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Jordan Creek Water Quality Report, 2003-2013

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Executive Summary

Jordan Creek, located on the eastern side of Juneau's Mendenhall Valley basin, was listed on the State of Alaska Section 303(d) list of impaired waters in 1998 due to sediment, low dissolved oxygen, and debris. The Juneau Watershed Partnership (JWP) began monitoring water quality on Jordan Creek in 2003 with the goal of maintaining and continuing a long-term data record and assessing stream water quality gains as storm water treatment, culvert replacement, riparian restoration and other stream enhancement projects are completed.

In 2013, no monitoring results were out of range for state limits on temperature, conductivity, turbidity, TSS, dissolved oxygen (DO) or pH. Residues (in-stream trash) remain ever-present in both residential and urban reaches. Discharge was recorded at the real-time stage gauge located downstream of the Super 8 Motel (JC-B) sample site concurrently with sample collection. The 2013 dataset values did not deviate from long-term monitoring results. 2013 monitoring was guided to identify areas of Jordan Creek with highest potential for water quality and habitat improvement.

The 2013 monitoring period marks the tenth and final year of water quality monitoring on Jordan Creek. Coupled with this long-term dataset, future JWP USFWS-funded stormwater outfall mapping will identify locations where improved stormwater treatment could significantly contribute to improved water quality and overall stream health.

Project Description and Purpose

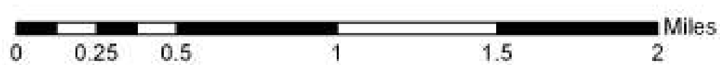
In 2013, the Juneau Watershed Partnership (JWP) continued monitoring Jordan Creek water quality throughout the spring and summer seasons, bringing the period of record to ten years total. The JWP long-term monitoring program aims to characterize water quality of Jordan Creek, compare water quality to Alaska state standards, and evaluate the effects of urbanization, restoration, and conservation projects on in-stream sediment concentrations. Urbanization and development continue to impact the stream corridor of Jordan Creek, and low-flow periods (including periods of no-flow), increased sediment loads, and declines in fish presence persist. A suite of water quality parameters were monitored bi-monthly at three representative sites on Jordan Creek between June 2013 and August 2013 to document water quality and habitat conditions (detailed discussion below).

The specific goals of this project were:

- To document existing water quality conditions in Jordan Creek and compare current conditions to historic data.
- To locate general areas of interest where Jordan Creek water quality is most impacted by stormwater runoff.

Jordan Creek Watershed: Sampling Locations and EVR Tributary Rehabilitation Site

Map created by the Juneau Watershed Partnership, August 2013, for visual purposes only.



Project Design and Methods

Adhering to protocols set in the ADEC-approved quality-assurance project plan (QAPP) for Jordan Creek, the following parameters of concern were monitored at three representative sample sites between June 2013 and August 2013: water temperature, specific conductance, pH, turbidity, dissolved oxygen (DO) and total suspended solids (TSS). All parameters, with the exception of TSS and turbidity, were monitored in-situ using a HACH HQ40d Rugged IntelliCAL multi-parameter meter. Sampling events included one 500 mL grab sample collected from each site, which was then transported to the UAS Bentwood Laboratory for suspended sediment concentration and turbidity analysis in-house. Turbidity was measured using a portable HACH 2100 turbidimeter.

Jordan Creek Sampling Sites: 2003-2013

Site Name	Site Description	Lattitude	Longitude
JC-A	Jordan Ck at Amalga St	58.38726067004	-134.56351114001
JC-B	Jordan Ck at Egan Drive	58.36616032005	-134.57784830000
JC-C	Jordan Ck at Yandukin Dr.	58.35917610005	-134.57835674000

Data and Results

1) Water Quantity: Discharge

Staff gage readings were simultaneously read from the staff gage at Trout Street for all sampling events.

Historic USGS discharge data from decommissioned gage #15052475 demonstrate that Jordan Creek mean monthly discharge at Egan Drive varies from less than 1 cfs (August) to over 23 cfs (October). High flows are associated with spring snowmelt (April and May) and fall storms (September-October). Low flows occur during winter months (November-March) and in mid-summer (June-August).

During the 2013 period of record, no areas of Jordan Creek were dry or stagnant with low flow during sample collection, including sites between Trout Street (just below JC-B) and Yandukin Drive (JC-C). Areas upstream of Egan Drive also had flowing water during all sampling events.

