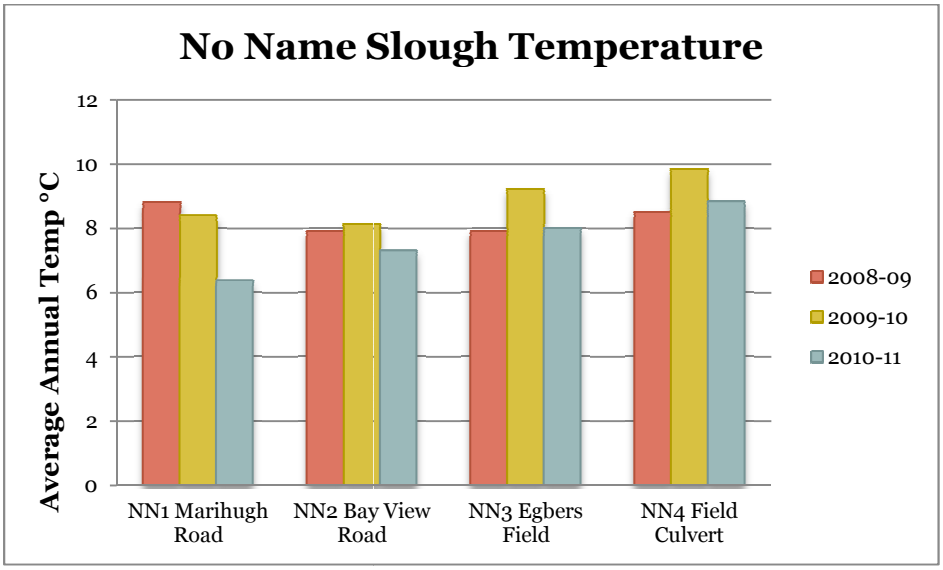


Figure 49. No Name Slough Temperature: Three-year comparison

Turbidity in No Name was similar to the past 2 years, with increasing turbidity from top to bottom of the watershed.

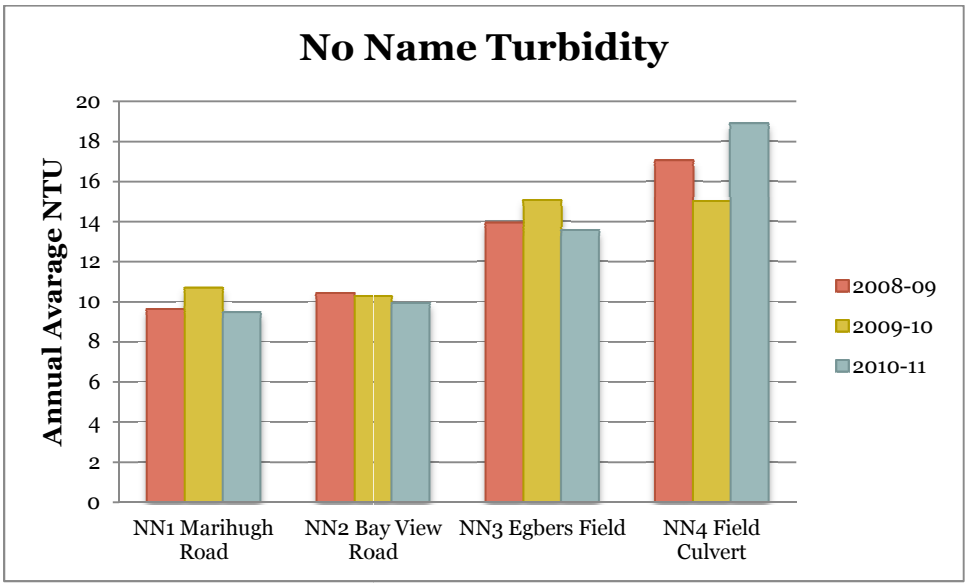


Figure 50. No Name Slough Turbidity: Three-year comparison

All No Name sites had extremely high fecal coliform levels during rainy spring months. Site 1 at Marihugh Road also had high levels in September and October.

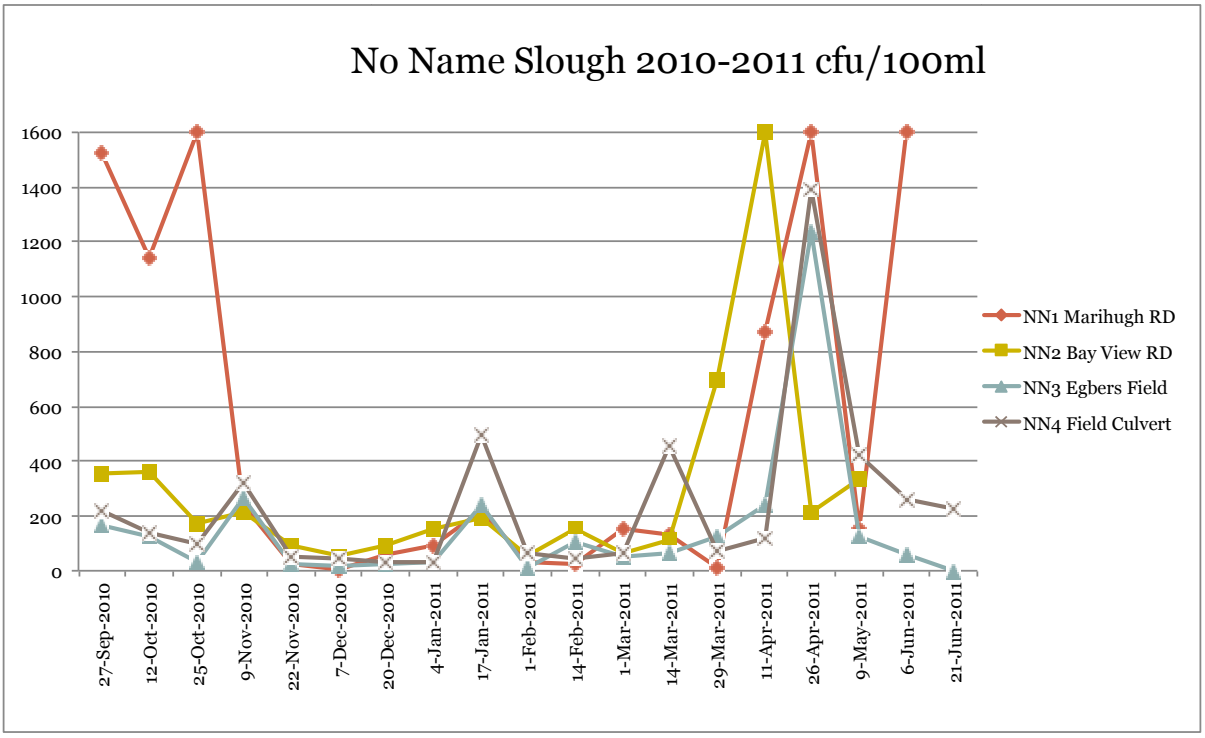


Figure 51. No Name Slough Fecal Coliform: 2010-2011

Only Site 3, Egbers Field met Part 1 of the state standard of 100 CFU/100ml. None of the sites met the <10% over 200 CFU/100ml standard. In spite of very high numbers, all sites showed improvement from 2009-2010 and all except Site 2 were lower than 2008-2009.

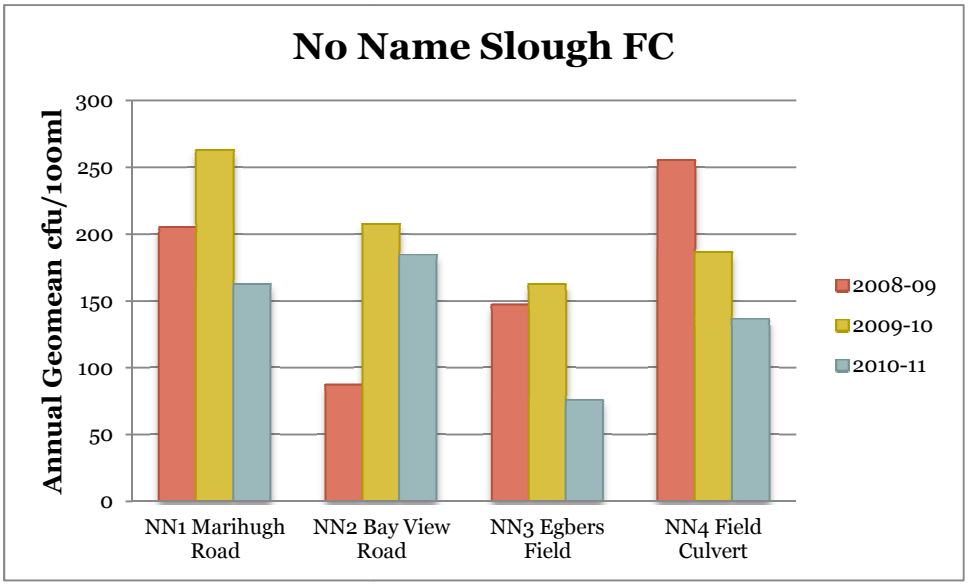


Figure 52. No Name Slough Fecal Coliform: Three-year comparison

Bay View Drainage Results
Figures 53 through 59 below present results from Bay View Drainage sampling.

All sites in Bay View had similar dissolved oxygen results during the 2010-2011 season.

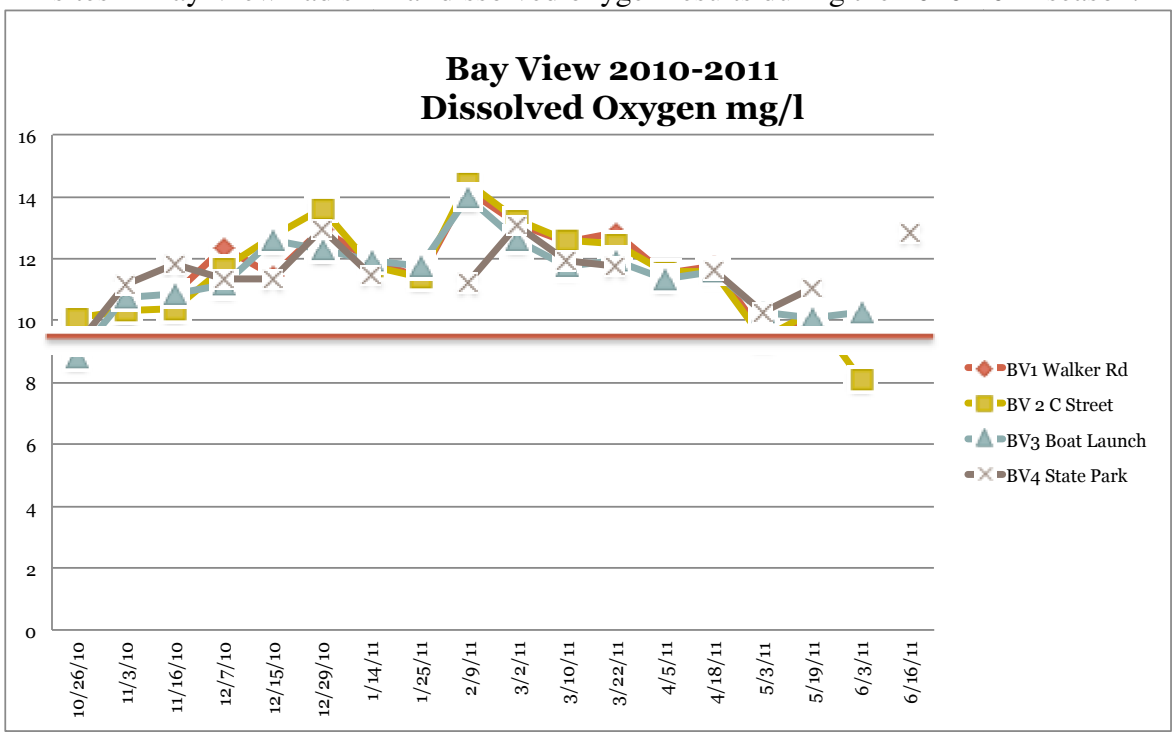


Figure 53. Bay View Drainage: 2010-2011

Dissolved oxygen levels were very similar to those from the previous two years, slightly higher than 2009-2010 and slightly lower than 2008-2009. The red line is for reference only. State standards are not based on the annual average.

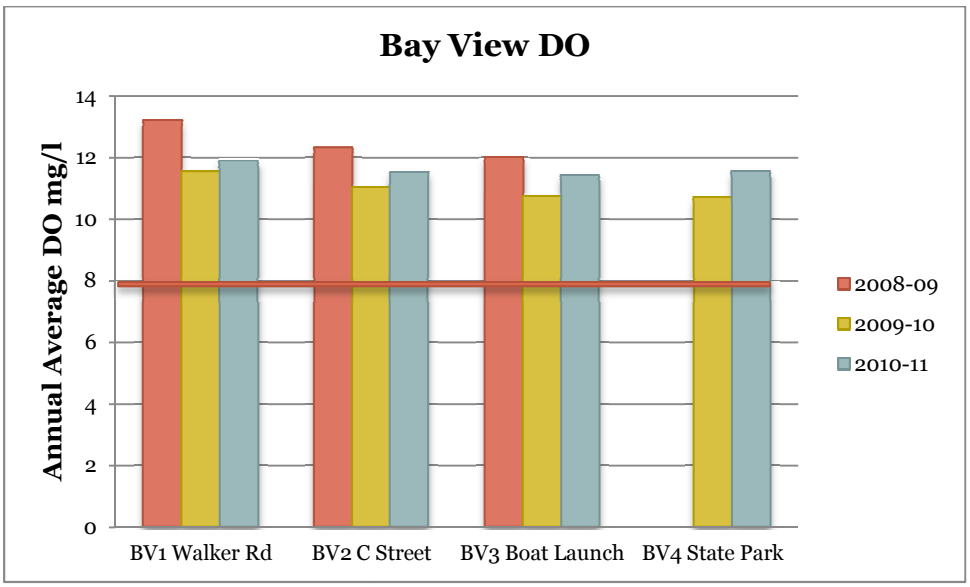


Figure 54. Bay View Drainage DO: Three-year comparison

Temperatures for all samples at all sites were below the optimum level of 17.5°C. No samples were taken during the warmest summer season when temperatures may have risen above the state standard.

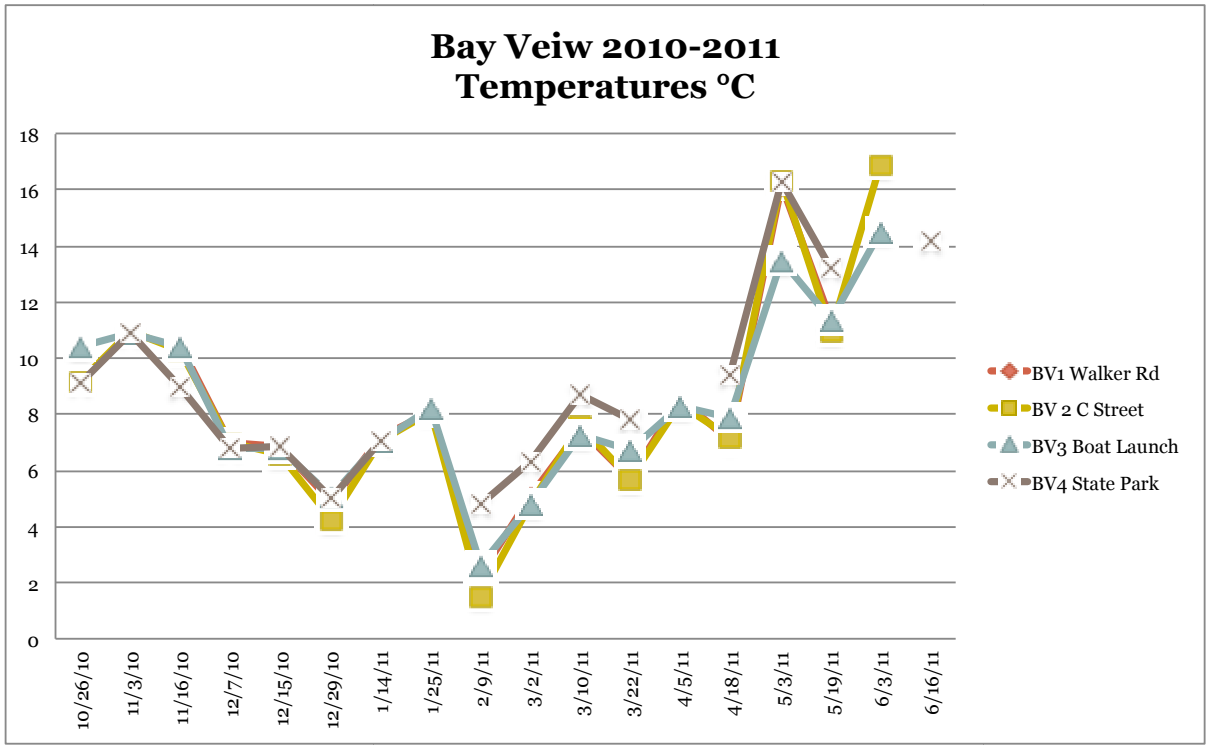


Figure 55. Bay View Drainage Temperature: 2010-2011

Compared to the previous two years, average annual temperatures were slightly cooler than 2009-2010 and slightly warmer than 2008-2009.

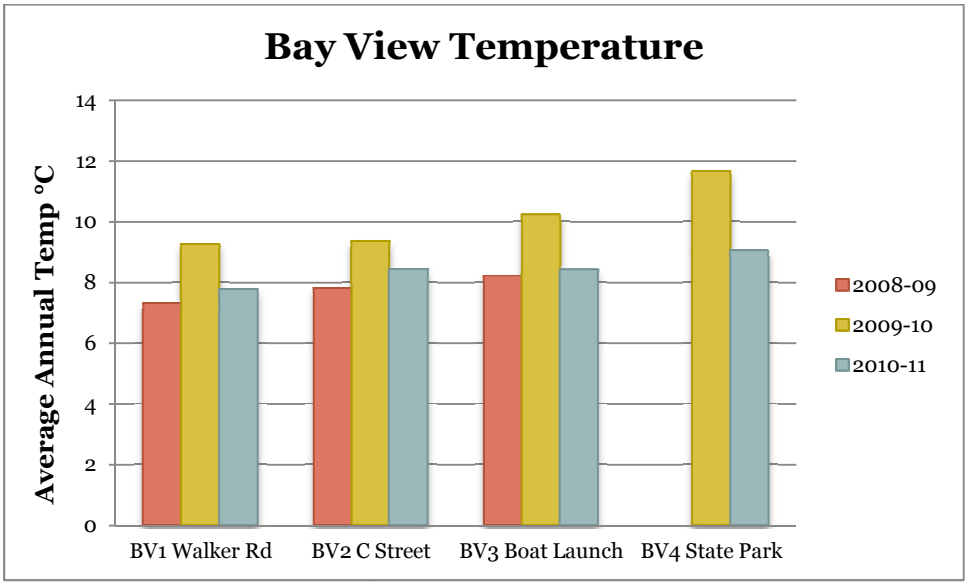


Figure 56. Bay View Drainage Temperature: Three-year comparison

The highest turbidity levels were at the salt water site at Bay View State Park. Levels were much lower than 2008-2009 and similar to 2009-2010.

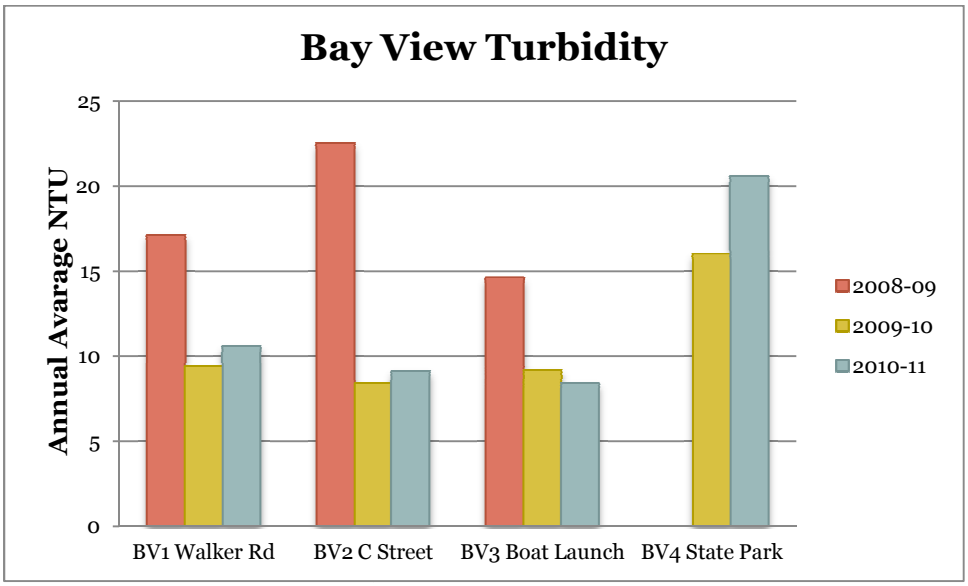


Figure 57. Bay View Drainage Turbidity: Three-year comparison

Except for a few high counts at Sites 3 and 4 in October and November, fecal coliform numbers were relatively low, under the state standard of 100 cfu/100ml.

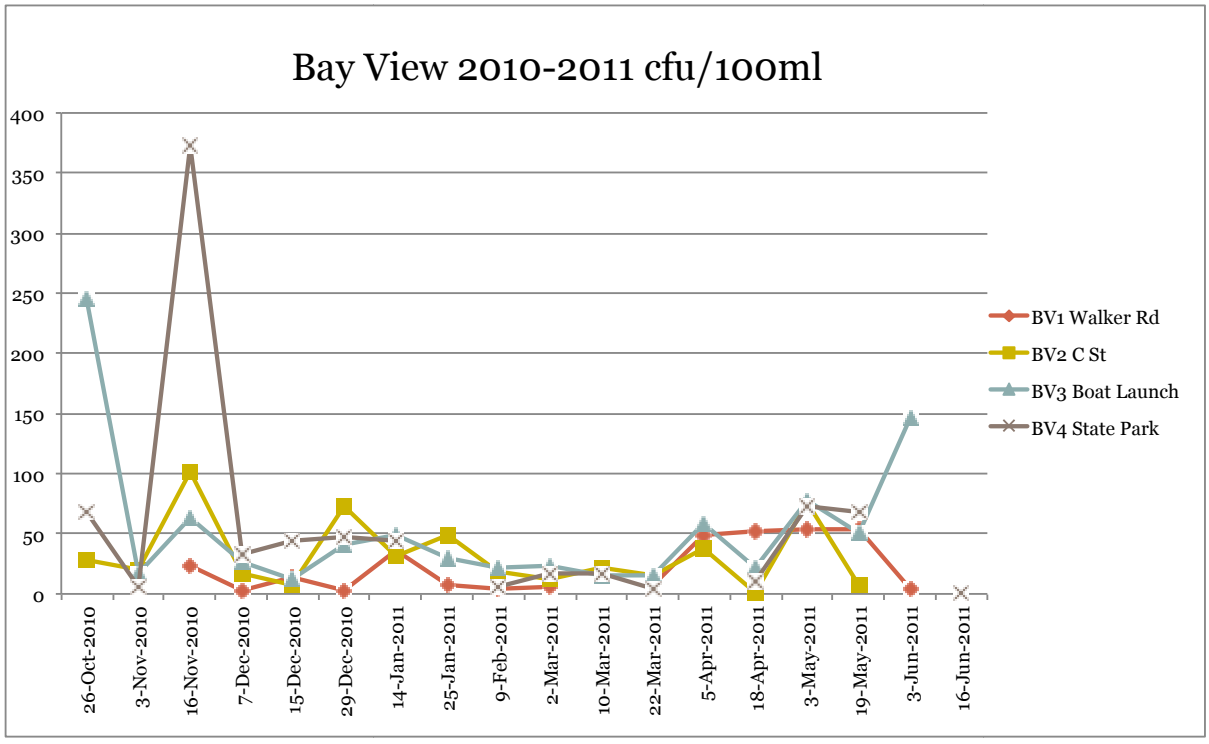


Figure 58. Bay View Drainage Fecal Coliform: 2010-2011

Annual geometric means for Bay View fecal coliform compare favorably to the past two years, with all sites meeting the state standards for both geomean and no more than 10% above 200 cfu/100ml.

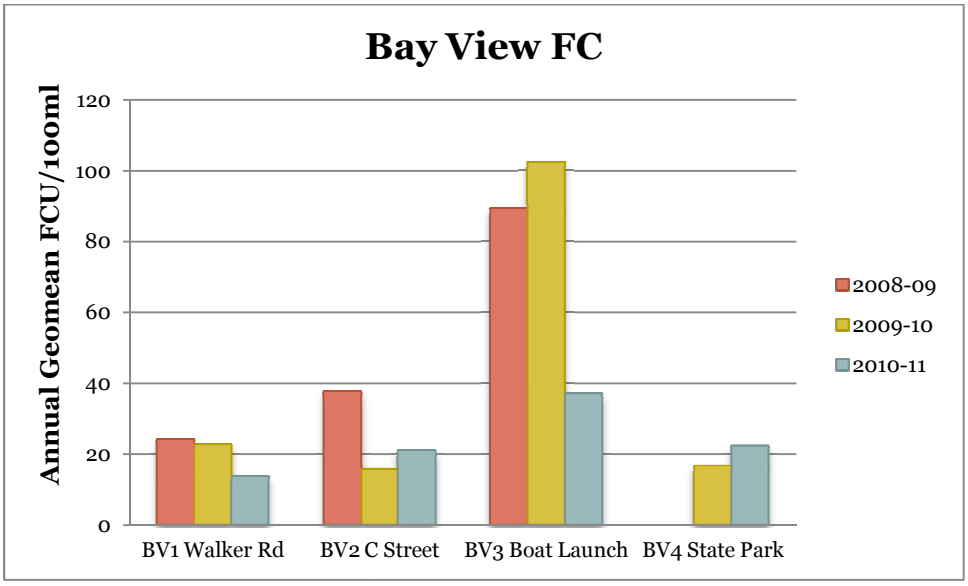


Figure 59. Bay View Drainage Fecal Coliform: three-year comparison

Joe Leary Slough Results

Figures 60 through 66 below present results from Joe Leary Slough sampling.

Dissolved oxygen levels were consistently below standards for all sites, even during the cold winter months. Levels at the tide gate at Site 4 were near zero on four occasions. These levels are the lowest of any watershed in the program.

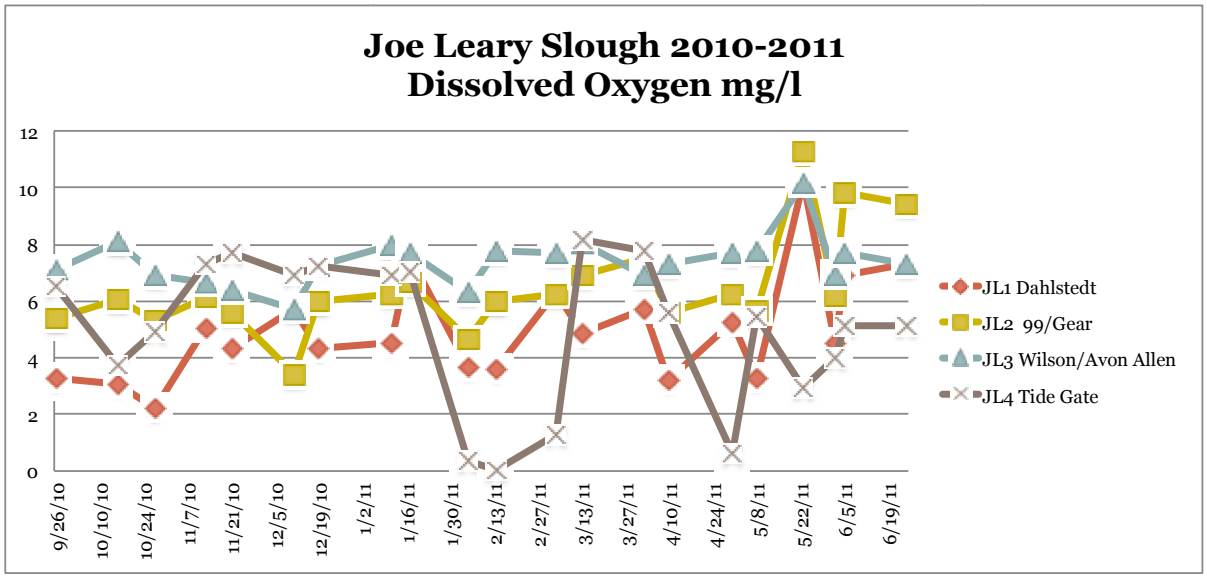


Figure 60. Joe Leary Sough DO: 2010-2011

Dissolved oxygen levels were lower in 2010-2011 than in the previous year, with averages below the state standard of 8°C.

