With participation from: Mid Vancouver Island Habitat Enhancement Society, Qualicum Beach Streamkeepers, Parksville Fish & Game, Nile Creek Enhancement Society, Friends of French Creek and Nanaimo Area Land Trust

Regional District of Nanaimo
Community Watershed Monitoring Network
2011 Data Summary

Prepared by:
Rosie Barlak
Environmental Impact Assessment Biologist
Environmental Protection Division
Ministry of Environment
2080-A Labieux Rd
Nanaimo, BC V9T 6J9

June 2012

Program Outline

The following data are part of the Community Watershed Monitoring Network partnership initiated in 2011 by the Regional District of Nanaimo (RDN) and the British Columbia (BC) Ministry of Environment (MOE) to collect data across the RDN. In its early stages (2011-2013) the program will be used for data gathering with the goals of obtaining enough data to see watershed trends and raise watershed health awareness in local communities. Long term goals are to use multiple years of data to determine in which watersheds more detailed monitoring and/or improved watershed management need occur, and to assist in land use planning.

Partnerships are core to the monitoring program. In 2011 the RDN and MOE organized the program and trained participants in monitoring protocols. Six stewardship groups within the RDN participated in the monitoring program, with safety gear and land access provided by Island Timberlands LP. Stewardship groups participating in 2011 were: Nile Creek Enhancement Society, Friends of French Creek, Qualicum Beach Streamkeepers, Parksville Fish and Game, Mid Vancouver Island Habitat Enhancement Society and the Nanaimo Area Land Trust.

A total of 25 different sites in 9 different watersheds were monitored in 2011, the pilot year of the program. Samples were collected weekly between August 16 and September 13, 2011 (summer low flow) and between October 18 and November 15, 2011 (fall rains) by the stewardship groups according to BC MOE sampling procedures (BC MOE, 2003). It should be noted that the 2011 fall flush sample period had less precipitation than normally observed in October/November and did not capture a true fall flush event. In this document, data are presented and compared to existing BC Water Quality Guidelines (BC MOE, 1997) and/or Englishman River Water Quality Objectives (Barlak *et al*., 2010) (Table 1), applicable to other watersheds within the same ecoregion. Exceedences are noted.

Table 1 - BC Water Quality Guidelines and/or Englishman River Water Quality Objectives

Parameter	Guideline or Objective Value	Importance
Turbidity (Englishman River Water Quality Objective)	October to December: 5 NTU maximum January to September: 2 NTU maximum	Measures clarity or cloudiness of water. High values are associated with higher levels of other contaminants (e.g. bacteria).
Temperature (Englishman River Water Quality Objective)	Short Term, at any location in the river - $\leq 17^{o}C$ average weekly temperature Long Term $\leq 15^{o}C$ average weekly temperature	If too warm not aesthetically pleasing to drink and can affect health and survival of aquatic organisms.
Dissolved Oxygen (BC Water Quality Guideline for aquatic life)	30 day average 8 mg/L Instantaneous minimum 5 mg/L	If too low affects the health and survival of aquatic organisms.
Conductivity (no guideline)	No guidelines exist; coastal streams generally less than 80 μS/cm but can be more if significant ground water influences	The more dissolved ions in water, the greater the electrical conductivity. Dilution decreases conductivity but groundwater influences or sediment introduced in water can increase it.

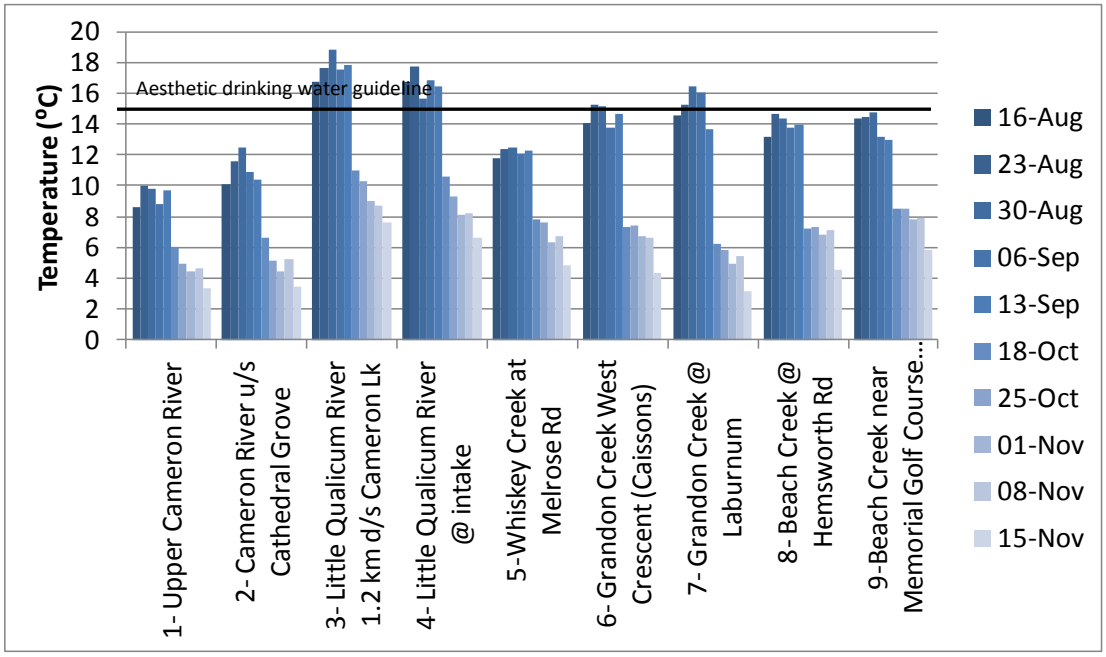
Data Summary

Summer 2011

Qualicum Beach Streamkeepers and Parksville Fish and Game

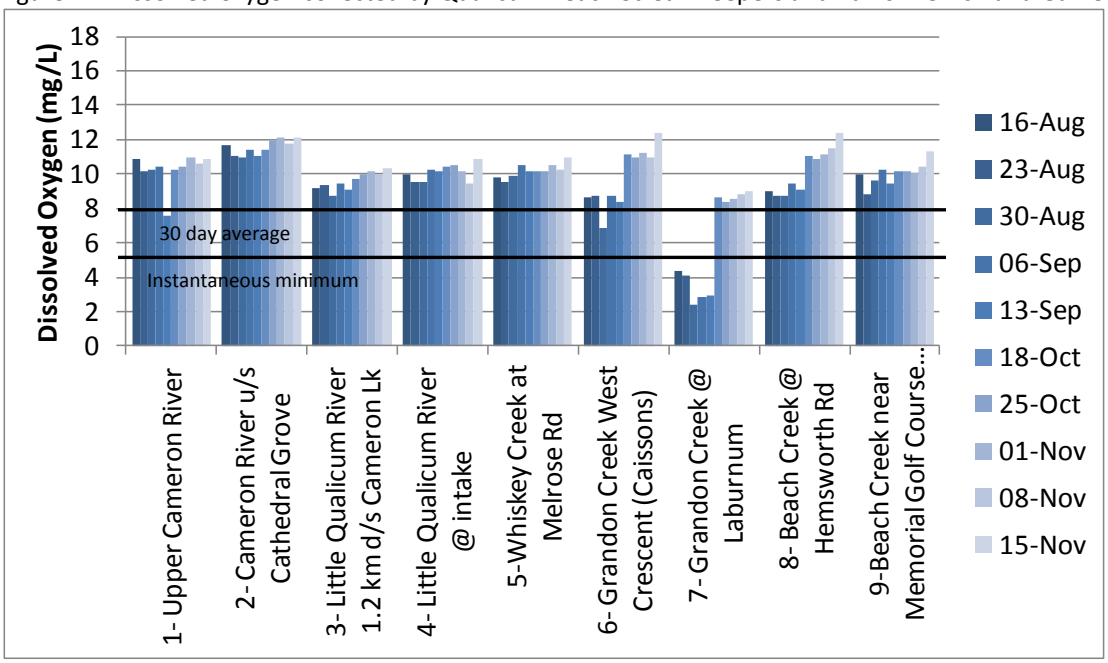
There were exceedences of the aesthetic drinking water temperature guideline (maximum 15°C) in the lower Little Qualicum River throughout the summer sample period (Figure 1). Maximum summer water temperatures at times exceeded the guideline for coho (17°C) rearing. This is typical of many east coast Vancouver Island streams where the lower portions are wide and shallow; as long as refuges remain with lower temperatures, juvenile fish should be able to retreat to these during periods of elevated temperatures.