2) Water Quality

a. **Dissolved Oxygen.** Dissolved oxygen (D.O.) is a measure of oxygen content in water, expressed in units of milligrams per liter (mg/L). Introduced by aquatic plants and moving water, D.O. is essential to aquatic organism health. D.O. levels fluctuate throughout the day and with water temperature. Dissolved oxygen is consumed by microorganisms in the breakdown of organic wastes; low D.O. levels may indicate upstream inputs from wastewater, stormwater runoff, or failing septic systems.

No sampling events in 2013 yielded D.O. levels lower than 7.0 mg/L, which is the state water quality standard for dissolved oxygen concentrations in anadromous fish habitat. Amalga Dr. dissolved oxygen levels were slightly lower than the results from the other two sampling sites. This can be attributed to the fact that flows at the Amalga Dr. site are primarily groundwater-fed, close to headwaters, and are thus likely to be lower in D.O. than downstream waters. The highest D.O value was recorded in the beginning of June, during colder-water discharge and before the prolonged period of warm weather Juneau experience this summer occurred.

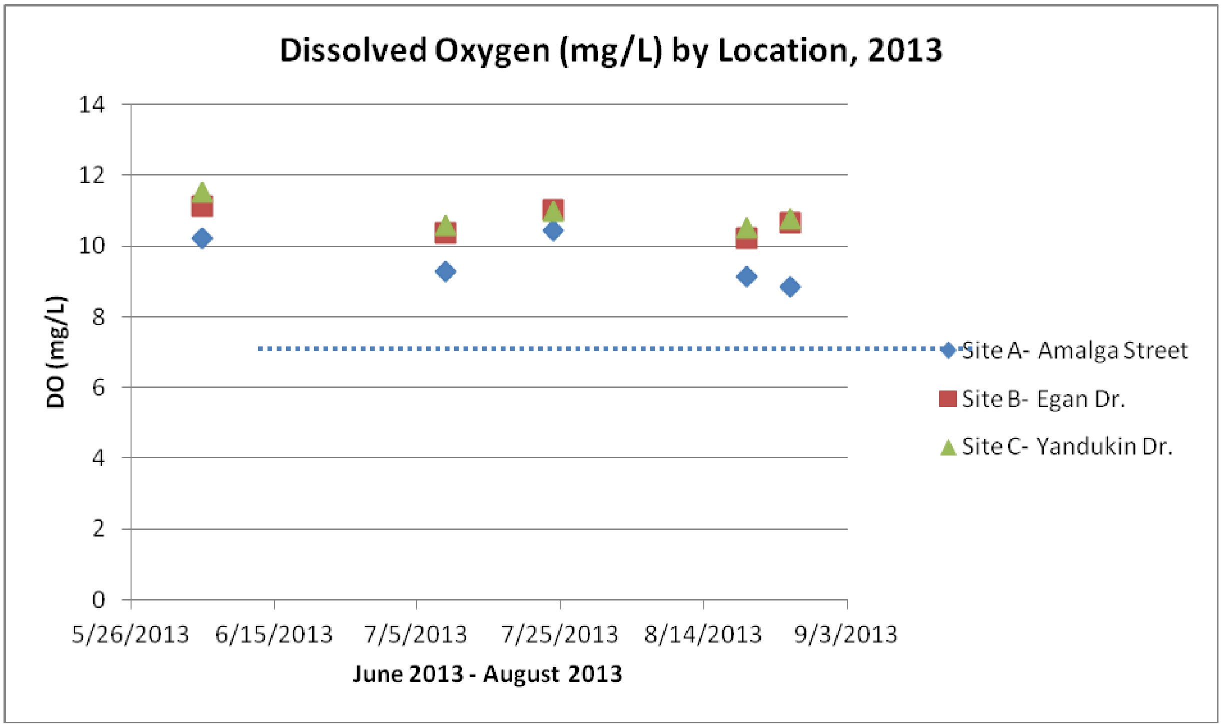


Figure 1: Dissolved Oxygen (DO) values from Jordan Creek water quality monitoring by location for the period of record in 2013. Alaska Water Quality Standards call for > 7 mg/L for anadromous fish; <17 mg/L for aquatic life (the dotted lines correlate to DO concentrations required for a healthy anadromous fish population).

b. Conductivity. Conductivity is a measure of the ionic content of a solution and is indicative of total dissolved inorganic solids in a water sample. This type of measurement is not ion-specific. Conductivity is monitored for background purposes; an unusually high measurement may indicate a failing septic system upstream, while an unusually low measurement may indicate an oil spill upstream. Water temperature is positively correlated to conductivity, i.e. higher water temperature results in higher conductivity.