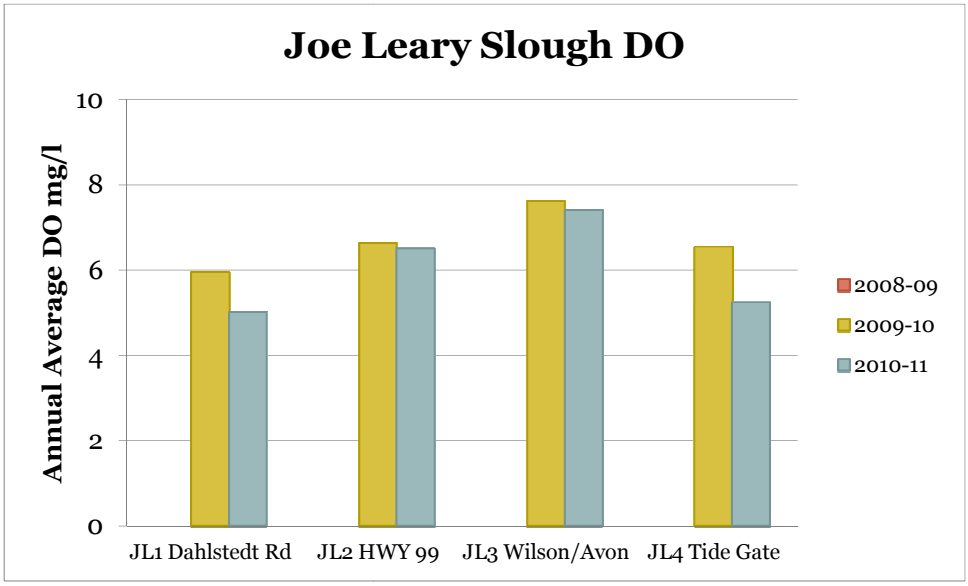


Figure 61. Joe Leary Slough DO: Two-year comparison

Temperatures for Sites 2-4 were above the optimum level of 17.5°C on June 5, 2010. All other samples were at or below 17.5 °C. No samples were taken during the warmest summer season when temperatures may have risen even higher.

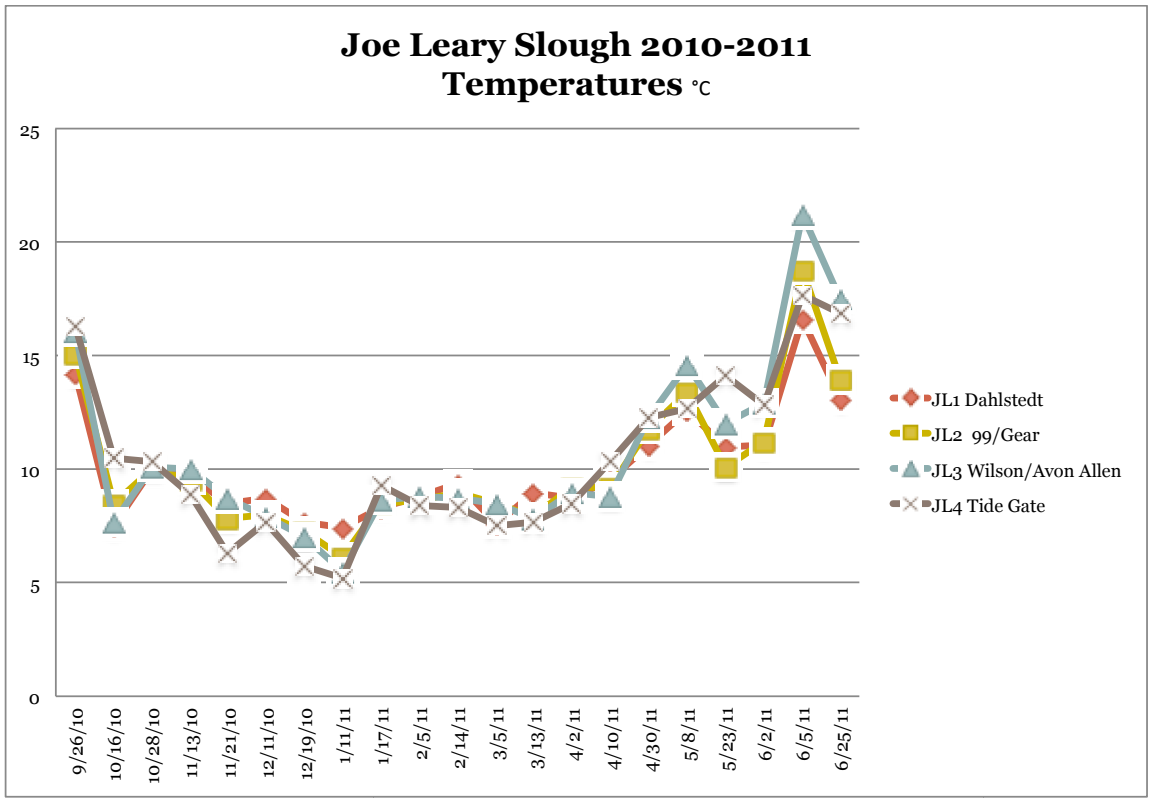


Figure 62. Joe Leary Slough Temperature: 2010-2011

Compared to 2009-2010, average annual temperatures were cooler in 2010-2011for Sites 1-3 and warmer for Site 4.

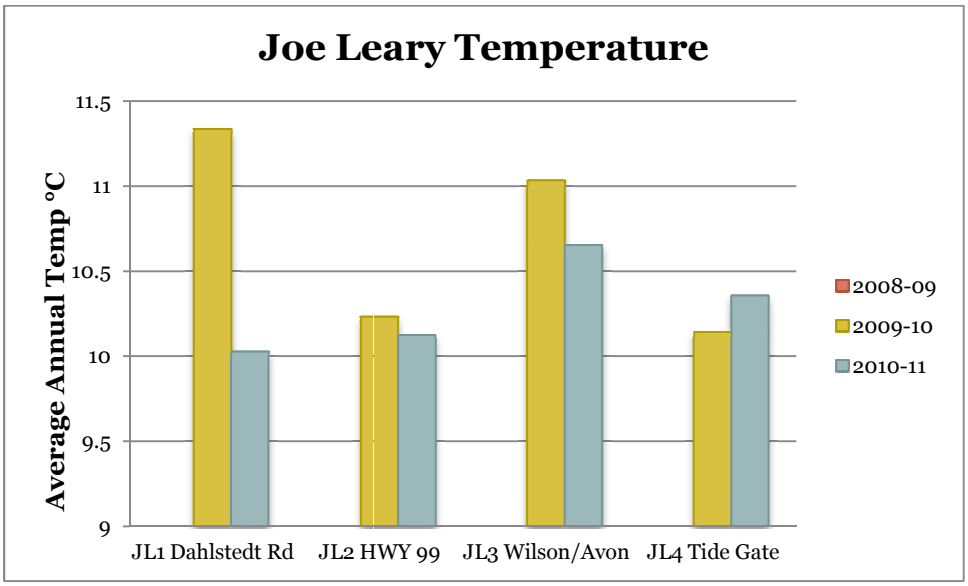


Figure 63. Joe Leary Slough Temperature: Two-year comparison

Turbidity in Joe Leary Slough was relatively high compared to other streams, and slightly lower or the same at 2009-2010.

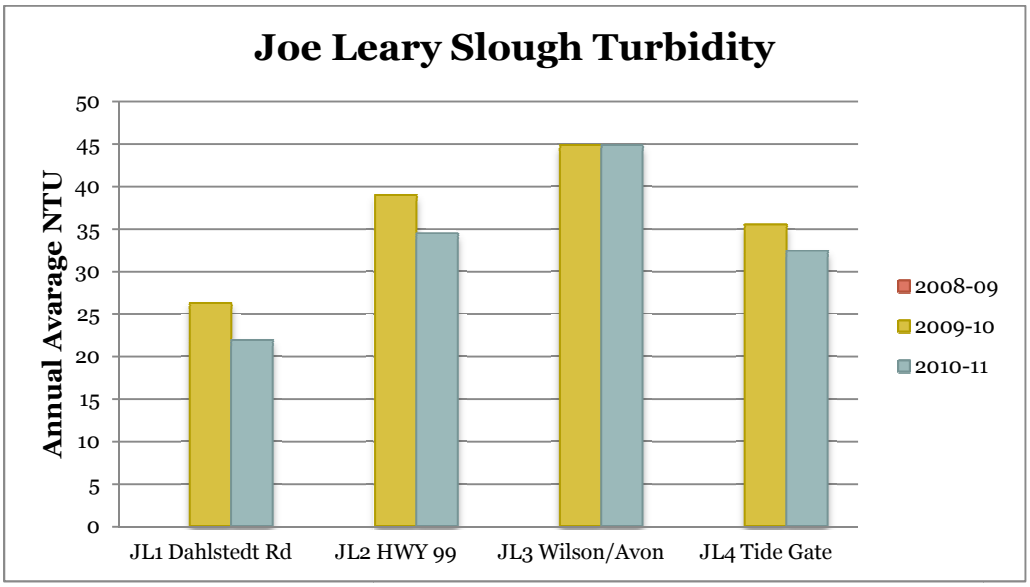


Figure 64. Joe Leary Slough Turbidity: Two-year comparison

Fecal coliform levels at all Joe Leary sites were often several times the standard of 100 cfu/100ml throughout the sampling season. Site 3 was usually the lowest of the four sites.

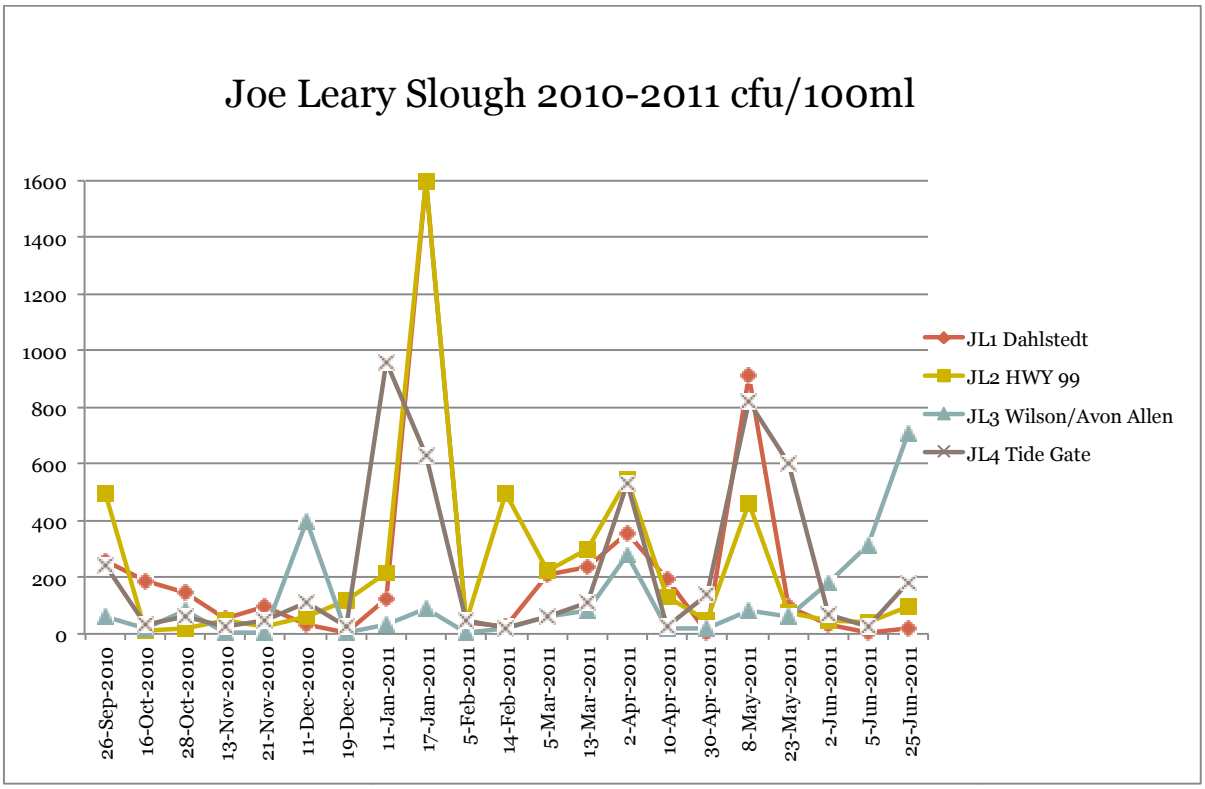


Figure 65. Joe Leary Slough Fecal Coliform: 2010-2011

Compared to 2009-2010, fecal coliform levels were lower for Sites 1-3 and slightly higher for Site 4. All four sites failed the state standard of <10% above 200 cfu/100ml. Sites 1, 2, and 4 failed the standard of geometric mean <100 cfu100ml.

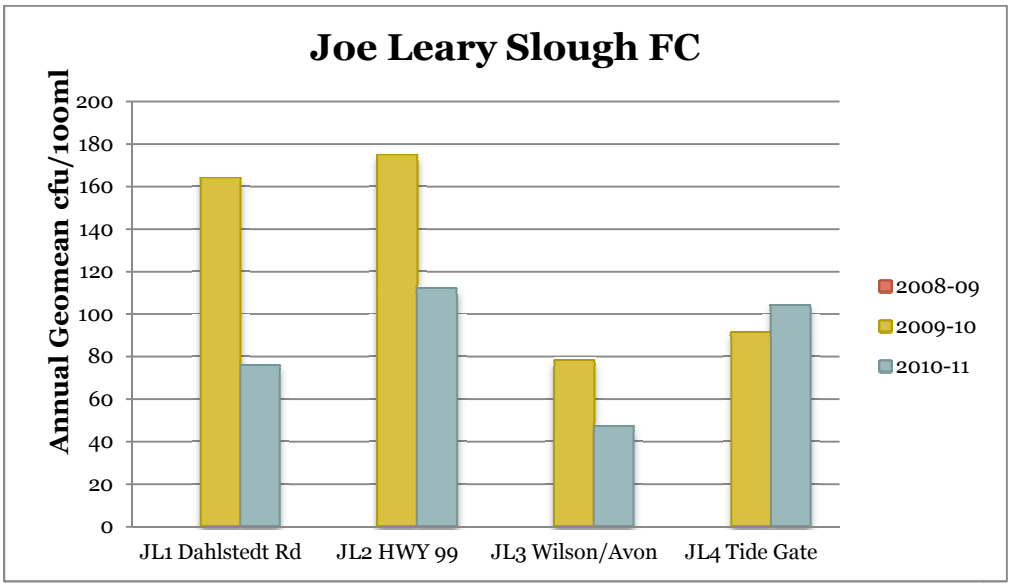


Figure 66. Joe Leary Slough Fecal Coliform: Two-year comparison

Trumpeter Basin Results
Figures 67 through 73 below present results from Trumpeter Basin sampling.

Dissolved oxygen levels dropped below the standard of 9.5°C at all sites in April in spite of cool water temperatures. Unusually high DO levels (above 15 mg/L) may be caused by daytime plant growth due to excessive nutrient levels. This is often followed by low DO levels at night when plants respire.

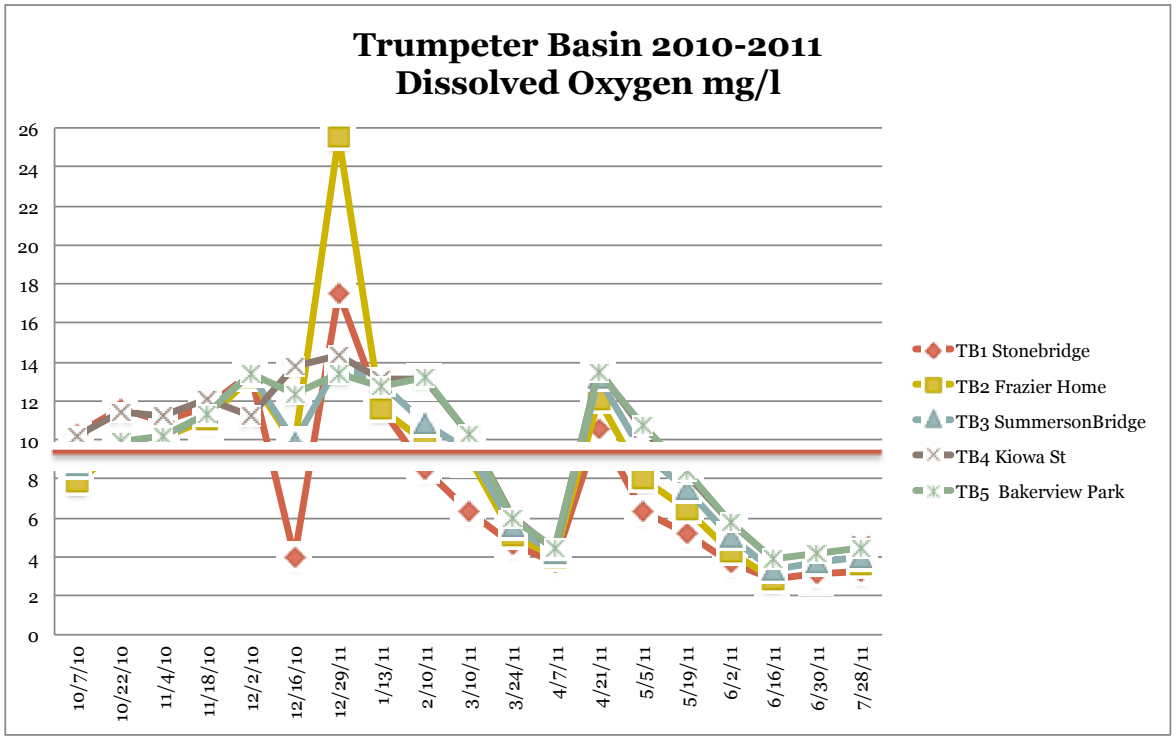


Figure 67. Trumpeter Basin DO: 2010-2011

Figrue 68 below shows that dissolved oxygen levels dropped from previous years in 2010-2011, and the average annual DO was below the standard of 9.5mg/l for Sites 1 and 3. State standards are not based on annual averages, but on the lowest single measurement.

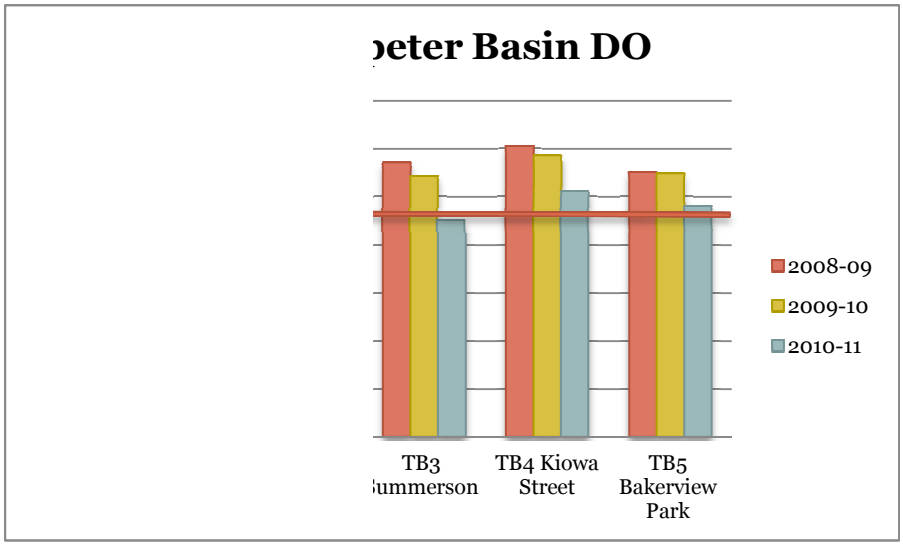


Figure 68. Trumpeter Basin DO: Three-year comparison

Temperatures for all samples at all sites were below the upper limit of 16°C. No samples were taken during August when temperatures may have risen above the state standard.

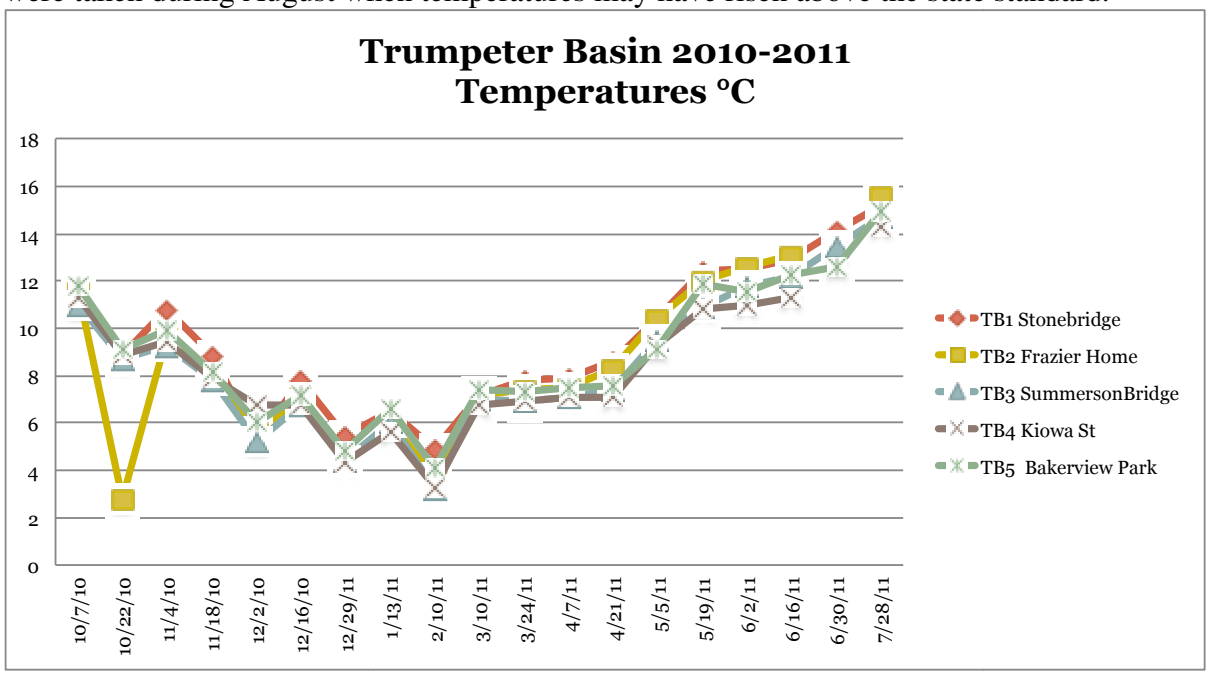


Figure 69. Trumpeter Basin Temperature: 2010-2011

Trumpeter Basin average annual temperatures in 2010-2011 were the coolest in 3 years. State standards are not based on the annual averages.

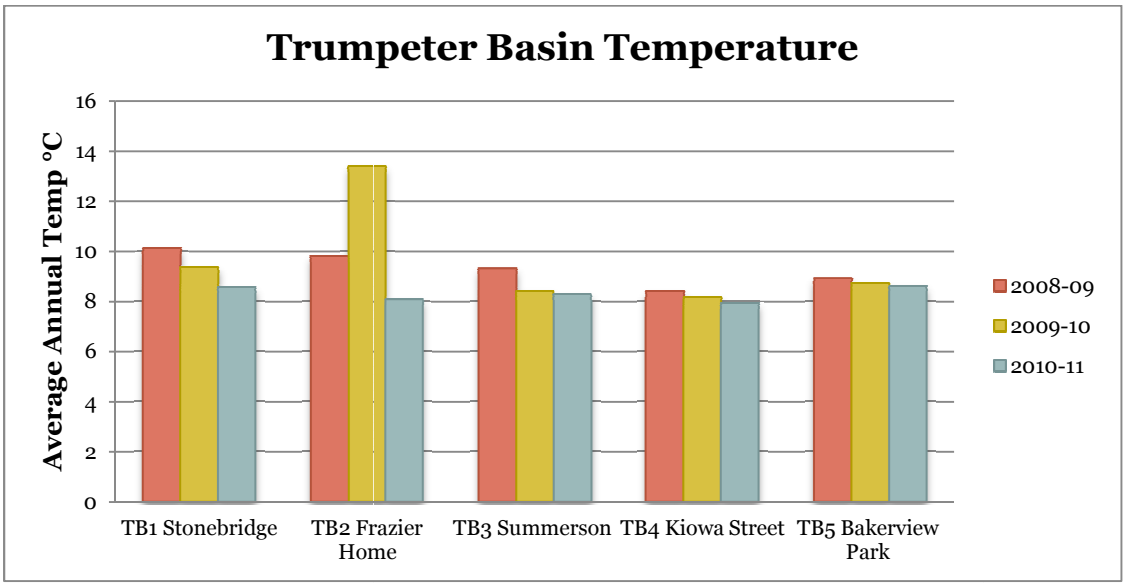


Figure 70. Trumpeter Basin Temperature: Three-year comparison

Turbidity levels in Trumpeter Basin were higher than the previous two years for Sites 2-5, and higher than 2009-2010 for Site 1. Turbidity may be connected to the low oxygen levels in March and April.

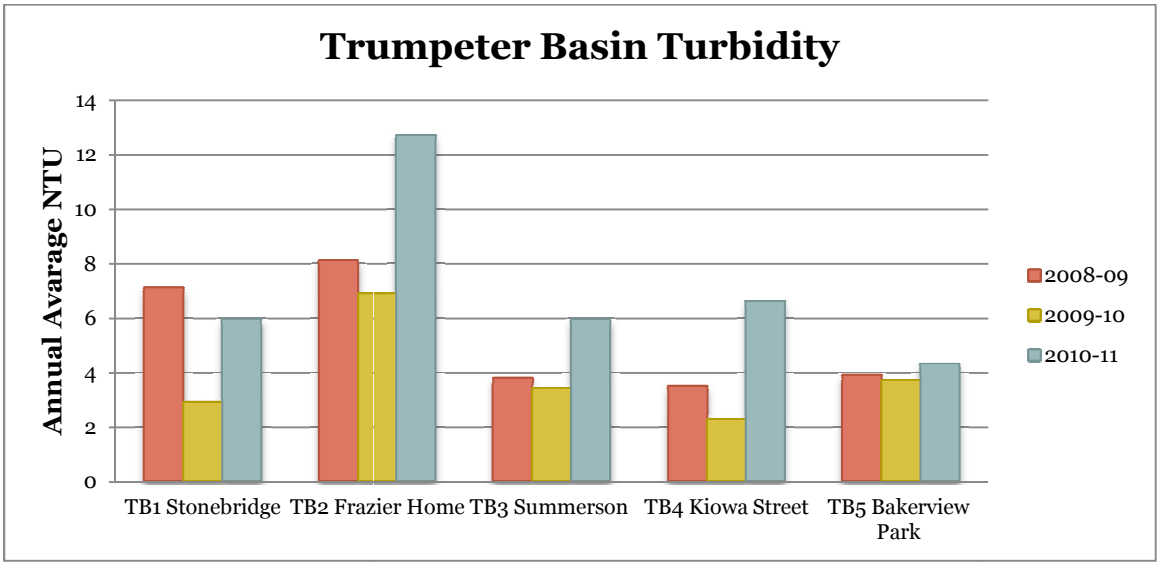


Figure 71. Trumpeter Basin Turbidity: Three-year comparison

Fecal coliform levels spiked for all sites at some point during the sampling season. Site 2 had the most frequent spikes in numbers, with 6 out of 17 higher than 200 CFU/100ml. While all five sites had geometric means lower than the 100 CFU/100ml standard, only Site 5, Bakerview Park, passed the standard of <10% of counts under 200 CFU/100ml.