Figure 1 – Temperature collected by Qualicum Beach Streamkeepers and Parksville Fish and Game.



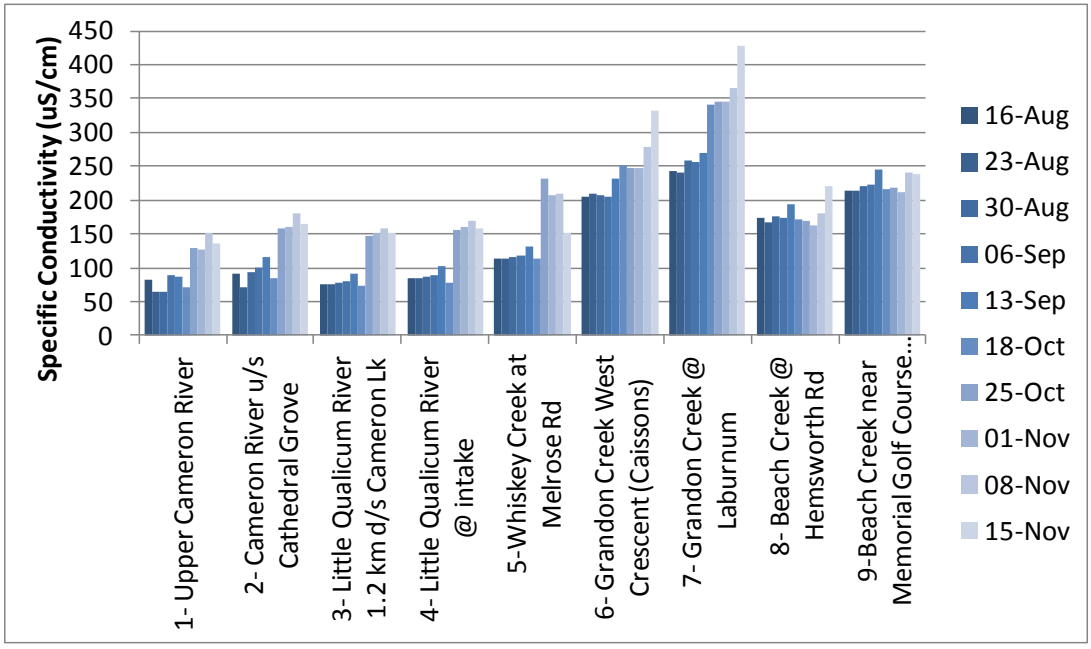
Dissolved oxygen (DO) at Grandon Creek at Laburnum was below the instantaneous minimum aquatic life guideline throughout the summer (Figure 2). An average (not shown in figure below) of these values was below the recommended 30 day average. Low DO values may be indicative of very low flow or still water. At this time no flow data is available for comparison for Grandon Creek. The lower than normal September 13th observation at the Upper Cameron River site was due to this sample having been analyzed with a different meter than all other dates and sites; the meter likely required calibration.

Figure 2 – Dissolved oxygen collected by Qualicum Beach Streamkeepers and Parksville Fish and Game.



Conductivity was higher than levels typical of coastal streams in both Grandon and Beach Creeks and in the fall at all sites (Figure 3). In Grandon and Beach Creeks increases appear to be associated primarily with increased turbidity in summer and possibly groundwater influences at all times. Fall increases at the other sites appear to be due to calibration error (discussed in quality control section below).

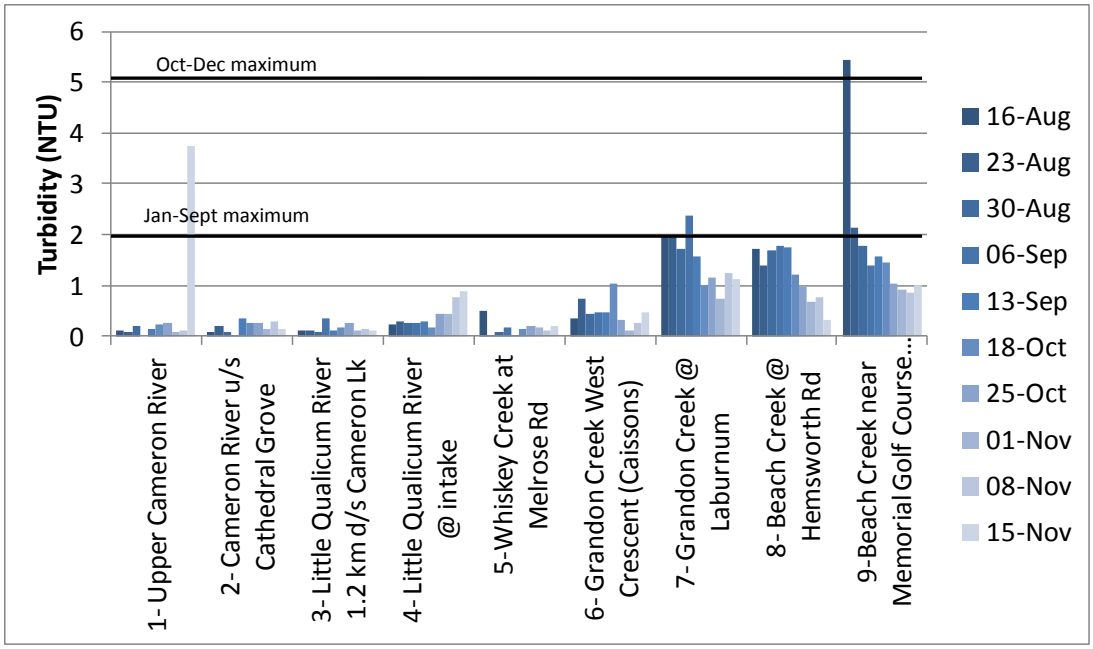
Figure 3 – Specific conductivity collected by Qualicum Beach Streamkeepers and Parksville Fish and Game.



The January through September summer low flow maximum turbidity objective was at times exceeded in both Grandon Creek and Beach Creeks (Figure 4); as further data are collected trends may become apparent. The August 16th high value in Beach Creek was likely due to dredging occurring in an

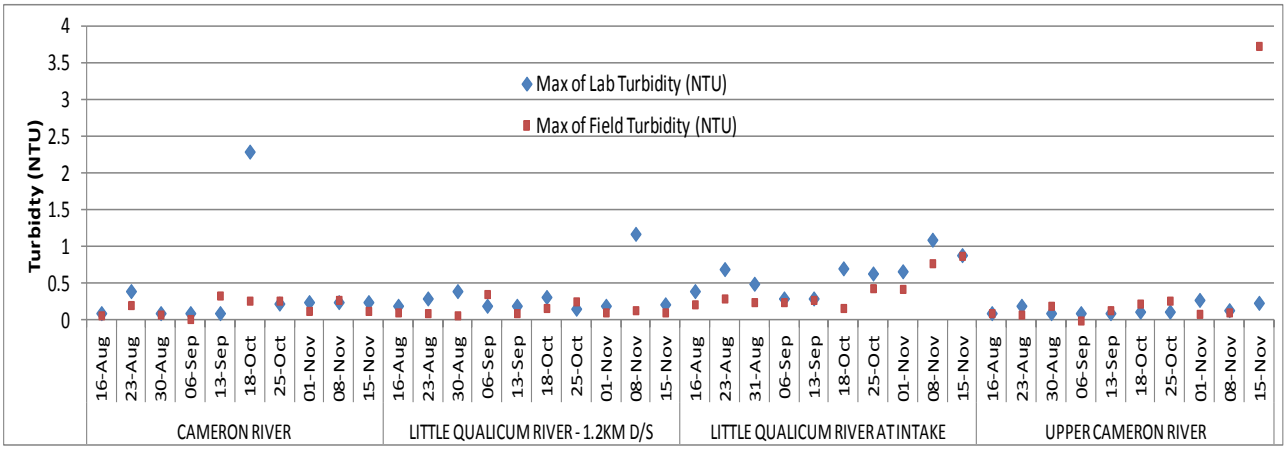
adjacent pond (as noted in field notes), while the November 15th high value in the Upper Cameron river may have been due to noted high water and groundwater trickle coming from the river bank or possibly sampling procedure (discussed below). Slightly increased levels at Little Qualicum River at Intake in November were likely associated with the presence of spawning salmon and fisherman (as noted in field notes).