The state has not outlined specific water quality objectives for conductivity. The apparent outlier, Yandukin Drive on August 26, 2013 cannot be tied expressly to stormwater runoff, as this site can be tidally influenced. In general, Amalga St.

conductivity was consistent throughout the sampling period, due to groundwater-fed streamflow and a lack of stormwater runoff at that location. Yandukin and Egan Drive samples were typically similar in conductivity and were more closely linked to discharge than values found at Amalga St.

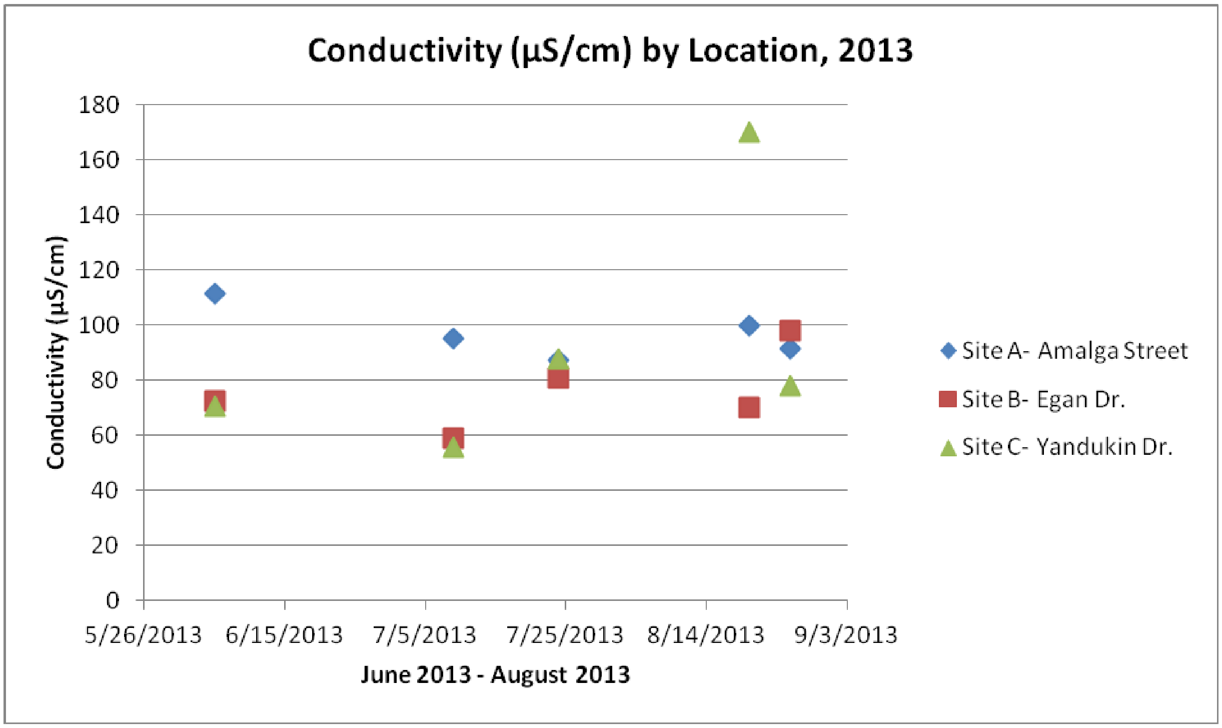


Figure 2: Conductivity values from Jordan Creek water quality monitoring by location for the period of record in 2013.

c. **pH.** pH indicates the alkalinity or acidity of a water sample, usually in the range of 6.5 to 8.5 (essentially unit less). Acidity increases as the pH gets lower and values above 8.5 indicate the sample is increasing toward a basic condition. Low pH values (less than 6.5) may be indicative of sub-optimal fish habitat and/or conditions where toxic substances become available to fish and plants and harm aquatic species diversity. The Alaska water quality standard (WQS) calls for pH values that range from 6.5 to 8.5 to support healthy and diverse aquatic life.