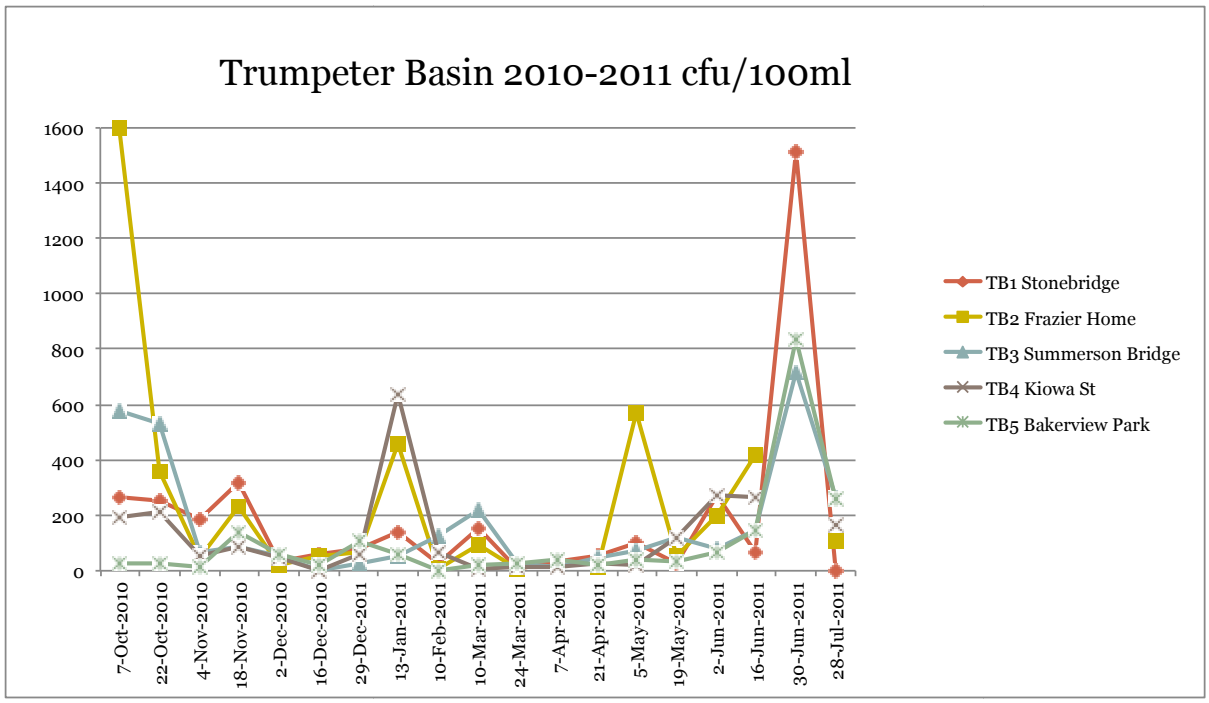


Figure 72. Trumpeter Basin Fecal Coliform: 2010-2011

Compared to the past two years, all sites showed improvement over 2009-2010, and all except Site 4 had lower numbers than 2008-2009.

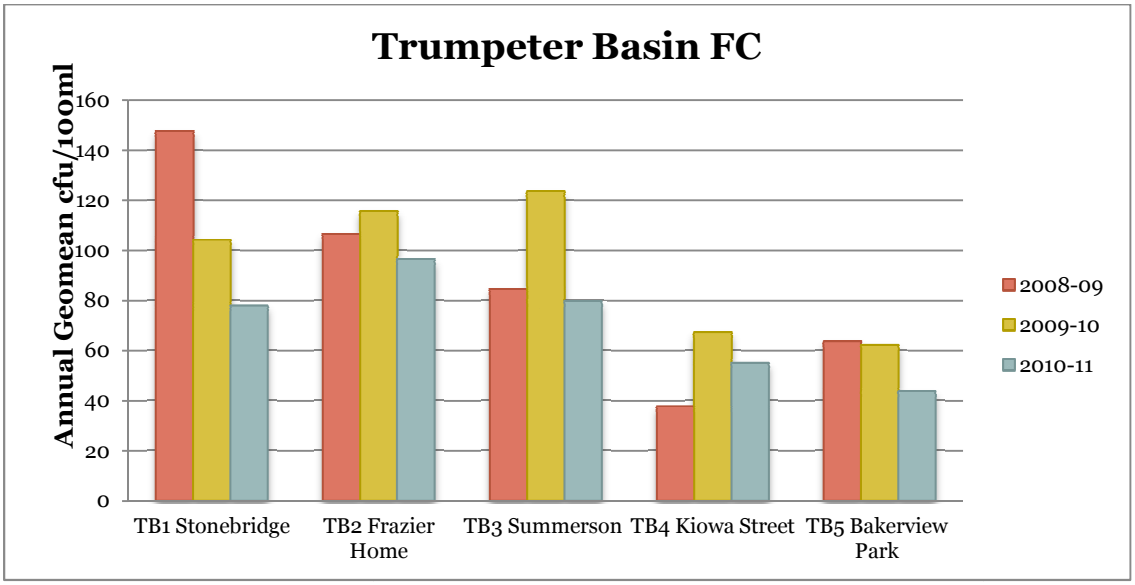


Figure 73. Trumpeter Basin Fecal Coliform: Three-year comparison

Kulshan Creek Results
Figures 74 through 80 below present results from Kulshan Creek sampling.

Dissolved oxygen in all Kulshan Creek sites were below the state standard of 9.5mg/l for most of the sampling season.

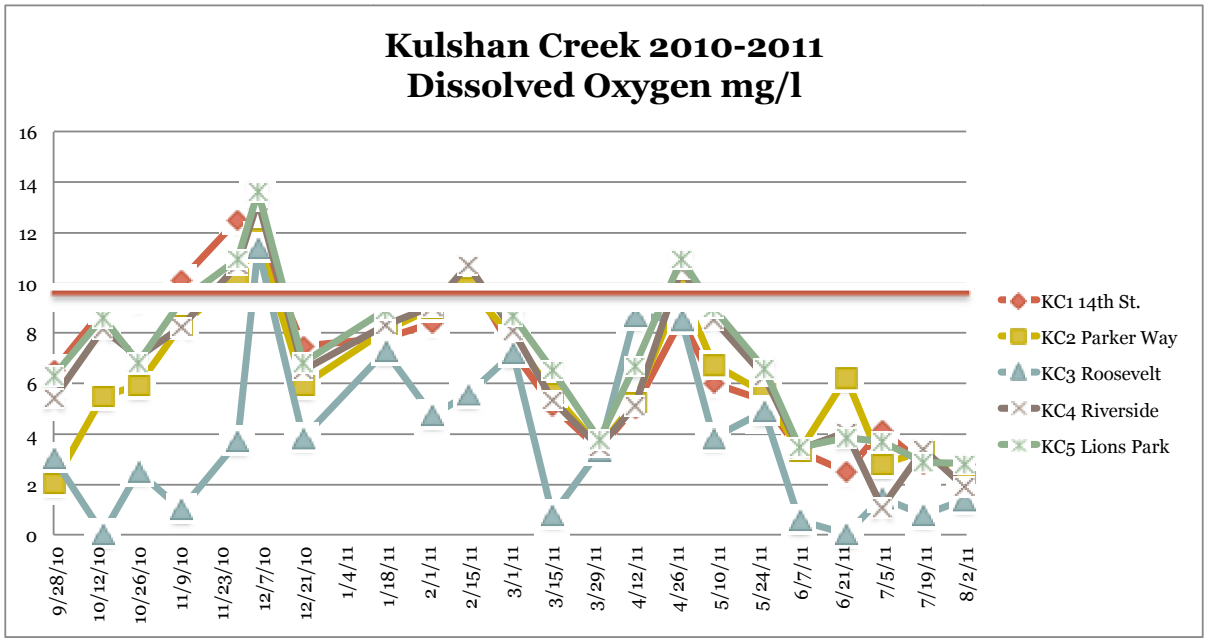


Figure 74. Kulshan Creek DO: 2010-2011

Compared with the past two years, dissolved oxygen levels improved slightly over last year at Site 4. All other sites had the same or lower levels than last year, and all but Site 3 had lower levels than 2008-2009

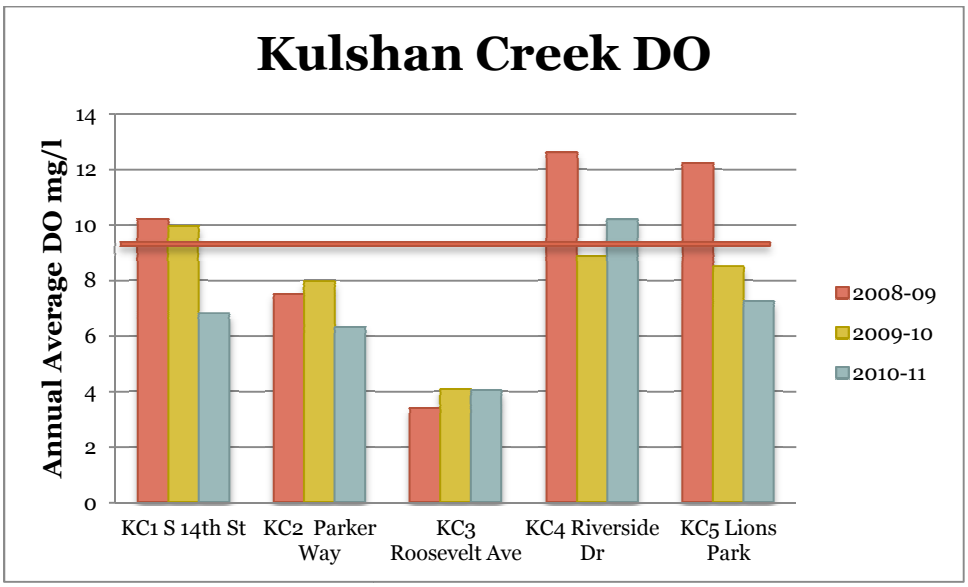


Figure 75. Kulshan Creek DO: Three-year comparison

Temperatures for all sites were above the maximum level of 16°C on September 28, 2010. Site 3 was above 16°C on August 2 and Site 5 was above 16°C on July 19 and August 2.

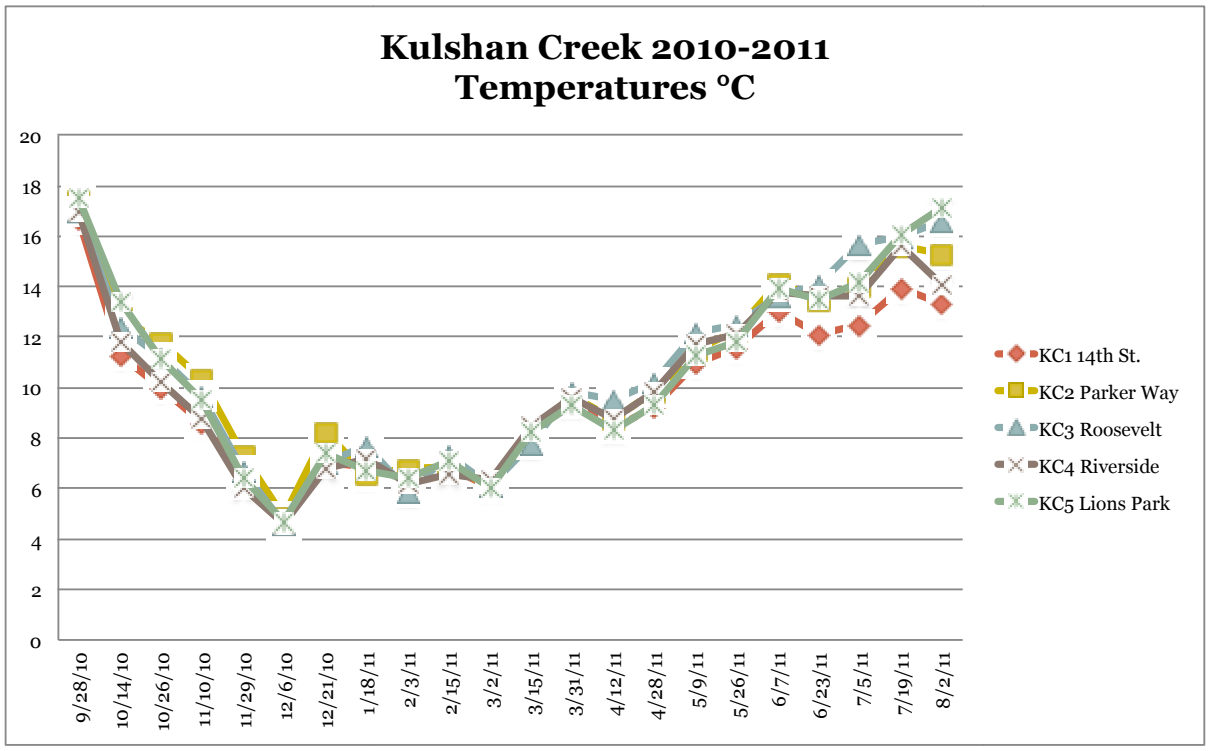


Figure 76. Kulshan Creek Temperature: 2010-2011

Compared to the previous two years, average annual temperatures for most sites were cooler than 2009-2010 and 2008-2009. Only Site 5 had warmer average temperatures than 2009-2010. State standards are not based on annual averages.

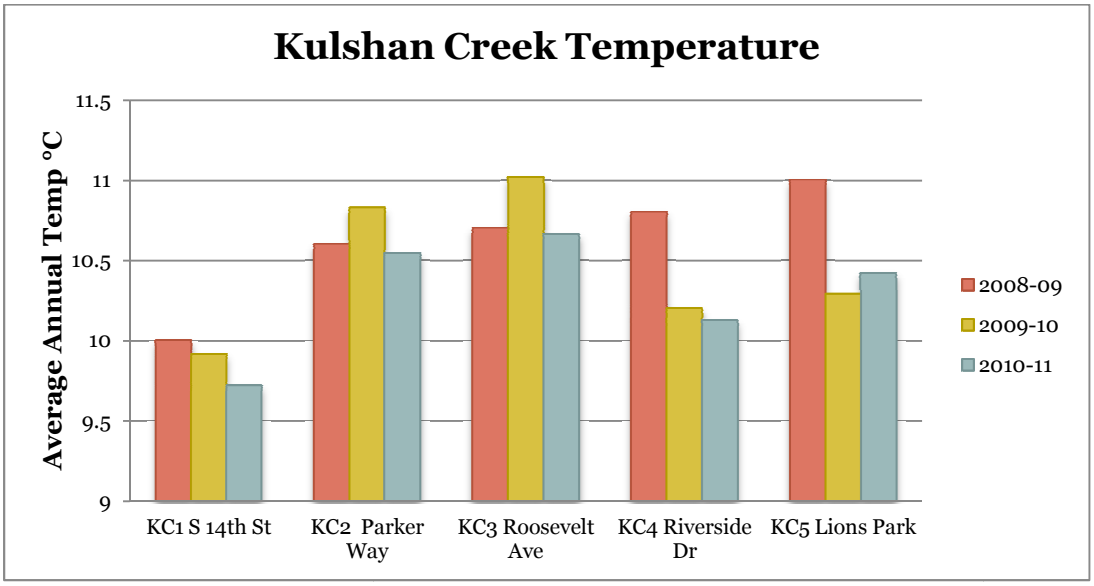


Figure 77. Kulshan Creek Temperature: Three-year comparison

Turbidity in Kulshan Creek was higher for all sites in 2010-2011. Sites 2 and 3 were not as high as in 2008-2009.

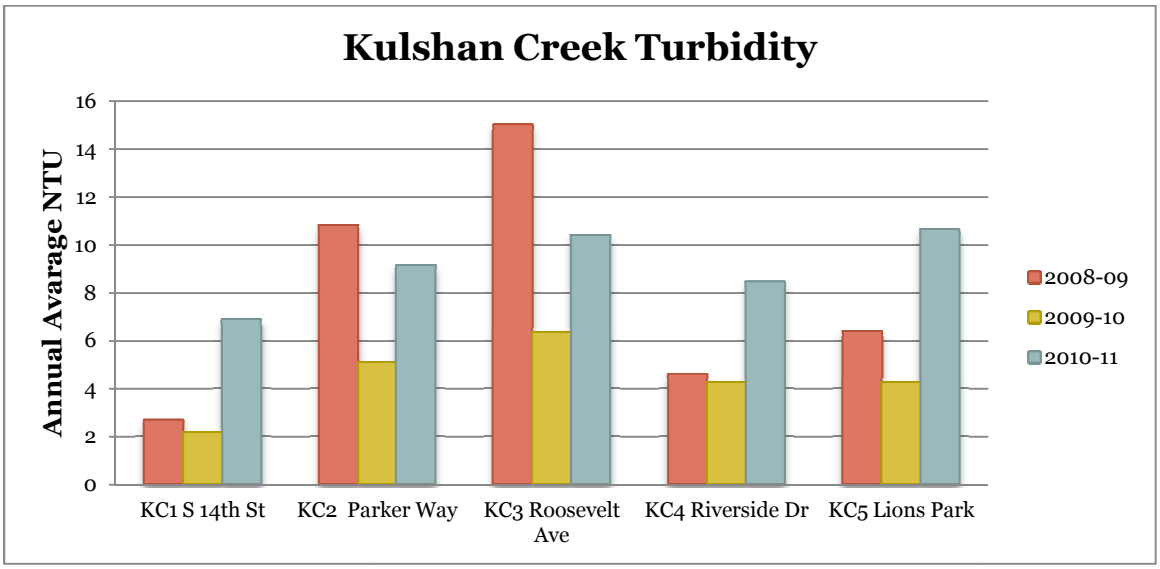


Figure 78. Kulshan Creek Turbidity: Three-year comparison

Fecal coliform counts in Kulshan Creek were highly variable throughout the year. All sites had over 10% of the samples over 200 CFU/100ml. Sites 1, 2, and 4 had nearly 50% of the counts above 200 CFU/100ml. Sites 1, 2, and 4 had annual geometric means over the standard of 100 CFU/100ml.

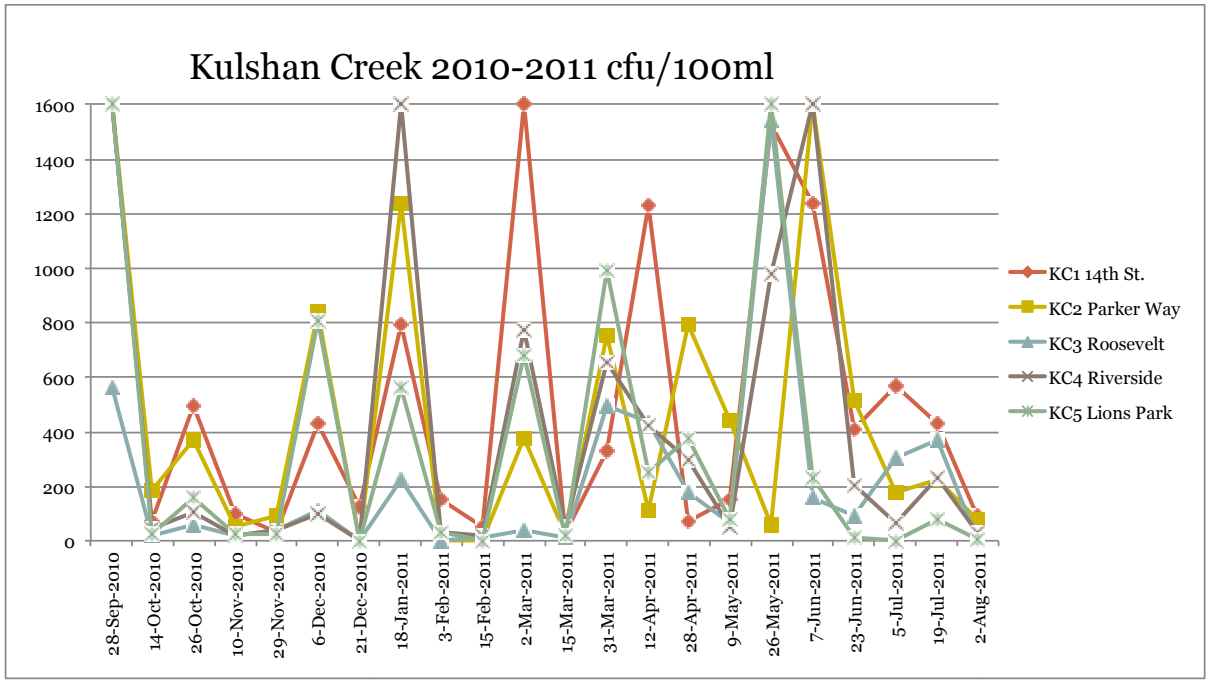


Figure 79. Kulshan Creek Fecal Coliform: 2010-2011

In 2010-2011, all Kulshan Creek sites had the highest fecal coliform levels in three years.

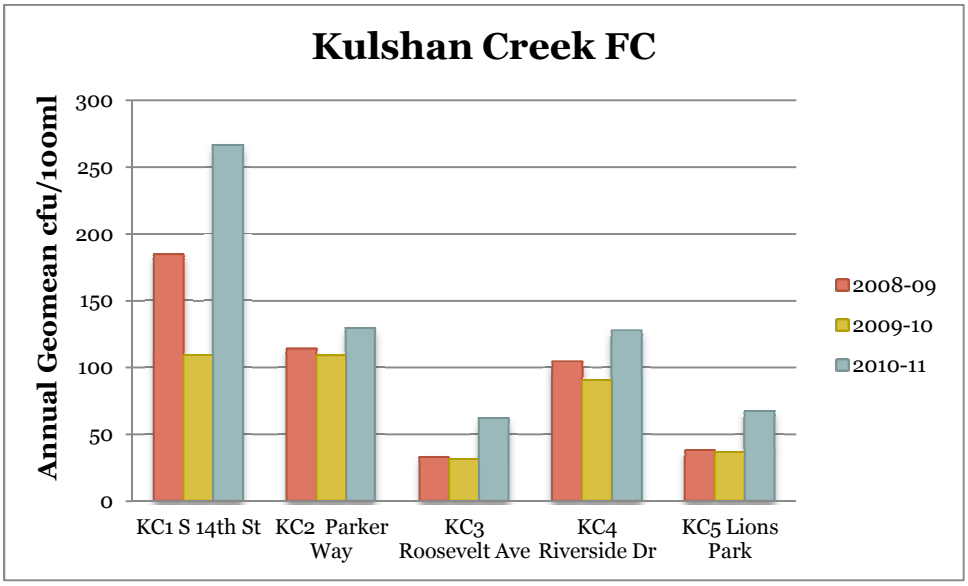


Figure 80. Kulshan Creek Fecal Coliform: Three-year comparison

Brickyard Creek Results

Figures 81 through 87 below present results from Brickyard Creek sampling. Because this was the final year for sampling in Brickyard Creek,

Dissolved oxygen for Site 2 was higher than the standard for 8mg/l throughout the sampling season, including the summer months. All other sites dropped below the standard at some point during the year.

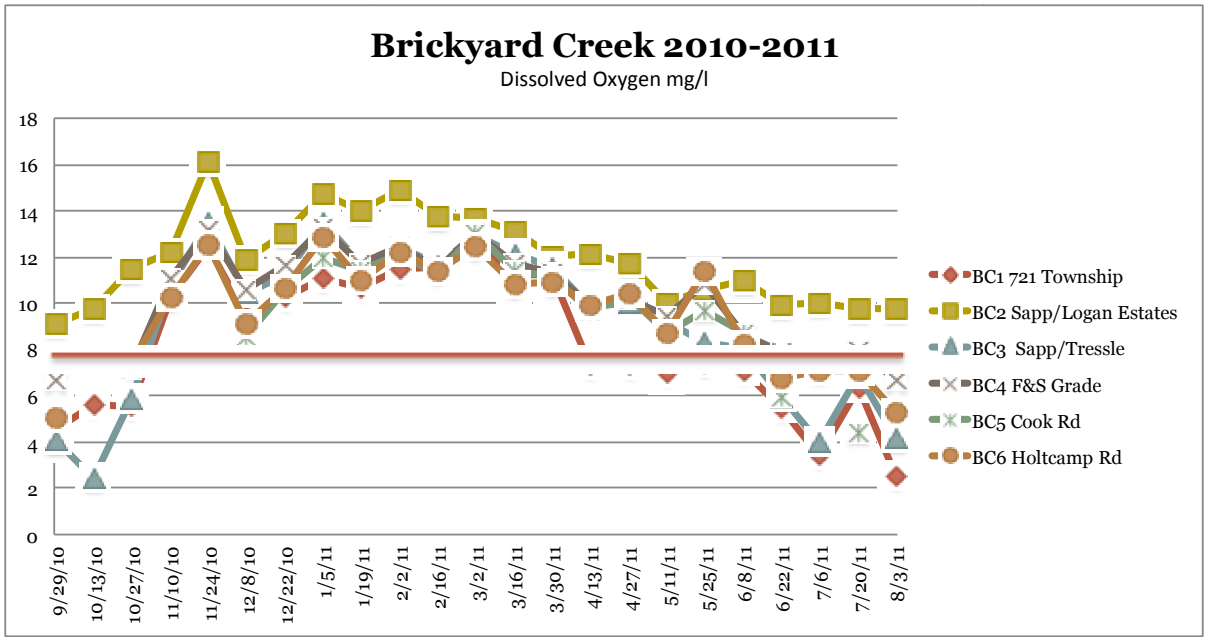


Figure 81. Brickyard Creek DO: 2010-2011

Compared with past years, average dissolved oxygen was similar to the past two years. Site 4 was much lower than in 2008-2009, and Site 6 was slightly higher than the previous 2 years. The orange line in figure 82 is for reference only. State standards for DO are not based on the annual average.

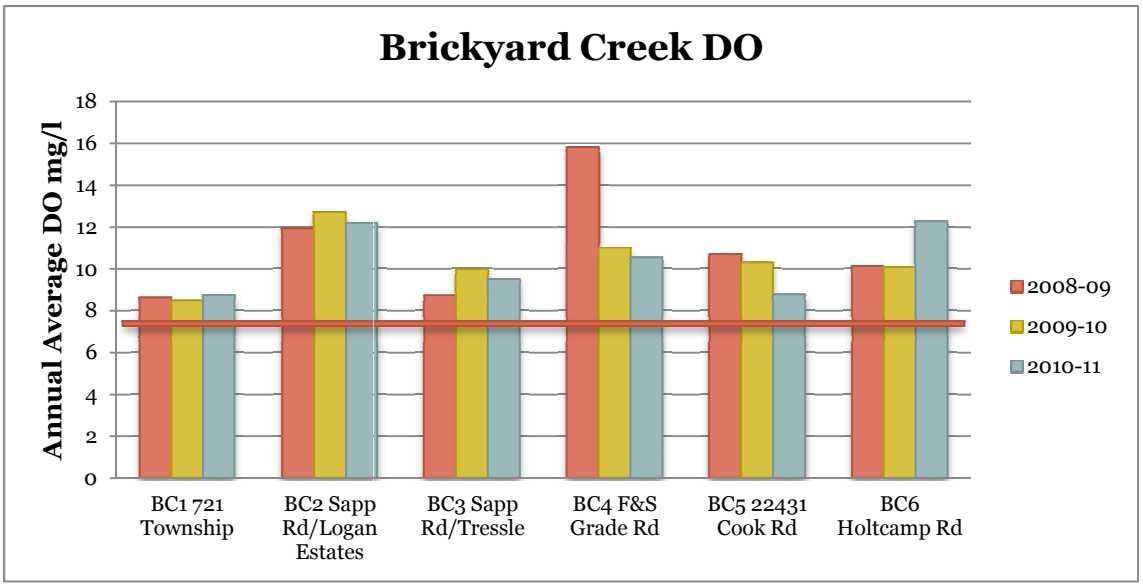


Figure 82. Brickyard Creek DO: Three-year comparison

Temperatures for all samples at all sites were below the maximum level of 17.5°C.