Figure 4 – Turbidity collected by Qualicum Beach Streamkeepers and Parksville Fish and Game.



The Cameron and Little Qualicum River sites were also sampled as part of a larger project in which water samples were collected in bottles and sent to a lab for analysis. Four samples exceeded the MOE quality assurance/quality control criteria (<25% difference between duplicate samples) for turbidity (Figure 5). All of these differences were likely due to sampling procedure. In the three cases where lab values were higher than field values, filling the bottle may have stirred up sediment or; the one higher field value was likely due to dust in turbidometer or vial cleanliness.

Figure 5 – Comparison of lab and field turbidity measurements in the Little Qualicum and Cameron Rivers.



As well, at the Little Qualicum River at Intake site, a sonde was installed that monitors temperature, conductivity and turbidity every 15 minutes. Increased sonde turbidity readings in November 2011, when the grab and meter readings both remained low, indicate the sonde may have been experiencing some calibration drift or fouling of the instrument (Figure 6). Meter readings for specific conductivity were within acceptable quality control criteria on all but the last four fall sample dates (Figure 7) when they were much higher than the sonde readings. This was likely due to calibration error in the meter. Temperature readings were very consistent with those observed in the sonde (Figure 8).

Figure 6 – Comparison of lab, field and continuous monitoring sonde turbidity measurements at the Little Qualicum River at Intake Site.

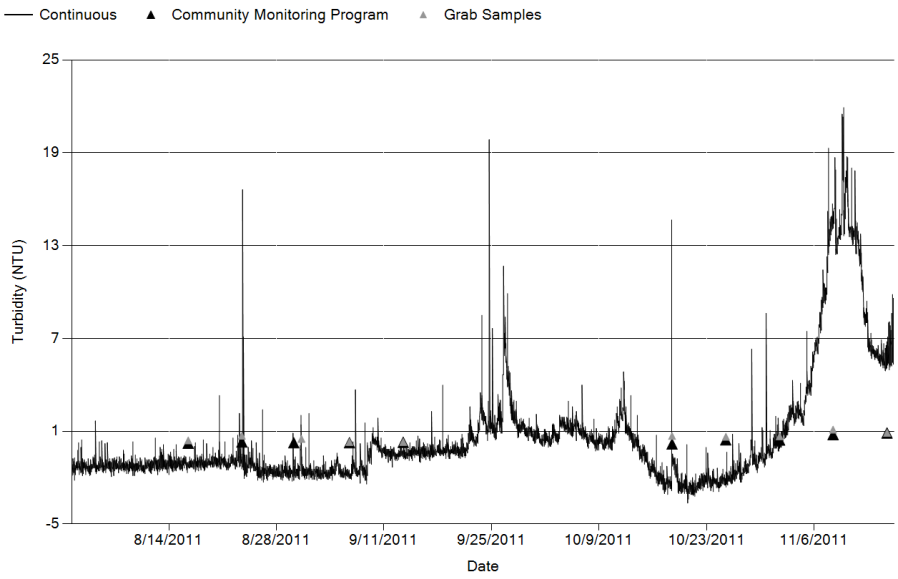


Figure 7 – Comparison of field and continuous monitoring sonde specific conductivity measurements at the Little Qualicum River at Intake Site.

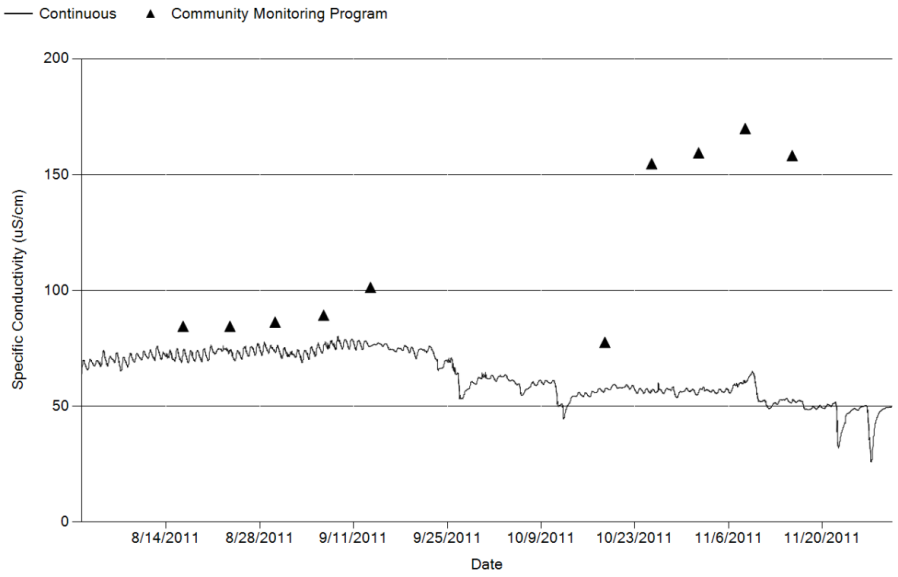
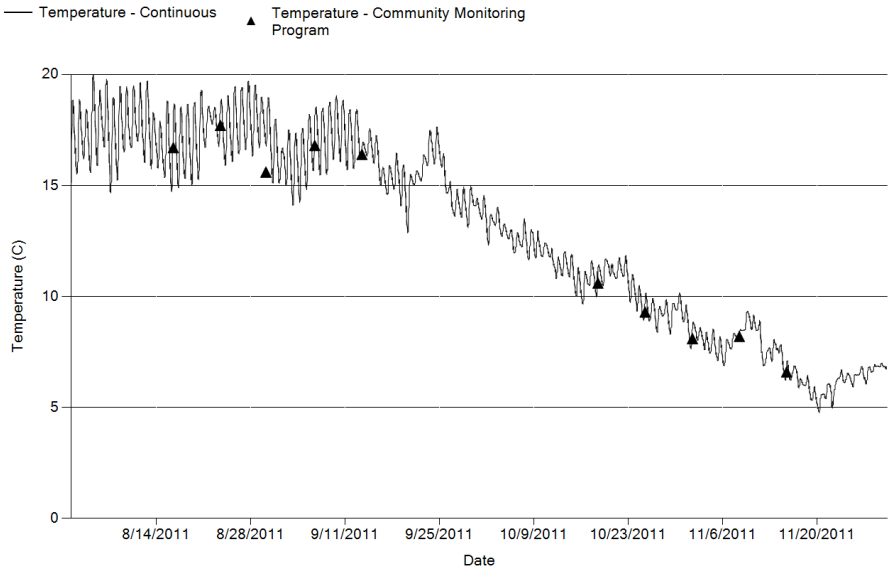


Figure 8 – Comparison of field and continuous monitoring sonde temperature measurements at the Little Qualicum River at Intake Site.



Nile Creek Enhancement Society

There was one exceedence of the aesthetic drinking water temperature guideline (maximum 15°C) at one site in Thames Creek (Figure 9). Other parameters collected showed nothing of concern (Figures 10-12).

Figure 9 – Temperature collected by the Nile Creek Enhancement Society.