For the 2013 period of record, all samples fell between the acceptable WQS range set by the State of Alaska , and all samples were below the maximum allowable pH threshold. The Amalga St. samples exhibited consistently lower pH values due to groundwater-origin and low flow.

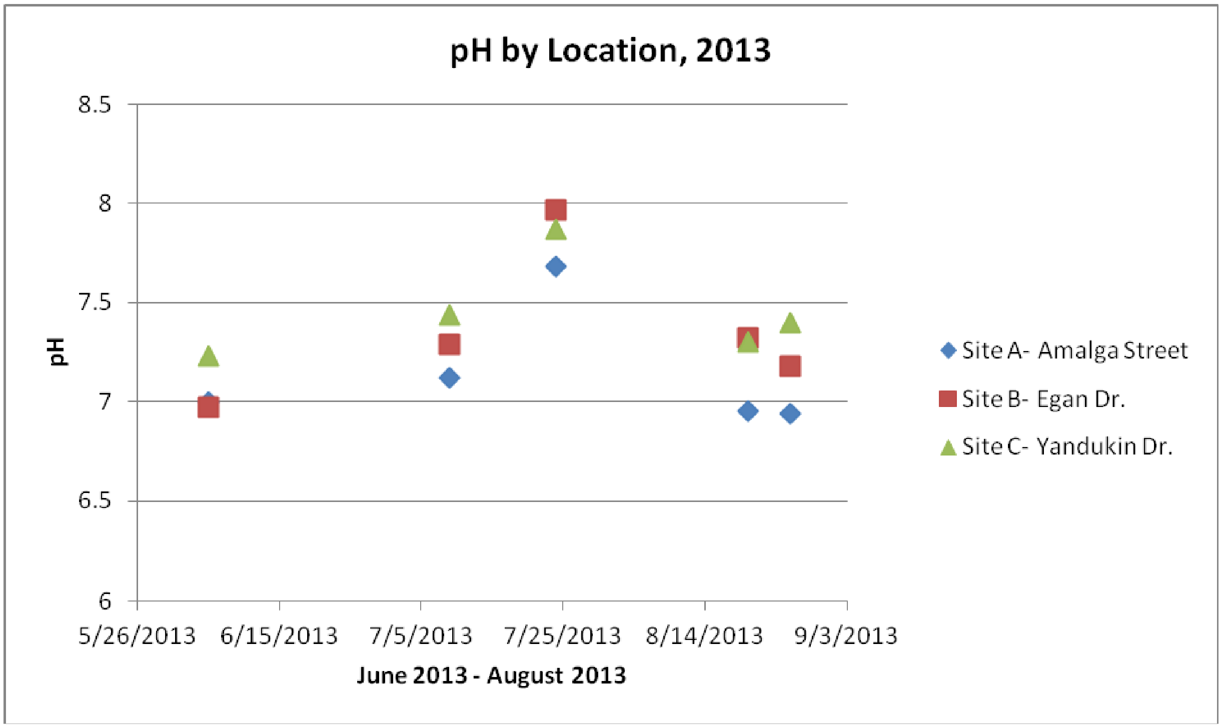


Figure 3: pH values from Jordan Creek water quality monitoring by location for the period of record in 2013. Note the dashed lines indicate the Alaska Water Quality Standard for pH values to support aquatic life, with a minimum of pH 6.5 and a maximum of pH 8.5.

d. **Turbidity.** Turbidity measurements (measured in NTU's, or nephelometric turbidity units) are indicative of the fraction of fines, both organic and inorganic, suspended in the water column and may closely parallel suspended solids data, depending on the size distribution of suspended sediments. In-stream turbidity is usually 1-10 NTU's with some values in the 100's if measured during a runoff event in an urban watershed. High in-stream turbidity may contribute to high water temperature, low dissolved oxygen values and lower photosynthesis rates in plants. Increased fines suspended in the water column may also camouflage prey or egg burial and decrease interstitial dissolved oxygen levels, all of which may result in low aquatic species diversity. High turbidity, common in developed watersheds where impermeable surfaces quickly transport rainfall and runoff to streams, may be indicative of erosion, construction, or poor storm water management upstream.