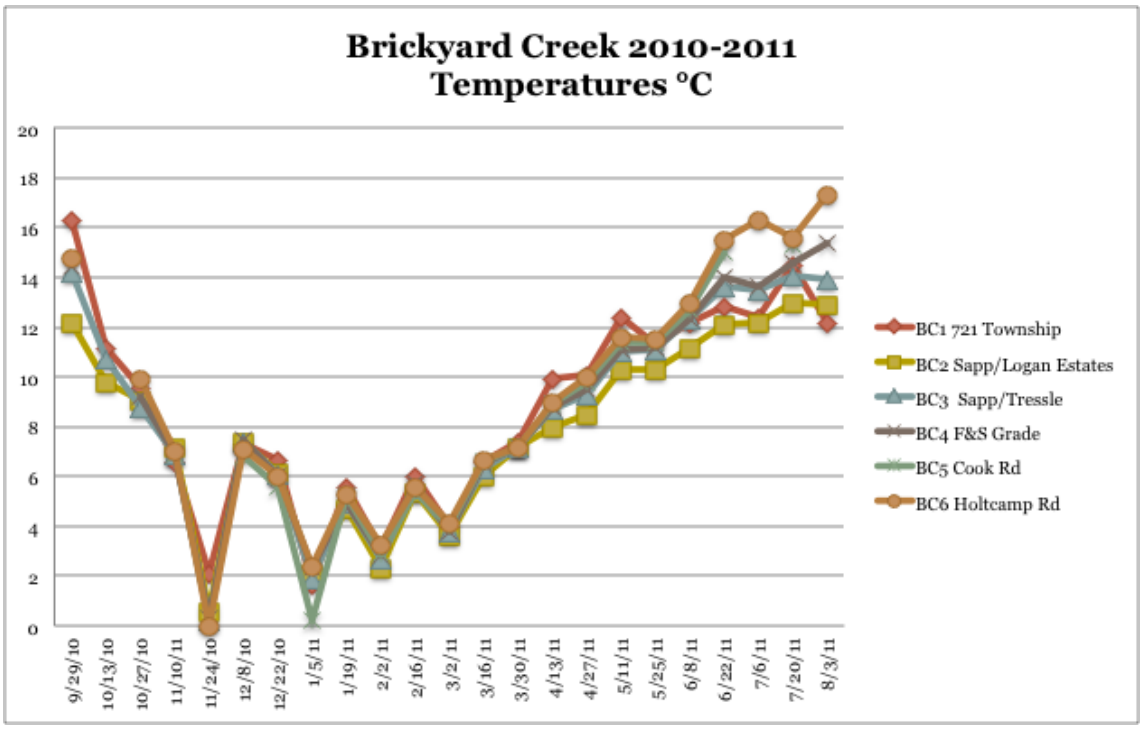


Figure 83. Brickyard Creek Temperature: 2010-2011

Compared to the previous two years, average annual temperatures all cooler than 2009-2010 temperatures. Sites 1 and 5 were higher than average temperatures 2008-2009. State standards are not based on the annual averages.

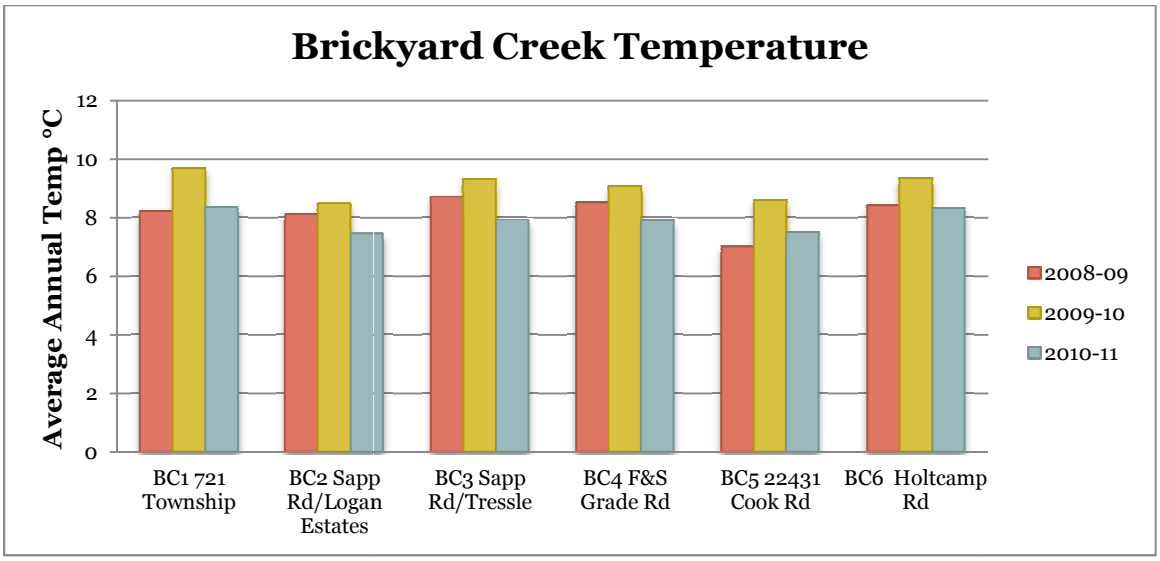


Figure 84. Brickyard Creek Temperature: Three-year comparison

For most Brickyard Creek sites, turbidity was about the same as in 2008-2009, and higher than in 2009-2010. Site 2, Sapp Road at Logan Estates was almost 4 times higher than last year.

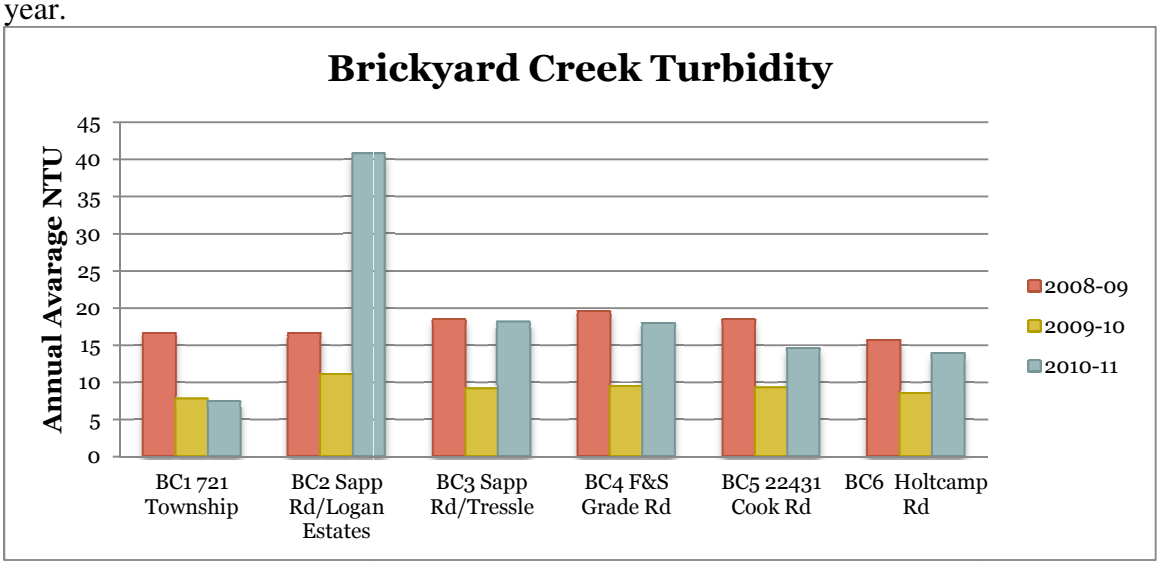


Figure 85. Brickyard Creek Turbidity: Three-year comparison

Fecal coliform in Brickyard was highly variable, with spikes throughout the season. All sites had very high numbers at some point, especially March 29. Sites 2-4 had geometric means higher than the 100 CFU/100ml standard. All six sites had more than 10% of the counts higher than 200 CFU/100ml.

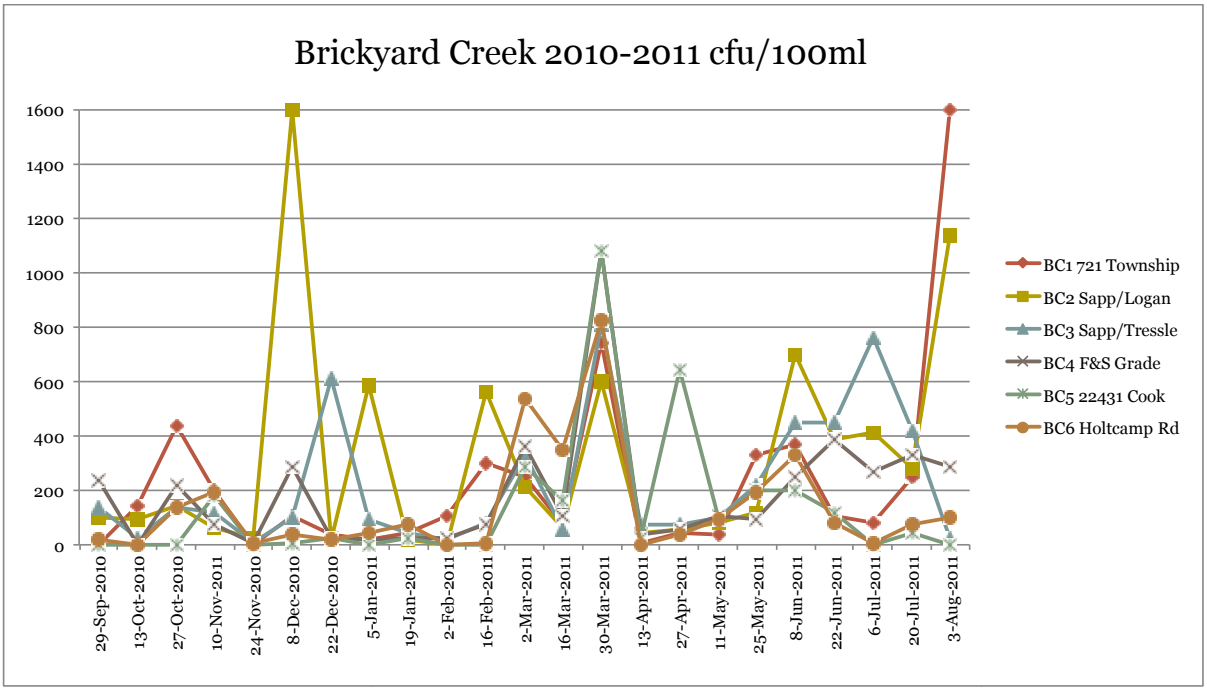


Figure 86. Brickyard Creek Fecal Coliform: 2010-2011

Compared to the past two years, fecal coliform levels were much higher at Sites 1-4 and lower for Site 5. Site 6 was better this year than in 2009-2010, and about the same as 2008-2009.

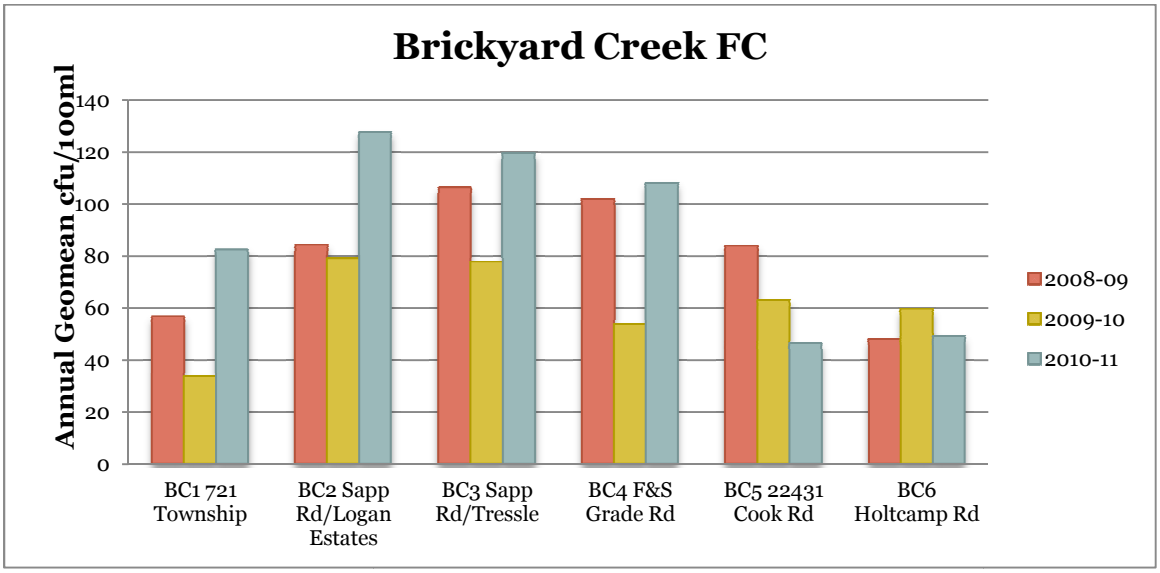


Figure 87. Brickyard Creek Fecal Coliform: Three-year comparison

Gages Slough Results
Figures 88 through 94 below present results from Gages Slough sampling.

Dissolved oxygen at Site 1 was below the state standard of 8mg/l for the entire sampling season. All other sites were below the standard in the fall and spring. Water levels are very low and slow-moving in the summer and early fall, which may cause the very low dissolved oxygen levels.

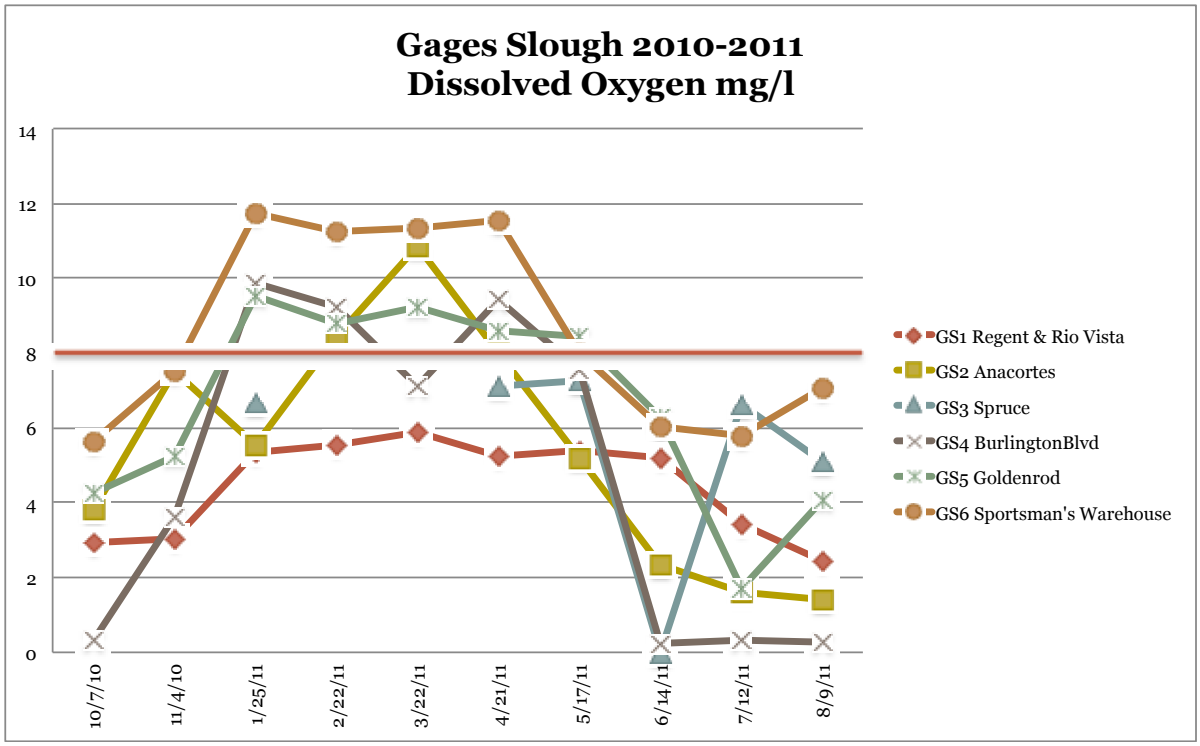


Figure 88. Gages Slough DO: 2010-2011

Average dissolved oxygen levels (Figure 89 below) were lower in 2010-2011 than in previous years at all sites with the exception of Site 4, which was higher. Sites 3 and 5 levels fell between the previous two years. The standard line in Figure 89 below is for reference only. State standards are not based on annual averages.

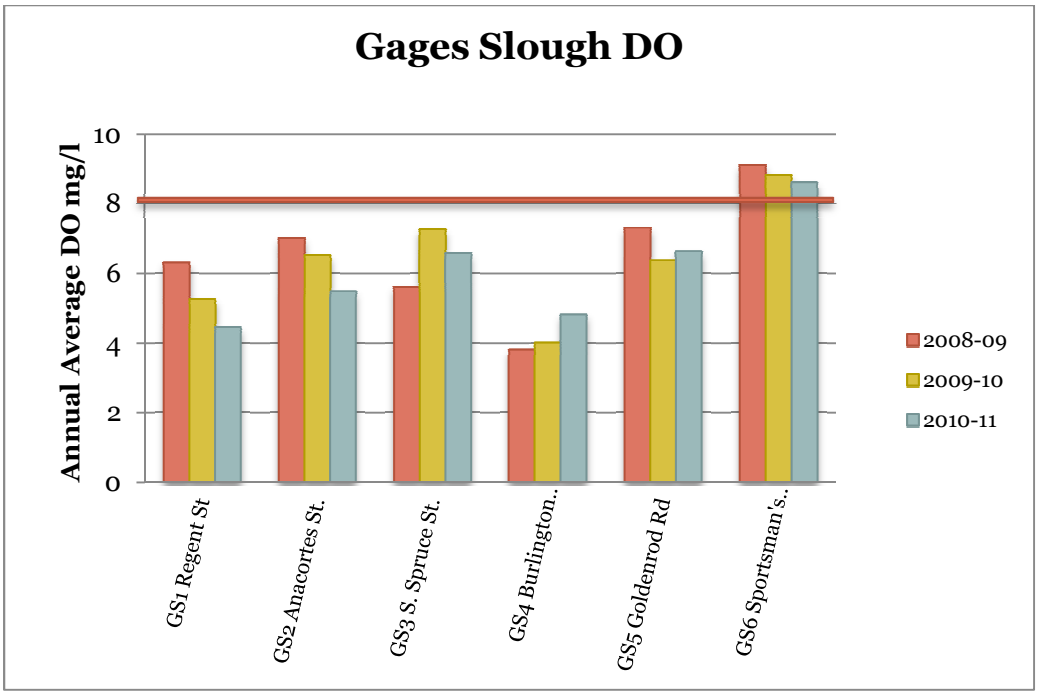


Figure 89. Gages Slough DO: Three-year comparison

Gages Slough Site 3, , Spruce Street, had a high temperature of 17.8°C on July 12, 2011. Temperatures for all other samples at all sites were below the standardof 17.5°C. (Low temperature is good.)

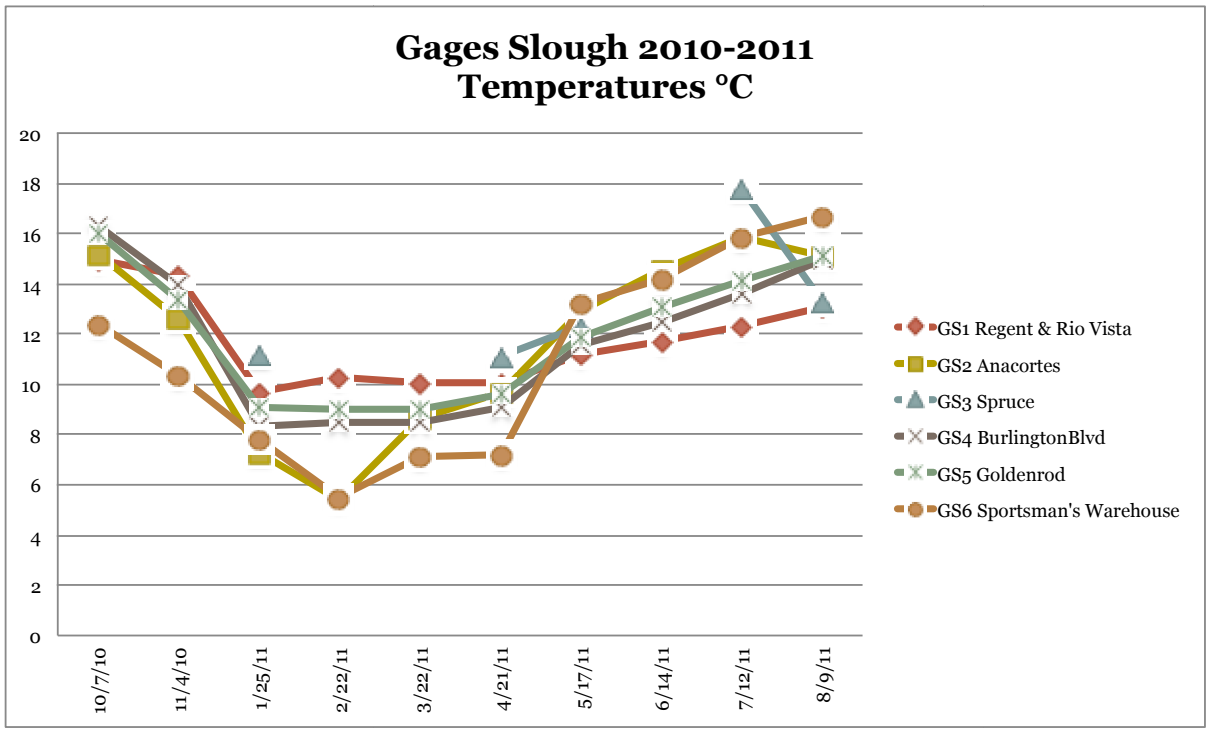


Figure 90. Gages Slough Temperature: 2010-2011

Temperatures in Gages Slough showed mixed trends compared to the past two years, as seen in Figure 91 below. With the exception of Site 3, average temperatures varied less than 2°C between sites and between years.

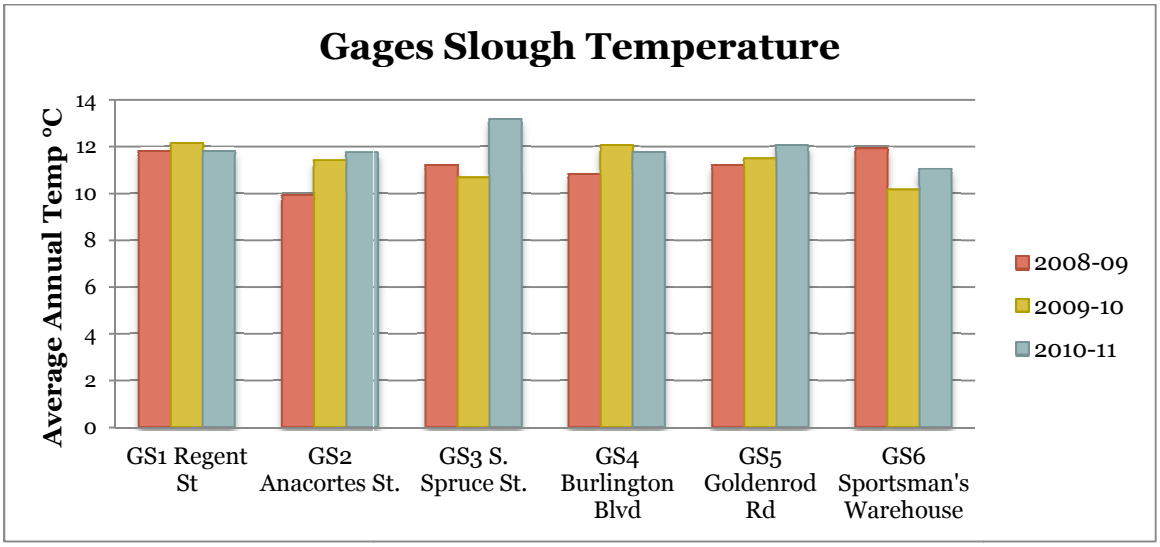


Figure 91. Gages Slough Temperature: Three-year comparison

Turbidity levels in Gages Slough were lower than 2008-2009 for all sites. Half the sites were higher than 2009-2010 and half were lower in turbidity.

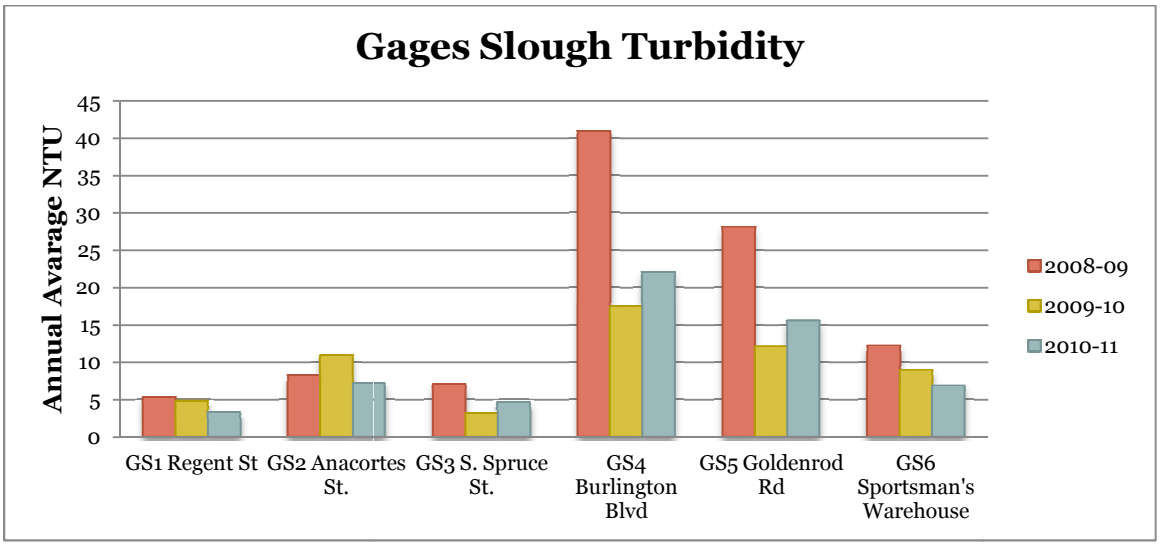


Figure 92. Gages Slough Turbidity: Three-year comparison

Fecal coliform numbers (Figure 93 below) were sometimes very high for sites 1 and 6. Those two sites did not meet the state standard of 100 cfu/100ml. Site 1 had the highest FC geomean of any Stream Team site. All other sites had fecal coliform numbers under the 100 cfu/100ml level for the entire sampling season. The same holds true for the <10% under 200 cfu/100ml standard. Sites 1 and 6 did not meet this standard, while Sites 2-5 did.