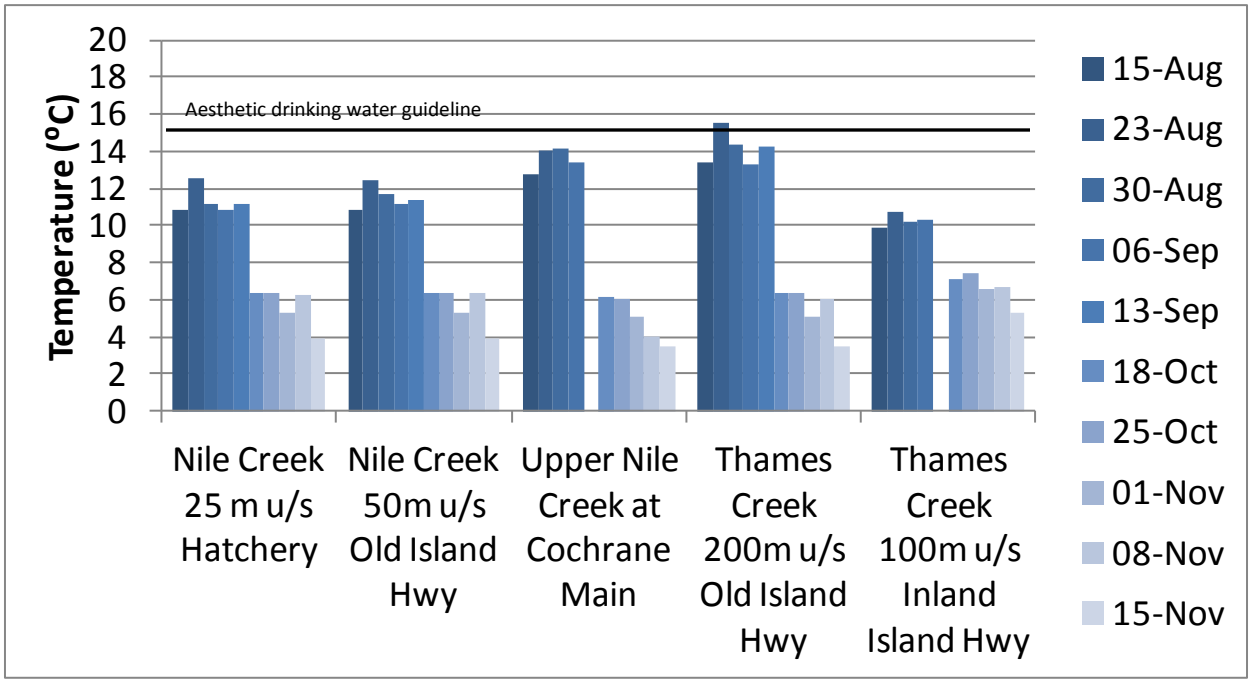


Figure 10 – Dissolved oxygen collected by the Nile Creek Enhancement Society.

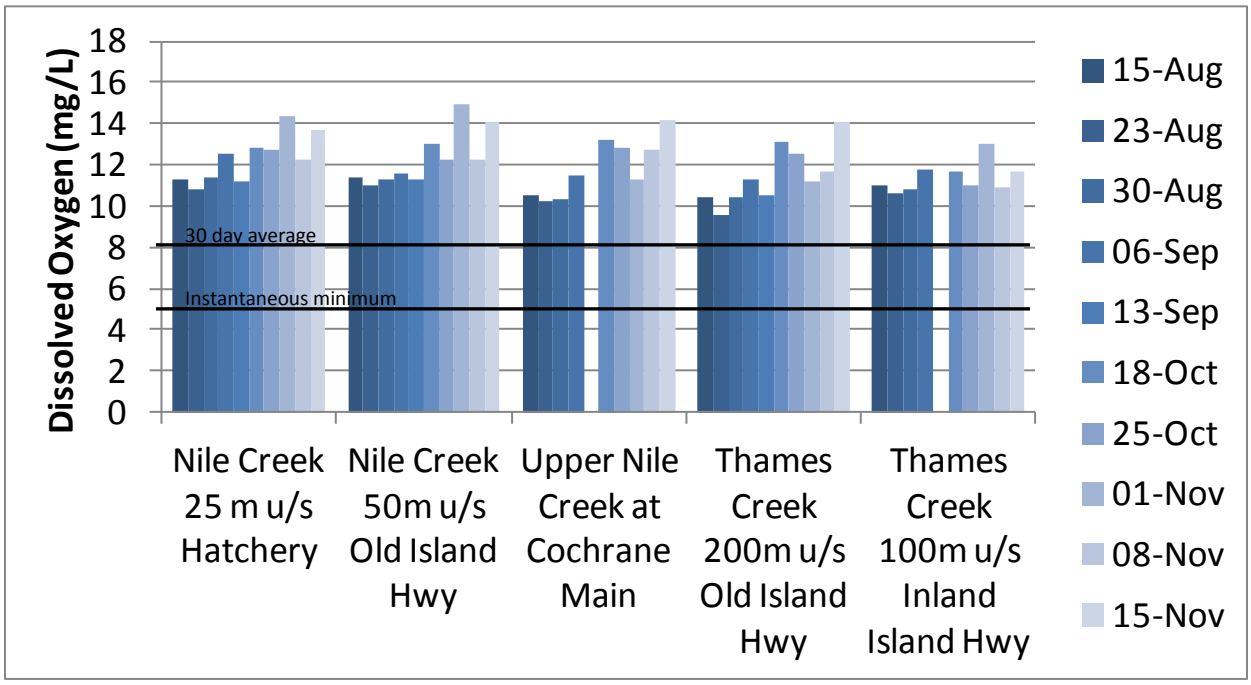


Figure 11 – Specific conductivity collected by the Nile Creek Enhancement Society.

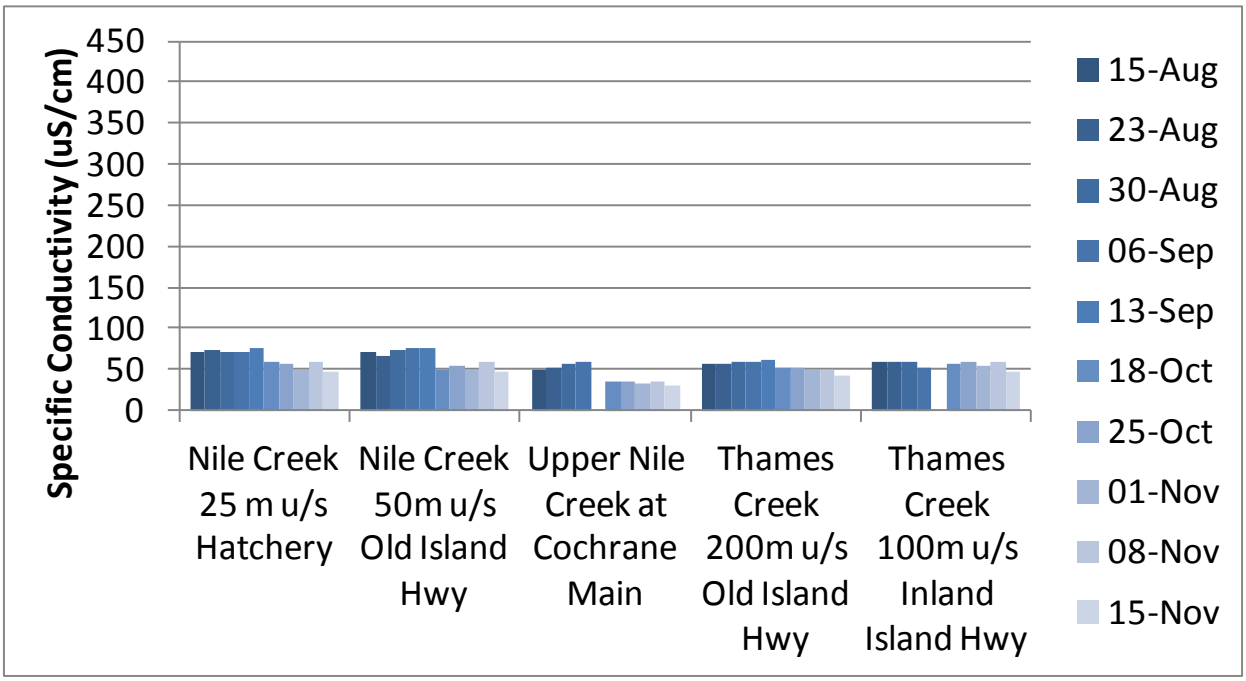
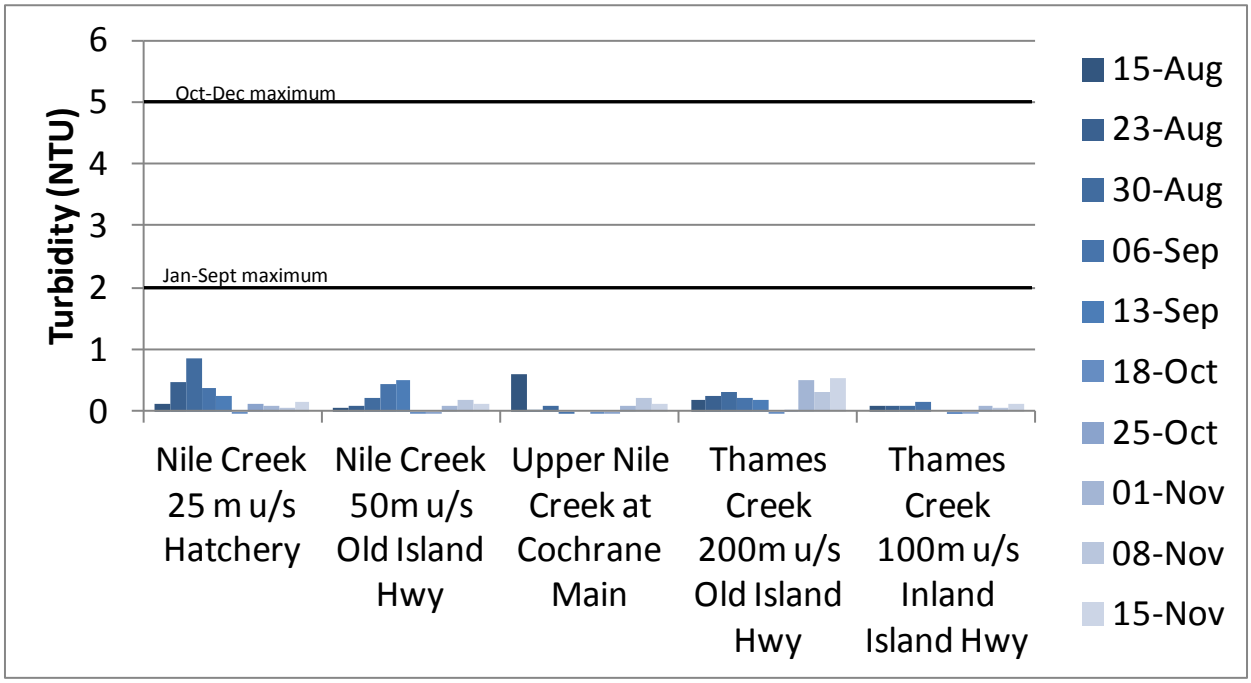