State of Alaska water quality standards are set based on water use criteria. Turbidity standards for fish and wildlife protection (designated use) indicate that turbidity may not exceed 25 nephelometric turbidity units (NTUs) above natural background conditions. The state water quality criteria for designated uses sets maximum allowable levels of turbidity above "natural background" conditions. For the purposes of this study, Amalga St. monitoring data were used for "background level" data. Two samples from Sites B and C exceeded the more strict allowable maximum of 5 NTU above background levels for contact recreation, which can be associated with stormwater runoff due to rainfall greater than 0.5 inches in a 24-hour period. The trend appears to demonstrate decreasing turbidity levels over time, despite greater rainfall accumumlations in late summer.

In-stream peak turbidity is closely linked to initiation of runoff after rainfall begins, and the timing of periodic sampling is rarely adequate to characterize high turbidity levels in Jordan Creek. The 2013 monitoring results indicate that turbidity was higher downstream of our "background" site during rainfall events, probably due to increased flows re-suspending sediment and fines, and the introduction of sediment and fines via stormwater flows. To better characterize turbidity and sediment loading relative to precipitation and runoff in Jordan Creek watershed, future studies should focus on continuous turbidity and sediment sampling from initiation of rainfall until rainfall ceases for a limited number of events, coupled with discharge data.

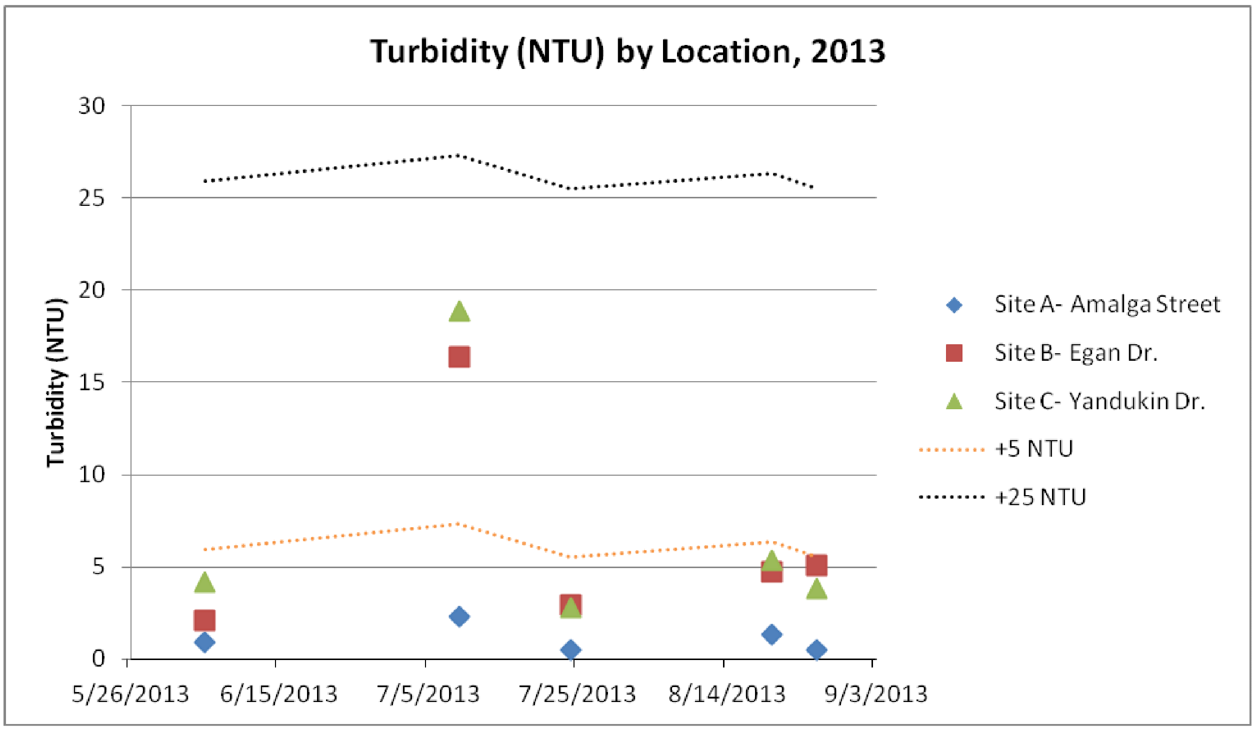


Figure 4: Turbidity values from Jordan Creek water quality monitoring by location for the period of record in 2013. Note the dashed lines indicate the maximum allowable turbidity relative to "background levels" (Amalga St.) in accordance with two (2) designated uses. The lower dashed line (orange) is representative of the maximum allowable turbidity of 5 NTU above background levels for contact recreation. The upper dashed line (black) represents the maximum allowable turbidity of 25 NTU above background levels for the growth and propagation of aquatic life.