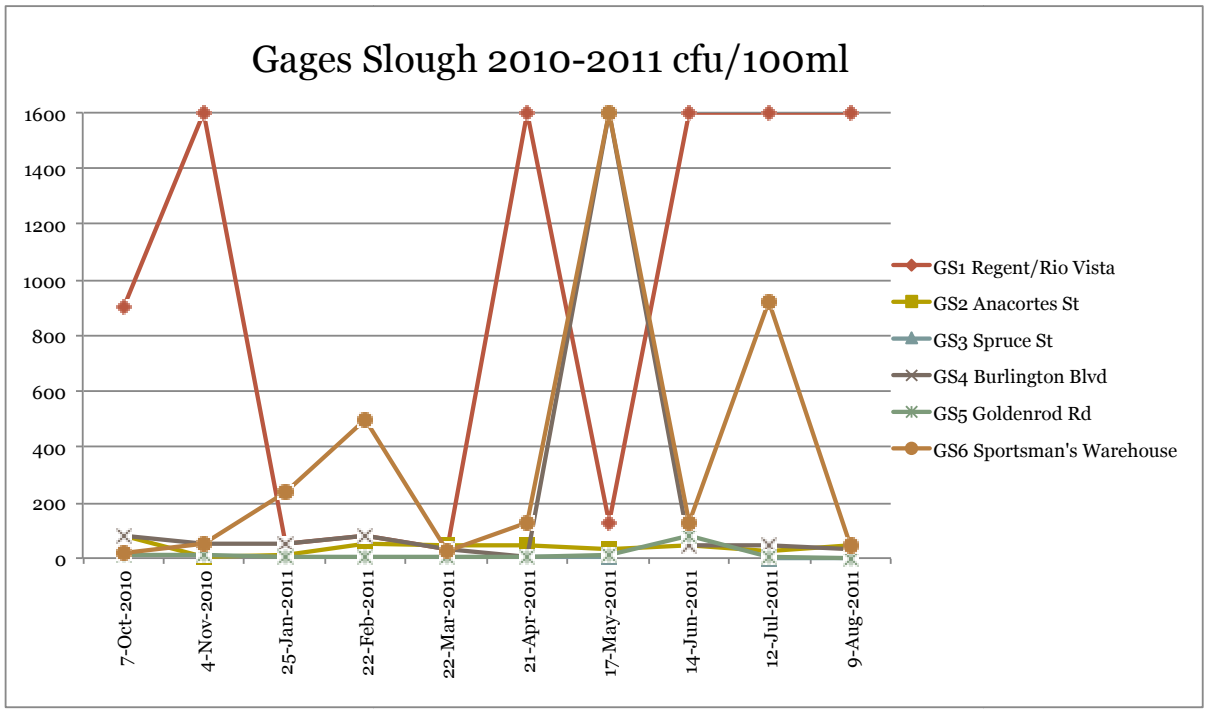


Figure 93. Gages Slough Fecal Coliform: 2010-2011

Compared to the previous two years, Gages Slough had higher fecal coliform levels in 2010-2011 at Sites 1 and 6. Sites 2-5 had lower numbers than in previous years.

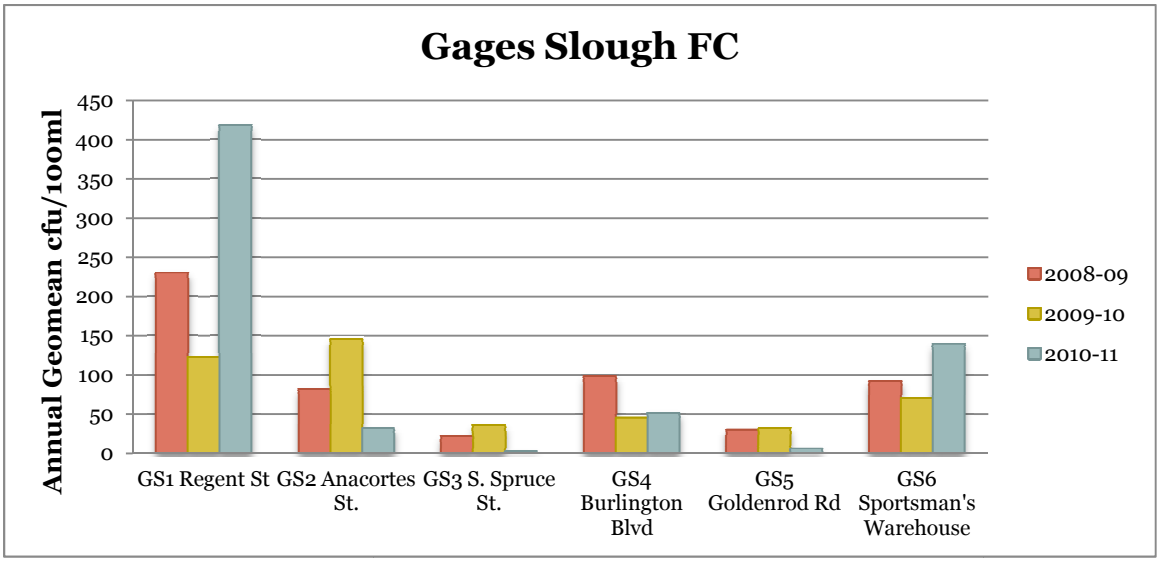


Figure 94. Gages Slough Fecal Coliform: Three-year comparison

Storm Team Results

Bay View/No Name Storm Team volunteers sampled 19 sites on Bay View Ridge draining to Padilla Bay. They sampled during 14 rain events and three times during dry weather. In Figures 95 and 96 below, the three dates to the far right on the graph are the low flow, dry

weather measurements. While most of the low flow levels were comparatively low, there were exceptions, most notably at Bay View sites 3 and 7.

As seen in Figure 95 below, all Bay View sites experienced high numbers of fecal coliform bacteria during rain events, often higher than the upper test limit of 1600 CFU/100ml. Even sites with the lowest counts were often many times the standard of 100 CFU/100ml. Site BV3 at South Bay View State Park and Site BV7, called the Beach Cottage nearly always had the highest counts. The three dates on the right side of Figure 95 were low rain samples, taken for comparison and not included in the geometric mean calculations presented in Figure 101. Notice that even without rainfall and surface water runoff, Site BV7, a culvert draining a residential area in Bay View had very high fecal coliform numbers.

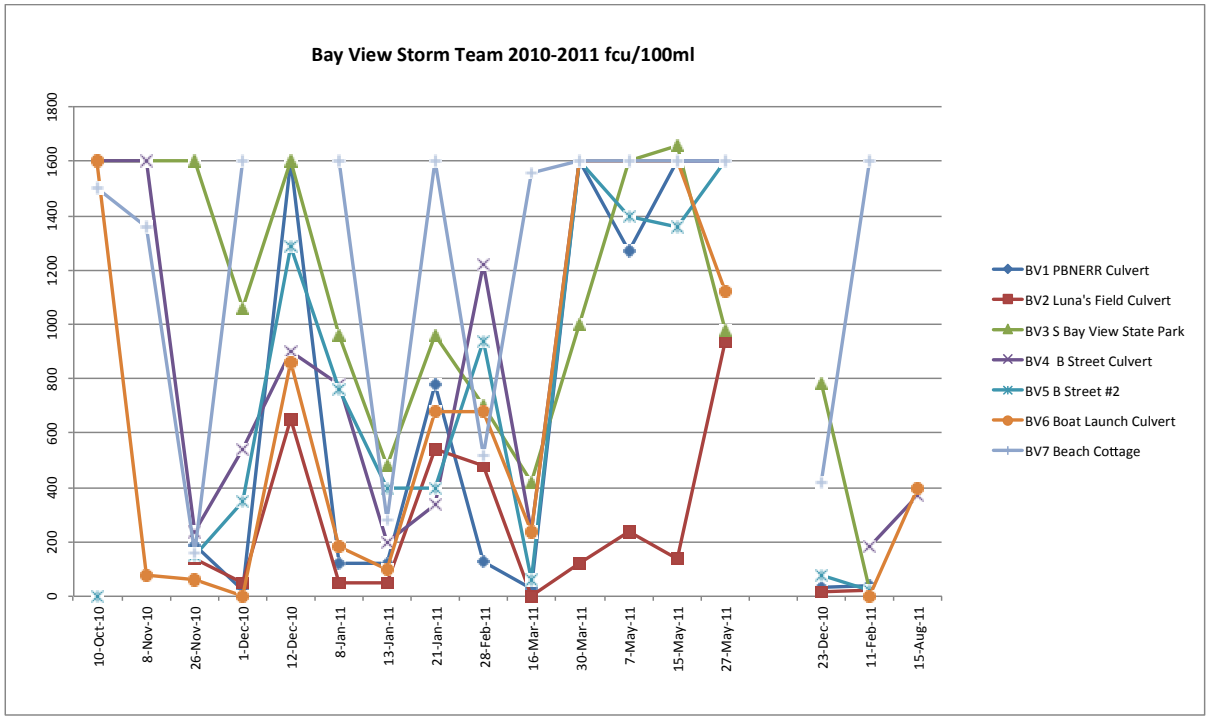


Figure 95. Storm Team: Bay View Fecal Coliform

Figures 96 and 97 below present fecal coliform results for No Name Creek and No Name Slough sites during rain events. The three dates to the right of the chart are low rain dates. All sites had very high counts during most of the sampling events. While the chart shows very wide variation between dates and sites, most are many times the 100 cfu/100ml standard.

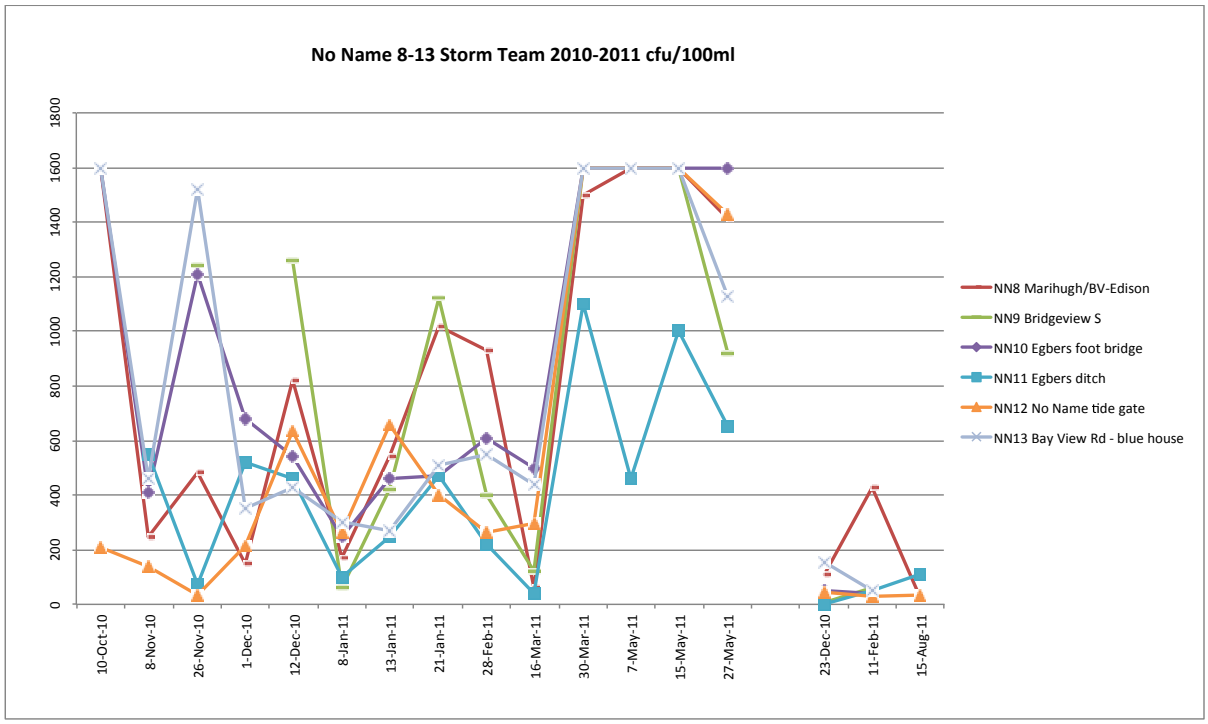


Figure 96. Storm Team: No Name Sites 8-13 Fecal Coliform

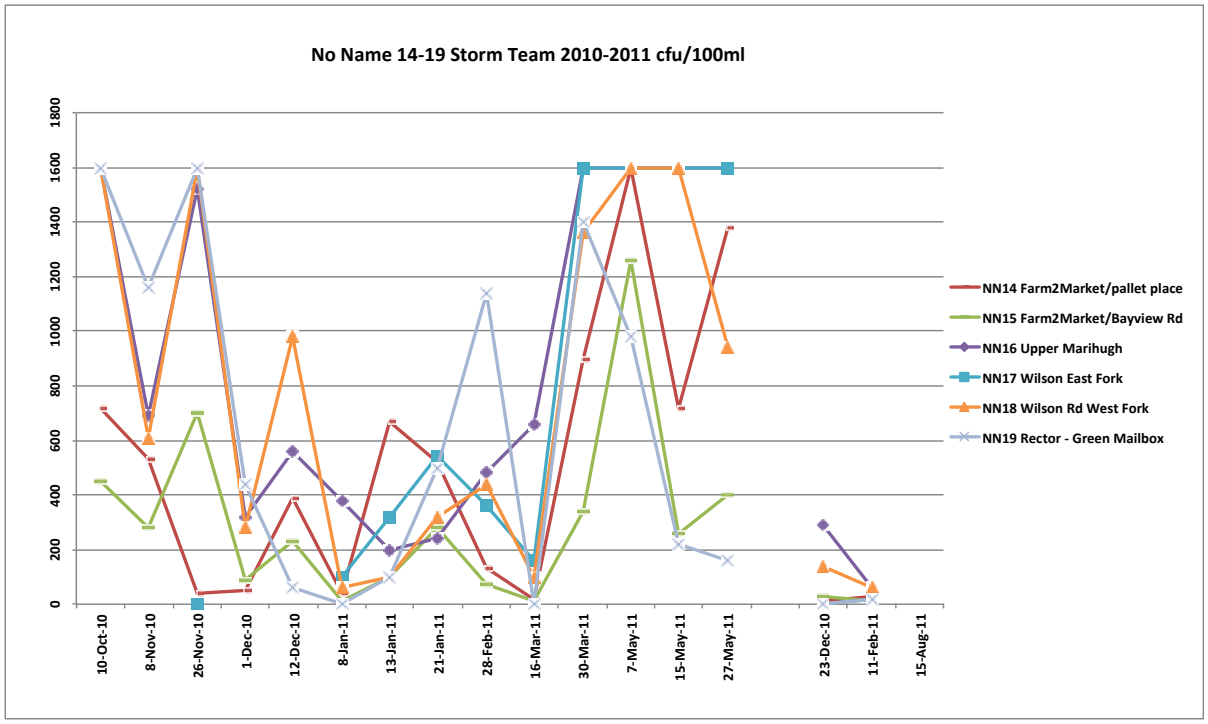


Figure 97. Storm Team: No Name Sites 14-19 Fecal Coliform

The geometric average for each Storm Team site is presented in Figure 98 below. This chart includes only data from rain events. Though nearly all the sites fall above the state standard of 100 CFU/100ml, it is important to note that this does not represent the overall annual average for the sites. This study only presents the very highest levels of fecal coliform during

periods of high runoff. It should not be compared to regularly scheduled Stream Team measurements taken during all seasons and levels of runoff.

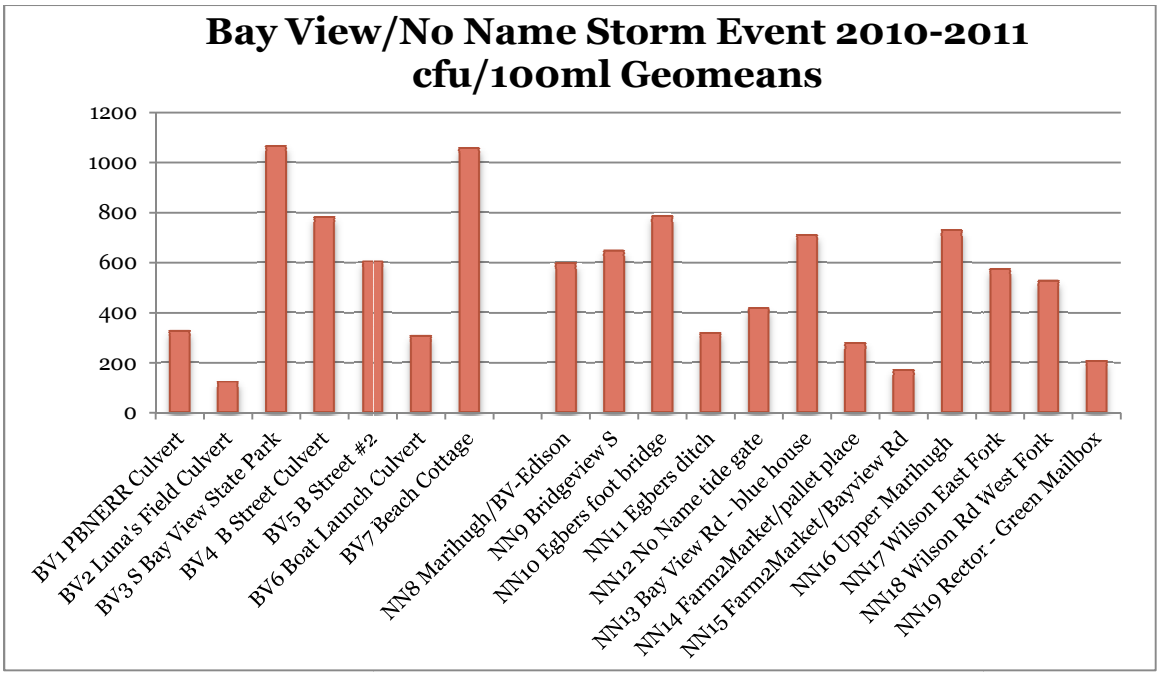


Figure 98. Storm Team: All Sites, Fecal Coliform Geometric Means

As this is the first year sampling Bay View and No Name during storm events, the results from this study were used to revise sites for the 2011-2012 season. It is clear that high levels of fecal coliform are entering Padilla Bay from both No Name Slough and from ditches and culverts draining the town of Bay View. This data should prove useful to regulators with WA Department of Ecology and Skagit County as they begin to address this problem.

I. Summary

Figures 99-102 below show annual averages for all parameters at each site. While it is interesting to compare watersheds, it is important to note that each water body has unique characteristics that naturally influence water quality. Variation is normal, and what might be considered "healthy" for water backed up behind a tide gate might not be healthy for a small wooded stream in the Upper Nookachamps.

For dissolved oxygen, a number of sites in Figure 99 have annual averages below 8mg/l. Considering regulations do not allow even one occurrence of levels below the standard, it is clear that these sites are in need of attention.

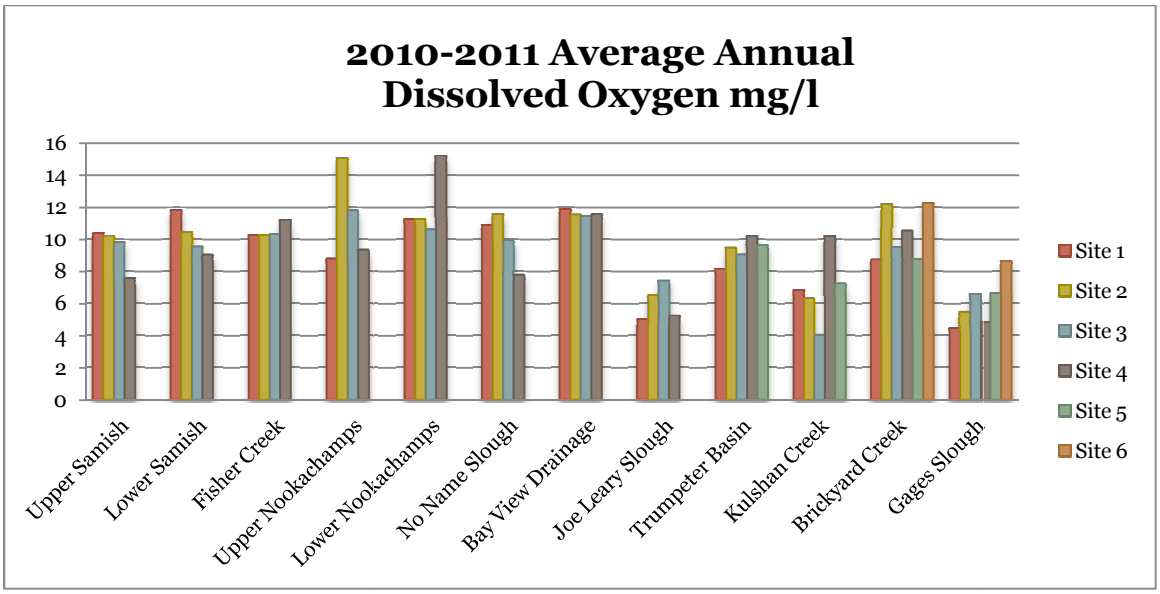


Figure 99. Average Annual Dissolved Oxygen: All sites

In Figure 100, measurements in many watersheds show increasing temperatures at sites farther downstream. Slow moving, urban streams like Gages Slough have higher temperatures than rural, shaded streams like the Nookachamps or Fisher Creek. Gages Slough, Joe Leary Slough, and Kulshan Creek stand out with the warmest water in the Stream Team study area.

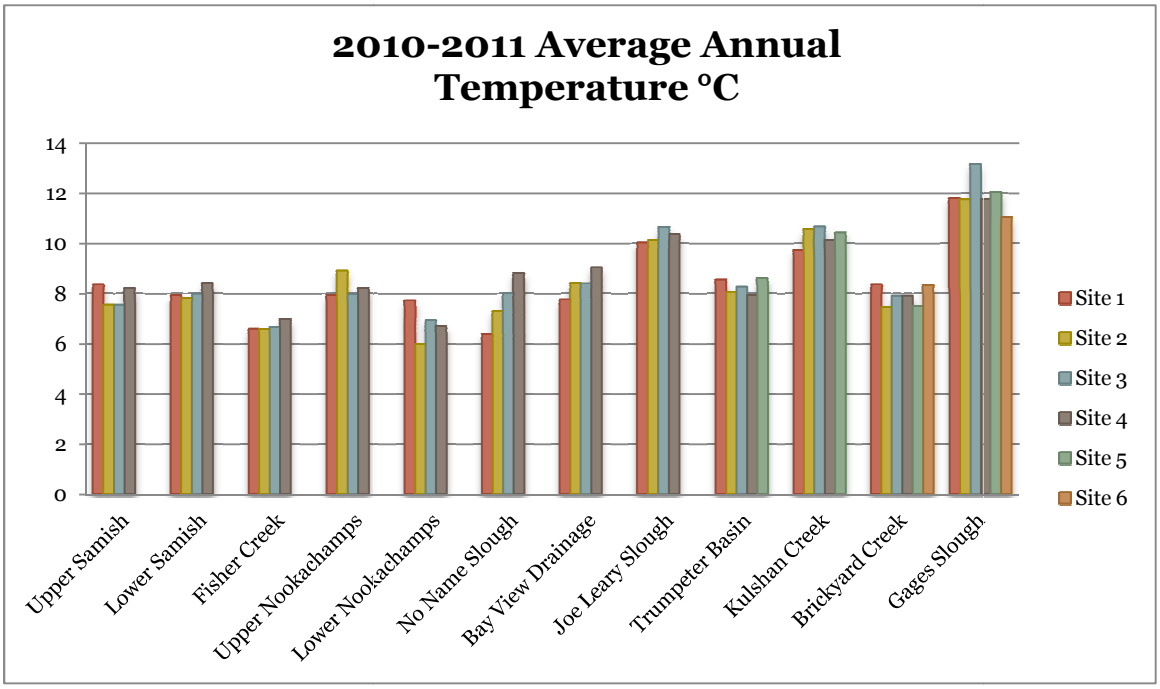


Figure 100. Average Annual Temperature: All sites

While turbidity may be the parameter with the greatest naturally occurring variation, two watersheds in Figure 101 stand out: Joe Leary Slough and Brickyard Creek. The extremely high turbidity levels there indicate a water quality problem that should be addressed.

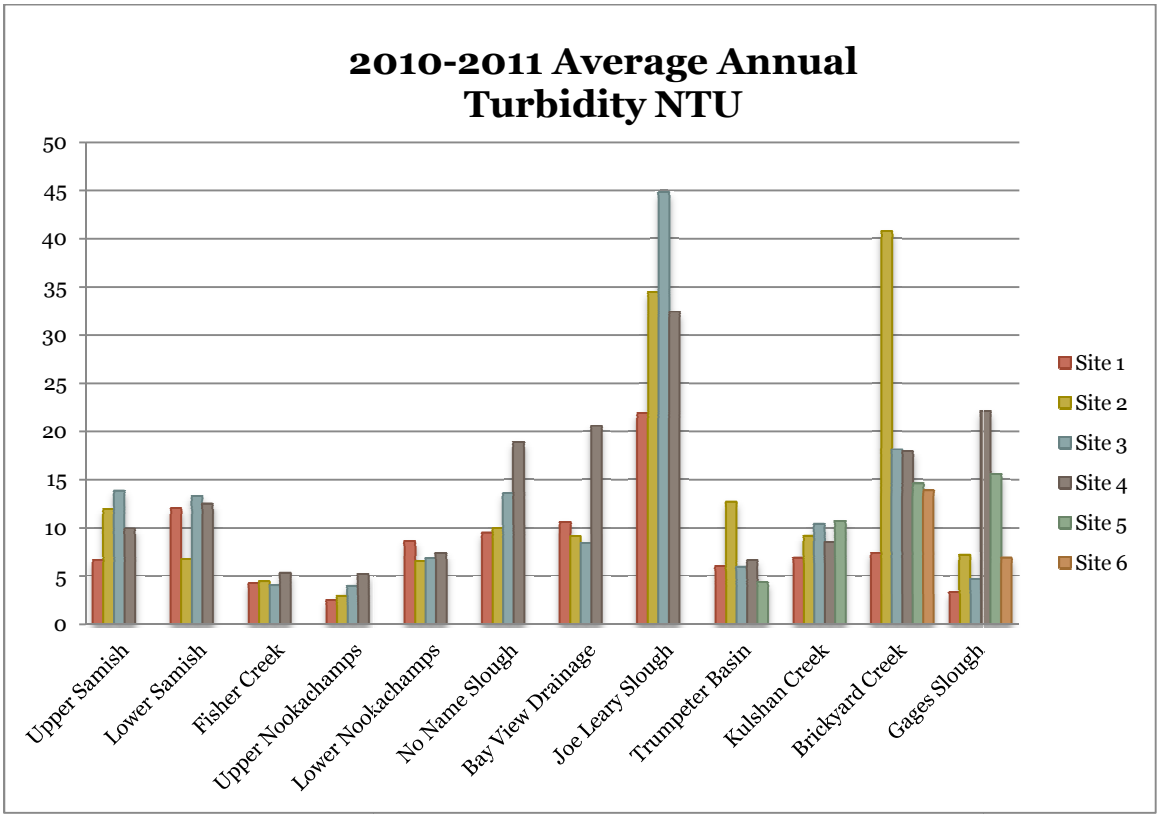


Figure 101. Average Annual Turbidity: All sites

Fecal coliform shown in Figure 102 below is the parameter of greatest interest to regulators, health officials, and shellfish growers and harvesters. Sites in Upper Nookachamps, No Name Slough, Kulshan Creek, Brickyard Creek, and Gages Slough did not meet the state standard of 100 cfu/100ml for fecal coliform. And as discussed earlier, many sites whose annual averages sit comfortably below the 100 cfu/100ml line below did not meet the second requirement that no more than 10% of the counts can be higher than 200 cfu/100ml.The sites that stand out as needing attention are Site 1 in Upper Nookachamps, Sites 1, 2, and 4 in No Name Slough, Site 1 in Kulshan Creek, and Sites 1 and 6 in Gages Slough.