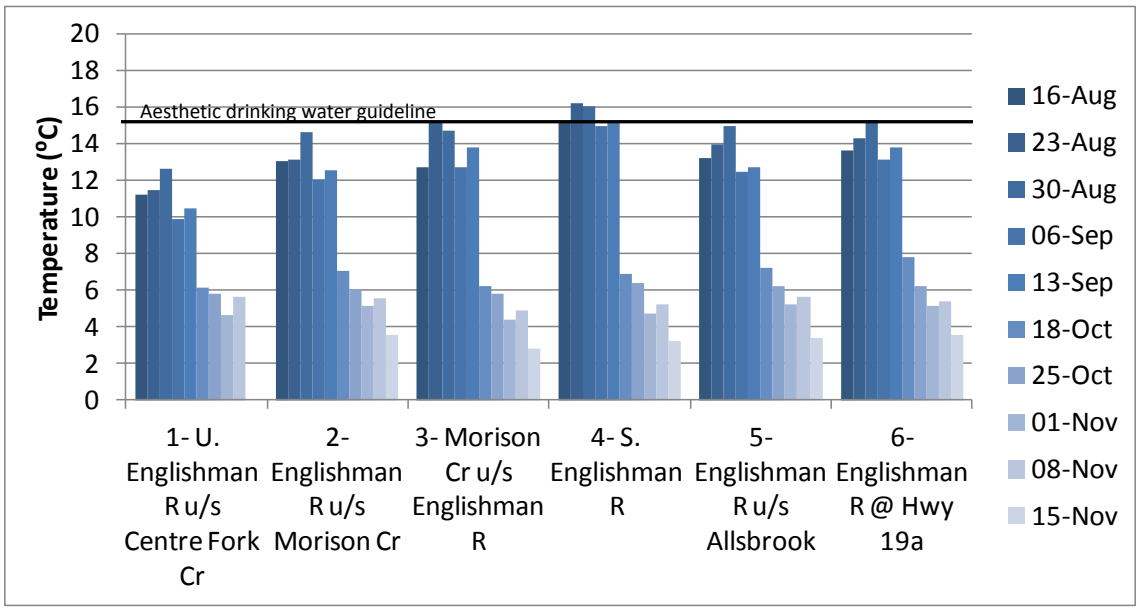
Figure 12 – Turbidity collected by the Nile Creek Enhancement Society.



Mid Vancouver Island Habitat Enhancement Society

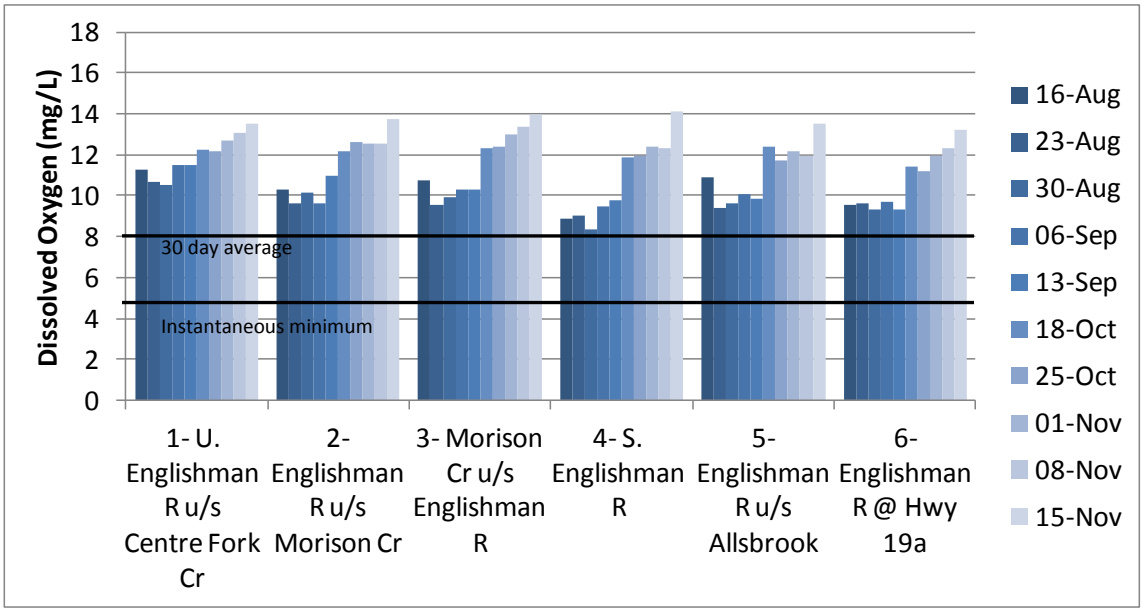
There were exceedences of the aesthetic drinking water temperature guideline (maximum 15°C) occasionally in the summer at South Englishman River, Highway 19A and Morrison Creek sites (Figure 13). This is typical of many east coast Vancouver Island streams where the lower portions are wide and shallow.

Figure 13 – Temperature collected by the Mid Vancouver Island Habitat Enhancement Society.



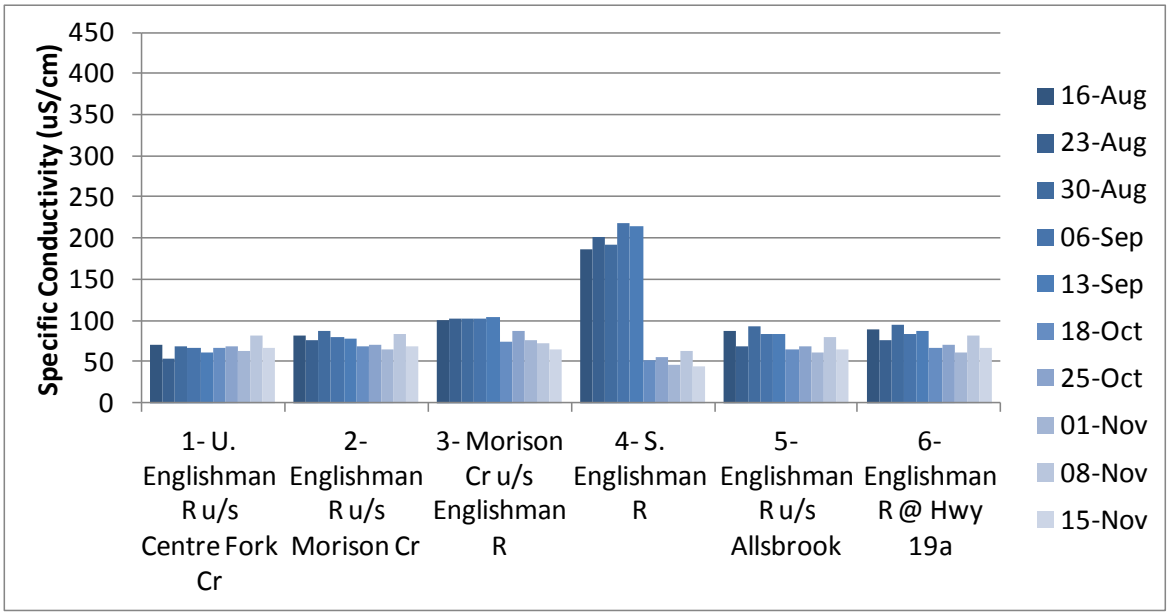
Dissolved oxygen showed nothing of concern (Figure 15).