e. Total Suspended Solids (TSS). Total Suspended Solids (TSS) concentration (measured in mg/L) refers to solids that are not dissolved in solution and can be removed by filtration

(2 microns and greater diameter). Suspended solids include organic and inorganic particles and can adversely impact water clarity, conductivity, temperature and turbidity. High TSS values in stream water may raise water temperature, harming aquatic life suited to lower temperatures, as well as impact cellular water balance within small aquatic organisms, affecting their hydration and buoyancy.

Values for TSS samples collected for Jordan Creek in 2013 ranged from Non-Detect (below the detection limit of 4 mg/L) to 11 mg/L. The samples showed no significant increase in the amount of solids being transported from the background site (Site A-Amalga Street) and the two site locations downstream from the East Valley Reservoir Tributary Rehabilitation Site. When the TSS values did increase above background levels the increase in solids was relatively low (11 mg/L and 10 mg/L) and positively correlated to samples collected during wetter conditions with a higher amount of cumulative precipitation over a 24-hour period.

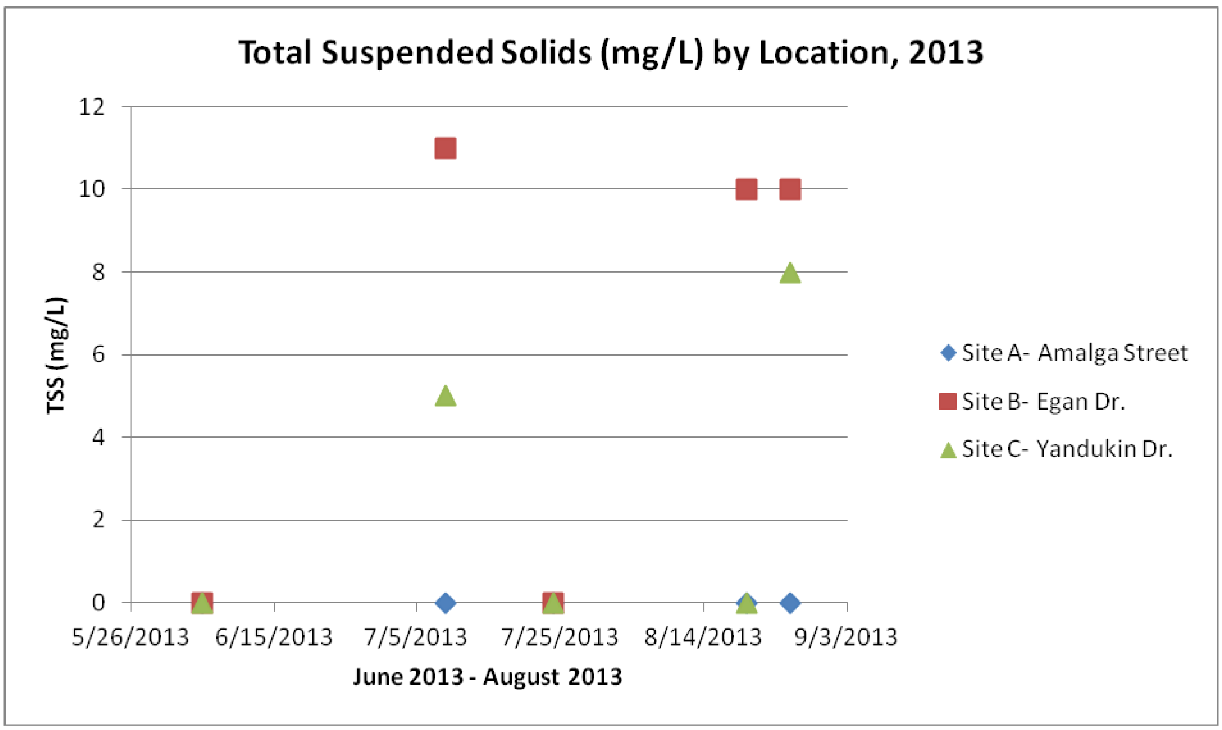


Figure 5: Total Suspended Solids values from Jordan Creek water quality monitoring by location for the period of record in 2013.

f. Water Temperature. Temperature (measured in degrees Celcius) determines the oxygen content of water (as temperature increases, oxygen content dwindles). Optimum habitat for aquatic species is dependent on water temperature which naturally fluctuates throughout a surface water body depending on stream or lake width, depth, and discharge. In riparian areas, vegetation and plant cover lowers stream temperatures, as will groundwater and seep water in areas of emergence. Higher water temperatures impact photosynthesis, metabolic rates of organisms (good and bad organisms), and the mobility or uptake potential of toxic substances in water. Long-term changes in water temperature may determine the ability of non-native species to invade local water bodies.