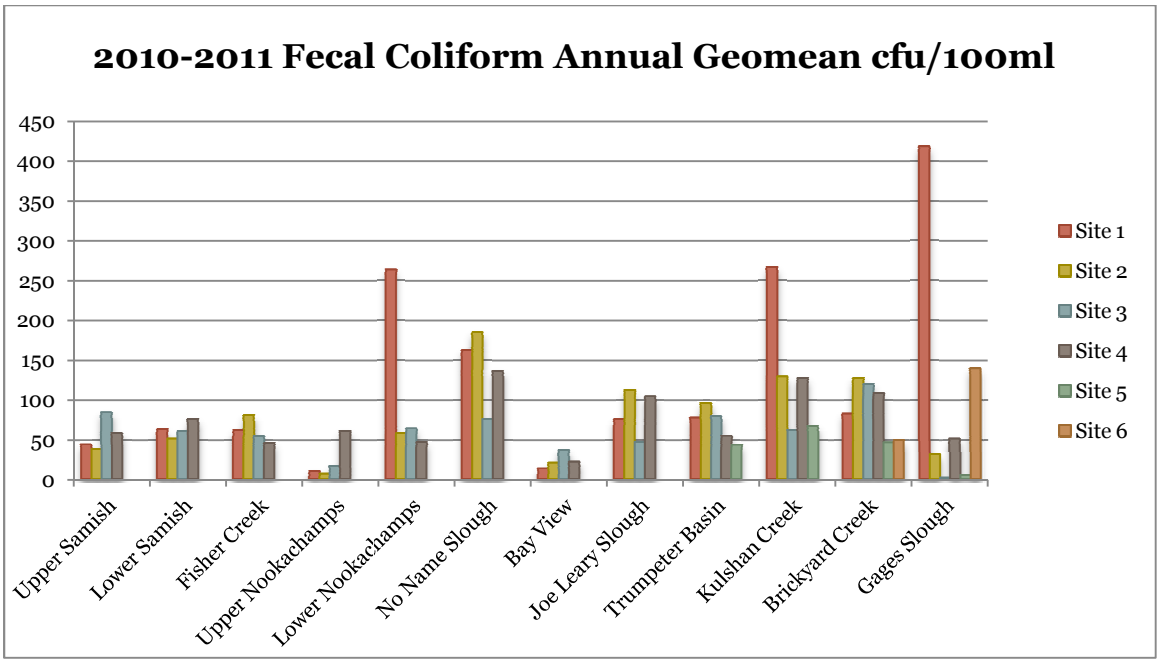


Figure 102. Annual Geomean Fecal Coliform: All sites

VI Conclusion

The 2010-2011 Stream Team volunteers built upon the success of previous years, and provided a thirteenth year of baseline WQ data for Skagit County's priority watersheds. This year saw the addition of the Upper Nookachamps, and continuation of fearless Storm Team sampling of Bay View and No Name drainages during heavy rain events.

Over 70 adult volunteers were exposed to a firsthand view of the impact that non-point source pollution has on local water quality. Along the way they experienced sampling techniques used by environmental professionals, learned the importance of establishing a long-term, routine sampling program, and enriched their own lives through volunteering.

Thanks to over 1000 volunteer hours, this program has provided valuable data to citizens and agencies, assessing current conditions so water quality improvements can be made, and documented in the future. This is key data for the long-term protection of our water resources. As citizens of this State and residents of these watersheds, we hope that our data is useful in identifying problem areas for the attention of the appropriate agencies.

Appendix A - Data

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
NO NAME SLOUGH						
NN! Marihugh Road	Average/Geomean	6.37	9.44	88.29	10.9	183
-	9/27/10	16.80	3.80	68.00	6.70	1600
-	10/12/10	11.20	16.80	57.60	6.35	1140
-	10/25/10	10.40	40.60	74.80	8.91	1600
-	11/9/10	8.10	10.80	83.90	10.04	242
-	11/22/10	1.30	6.90	97.30	18.20	25
-	12/7/10	6.60	4.50	95.50	11.20	5
-	12/20/10	3.50	5.80	97.20	12.86	60
-	1/4/11	-	9.20	-	-	90
-	1/17/11	8.00	17.10	91.90	11.03	220
-	2/1/11	1.20	6.20	100.30	14.20	30
-	2/14/11	6.80	8.50	91.50	11.04	25
-	3/1/11	3.10	8.10	113.30	15.30	150
-	3/14/11	6.40	14.80	90.30	11.75	135
-	3/29/11	8.30	8.80	89.80	10.53	10
-	4/11/11	7.30	12.10	99.80	11.90	875
-	4/26/11	7.90	8.90	95.30	11.36	1600
-	5/9/11	10.70	8.60	92.20	10.26	155
-	6/6/11	14.80	8.70	79.80	9.01	1600
no data	6/21/11	-	-	-	-	
NN2 Bay View Road	Average/Geomean	7.29	9.91	94.75	11.55	190
-	9/27/10	16.00	5.20	88.70	8.70	355
-	10/12/10	10.60	9.00	91.40	10.06	360
-	10/25/10	9.70	2.50	61.30	6.80	175
-	11/9/10	7.70	11.90	93.80	11.16	210
-	11/22/10	0.40	7.20	104.30	14.92	95
-	12/7/10	5.80	7.20	100.30	12.60	55
-	12/20/10	3.30	7.00	100.50	13.43	95
no data	1/4/11	-	-	-	-	
-	1/17/11	8.00	34.30	95.40	11.80	150
-	2/1/11	1.10	6.40	101.50	14.45	195
-	2/14/11	6.70	10.30	92.50	11.50	55
-	3/1/11	2.30	10.50	108.30	14.76	155
-	3/14/11	6.80	9.80	96.80	11.75	65
-	3/29/11	7.50	7.60	89.50	10.73	110
-	4/11/11	7.20	13.70	102.50	12.10	695
-	4/26/11	7.90	9.60	97.40	11.59	1600
-	5/9/11	10.40	9.60	91.30	10.31	210
-	6/6/11	12.50	6.70	95.30	9.66	335
no data	6/21/11	-	-	-	-	
NN3 Egbers Field	Average/Geomean	7.99	13.54	80.86	9.92	76
-	9/27/10	16.70	4.20	69.20	6.77	165
-	10/12/10	12.40	7.10	54.60	5.83	123
-	10/25/10	9.70	5.10	54.40	7.37	32
-	11/9/10	8.20	8.80	76.30	8.58	266
-	11/22/10	1.50	10.60	80.40	10.99	26

Site	Date	Water Temp(°C)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
Egbers Field	12/7/10	5.20	6.60	87.10	11.01	22
-	12/20/10	3.70	11.50	90.30	11.71	26
-	1/4/11	1.50	7.20	92.60	13.50	30
-	1/17/11	8.00	43.40	96.90	11.47	243
-	2/1/11	1.80	12.70	91.20	12.69	13
-	2/14/11	6.80	19.20	87.90	11.07	107
-	3/1/11	2.50	18.80	103.30	14.14	51
-	3/14/11	6.80	16.90	86.50	11.13	62
-	3/29/11	8.00	23.20	78.00	9.27	125
-	4/11/11	7.60	20.10	92.80	11.60	244
-	4/26/11	8.30	16.20	93.30	11.40	1233
-	5/9/11	10.90	15.50	77.80	8.55	128
-	6/6/11	16.80	7.70	71.80	6.45	58
-	6/21/11	15.40	2.40	52.00	5.03	24
Field Culvert	Average/Geomean	8.81	18.85	61.48	7.79	136
-	9/27/10	17.80	4.90	55.80	5.56	223
-	10/12/10	11.40	9.80	51.80	4.55	141
-	10/25/10	9.80	15.60	20.20	5.53	99
-	11/9/10	8.10	11.50	52.40	5.67	321
-	11/22/10	2.00	18.40	68.50	10.07	50
-	12/7/10	6.00	9.80	64.20	7.05	43
-	12/20/10	4.00	11.80	6.74	8.31	35
-	1/4/11	1.20	11.50	50.10	7.16	33
-	1/17/11	8.20	93.40	95.80	11.02	495
-	2/1/11	2.20	21.00	75.80	10.50	68
-	2/14/11	6.90	25.40	85.00	9.97	48
-	3/1/11	2.50	21.80	94.50	13.06	68
-	3/14/11	6.50	18.90	88.10	10.41	453
-	3/29/11	8.30	12.90	48.10	6.21	75
-	4/11/11	7.60	18.20	76.90	10.50	118
-	4/26/11	10.20	18.20	72.80	8.59	1393
-	5/9/11	11.40	16.70	60.30	6.95	423
-	6/6/11	21.40	5.60	74.10	5.27	258
-	6/21/11	21.90	12.80	27.00	1.67	228
	Average - all sites	**7.61**	**12.94**	**81.35**	**10.03**	146
UPPER SAMISH						
Pomona Grange	Average/Geomean	8.36	6.64	97.30	13.92	44
-	10/8/10	13.30	3.40	7.51	70.80	32
-	10/20/11	10.70	2.40	76.20	8.20	26
-	11/5/10	10.70	9.00	65.30	7.20	24
-	11/17/10	9.10	9.40	67.80	7.80	50
-	12/3/10	6.20	6.10	56.00	6.95	15
-	12/15/10	7.00	16.01	136.60	16.72	36
-	12/29/10	4.90	5.00	57.40	7.36	32
-	1/12/11	4.20	6.73	87.80	11.63	52
-	1/28/11	5.90	5.10	78.20	9.77	34

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
Pomona Grange	2/9/11	4.20	3.60	67.50	8.81	9
-	2/25/11	0.60	4.50	175.80	-	13
-	3/9/11	6.20	10.15	93.70	11.70	87
-	3/25/11	7.10	3.80	87.20	10.56	38
-	4/6/11	6.90	12.30	118.30	14.33	33
-	4/22/11	8.30	6.20	110.80	13.08	18
-	5/4/11	8.80	9.20	251.70	-	56
-	5/20/11	12.00	5.60	96.10	10.37	441
-	6/2/11	12.30	4.30	97.00	10.50	68
-	6/17/11	13.40	2.60	102.20	13.30	201
-	6/29/11	15.30	7.50	112.80	11.54	313
Swede Creek	Average/Geomean	7.55	11.91	89.31	10.20	38
-	10/8/10	12.00	21.00	47.20	5.10	26
-	10/20/11	7.20	5.80	51.70	6.15	4
-	11/5/10	9.10	7.10	51.50	6.40	140
-	11/17/10	8.30	18.40	65.00	7.37	50
-	12/3/10	4.90	8.80	52.50	6.75	30
-	12/15/10	6.40	11.85	142.20	17.50	31
-	12/29/10	4.00	9.60	57.30	7.51	124
-	1/12/11	3.00	19.56	92.40	12.20	140
-	1/28/11	5.80	6.90	72.00	9.07	17
-	2/9/11	3.10	17.00	68.10	9.15	17
-	2/25/11	0.20	8.50	159.20	-	23
-	3/9/11	5.60	21.40	89.00	11.19	62
-	3/25/11	7.30	8.40	140.80	17.00	6
-	4/6/11	6.80	18.50	120.00	14.68	42
-	4/22/11	8.30	8.50	109.60	12.82	4
-	5/4/11	8.50	7.60	101.30	11.87	35
-	5/20/11	11.00	10.70	95.00	10.42	37
-	6/2/11	11.60	11.60	92.00	10.03	101
-	6/17/11	12.80	8.90	98.40	10.46	303
-	6/29/11	15.10	8.10	81.00	8.19	317
Thomas Creek	Average/Geomean	7.55	13.79	81.42	9.79	84
-	10/8/10	12.40	4.10	55.50	5.87	18
-	10/20/11	8.00	4.90	60.20	7.18	38
-	11/5/10	9.40	10.70	56.70	6.49	230
-	11/17/10	8.70	33.70	63.00	7.38	149
-	12/3/10	5.50	14.90	56.80	7.18	94
-	12/15/10	6.60	18.06	65.40	8.05	106
-	12/29/10	4.50	10.40	60.40	7.81	164
-	1/12/11	3.60	22.50	51.60	6.96	48
-	1/28/11	6.10	12.50	74.70	9.28	25
-	2/9/11	3.80	12.40	69.90	9.25	100
-	2/25/11	0.10	12.10	61.80	9.00	86
-	3/9/11	5.80	33.30	88.60	11.02	151
bad DO meter?	3/25/11	7.30	10.70	149.50	17.95	10
-	4/6/11	6.70	22.40	121.60	14.94	93

Site	Date	Water Temp(°C)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
-	4/22/11	8.60	12.00	113.50	13.54	52
-	5/4/11	8.20	10.50	103.70	12.72	102
-	5/20/11	9.80	7.30	98.90	11.22	43
-	6/2/11	10.80	10.40	94.90	10.52	344
-	6/17/11	11.70	6.30	112.40	12.26	108
	6/29/11	13.30	6.70	69.30	7.23	722
Willard Creek	Average/Geomean	8.21	9.90	57.78	13.67	58
-	10/8/10	12.40	14.10	17.40	2.30	63
-	10/20/11	10.00	28.50	13.60	1.50	4
-	11/5/10	10.00	3.70	29.10	3.28	41
-	11/17/10	8.70	12.60	55.40	6.42	130
-	12/3/10	5.80	6.10	46.90	5.78	27
-	12/15/10	6.50	7.76	58.90	7.37	92
-	12/29/10	4.80	6.10	48.00	6.75	62
-	1/12/11	3.20	14.40	49.00	6.54	66
-	1/28/11	6.90	5.00	64.00	7.89	79
-	2/9/11	4.20	6.40	73.40	9.56	13
-	2/25/11	0.80	6.10	57.50	7.94	34
-	3/9/11	6.10	20.30	79.40	9.88	12
-	3/25/11	8.30	6.50	16.00	136.20	148
-	4/6/11	7.00	11.90	116.00	14.07	82
-	4/22/11	8.70	5.40	99.30	11.60	109
-	5/4/11	9.40	3.80	103.40	11.88	137
-	5/20/11	11.10	12.80	79.60	8.80	88
-	6/2/11	11.30	7.60	70.50	7.73	199
-	6/17/11	13.20	8.40	48.20	4.92	113
-	6/29/11	15.80	10.60	29.90	2.92	95
	Average - all sites	**7.92**	**10.56**	**81.45**	**11.90**	56
LOWER SAMISH						
99 Bridge	Average/Geomean	7.92	11.99	128.51	11.81	64
-	10/2/10	14.10	2.86	186.40	19.27	47
-	10/13/10	9.30	5.20	45.80	5.36	46
-	10/30/10	8.90	2.90	163.50	18.67	65
-	11/10/10	7.30	7.30	78.50	9.41	69
-	11/27/10	6.10	8.13	64.70	8.23	76
-	12/9/10	6.90	43.50	189.40	-	174
-	12/22/10	6.80	6.60	67.70	8.27	19
-	1/5/11	4.20	5.40	103.60	13.34	22
-	1/22/11	6.60	15.50	80.80	9.94	27
-	2/2/11	3.70	8.50	65.50	8.63	418
-	2/19/11	4.20	1.20	176.20	-	28
-	3/2/11	4.40	9.70	90.60	11.70	29
-	3/19/11	6.50	9.90	165.90	-	29
-	3/30/11	7.40	74.90	165.10	19.70	2127
-	4/16/11	7.80	9.81	109.70	13.16	23
-	4/27/11	8.50	8.80	217.10	-	83

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
-	5/14/11	10.60	8.91	225.00	-	56
-	5/25/11	10.40	5.60	192.80	-	53
	6/11/11	12.00	2.40	105.20	11.55	137
	6/22/11	12.70	2.60	76.70	8.12	54
Jolly Rd	Average/Geomean	7.81	6.71	100.20	10.43	51
-	10/2/10	13.70	3.92	176.90	18.32	53
-	10/13/10	9.30	5.00	47.70	5.35	37
-	10/30/10	8.80	2.60	73.70	8.62	35
-	11/10/10	7.40	6.80	72.10	8.72	77
-	11/27/10	5.60	7.36	61.20	7.79	112
No data	12/9/10	-	-	-	-	
-	12/22/10	6.80	7.60	69.30	8.51	17
-	1/5/11	4.00	7.30	98.80	12.95	29
no data	1/22/11	-	-	-	-	
-	2/2/11	3.40	7.30	67.50	8.98	26
-	2/19/11	4.00	2.60	70.50	9.11	12
-	3/2/11	4.30	9.80	90.70	11.83	35
-	3/19/11	6.10	10.60	157.60	-	33
no data	3/30/11	-	-	-	-	535
-	4/16/11	7.70	10.77	115.30	13.64	38
-	4/27/11	8.60	8.00	105.10	12.25	121
-	5/14/11	-	9.21	212.50	-	39
-	5/25/11	10.50	7.70	96.80	10.81	55
-	6/11/11	11.90	3.30	108.50	11.76	159
-	6/22/11	12.80	4.20	79.20	7.86	67
Chuckanut Bridge	Average/Geomean	7.98	13.27	84.55	14.45	60
-	10/2/10	14.10	4.28	83.80	8.55	23
-	10/13/10	9.70	5.90	47.40	5.58	37
-	10/30/10	9.10	2.80	64.20	7.51	35
-	11/10/10	7.50	9.10	65.60	7.85	99
	11/27/10	5.30	6.72	56.90	7.27	148
	12/9/10	7.10	53.40	66.40	8.06	254
	12/22/10	6.70	10.70	65.70	8.06	21
	1/5/11	4.10	8.50	55.00	7.20	22
	1/22/11	6.00	20.30	89.00	11.12	77
	2/2/11	3.50	9.80	66.20	8.76	13
	2/19/11	4.40	3.00	63.50	8.23	47
	3/2/11	4.30	12.90	84.60	10.97	66
	3/19/11	6.50	14.20	167.30	-	50
	3/30/11	7.60	60.50	148.10	17.83	785
	4/16/11	7.90	10.38	112.20	13.42	77
	4/27/11	8.90	10.80	103.20	12.01	107
	5/14/11	10.80	9.38	96.10	10.65	62
	5/25/11	10.70	5.70	93.50	104.10	31
	6/11/11	11.90	3.80	93.80	10.24	67
	6/22/11	13.50	3.30	68.40	7.13	61

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
Samish at Boat Docks	Average/Geomean	8.41	12.49	77.31	9.02	75
	10/2/10	15.20	17.52	65.10	6.62	
	10/13/10	10.40	6.80	46.10	4.96	165
	10/30/10	9.10	6.80	57.60	5.94	184
	11/10/10	7.70	7.20	59.70	7.03	79
	11/27/10	4.90	6.58	56.40	7.02	103
	12/9/10	7.30	31.70	57.40	6.78	378
	12/22/10	7.60	14.70	117.00	14.22	29
	1/5/11	3.50	6.90	56.30	7.23	57
	1/22/11	6.20	28.40	82.30	9.96	78
	2/2/11	3.60	8.40	68.70	9.03	43
	2/19/11	4.90	4.50	62.30	7.93	20
	3/2/11	4.50	17.90	82.20	10.59	65
	3/19/11	6.80	14.20	101.10	12.31	188
	3/30/11	7.80	28.60	81.20	9.63	238
	4/16/11	8.10	13.39	110.20	13.11	35
	4/27/11	9.30	11.80	99.70	11.55	54
	5/14/11	11.20	10.74	95.50	10.47	75
	5/25/11	11.50	5.50	87.00	9.47	43
	6/11/11	13.00	3.50	99.20	10.40	54
	6/22/11	15.50	4.70	61.10	6.09	47
	Average - all sites	**8.03**	**11.11**	**97.64**	**11.43**	63
GAGES SLOUGH						
GS #1 Regent St. & E. Rio Vista St.	Average/Geomean	11.79	3.27	40.82	4.44	418
-	10/7/10	15.00	1.69	30.80	2.93	900
-	11/4/10	14.40	2.64	26.30	3.01	1600
-	1/25/11	9.70	1.68	50.80	5.34	50
-	2/22/11	10.30	2.38	49.60	5.55	80
-	3/22/11	10.10	2.81	51.60	5.87	33
-	4/21/11	10.10	6.15	47.10	5.23	1600
-	5/17/11	11.20	3.04	49.10	5.41	130
-	6/14/11	11.70	4.15	48.00	5.18	1600
-	7/12/11	12.30	4.23	31.90	3.41	1600
-	8/9/11	13.10	3.88	23.00	2.43	1600
GS #2 Anacortes St.	Average/Geomean	11.73	7.17	48.35	5.47	32
-	10/7/10	15.20	7.65	26.20	3.80	80
-	11/4/10	12.60	8.53	71.30	7.53	4
-	1/25/11	7.30	4.04	47.20	5.55	13
-	2/22/11	5.40	5.07	67.40	8.44	50
-	3/22/11	8.60	2.69	93.50	10.88	49
-	4/21/11	9.70	5.03	69.50	8.00	46
-	5/17/11	12.90	4.61	49.50	5.21	33
-	6/14/11	14.60	9.49	27.90	2.32	49
-	7/12/11	15.90	14.00	16.60	1.62	26
-	8/9/11	15.10	10.55	14.40	1.39	49

Site	Date	Water Temp(°C)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
GS #3 S. Spruce St.	Average/Geomean	13.14	4.66	60.20	6.56	2
-	10/7/10	-	-	-	-	
-	11/4/10	-	-	-	-	
-	1/25/11	11.20	0.44	59.30	6.69	4
-	2/22/11	-	-	-	-	
-	3/22/11	-	-	-	-	
-	4/21/11	11.10	0.13	64.90	7.13	2
-	5/17/11	12.30	1.38	67.50	7.25	5
-	6/14/11	-	-	-	-	
-	7/12/11	17.80	0.73	62.10	6.63	1
-	8/9/11	13.30	20.60	47.20	5.10	1
GS #4 Burlington Blvd	Average/Geomean	11.74	22.03	42.39	4.81	51
-	10/7/10	16.30	6.77	4.00	0.34	80
-	11/4/10	14.00	9.16	34.90	3.62	50
-	1/25/11	8.30	28.90	85.50	9.86	50
-	2/22/11	8.50	62.20	78.90	9.22	80
-	3/22/11	8.50	-	62.30	7.14	33
-	4/21/11	9.10	14.10	80.30	9.41	2
-	5/17/11	11.60	42.10	68.80	7.58	1600
-	6/14/11	12.50	20.80	2.60	0.24	49
-	7/12/11	13.60	9.06	3.40	0.34	49
-	8/9/11	15.00	5.22	3.20	0.30	33
GS #5 Goldenrod Rd	Average/Geomean	12.03	15.54	62.42	6.62	6
-	10/7/10	16.00	8.72	49.90	4.24	13
-	11/4/10	13.40	19.50	52.10	5.23	13
-	1/25/11	9.10	2.72	82.80	9.52	4
-	2/22/11	9.00	7.29	76.20	8.81	2
-	3/22/11	9.00	6.42	80.10	9.23	7
-	4/21/11	9.60	3.28	75.70	8.60	2
-	5/17/11	11.90	7.12	78.50	8.47	11
-	6/14/11	13.10	7.72	58.20	6.26	79
-	7/12/11	14.10	41.30	21.10	1.71	2
-	8/9/11	15.10	51.30	49.60	4.08	1
GS # 6 Sportsman's Warehouse	Average/Geomean	11.04	6.86	76.92	8.60	139
-	10/7/10	12.40	2.19	53.70	5.65	17
-	11/4/10	10.40	3.70	67.10	7.51	50
-	1/25/11	7.80	13.60	99.10	11.77	240
-	2/22/11	5.50	14.40	92.30	11.26	500
-	3/22/11	7.10	9.22	93.30	11.33	23
-	4/21/11	7.20	3.09	95.00	11.53	130
-	5/17/11	13.20	10.57	76.90	8.01	1600
-	6/14/11	14.20	2.82	59.40	6.04	130
-	7/12/11	15.90	4.22	60.80	5.79	920
-	8/9/11	16.70	4.76	71.60	7.08	46
	Average - all sites	**11.91**	**9.92**	**55.18**	**6.08**	108

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
BAYVIEW						
# 1, Walker Rd	Average/Geomean	7.75	10.55	98.80	11.88	15
no data	10/26/10	-	-	-	-	
no data	11/3/10	-	-	-	-	
-	11/16/10	10.50	6.40	97.20	10.85	24
-	12/7/10	7.00	4.32	99.60	12.33	5
-	12/15/10	6.90	4.40	94.60	11.45	14
-	12/29/10	4.90	23.90	101.40	12.94	4
-	1/14/11	7.20	6.10	98.40	11.95	36
-	1/25/11	8.10	6.40	96.50	11.40	8
-	2/9/11	2.30	11.92	103.50	14.20	9
-	3/2/11	5.10	7.92	103.40	13.14	7
-	3/10/11	7.50	4.69	105.20	12.52	
-	3/22/11	5.70	4.00	100.80	12.81	15
-	4/5/11	8.60	12.50	97.60	11.50	49
-	4/18/11	7.10	17.50	96.80	11.74	53
-	5/3/11	16.20	33.00	97.60	9.57	53
-	5/19/11	11.40	4.61	90.60	9.89	54
-	6/3/11	-	-	-	-	4
no data	6/16/11	-	-	-	-	
# 2, C Street	Average/Geomean	8.42	9.10	96.75	11.51	27
-	10/26/10	9.20	5.60	86.50	10.10	28
-	11/3/10	11.00	-	93.00	10.30	20
-	11/16/10	10.30	9.00	93.10	10.40	102
-	12/7/10	7.00	8.69	95.00	11.70	18
-	12/15/10	6.60	9.10	98.60	12.70	7
-	12/29/10	4.30	7.40	105.30	13.64	72
-	1/14/11	7.10	11.20	97.00	11.78	31
-	1/25/11	8.10	11.26	96.60	11.41	49
-	2/9/11	1.50	19.53	102.30	14.45	19
-	3/2/11	4.80	8.54	103.30	13.23	13
-	3/10/11	7.60	10.20	105.20	12.57	22
-	3/22/11	5.70	7.90	100.00	12.50	30
-	4/5/11	8.40	13.00	98.40	11.56	39
-	4/18/11	7.20	5.10	96.00	11.60	
-	5/3/11	16.40	10.00	96.70	9.43	76
-	5/19/11	11.00	6.69	93.70	10.26	7
no data	6/3/11	16.90	2.40	84.00	8.10	
no data	6/16/11	-	-	-	-	
# 3, Boat Launch	Average/Geomean	8.39	8.40	96.73	11.41	37
-	10/26/10	10.40	3.50	72.90	8.80	245
-	11/3/10	10.90	1.90	98.10	10.76	17
-	11/16/10	10.40	8.70	95.50	10.84	63
-	12/7/10	6.80	8.87	97.00	11.15	27
-	12/15/10	6.80	8.60	104.50	12.61	12
-	12/29/10	5.10	7.00	96.60	12.29	41

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
# 3, Boat Launch	1/14/11	7.10	12.10	98.60	11.93	49
-	1/25/11	8.20	12.54	100.60	11.78	30
-	2/9/11	2.60	11.92	102.60	13.95	22
-	3/2/11	4.80	9.09	98.30	12.61	23
-	3/10/11	7.30	10.54	97.60	11.78	15
-	3/22/11	6.70	7.10	97.00	11.93	16
-	4/5/11	8.30	13.80	96.50	11.33	58
-	4/18/11	7.90	7.60	97.80	11.59	23
-	5/3/11	13.50	9.60	98.10	10.26	78
-	5/19/11	11.40	5.76	92.70	10.07	50
-	6/3/11	14.50	4.10	100.00	10.29	146
no data	6/16/11	-	-	-	-	
# 4, Bay View State Park	Average/Geomean	9.03	20.56	100.63	11.53	28
-	10/26/10	9.10	5.90	93.90	9.17	69
-	11/3/10	10.90	0.60	100.30	11.15	7
-	11/16/10	9.00	48.90	98.00	11.80	372
-	12/7/10	6.80	3.18	93.50	11.32	33
-	12/15/10	6.90	36.60	93.90	11.37	45
-	12/29/10	5.00	38.50	102.10	12.98	48
-	1/14/11	7.10	11.20	95.10	11.49	44
no data	1/25/11	-	-	-	-	
-	2/9/11	4.80	12.92	87.90	11.23	6
-	3/2/11	6.30	47.60	108.60	13.10	17
-	3/10/11	8.70	23.90	101.30	11.96	18
-	3/22/11	7.80	7.20	98.80	11.75	4
-	4/5/11	-	-	-	-	
-	4/18/11	9.40	15.50	101.20	11.62	10
-	5/3/11	16.30	46.30	105.60	10.24	73
-	5/19/11	13.20	5.58	103.40	11.02	68
no data	6/3/11					
-	6/16/11	14.20	4.50	125.80	12.81	
	Average - all sites	8.40	12.15	98.23	11.58	27
FISHER CREEK						
#1 Bulson Road Culvert	Average/Geomean	6.59	4.25	80.30	10.23	66
-	10/7/10	9.10	3.40	66.60	7.60	163
-	10/18/10	6.50	2.05	74.50	9.25	510
-	11/4/10	9.40	3.40	82.30	9.40	505
-	11/16/11	9.00	4.78	62.90	7.32	158
-	12/2/10	5.10	2.20	63.00	7.99	65
-	12/14/10	7.30	10.80	60.50	7.56	133
-	12/30/10	1.70	6.00	63.30	8.95	13
-	1/11/11	2.40	2.80	68.30	9.34	8
-	1/27/11	6.00	3.60	65.60	8.15	10
-	2/10/11	2.70	3.00	35.60	5.40	18
-	2/22/11	1.20	8.20	103.70	14.60	63