Figure 15– Dissolved oxygen collected by the Mid Vancouver Island Habitat Enhancement Society.



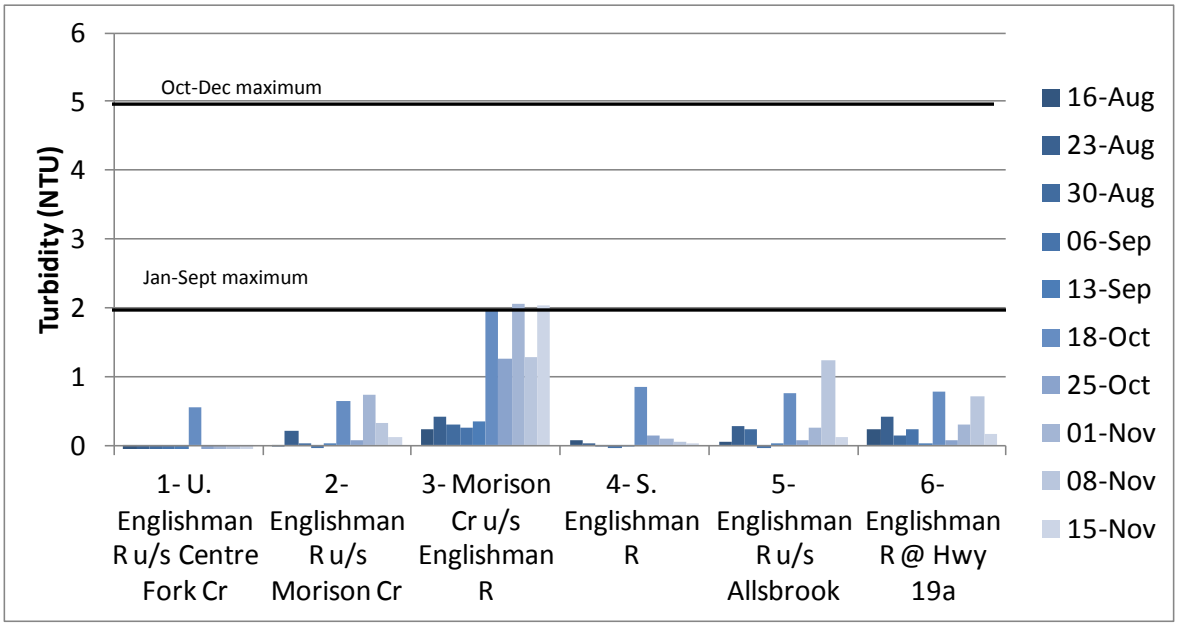
At the South Englishman River site, conductivity was higher than levels typical of coastal streams (Figure 16). These values are not associated with increased turbidity and are most likely influenced by higher groundwater inputs.

Figure 16– Specific conductivity collected by the Mid Vancouver Island Habitat Enhancement Society.



Though they only exceed the objective on one sample date, higher turbidity levels at Morison Creek should be noted as they are above background levels (Figure 17). As further data are collected trends may become apparent.

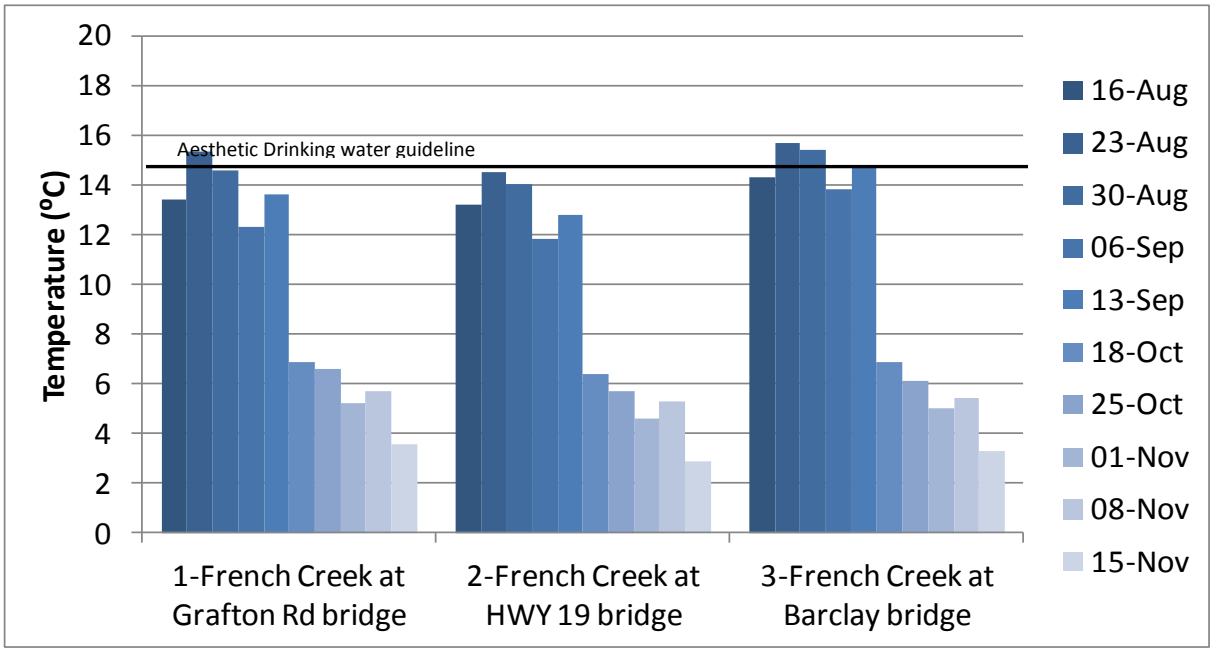
Figure 17– Turbidity collected by the Mid Vancouver Island Habitat Enhancement Society.



Friends of French Creek

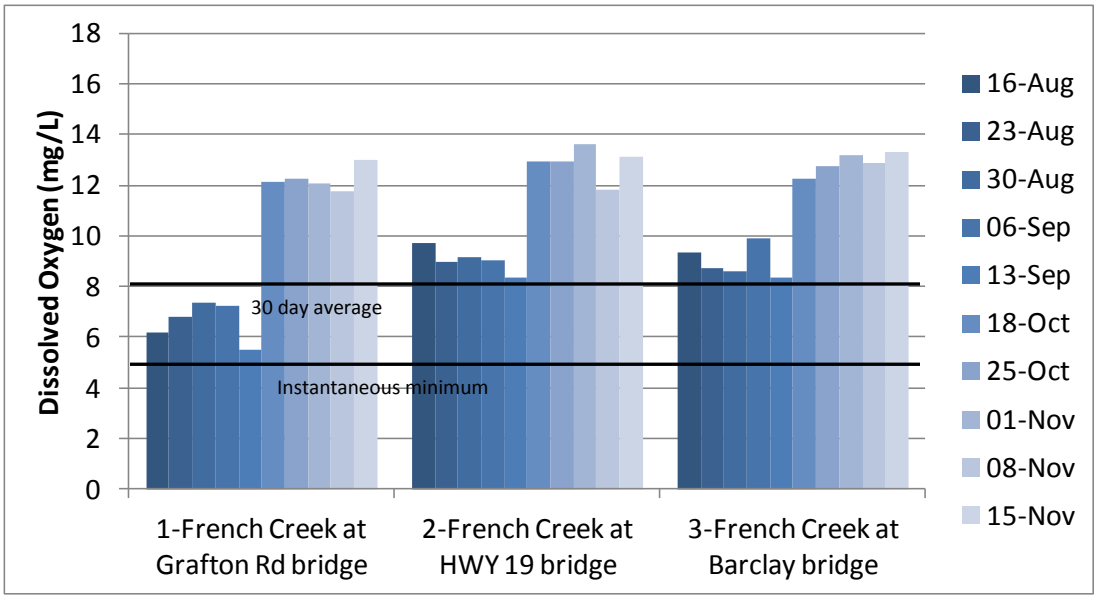
There were occasional summer exceedences of the aesthetic drinking water temperature guideline (maximum 15°C) at both the Grafton Rd and Barclay Bridge sites (Figure 18).

Figure 18– Temperature collected by the Friends of French Creek.



Dissolved oxygen (DO) at the Grafton Road site was below the recommended 30 day average (average note shown) (Figure 19). Low DO values are associated with very low flow or still water at this site.

Figure 19– Dissolved oxygen collected by the Friends of French Creek.



At the Highway 19 and Barclay Bridge sites, conductivity was higher than levels typical of coastal streams in the summer (Figure 20). These values do not appear to be associated with increased turbidity (Figure 21) and are most likely influenced by higher groundwater inputs.

Figure 20– Specific conductivity collected by the Friends of French Creek.

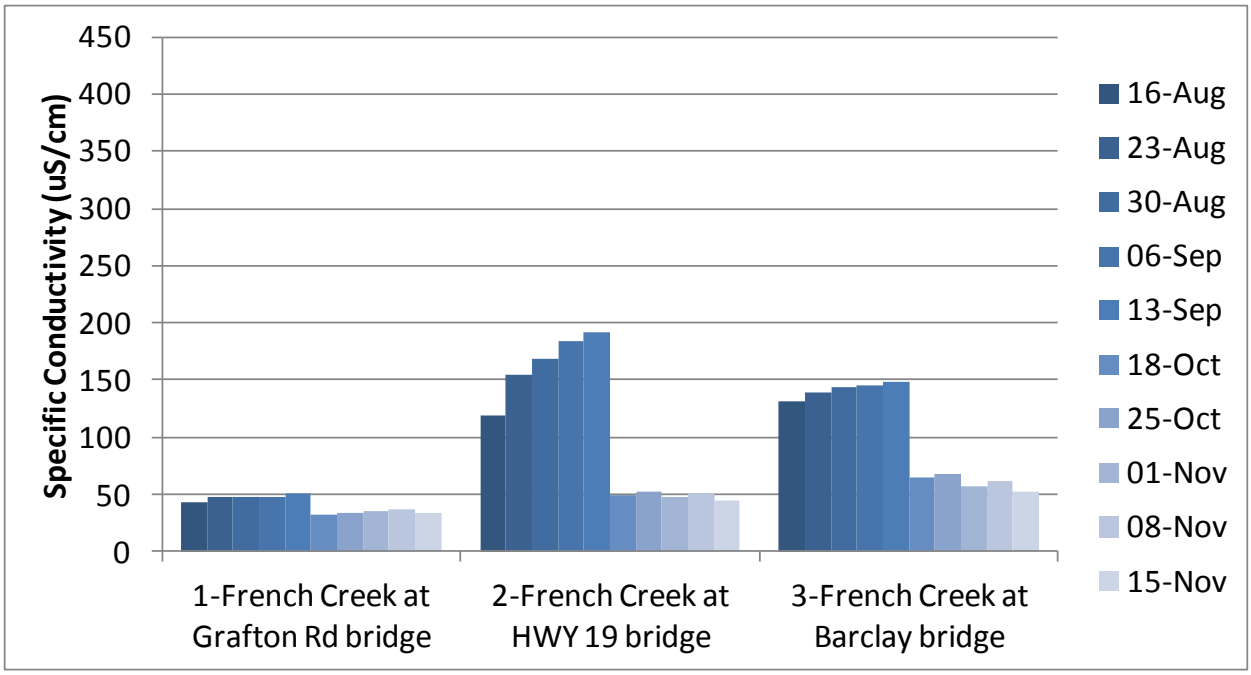
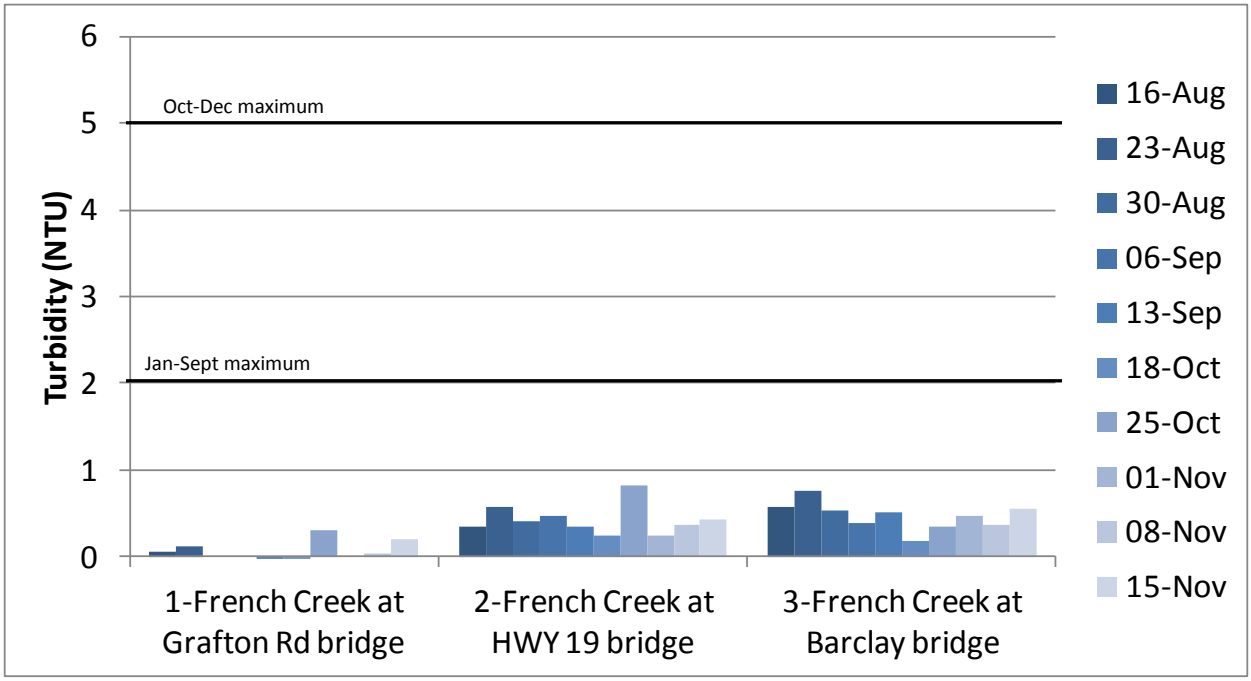


Figure 21– Turbidity collected by the Friends of French Creek.



Nanaimo Area Land Trust

Note that for this watershed only one summer low flow date was sampled. On the one summer sampling date, temperature was higher than the aesthetic drinking water temperature guideline (maximum 15°C) at both sites, and exceeded the guideline for coho rearing (17°C) at the Nanaimo River site (Figure 22). This is typical of many east coast Vancouver Island streams where the lower portions are wide and shallow; as long as refuges remain with lower temperatures, juvenile fish should be able to retreat to these during periods of elevated temperatures. All other parameters collected showed nothing of concern (Figure 23-25).

Figure 22– Temperature collected by the Nanaimo Area Land Trust.

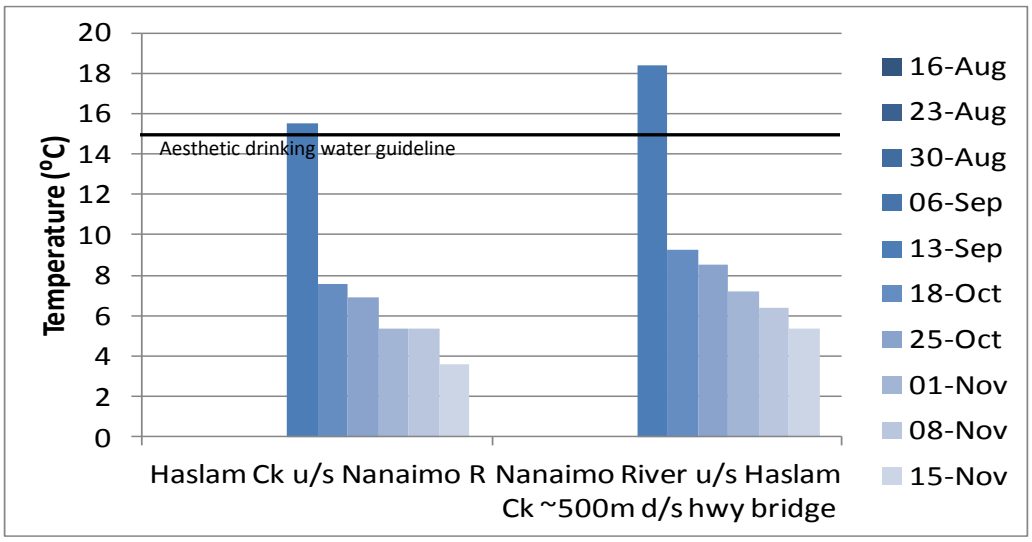


Figure 23– Dissolved oxygen collected by the Nanaimo Area Land Trust.