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
#1 Bulson Road	3/8/11	4.30	3.80	101.60	13.17	10
-	3/24/11	6.20	2.60	100.80	12.49	15
-	4/5/11	6.20	4.80	62.90	13.10	40
-	4/21/11	5.80	3.40	106.70	13.33	20
-	5/3/11	7.60	3.60	103.00	12.41	110
-	5/19/11	8.10	2.50	104.20	12.43	88
-	5/31/11	9.40	2.20	98.90	11.18	55
-	6/16/11	10.40	3.50	88.30	11.14	390
-	6/28/11	13.40	8.30	93.30	9.79	1600
#2 23616 Bulson Road	Average/Geomean	6.58	4.42	83.56	10.25	88
-	10/7/10	10.00	1.80	66.10	7.44	163
-	10/18/10	6.70	1.57	76.40	9.28	1025
-	11/4/10	9.20	2.90	80.50	9.25	155
-	11/16/11	8.90	5.37	61.60	7.14	210
-	12/2/10	4.90	2.60	63.40	8.15	110
-	12/14/10	7.10	10.70	61.00	7.40	185
-	12/30/10	1.60	7.00	65.80	9.17	10
-	1/11/11	2.10	6.60	67.30	9.16	40
-	1/27/11	5.80	8.40	64.90	8.12	10
-	2/10/11	2.50	3.80	34.60	4.76	40
-	2/22/11	1.00	7.00	97.60	14.28	38
-	3/8/11	4.30	3.80	99.80	12.96	50
-	3/24/11	6.30	2.40	102.10	12.66	20
-	4/5/11	6.20	4.10	102.30	12.77	45
-	4/21/11	6.10	4.00	110.90	13.76	25
-	5/3/11	7.60	2.70	102.80	12.32	150
-	5/19/11	8.20	4.30	111.10	13.08	180
-	5/31/11	9.40	3.30	99.50	11.38	450
-	6/16/11	10.40	2.40	102.40	11.42	235
-	6/28/11	13.30	3.60	101.10	10.55	380
#3 Starbird Road	Average/Geomean	6.66	3.97	85.05	10.32	54
-	10/7/10	10.20	1.40	71.40	8.01	65
-	10/18/10	7.30	1.73	79.60	10.40	409
-	11/4/10	8.90	3.10	82.30	9.76	35
-	11/16/11	8.90	4.92	62.50	6.80	144
-	12/2/10	4.80	3.70	63.60	8.08	52
-	12/14/10	7.20	9.30	61.90	7.70	145
-	12/30/10	1.50	3.30	69.00	9.50	31
-	1/11/11	1.80	3.10	69.40	9.60	21
-	1/27/11	5.60	4.40	64.80	8.14	27
-	2/10/11	2.10	3.60	31.10	4.31	12
-	2/22/11	1.30	3.90	100.20	14.10	53
-	3/8/11	4.10	6.10	99.20	12.09	15
-	3/24/11	6.40	3.10	103.00	12.50	11
-	4/5/11	6.30	3.70	106.50	12.53	40
-	4/21/11	6.50	3.20	106.80	13.14	12
-	5/3/11	7.80	3.20	103.80	12.34	220

Site	Date	Water Temp(°C)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
#3 Starbird Road	5/19/11	8.40	4.40	104.80	12.42	46
-	5/31/11	9.70	4.60	101.90	11.33	96
-	6/16/11	10.70	4.30	111.30	12.30	249
-	6/28/11	13.60	4.30	107.90	11.31	271
#4 Franklin Road	Average/Geomean	6.98	5.30	87.47	11.18	50
-	10/7/10	10.40	1.70	85.70	9.58	69
	10/18/10	8.40	-	91.90	10.72	12
	11/4/10	8.80	2.80	92.50	10.77	
	11/16/11	9.10	7.63	71.20	8.22	100
	12/2/10	5.10	3.60	72.60	9.25	19
	12/14/10	7.50	31.50	69.00	8.21	186
	12/30/10	2.10	4.20	71.80	9.40	27
	1/11/11	2.20	3.30	74.20	10.22	24
	1/27/11	5.90	4.50	72.30	9.03	15
	2/10/11	2.60	2.40	32.30	4.12	9
	2/22/11	2.30	3.20	104.50	14.35	37
	3/8/11	4.40	3.00	120.10	15.77	60
	3/24/11	6.80	3.50	107.10	13.11	30
	4/5/11	6.50	6.20	113.10	14.58	103
	4/21/11	7.20	4.80	108.60	13.23	33
	5/3/11	8.10	3.70	112.80	13.37	928
	5/19/11	8.80	4.00	11.00	12.66	34
	5/31/11	10.00	3.60	104.10	11.74	35
	6/16/11	10.80	3.80	118.30	12.99	176
	6/28/11	12.50	3.20	116.30	12.36	175
	Average - all sites	6.70	4.48	84.10	10.50	65
TRUMPETER CREEK						
Site 1. Stonebridge Adult Community	Average/Geomean	8.54	5.96	69.25	8.14	94
-	10/7/10	1.40	0.00	94.80	10.33	267
-	10/22/10	8.90	1.40	98.50	11.58	253
-	11/4/10	10.80	2.21	99.10	10.94	187
-	11/18/10	8.90	11.90	102.10	11.76	320
-	12/2/10	5.20	3.84	107.30	13.44	33
-	12/16/10	7.80	8.77	33.50	3.98	60
-	12/29/11	5.50	6.34	136.60	17.53	77
-	1/13/11	6.50	28.30	95.60	11.73	140
-	2/10/11	4.90	5.29	67.00	8.55	27
-	3/10/11	7.20	10.14	52.70	6.35	153
-	3/24/11	7.80	5.07	38.80	4.63	7
-	4/7/11	7.90	8.70	31.20	3.71	33
-	4/21/11	8.60	1.50	90.80	10.61	53
-	5/5/11	10.40	4.60	57.10	6.37	100
-	5/19/11	12.40	1.00	49.20	5.25	27
-	6/2/11	12.50	0.80	35.40	3.76	273
-	6/16/11	12.90	0.00	27.00	2.85	67

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
Site 1. Stonebridge	6/30/11	14.10	7.40	29.80	3.17	1514
-	7/28/11	15.20	0.00	32.10	3.22	2
Site 2. Frazier Home on College Way	Average/Geomean	8.06	12.69	78.60	9.45	95
-	10/7/10	11.50	3.11	71.60	7.81	1600
-	10/22/10	2.80	3.44	79.50	9.52	360
-	11/4/10	9.60	4.41	89.30	10.07	47
-	11/18/10	7.90	17.70	93.30	11.07	233
-	12/2/10	5.60	9.83	107.10	13.18	17
-	12/16/10	7.10	11.90	79.60	9.70	50
-	12/29/11	4.30	65.40	191.80	25.55	67
-	1/13/11	6.00	32.00	93.00	11.63	455
-	2/10/11	3.70	9.27	74.50	9.90	7
-	3/10/11	7.20	22.70	75.80	9.22	93
-	3/24/11	7.40	6.60	43.50	5.14	7
-	4/7/11	7.50	13.00	33.80	4.03	
-	4/21/11	8.30	4.20	102.50	12.11	13
-	5/5/11	10.40	6.50	73.00	8.05	573
-	5/19/11	12.00	2.50	60.20	6.47	53
-	6/2/11	12.60	1.30	40.50	4.32	200
-	6/16/11	13.10	1.80	27.20	2.88	420
-	6/30/11	-	-	-	-	
-	7/28/11	15.60	0.95	36.50	3.60	107
Site 3. Summerson Nursery Bridge	Average/Geomean	8.26	5.93	76.42	9.02	74
-	10/7/10	11.00	0.00	77.50	8.67	580
-	10/22/10	8.70	0.77	84.90	9.87	533
-	11/4/10	9.30	1.23	87.20	10.06	67
-	11/18/10	7.80	11.30	96.00	11.44	87
-	12/2/10	5.20	3.84	107.30	13.44	53
-	12/16/10	6.80	12.10	81.60	9.90	1
-	12/29/11	4.40	20.50	126.00	13.84	27
-	1/13/11	6.00	17.50	103.10	12.97	53
-	2/10/11	3.20	6.06	81.20	10.86	127
-	3/10/11	7.00	9.25	78.20	9.45	220
-	3/24/11	6.90	5.12	45.70	5.56	27
-	4/7/11	7.10	6.90	34.80	4.22	13
-	4/21/11	7.40	1.90	108.20	13.19	47
-	5/5/11	9.50	3.40	82.30	9.37	73
-	5/19/11	10.90	1.80	68.40	7.50	120
-	6/2/11	11.80	1.10	46.30	4.99	80
-	6/16/11	12.20	0.55	31.20	3.35	147
-	6/30/11	13.50	3.50	35.70	3.75	720
-	7/28/11	14.70	0.00	38.80	4.00	266
Site 4. Kiowa Street	Average/Geomean	7.92	6.61	85.16	10.20	51
-	10/7/10	11.30	0.00	92.90	10.18	193
-	10/22/10	8.90	0.74	96.70	11.47	213

Site	Date	Water Temp(°C)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
Site 4. Kiowa Street	11/4/10	9.40	0.77	98.20	11.28	53
-	11/18/10	7.90	13.90	102.50	12.12	87
-	12/2/10	6.80	5.80	92.90	11.26	47
-	12/16/10	6.80	13.60	113.50	13.77	1
-	12/29/11	4.30	21.00	110.60	14.38	57
-	1/13/11	5.60	13.10	105.00	13.12	634
-	2/10/11	3.30	3.85	97.80	13.11	68
-	3/10/11	6.80	6.04	84.90	10.26	7
-	3/24/11	6.90	4.24	49.60	6.03	13
-	4/7/11	7.10	7.90	36.50	4.40	13
-	4/21/11	7.10	1.60	111.80	13.58	27
-	5/5/11	9.30	3.80	92.60	10.62	20
-	5/19/11	10.80	3.10	75.00	8.27	120
-	6/2/11	11.00	3.00	52.10	5.76	273
-	6/16/11	11.30	10.00	35.10	3.87	267
-	6/30/11	-	-	-	-	
-	7/28/11	14.30	0.75	45.20	4.61	167
Site 5. Bakerview Park Footbridge	Average/Geomean	8.60	4.31	78.86	9.61	39
-	10/7/10	11.80	1.59	82.00	8.90	27
-	10/22/10	9.10	2.67	86.50	9.94	27
-	11/4/10	9.90	2.20	88.70	10.21	13
-	11/18/10	8.10	7.19	96.50	11.38	140
-	12/2/10	6.00	3.34	107.20	13.40	60
-	12/16/10	7.20	4.92	102.30	12.34	23
-	12/29/11	4.80	7.89	64.60	13.44	103
-	1/13/11	6.60	13.60	104.10	12.77	60
-	2/10/11	4.10	3.10	101.70	13.25	1
-	3/10/11	7.40	5.27	86.40	10.34	20
-	3/24/11	7.30	3.16	50.10	6.01	27
-	4/7/11	7.50	5.30	36.80	4.45	40
-	4/21/11	7.60	1.10	111.70	13.46	20
-	5/5/11	9.10	3.40	93.10	10.78	40
-	5/19/11	11.90	1.40	78.20	8.40	33
-	6/2/11	11.50	2.00	53.10	5.79	67
-	6/16/11	12.30	4.50	36.40	3.89	147
-	6/30/11	12.60	5.00	40.10	4.21	834
-	7/28/11	14.90	0.80	44.30	4.47	260
-	Average - all sites	8.28	7.10	77.66	9.29	71
-						
BRICKYARD CREEK						
BC1 721 Township	Average/Geomean	8.35	7.36	72.35	8.72	68
-	9/29/10	16.30	3.34	47.10	4.58	1
-	10/13/10	11.20	2.09	47.60	5.60	145
-	10/27/10	9.60	5.42	50.10	5.53	440
-	11/10/11	6.60	8.11	83.00	10.28	200
-	11/24/10	2.10	0.03	89.30	12.45	1

Site	Date	Water Temp(°C)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
BC1 721 Township	12/8/10	7.30	2.55	77.50	9.44	109
-	12/22/10	6.70	3.18	80.00	10.25	36
-	1/5/11	1.70	3.49	84.40	11.04	18
-	1/19/11	5.60	7.44	85.80	10.65	45
-	2/2/11	3.10	4.44	86.50	11.46	109
-	2/16/11	6.00	6.39	92.80	11.59	300
-	3/2/11	4.00	14.40	96.70	12.73	250
-	3/16/11	6.60	7.85	91.60	11.26	73
-	3/30/11	7.40	53.60	92.60	11.20	745
-	4/13/11	9.90	4.76	64.50	7.30	9
-	4/27/11	10.10	4.16	65.30	7.34	45
-	5/11/11	12.40	3.21	67.30	7.02	36
-	5/25/11	11.30	4.48	67.50	7.40	330
-	6/8/11	12.20	4.65	63.80	7.12	370
-	6/22/11	12.80	5.08	52.80	5.49	109
-	7/6/11	12.40	5.86	33.10	3.46	82
-	7/20/11	14.50	3.47	62.00	6.38	250
-	8/3/11	12.20	3.99	23.40	2.55	1600
Site 2. Sapp Rd / Logan Estates	Average/Geomean	7.45	40.72	100.50	12.16	112
-	9/29/10	12.20	14.00	85.50	9.11	100
-	10/13/10	9.80	44.90	86.30	9.81	91
-	10/27/10	9.10	88.70	92.70	11.49	145
-	11/10/11	7.20	11.80	101.80	12.24	64
-	11/24/10	0.60	3.09	112.70	16.16	27
-	12/8/10	7.40	14.20	99.80	11.92	1600
-	12/22/10	6.20	8.74	104.50	13.00	18
-	1/5/11	2.10	26.40	107.00	14.77	590
-	1/19/11	4.70	12.20	108.60	14.01	18
-	2/2/11	2.30	195.00	108.30	14.90	1
-	2/16/11	5.40	10.02	109.40	13.76	560
-	3/2/11	3.60	66.40	103.70	13.72	210
-	3/16/11	6.00	32.70	105.20	13.08	64
-	3/30/11	7.20	266.00	99.90	12.07	600
-	4/13/11	8.00	9.32	102.40	12.12	45
-	4/27/11	8.50	11.70	100.80	11.76	54
-	5/11/11	10.30	16.30	100.30	10.00	82
-	5/25/11	10.30	7.99	95.30	10.60	118
-	6/8/11	11.20	9.79	102.10	10.98	700
-	6/22/11	12.10	4.14	91.00	9.90	390
-	7/6/11	12.20	1.70	93.10	10.05	410
-	7/20/11	13.00	6.46	93.50	9.80	280
-	8/3/11	12.90	1.94	92.10	9.79	1136
Site 3. Sapp Rd / Tressle	Average/Geomean	7.91	18.09	78.31	9.50	121
-	9/29/10	14.20	19.40	39.20	4.06	136
-	10/13/10	10.70	8.76	21.20	2.41	27
-	10/27/10	8.80	19.90	51.00	5.83	136

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
Site 3. Sapp Rd	11/10/11	6.90	9.62	88.10	10.72	118
-	11/24/10	0.20	1.84	93.00	13.53	9
-	12/8/10	7.40	5.52	86.30	10.45	100
-	12/22/10	6.10	5.30	100.00	11.20	609
-	1/5/11	1.90	8.85	99.10	13.55	91
-	1/19/11	4.90	12.60	90.90	11.69	45
-	2/2/11	2.70	12.20	92.30	12.48	18
-	2/16/11	5.50	7.23	92.40	11.66	82
-	3/2/11	3.80	37.80	98.30	12.97	330
-	3/16/11	6.30	23.40	97.80	12.10	54
-	3/30/11	7.20	163.00	95.40	11.56	809
-	4/13/11	8.70	7.30	84.50	9.82	73
-	4/27/11	9.30	7.81	85.50	10.05	73
-	5/11/11	11.00	9.17	84.00	9.17	100
-	5/25/11	11.10	5.24	74.70	8.34	220
-	6/8/11	12.30	6.01	75.40	8.06	450
-	6/22/11	13.60	4.45	57.10	5.94	450
-	7/6/11	13.50	4.47	38.30	4.01	764
-	7/20/11	14.10	3.86	67.30	6.95	420
-	8/3/11	13.90	8.36	40.50	4.18	27
Site 4. F&S Grade Rd	Average/Geomean	7.90	17.88	86.94	10.51	97
-	9/29/10	14.40	4.23	63.60	6.65	240
No water	10/13/10	-	-	-	-	
-	10/27/10	9.20	4.88	62.20	7.20	220
-	11/10/11	6.90	9.47	90.60	11.06	73
-	11/24/10	0.30	0.87	91.00	13.22	9
-	12/8/10	7.50	14.90	88.50	10.59	290
-	12/22/10	6.00	4.43	91.70	11.68	27
-	1/5/11	2.30	15.20	97.20	13.31	18
-	1/19/11	4.90	11.30	91.30	11.70	27
-	2/2/11	2.80	7.21	92.10	12.50	27
-	2/16/11	5.70	6.94	91.90	11.51	73
-	3/2/11	3.80	29.50	99.60	13.00	360
-	3/16/11	6.50	17.80	95.40	11.73	109
-	3/30/11	7.20	176.00	94.00	11.36	1082
-	4/13/11	8.80	5.81	85.40	9.93	36
-	4/27/11	9.50	7.64	89.50	10.21	54
-	5/11/11	11.10	7.26	85.80	9.45	109
-	5/25/11	11.20	7.42	98.40	10.86	91
-	6/8/11	12.30	16.90	79.50	8.60	250
-	6/22/11	14.00	5.52	76.50	7.90	390
-	7/6/11	13.60	4.29	74.60	7.76	270
-	7/20/11	14.60	3.56	78.60	7.97	330
-	8/3/11	15.40	3.10	67.00	6.69	290

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
Site 5. 22431 Cook	Average/Geomean	7.50	14.54	85.73	10.30	46
no water	9/29/10	-	-	-	-	
no water	10/13/10	-	-	-	-	
no water	10/27/10	-	-	-	-	
-	11/10/11	6.90	10.77	84.30	10.23	182
-	11/24/10	-	-	-	-	
-	12/8/10	6.80	2.51	69.80	8.56	9
-	12/22/10	5.60	4.62	84.60	10.60	27
-	1/5/11	0.20	3.72	83.40	12.00	1
-	1/19/11	5.20	10.65	90.00	11.37	27
-	2/2/11	2.90	10.08	89.70	12.16	1
-	2/16/11	5.40	14.60	88.50	11.21	1
-	3/2/11	4.00	17.00	98.80	13.00	290
-	3/16/11	6.60	4.20	92.90	11.38	164
-	3/30/11	7.20	114.00	92.20	11.18	1082
-	4/13/11	8.90	5.99	84.00	9.73	27
-	4/27/11	9.80	7.40	90.30	10.28	640
-	5/11/11	11.40	5.45	79.70	8.71	91
-	5/25/11	11.40	4.18	88.10	9.70	200
-	6/8/11	12.70	12.20	95.70	8.75	200
-	6/22/11	15.00	5.24	59.70	5.96	118
no water	7/6/11	-	-	-	-	
-	7/20/11	15.30	2.65	44.40	4.41	45
Site 6. Holtcamp Rd	Average/Geomean	8.32	13.81	82.78	9.96	46
-	9/29/10	14.80	3.59	50.40	5.08	18
no water	10/13/10	-	-	-	-	
-	10/27/10	9.90	3.86	62.50	7.40	136
-	11/10/11	7.00	10.14	84.20	10.26	191
-	11/24/10	0.00	0.40	85.70	12.52	9
-	12/8/10	7.10	19.80	75.50	9.12	36
-	12/22/10	6.00	4.05	85.30	10.65	18
-	1/5/11	2.40	35.60	93.30	12.83	45
-	1/19/11	5.30	15.00	86.50	11.00	73
-	2/2/11	3.30	10.22	90.70	12.20	1
-	2/16/11	5.60	4.79	91.00	11.39	9
-	3/2/11	4.10	23.80	95.60	12.45	540
-	3/16/11	6.70	16.20	88.80	10.84	350
-	3/30/11	7.20	92.00	90.50	10.93	827
-	4/13/11	9.00	6.24	85.80	9.94	1
-	4/27/11	10.00	5.57	92.10	10.39	40
-	5/11/11	11.60	5.90	80.20	8.75	91
-	5/25/11	11.50	4.22	100.10	11.37	191
-	6/8/11	13.00	5.53	78.30	8.25	330
-	6/22/11	15.50	5.72	67.40	6.73	82
-	7/6/11	16.30	3.59	71.60	7.05	9
-	7/20/11	15.60	3.52	71.10	7.07	73
-	8/3/11	17.30	0.57	55.40	5.28	100

	Average - all sites	7.90	18.73	84.43	10.19	82
Site	**Date**	**Water Temp(℃)**	**Turbidity (NTU)**	**D.O. (% sat.)**	**D.O. (mg/l)**	**FC High-Low average (CFU/100ml)**
KULSHAN CREEK						
Site 1. S. 14th St.	Average/Geomean	9.72	6.88	58.64	6.80	280
-	9/28/10	16.70	3.59	67.50	6.53	1600
-	10/14/10	11.30	0.00	84.00	8.95	73
-	10/26/10	10.00	2.80	83.10	9.39	494
-	11/10/10	8.60	2.84	85.90	10.10	100
-	11/29/10	6.60	3.83	101.80	12.54	33
-	12/6/10	4.80	21.80	90.40	11.84	427
-	12/21/10	7.00	2.50	61.20	7.50	123
-	1/18/11	6.90	36.00	63.80	7.77	794
-	2/3/11	6.40	2.80	68.00	8.36	153
-	2/15/11	6.90	2.99	85.10	10.37	53
-	3/2/11	6.00	12.00	57.90	7.27	1600
-	3/15/11	8.20	3.75	43.50	5.13	27
-	3/31/11	9.40	11.10	29.60	3.40	333
-	4/12/11	8.40	2.80	42.50	5.00	1234
-	4/28/11	9.20	3.20	74.30	8.54	73
-	5/9/11	11.00	1.30	54.60	6.01	153
-	5/26/11	11.60	4.70	49.70	5.34	1527
-	6/7/11	13.00	22.00	31.60	3.33	1240
-	6/23/11	12.10	4.10	22.80	2.47	413
-	7/5/11	12.50	3.80	38.90	4.16	567
-	7/19/11	13.90	1.10	27.50	2.82	427
-	8/2/11	13.30	2.34	26.40	2.78	93
Site 2. Parker Way	Average/Geomean	10.54	9.15	52.85	6.30	141
-	9/28/10	17.40	21.00	21.20	2.05	1600
-	10/14/10	12.80	0.00	5.00	5.45	187
-	10/26/10	11.80	2.94	54.80	5.94	367
-	11/10/10	10.40	5.58	72.90	8.29	53
-	11/29/10	7.30	6.34	85.20	10.22	93
-	12/6/10	4.90	30.30	93.00	11.73	840
-	12/21/10	8.20	4.73	50.20	5.91	1
-	1/18/11	6.60	38.80	66.40	8.12	1240
-	2/3/11	6.80	6.36	74.00	9.02	1
-	2/15/11	6.90	6.04	80.10	9.80	1
-	3/2/11	6.10	21.10	63.30	7.81	380
-	3/15/11	8.00	8.81	47.70	5.63	27
-	3/31/11	9.70	19.00	30.60	3.46	756
-	4/12/11	8.80	6.20	45.40	5.27	113
-	4/28/11	9.80	6.00	84.80	9.71	794
-	5/9/11	11.50	4.00	62.20	6.77	440
-	5/26/11	12.30	5.20	52.20	5.65	60
-	6/7/11	14.20	6.00	32.20	3.28	1600
-	6/23/11	13.50	1.70	60.00	6.21	514
-	7/5/11	14.00	0.25	27.50	2.83	180
-	7/19/11	15.60	0.80	32.60	3.32	227

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
-	8/2/11	15.30	0.05	21.50	2.14	80
Site 3. Roosevelt Ave	Average/Geomean	10.66	10.40	31.40	4.03	62
-	9/28/10	17.00	3.96	31.50	3.05	560
-	10/14/10	12.40	3.32	0.90	0.05	20
-	10/26/10	11.20	12.20	22.60	2.51	60
-	11/10/10	9.7`	3.89	8.20	0.97	20
-	11/29/10	6.70	8.05	29.50	3.69	40
-	12/6/10	4.60	28.90	85.10	11.41	113
-	12/21/10	7.00	5.93	30.50	3.82	1
-	1/18/11	7.70	36.50	60.40	7.24	227
-	2/3/11	5.90	6.18	37.00	4.70	1
-	2/15/11	7.30	7.09	45.60	5.57	13
-	3/2/11	6.10	13.00	57.50	7.22	40
-	3/15/11	7.80	8.62	6.50	0.81	13
-	3/31/11	9.80	12.70	28.80	3.35	496
-	4/12/11	9.50	5.50	33.90	8.70	434
-	4/28/11	10.20	4.00	74.60	8.55	180
-	5/9/11	12.20	5.10	36.30	3.85	67
-	5/26/11	12.50	4.70	47.00	4.92	1540
-	6/7/11	13.60	1.90	5.70	0.56	160
-	6/23/11	14.10	30.00	8.10	-	93
-	7/5/11	15.70	13.00	14.30	1.47	307
-	7/19/11	16.00	6.80	13.30	0.81	373
-	8/2/11	16.60	7.40	13.60	1.37	4
Site 4. Riverside Dr.	Average/Geomean	10.12	8.45	58.47	6.76	136
-	9/28/10	17.00	1.36	56.20	5.43	1600
-	10/14/10	11.80	0.00	73.30	8.20	47
-	10/26/10	10.20	3.59	63.00	7.06	107
-	11/10/10	8.80	3.78	71.60	8.28	20
-	11/29/10	6.00	4.70	86.30	10.71	40
-	12/6/10	4.60	32.90	104.20	13.26	100
-	12/21/10	6.80	3.54	53.80	6.55	1
-	1/18/11	7.20	44.30	69.10	8.34	1600
-	2/3/11	6.20	4.50	73.50	9.04	33
-	2/15/11	6.60	7.33	84.00	10.71	20
-	3/2/11	6.30	19.20	66.00	8.08	774
-	3/15/11	8.50	7.24	45.80	5.37	53
-	3/31/11	9.60	17.00	30.80	3.48	653
-	4/12/11	8.80	4.80	44.10	5.11	420
-	4/28/11	9.80	5.00	93.00	10.53	300
-	5/9/11	11.70	2.40	78.40	8.54	53
-	5/26/11	12.10	5.00	57.90	6.28	980
-	6/7/11	13.80	7.00	32.70	3.40	1600
-	6/23/11	13.60	3.00	40.10	4.06	207
-	7/5/11	13.60	0.95	10.30	1.06	67
-	7/19/11	15.60	5.60	33.00	3.40	233