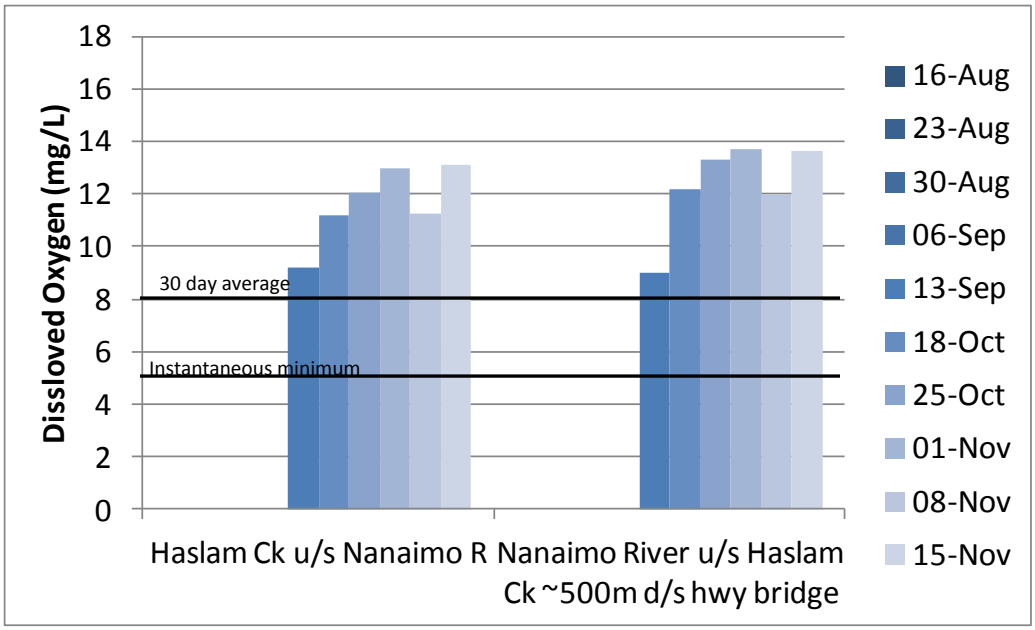


Figure 24– Specific conductivity collected by the Nanaimo Area Land Trust.

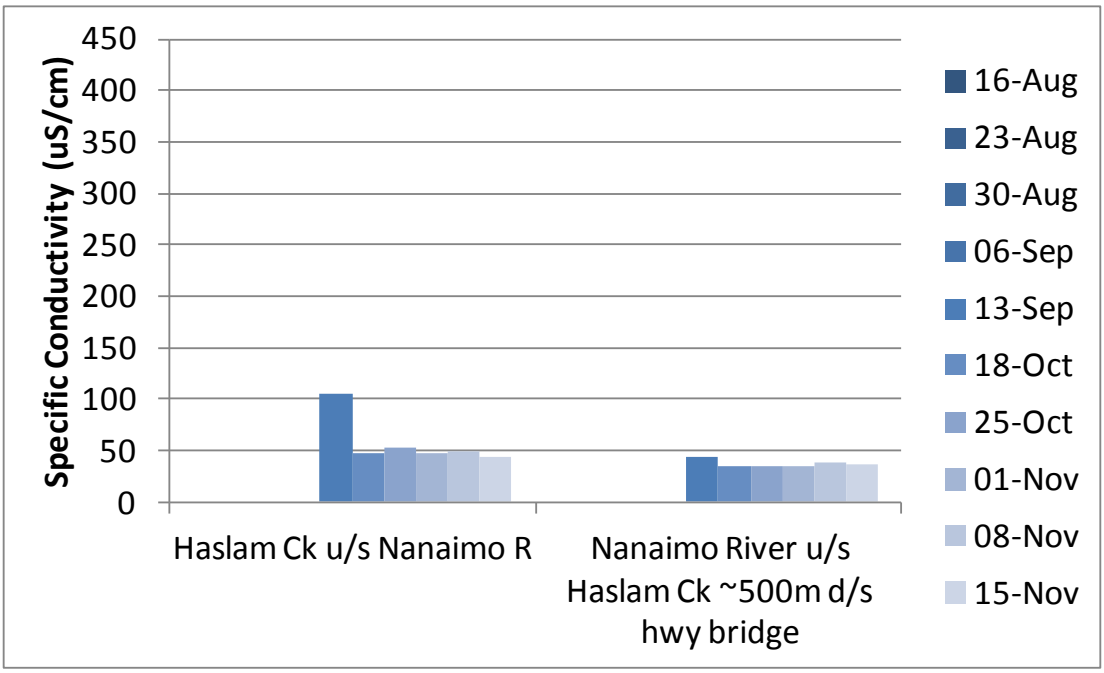
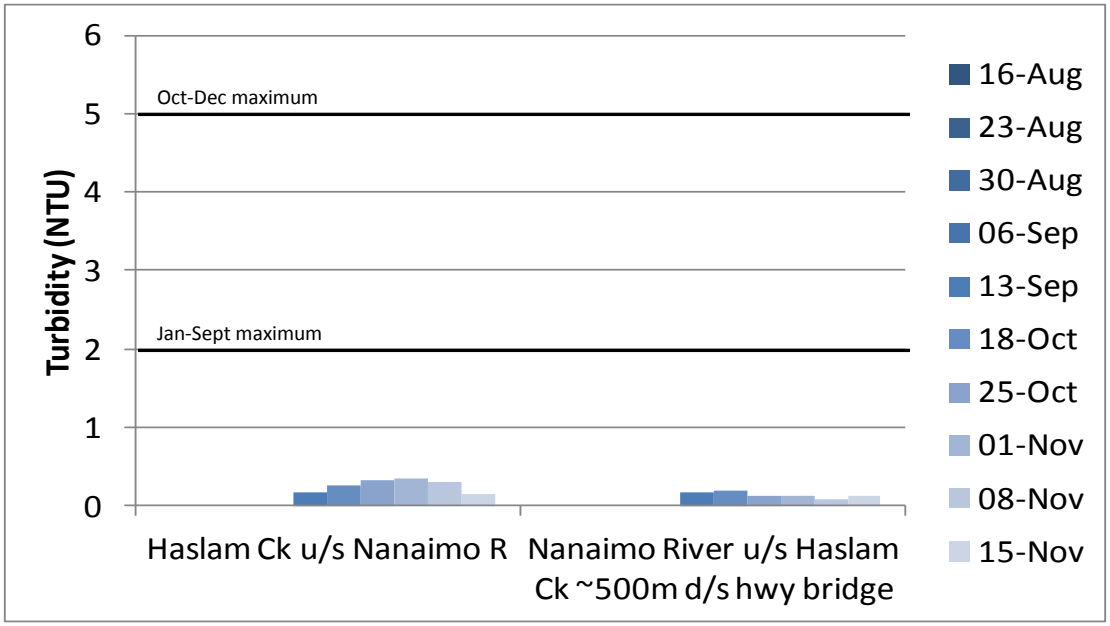


Figure 25– Turbidity collected by the Nanaimo Area Land Trust.



Recommendations

The following recommendations are made for future monitoring years:

- Sampling should continue at all sites.
- Re-training of calibration and sampling procedures should occur at least once each year of the program.
- Quality control samples (e.g. duplicates sent for lab analysis and duplicate meter readings) should occur in each watershed.
- Duplicates sent for lab analysis should include specific conductivity analysis.

References

Barlak, R., Epps, D. and Phippen, B. 2010. Water quality assessment and objectives for the Englishman River Community Watershed: technical report. British Columbia Ministry of Environment. Victoria, B.C. Available online at: http://www.env.gov.bc.ca/wat/wq/wq_objectives.html

BC MOE (British Columbia Ministry of Environment). 1997. Ambient water quality criteria for dissolved oxygen. Available online at: http://www.env.gov.bc.ca/wat/wq/BCguidelines/do/index.html

BC MOE (British Columbia Ministry of Environment). 2003. British Columbia field sampling manual for continuous monitoring and the collection of air, air-emission, water, wastewater, soil, sediment, and biological samples. Available online at: http://www.env.gov.bc.ca/epd/wamr/labsys/field_man_03.html.