-	8/2/11	14.10	2.60	19.20	1.88	34

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
Site 5. Lions Park	Average/Geomean	10.42	10.64	63.12	7.23	74
-	9/28/10	17.50	27.20	64.90	6.29	1600
-	10/14/10	13.40	0.00	83.00	8.64	27
-	10/26/10	11.10	6.47	62.00	6.84	160
-	11/10/10	9.50	4.09	81.10	9.26	27
-	11/29/10	6.40	5.90	88.70	10.90	27
-	12/6/10	4.70	38.20	104.90	13.62	807
-	12/21/10	7.40	4.16	56.60	6.84	1
-	1/18/11	6.70	54.00	73.10	8.92	560
-	2/3/11	6.40	4.44	74.30	9.28	33
-	2/15/11	7.10	8.71	80.00	9.60	1
-	3/2/11	6.00	20.60	69.40	8.68	680
-	3/15/11	8.20	7.37	55.20	6.55	20
-	3/31/11	9.30	15.70	31.40	3.76	992
-	4/12/11	8.30	5.30	57.20	6.71	253
-	4/28/11	9.30	5.70	96.00	10.97	380
-	5/9/11	11.30	2.40	82.30	8.97	80
-	5/26/11	11.80	4.80	61.80	6.64	1600
-	6/7/11	13.90	5.50	33.80	3.46	233
-	6/23/11	13.50	5.80	36.50	3.86	13
-	7/5/11	14.20	2.70	35.30	3.66	1
-	7/19/11	16.10	1.90	32.30	2.88	80
-	8/2/11	17.10	3.10	28.90	2.83	5
	Average - all sites	10.26	8.72	50.34	5.97	155
Joe Leary Slough						
#1 Dahlstedt Road	Average/Geomean	10.02	21.85	44.73	5.00	86
-	9/26/10	14.20	24.20	33.00	3.30	261
-	10/16/10	7.50	85.60	26.00	3.05	186
-	10/28/10	10.00	9.70	20.00	2.21	144
-	11/13/10	9.70	22.30	45.00	5.05	57
-	11/21/10	8.50	11.05	36.90	4.30	93
-	12/11/10	8.70	13.10	49.10	5.70	33
-	12/19/10	7.70	16.40	35.70	4.31	3
-	1/11/11	7.40	9.70	38.50	4.55	128
-	1/17/11	8.30	45.60	64.90	7.60	1600
-	2/5/11	8.80	20.90	31.70	3.64	39
-	2/14/11	9.40	19.70	31.80	3.63	28
-	3/5/11	7.60	8.60	53.00	6.32	210
-	3/13/11	9.00	17.90	42.50	4.87	238
-	4/2/11	8.70	27.90	50.90	5.75	353
-	4/10/11	9.50	15.90	27.90	3.18	191
-	4/30/11	11.10	11.80	47.70	5.28	5
-	5/8/11	12.60	17.80	31.10	3.28	915
-	5/23/11	11.00	13.80	89.50	10.20	95
-	6/2/11	11.10	15.50	40.30	4.52	33

-	6/5/11	16.60	24.80	70.80	6.94	9
-	6/25/11	13.10	26.60	73.10	7.30	22

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
#2- HWY 99 / Gear Road	Average/Geomean	10.12	34.40	56.47	6.49	122
-	9/26/10	15.10	32.20	54.30	5.40	500
-	10/16/10	8.50	19.90	53.70	6.05	11
-	10/28/10	10.00	19.50	47.00	5.30	22
-	11/13/10	9.50	17.90	54.50	6.14	50
-	11/21/10	7.80	12.58	47.00	5.60	24
-	12/11/10	8.00	16.30	25.60	3.43	65
-	12/19/10	7.30	38.40	50.20	6.01	116
-	1/11/11	6.10	33.20	50.50	6.27	219
-	1/17/11	8.50	126.20	56.90	6.66	1600
-	2/5/11	8.60	36.50	40.50	4.65	44
-	2/14/11	9.00	35.10	51.80	5.98	500
-	3/5/11	8.50	26.30	53.50	6.28	224
-	3/13/11	7.90	34.20	58.00	6.90	297
-	4/2/11	9.20	36.20	55.30	7.50	547
-	4/10/11	9.20	36.80	48.40	5.57	131
-	4/30/11	11.80	24.60	59.10	6.24	47
-	5/8/11	13.40	22.10	53.80	5.65	458
-	5/23/11	10.10	7.60	99.50	11.26	75
-	6/2/11	11.20	30.10	56.30	6.18	45
-	6/5/11	18.80	37.60	105.70	9.80	39
-	6/25/11	14.00	79.20	64.20	9.42	94
#3- Wilson/Avon Allen	Average/Geomean	10.65	44.74	66.13	7.40	47
-	9/26/10	16.10	27.80	72.10	7.13	64
-	10/16/10	7.70	32.60	70.00	8.10	17
-	10/28/10	10.10	43.50	61.00	6.90	81
-	11/13/10	10.00	28.60	56.90	6.63	7
-	11/21/10	8.70	17.16	54.60	6.36	3
-	12/11/10	7.90	43.30	46.50	5.72	398
-	12/19/10	7.00	82.40	59.40	7.26	4
-	1/11/11	5.50	37.50	64.10	7.97	35
-	1/17/11	8.60	133.50	66.10	7.71	92
-	2/5/11	8.80	37.40	55.50	6.35	9
-	2/14/11	8.70	28.20	67.00	7.80	20
-	3/5/11	8.50	31.90	66.00	7.68	58
-	3/13/11	7.80	28.20	68.10	8.02	80
-	4/2/11	9.00	51.20	59.30	6.90	280
-	4/10/11	8.80	26.30	63.10	7.29	21
-	4/30/11	12.30	24.20	72.10	7.68	20
-	5/8/11	14.60	37.90	76.80	7.79	79
-	5/23/11	12.00	10.70	90.50	10.16	60
-	6/2/11	12.90	49.30	65.50	6.90	183
-	6/5/11	21.20	82.20	77.30	7.72	312
-	6/25/11	17.50	85.60	76.90	7.33	710

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
#4- Tide Gate	Average/Geomean	10.35	32.36	45.72	5.23	104
-	9/26/10	16.30	24.30	66.50	6.50	242
-	10/16/10	10.50	21.80	34.70	3.76	32
-	10/28/10	10.30	21.80	50.00	4.90	60
-	11/13/10	8.90	16.70	28.50	7.29	29
-	11/21/10	6.30	12.40	62.60	7.73	48
-	12/11/10	7.70	37.90	53.10	6.90	113
-	12/19/10	5.70	55.40	58.20	7.23	26
-	1/11/11	5.20	30.70	54.40	6.90	960
-	1/17/11	9.30	83.90	61.40	7.02	632
-	2/5/11	8.40	39.10	2.30	0.34	44
-	2/14/11	8.30	34.80	70.40	8.22.	21
-	3/5/11	7.50	27.50	16.50	1.27	62
-	3/13/11	7.70	23.50	68.70	8.18	109
-	4/2/11	8.50	62.40	49.10	7.75	531
-	4/10/11	10.30	37.70	50.30	5.62	27
-	4/30/11	12.30	24.50	5.40	0.61	135
-	5/8/11	12.70	28.00	51.10	5.45	820
-	5/23/11	14.10	11.40	30.38	2.97	600
-	6/2/11	12.80	30.00	38.00	4.01	70
-	6/5/11	17.70	29.20	54.00	5.12	25
-	6/25/11	16.90	26.50	54.50	5.10	181
	Average - all sites	10.29	33.34	53.26	6.03	90
[redacted]						
Lower Nookachamps						
#1 College Way	Average/Geomean	7.72	8.57	93.05	11.23	326
-	10/5/10	10.40	2.40	77.80	8.78	1049
-	10/20/10	8.00	3.00	89.50	10.64	147
-	11/2/10	10.20	5.50	98.60	11.05	320
-	11/16/10	9.20	17.00	93.00	10.73	430
-	11/30/10	6.00	8.00	106.30	13.28	100
-	12/14/10	7.00	23.00	108.40	13.90	505
-	12/28/10	6.10	5.80	93.60	11.69	445
-	1/11/11	1.90	7.90	106.40	14.54	50
-	1/25/11	5.80	12.70	95.60	11.60	128
-	2/8/11	5.20	9.60	96.20	12.31	165
-	2/22/11	3.80	6.10	95.20	12.55	1600
-	3/8/11	4.20	19.60	92.40	12.05	325
-	3/22/11	6.00	7.40	88.10	11.08	545
-	4/5/11	6.50	15.90	88.00	10.80	275
-	4/19/11	7.20	4.40	103.50	12.49	55
-	5/3/11	8.90	6.80	69.10	8.01	180
-	5/17/11	10.90	5.30	97.90	10.82	175
-	5/31/11	11.30	4.20	107.30	11.78	130
-	6/14/11	12.10	4.30	79.00	8.79	245
-	6/28/11	13.60	2.50	75.00	7.70	1175

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
HWY 9 Bridge	Average/Geomean	5.99	6.48	90.26	11.24	60
-	10/5/10	10.10	2.40	77.80	8.70	65
-	10/20/10	7.10	2.20	83.70	10.12	42
-	11/2/10	8.20	4.40	99.30	11.75	232
-	11/16/10	7.20	9.60	77.73	9.74	210
-	11/30/10	4.50	3.20	104.60	13.56	63
-	12/14/10	6.20	23.70	103.40	12.73	116
-	12/28/10	4.50	16.20	98.60	12.71	53
-	1/11/11	1.10	3.80	89.30	12.63	46
-	1/25/11	5.60	6.80	84.90	10.70	48
-	2/8/11	4.00	3.80	88.90	11.72	45
-	2/22/11	2.20	3.20	89.60	11.75	66
-	3/8/11	3.60	3.80	89.60	11.85	28
-	3/22/11	4.90	4.20	87.70	10.84	27
-	4/5/11	5.00	16.30	85.60	10.95	55
-	4/19/11	5.80	3.10	95.40	11.91	21
-	5/3/11	5.10	6.70	67.10	8.55	206
-	5/17/11	7.30	3.80	95.90	11.53	37
-	5/31/11	7.90	2.90	99.50	11.80	43
-	6/14/11	8.40	7.60	92.30	10.88	31
-	6/28/11	11.00	1.90	94.20	10.33	111
#3 Swan Road	Average/Geomean	6.92	6.80	86.19	10.57	64
-	10/5/10	10.80	9.00	77.40	8.74	41
-	10/20/10	7.90	8.35	81.10	9.63	165
-	11/2/10	8.50	12.30	101.20	11.85	46
-	11/16/10	7.40	11.50	88.70	10.48	224
-	11/30/10	4.50	5.40	103.80	13.45	64
-	12/14/10	-	-	-	-	
-	12/28/10	4.90	9.60	95.20	12.22	81
-	1/11/11	1.40	4.70	92.20	12.98	60
-	1/25/11	5.90	7.80	81.50	10.90	118
-	2/8/11	4.60	4.90	83.40	10.72	71
-	2/22/11	3.00	4.30	85.30	11.50	113
-	3/8/11	3.70	5.30	88.70	11.72	35
-	3/22/11	5.30	4.50	83.60	10.71	18
-	4/5/11	5.80	12.50	79.00	9.88	131
-	4/19/11	6.70	4.10	92.80	11.38	27
-	5/3/11	6.00	8.00	64.80	8.06	120
-	5/17/11	8.90	4.10	88.50	10.46	75
-	5/31/11	9.60	4.00	91.70	10.46	37
-	6/14/11	10.60	4.80	90.00	9.92	35
-	6/28/11	16.00	4.00	68.80	5.80	38
#4 Francis Road	Average/Geomean	6.69	7.34	85.79	15.18	47
-	10/5/10	11.60	11.50	49.90	5.41	30
-	10/20/10	9.00	3.95	71.00	8.09	43
-	11/2/10	8.40	10.20	102.50	12.06	43

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
#4 Francis Road	11/16/10	7.50	14.20	99.70	11.88	130
-	11/30/10	4.30	4.80	103.40	13.48	41
-	12/14/10	-	-	-	-	
-	12/28/10	5.10	6.50	87.30	11.19	77
-	1/11/11	1.60	11.60	90.30	12.61	59
-	1/25/11	5.70	8.40	83.50	10.50	113
-	2/8/11	4.80	5.00	86.50	11.02	55
-	2/22/11	3.60	6.00	81.10	10.77	72
-	3/8/11	4.00	5.90	86.90	11.37	27
-	3/22/11	5.60	5.00	82.30	10.26	7
-	4/5/11	5.90	13.10	78.70	98.30	150
-	4/19/11	7.10	4.00	90.90	10.92	32
-	5/3/11	6.10	10.30	63.60	7.91	118
-	5/17/11	8.50	4.20	89.10	10.38	80
-	5/31/11	10.00	4.00	90.20	10.18	35
-	6/14/11	8.10	8.20	97.30	11.64	22
-	6/28/11	10.30	2.60	95.80	10.50	16
	Average - all sites	6.83	7.30	88.82	12.06	124
Upper Nookachamps						
Lake McMurray Est.	Average/Geomean	7.93	2.47	68.97	8.77	11
-	10/2/10	12.60	4.01	2.20	0.23	21
-	10/16/10	8.80	1.20	43.40	5.04	11
-	10/30/10	9.50	1.10	53.00	5.90	13
-	11/13/10	9.40	3.90	68.70	7.85	10
-	11/27/10	6.00	2.10	56.40	7.04	7
-	12/16/10	6.90	3.40	70.00	8.35	15
-	12/26/10	5.40	2.10	65.40	8.30	7
-	1/8/11	3.80	3.30	77.00	12.93	19
-	1/22/11	4.60	3.90	80.90	10.45	15
-	2/6/11	5.00	4.00	80.30	10.18	4
-	2/19/11	3.20	1.20	69.00	9.17	6
-	3/6/11	3.50	3.33	79.00	10.42	29
-	3/19/11	4.90	1.20	81.30	10.40	8
-	4/3/11	6.70	-	82.30	10.05	9
-	4/16/11	7.50	1.42	88.30	10.56	4
-	4/30/11	9.30	1.60	104.30	11.77	7
-	5/14/11	11.50	2.93	96.00	10.50	17
-	5/30/11	12.60	1.30	69.50	-	35
-	6/11/11	15.30	1.10	78.20	7.85	24
-	6/26/11	12.10	3.80	34.20	9.72	10
Big lake Outflow	Average/Geomean	8.90	2.91	86.75	15.05	9
-	10/2/10	16.80	4.40	73.60	7.11	9
-	10/16/10	13.10	3.00	65.30	6.87	4
-	10/30/10	-	1.80	7.80	8.64	37
-	11/13/10	9.00	3.30	81.30	9.31	4
-	11/27/10	4.40	1.80	92.70	11.90	79
-	12/16/10	6.20	3.00	93.20	11.54	15

Site	Date	Water Temp(℃)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
Big lake Outflow	12/26/10	4.80	5.10	97.40	12.40	6
-	1/8/11	3.30	4.70	96.70	12.93	14
-	1/22/11	-	5.70	94.30	11.95	27
-	2/6/11	5.50	4.70	92.50	11.40	7
-	2/19/11	4.50	3.50	88.70	11.50	13
-	3/6/11	3.50	3.05	88.80	11.77	4
-	3/19/11	5.20	2.60	85.30	10.78	9
-	4/3/11	7.70	2.12	86.00	10.23	4
-	4/16/11	8.20	2.48	94.50	11.17	4
-	4/30/11	9.80	1.30	101.20	100.40	12
-	5/14/11	11.50	2.17	93.80	10.22	4
-	5/30/11	13.70	1.20	106.10	11.34	10
-	6/11/11	15.60	1.00	94.30	9.41	4
-	6/26/11	17.40	1.30	101.40	10.12	10
Otter Pond Road	Average/Geomean	7.96	3.93	98.07	11.77	20
-	10/2/10	14.70	2.50	92.10	9.44	95
-	10/16/10	8.60	2.30	97.70	11.43	99
-	10/30/10	8.10	2.80	96.40	11.17	10
-	11/13/10	8.20	15.30	98.90	11.57	9
-	11/27/10	4.20	3.40	99.00	12.81	141
-	12/16/10	6.40	5.20	102.00	12.60	18
-	12/26/10	5.00	3.60	100.40	12.82	17
-	1/8/11	3.00	5.10	105.90	14.18	15
-	1/22/11	5.10	5.50	101.90	13.01	19
-	2/6/11	5.30	2.10	100.90	12.73	4
-	2/19/11	3.50	2.60	97.70	12.88	10
-	3/6/11	3.50	2.94	95.70	12.70	4
-	3/19/11	5.40	2.70	91.60	11.66	7
-	4/3/11	7.70	2.12	86.00	10.23	6
-	4/16/11	7.90	2.70	99.80	11.86	87
-	4/30/11	9.30	2.70	108.90	12.42	18
-	5/14/11	12.50	2.72	97.10	10.37	31
-	5/30/11	13.10	8.00	-	-	87
-	6/11/11	13.90	2.20	95.40	9.87	19
-	6/26/11	13.70	2.10	95.90	9.93	21
Knapp Road Bridge	Average/Geomean	8.21	5.13	78.40	9.35	62
-	10/2/10	15.20	6.60	43.70	4.38	78
-	10/16/10	11.10	5.00	59.80	6.64	52
-	10/30/10	9.40	2.90	72.00	8.09	43
-	11/13/10	8.40	6.50	73.40	8.56	78
-	11/27/10	4.10	3.80	80.70	10.58	279
-	12/16/10	5.70	4.20	82.40	10.30	147
-	12/26/10	5.10	-	87.60	11.20	
-	1/8/11	2.70	5.50	87.90	11.93	363
-	1/22/11	5.10	7.20	85.00	10.78	118
-	2/6/11	5.60	10.30	91.20	11.55	17
-	2/19/11	3.80	9.20	87.70	11.50	71

Site	Date	Water Temp(°C)	Turbidity (NTU)	D.O. (% sat.)	D.O. (mg/l)	FC High-Low average (CFU/100ml)
Knapp Road Bridge	3/6/11	3.30	1.23	84.80	11.32	3
-	3/19/11	4.80	7.80	74.00	9.48	167
-	4/3/11	7.30	2.70	78.00	9.41	53
-	4/16/11	7.90	3.81	98.40	9.30	125
-	4/30/11	9.20	3.20	91.90	10.93	14
-	5/14/11	11.10	3.27	72.20	7.93	65
-	5/30/11	13.30	9.00	-	-	44
-	6/11/11	14.80	2.60	76.70	7.72	60
-	6/26/11	16.30	2.60	62.20	5.97	57
	Average - all sites	8.25	3.61	83.05	11.24	26

Appendix B – Storm Team Data

	10-Oct-10	8-Nov-10	26-Nov-10	1-Dec-10	12-Dec-10	23-Dec-10
BV1 PBNERR Culvert			190	20	1600	35
BV2 Luna's Field Culvert			140	50	650	15
BV3 S Bay View State Park	1600	1600	1600	1060	1600	785
BV4 B Street Culvert	1600	1600	240	540	900	
BV5 B Street #2			150	350	1290	75
BV6 Boat Launch Culvert	1600	80	60	1	860	
BV7 Beach Cottage	1500	1360	160	1600		420
NN8 Marihugh/BV-Edison	1600	250	480	150	820	110
NN9 Bridgeview S			1240		1260	5
NN10 Egbers foot bridge	1600	410	1210	680	540	50
NN11 Egbers ditch		550	70	520	460	1
NN12 No Name tide gt	210	140	35	215	635	45
NN13 Bay View Rd - blue house	1600	460	1520	350	430	155
NN14 Farm-Market/ pallet place	720	530	40	50	390	10
NN15 Farm2Market/ Bayview Rd	450	280	700	90	230	30
NN16 Upper Marihugh	1600	690	1520	320	560	290
NN17 Wilson East Fork						
NN18 Wilson Rd West Fork	1600	610	1600	280	980	140
NN19 Rector - Green Mailbox	1600	1160	1600	440	60	1

	8-Jan-11	13-Jan-11	21-Jan11	11-Feb-11	28-Feb-11	16-Mar-11
BV1 PBNERR Culvert	120	120	780	40	130	30
BV2 Luna's Field Culvert	50	50	540	20	480	1
BV3 S Bay View State Park	960	480	960	20	700	420
BV4 B Street Culvert	780	200	340	180	1220	240
BV5 B Street #2	760	400	400	20	940	60
BV6 Boat Launch Culvert	180	100	680	1	680	240
BV7 Beach Cottage	1600	280	1600	1600	520	1560
NN8 Marihugh/BV-Edison	170	540	1020	430	930	60
NN9 Bridgeview S	60	420	1120	60	400	120
NN10 Egbers foot bridge	250	460	470	40	610	500
NN11 Egbers ditch	100	250	470	50	220	40
NN12 No Name tide gt	265	655	400	30	265	295
NN13 Bay View Rd - blue house	300	270	510	50	550	440
NN14 Farm-Market/ pallet place	40	670	520	30	130	20
NN15 Farm2Market/ Bayview Rd	10	100	280	10	70	10

NN16 Upper Marihugh		200	240	60	480	660
NN17 Wilson East Fork		320	540	20	360	160
NN18 Wilson Rd West Fork		100	320	60	440	100
NN19 Rector - Green Mailbox		100	500	20	1140	1

	30-Mar-11	**7-May-11**	**15-May-11**	**27-May-11**	**15-Aug-11**
BV1 PBNERR Culvert	1600	1270	1600	1600	
BV2 Luna's Field Culvert	120	240	140	940	
BV3 S Bay View State Park	1000	1600	1660	980	
BV4 B Street Culvert	1600	1600	1600	1600	372
BV5 B Street #2	1600	1400	1360	1600	
BV6 Boat Launch Culvert	1600	1600	1600	1120	396
BV7 Beach Cottage	1600	1600	1600	1600	
NN8 Marihugh/BV-Edison	1500	1600	1600	1410	28
NN9 Bridgeview S	1600	1600	1600	920	
NN10 Egbers foot bridge	1600	1600	1600	1600	
NN11 Egbers ditch	1100	460	1000	650	112
NN12 No Name tide gt	1600	1600	1600	1430	36
NN13 Bay View Rd - blue house	1600	1600	1600	1130	
NN14 Farm-Market/ pallet place	900	1600	720	1380	
NN15 Farm2Market/ Bayview Rd	340	1260	260	400	
NN16 Upper Marihugh	1600	1600	1600	1600	
NN17 Wilson East Fork	1600	1600	1600	1600	
NN18 Wilson Rd West Fork	1360	1600	1600	940	
NN19 Rector - Green Mailbox	1400	980	220	160	

Appendix C. Quality Objectives

parameter	method	precision (Rel. Std. Dev.)	accuracy	detection level
Dissolved Oxygen (DO)	YSI 55 Probe	Unavailable	± 0.3 mg/l	0-20 mg/l
Total depth	Fixed/hand-held Tape	± 20%	± 0.05 meters	0 - 1 cm
Turbidity	Turbidimeter	Unavailable	0.01 NTU	0-19.9 NTU 0-199.9 NTU
Temperature	YSI 55 Probe	Unavailable	0.2° C	°-5 to 45° C

parameter	method	test equipment	filter type	incubation
Fecal coliform bacteria	Membrane Filtration	Millipore sterifil aseptic system	47 mm membrane filter .45 um pore space	Millipore single chamber incubator Temp. range 30°c (±0.5) 44.5°c (±0.2)

Standard Operating Procedures (SOP's)

1. Dissolved Oxygen (DO)- Samples will be taken with a bottle placed in an extension pole and dipped using the Standard Methods. DO will be measured using a YSI 55 probe. Results will be recorded as DO mg/l.

DO testing procedure (YSI 55 Probe):

i. Turn probe on and calibrate immediately when picking up equipment. Make sure sponge inside the calibration chamber is wet with distilled water.
ii. Place probe in water below the surface of water and move probe back and forth until the reading stabilizes. Record the result in mg/l. Leave probe on for the rest of the sampling.

2. Temperature will be measured with a YSI probe and recorded in °C.

3. Total depth is measured using depth gauges installed at some sites.

4. Water clarity will be determined by placing a sample into a turbidimeter (EPA approved VWR 66120-200)

i. Warm-up Turbidimeter 30 minutes and calibrates w/ 0 NTU polymer standard using the "zero-adjustment".
ii. Thoroughly shake the water sample in a clean sampling jar.
iii. Pour sample into unscratched, clean, and Kim-wiped vial. Mix again
iv. Place in turbidimeter w/ index line facing directly out to the front.
v. Read and record the steady reading after the highest readings settle.

vi. If reading is greater than 200 NTU, dilute the sample by 50%. (x 2).

variable	sampling equipment	sample container	sample preservation	maximum holding time
fecal coliform	Pole w/glass bottle	glass bottle pre-sterilized	ice chest with ice pack	1 hr
d. oxygen	YSI probe	instream	none	immediately
total depth	Installed depth gauge	instream	none	immediately
temperature	YSI probe thermometer	instream instream	none none	immediately immediately
turbidity	turbidimeter	glass bottle, wide-mouth	ice chest	2 hrs

Equipment calibration and maintenance

1. Millipore Sterifil Filtration System maintenance
Maintenance: Immediately after use disassemble the apparatus and clean the components to ensure optimum performance.

i. Remove the cover from the funnel. Carefully remove the O-ring using forceps. Remove the support screen from the base by pushing a short blunt rod through the base outlet.
ii. Clean all components with a sponge, hot water, and non-alkaline, non-abrasive cleanser (anti-bacterial soap). Remove stubborn residues on the insides of the holder, cover port, and flask side arms using a plastic bristle brush and pipe cleaner dipped in cleanser (do not use any steel wool or abrasive materials that can harm the components).
iii. Rinse the components with lab water and sterilize.

2. Sample Containers and Equipment maintenance
Maintenance: Empty bottles and place in Liquinox and warm water. Wash with a bottlebrush. Double rinse with tap water and final rinse with distilled water. Autoclave all fecal coliform sample bottles and graduated cylinders.

3. Millipore Portable Single Chamber Incubator maintenance
Maintenance: Clean the exterior case and interior chamber with a damp cloth and warm water (anti-bacterial soap). Give final spray with rubbing alcohol.

4. VWR Turbidimeter
Calibration: Insert 0 NTU polymer standard with the range control set at "20". Set the "Zero Control" to 0. Set the coarse so that the meter reads as close to zero as possible. Calibrate turbidimeter annually.

5. YSI Meters (DO, Temp)
Calibration: Press and release UP ARROW and DOWN ARROW keys at the same time. Enter "0" for altitude and salinity, and ENTER afterwards. Instrument is calibrated.
Maintenance: Turn YSI 55 off and rinse probe with distilled water after each use. Replace membrane filters and Kim-wipe moisturizers monthly. Replace batteries as needed.

Appendix D. Sample Data Sheet

Gages Slough
Skagit Stream Team Field Work By_____
Water Quality Monitoring **Fax results to:** Attn: Kristi, Skagit CD 360-424-6172

Site GS #1. Regent & E. Rio Vista Streets Water Appearance ❑ Scum/Film ❑ Foam ❑ Muddy Brown ❑ Milky ❑ Clear ❑ Oily Sheen ❑ Frozen ❑ Other_____	Time of Sample	Total Depth ft	Water Temp ºC	Fecal Coliform Results (from Edge Analytical)
	D.O. saturation %	D.O. mg/L		
	Turbidity NTU's			
Site GS#2. Anacortes Street Water Appearance ❑ Scum/Film ❑ Foam ❑ Muddy Brown ❑ Milky ❑ Clear ❑ Oily Sheen ❑ Frozen ❑ Other_____	Time of Sample	Total Depth ft	Water Temp ºC	Fecal Coliform Results (from Edge Analytical)
	D.O. saturation %	D.O. mg/L		
	Turbidity NTU's			
Site GS#3. S. Spruce Street Water Appearance ❑ Scum/Film ❑ Foam ❑ Muddy Brown ❑ Milky ❑ Clear ❑ Oily Sheen ❑ Frozen ❑ Other_____	Time of Sample	Total Depth ft	Water Temp ºC	Fecal Coliform Results (from Edge Analytical)
	D.O. saturation %	D.O. mg/L		
	Turbidity NTU's			
Site GS #4. Burlington Blvd. Water Appearance ❑ Scum/Film ❑ Foam ❑ Muddy Brown ❑ Milky ❑ Clear ❑ Oily Sheen ❑ Frozen ❑ Other_____	Time of Sample	Total Depth ft	Water Temp ºC	Fecal Coliform Results (from Edge Analytical)
	D.O. saturation %	D.O. mg/L		
	Turbidity NTU's			
Site GS#5. Goldenrod Road Water Appearance ❑ Scum/Film ❑ Foam ❑ Muddy Brown ❑ Milky ❑ Clear ❑ Oily Sheen ❑ Frozen ❑ Other_____	Time of Sample	Total Depth ft	Water Temp ºC	Fecal Coliform Results (from Edge Analytical)
	D.O. saturation %	D.O. mg/L		
	Turbidity NTU's			