Nearly all samples collected in 2013 were below the state maximum allowable temperature of 13˚C for the designated use of growth and propagation of fish, shellfish, and other aquatic life and wildlife (the most stringent spawning, rearing, and egg incubation specification). Two samples results, one at Site B and one at Site C reported temperatures just above the 13˚C requirement but still below the 15˚C requirement for migration routes and rearing habitat.

June sampling temperatures were relatively low downstream of Amalga St. due to colder rain-on-snow stormwater runoff entering Jordan Creek. Temperatures were consistently lower at Amalga Street for the remainder of monitoring, probably due in part to that location's close proximity to creek headwaters and groundwater sources. Stormwater runoff elevates stream temperatures during periods of heavy rainfall.

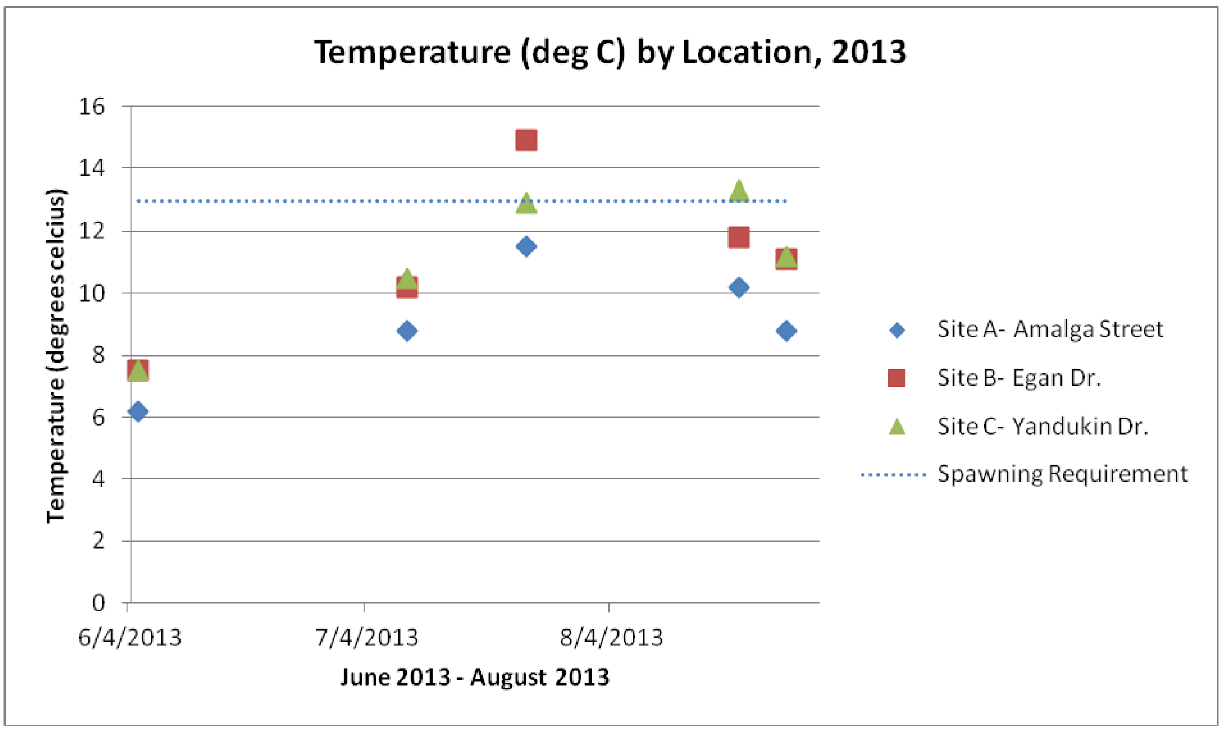


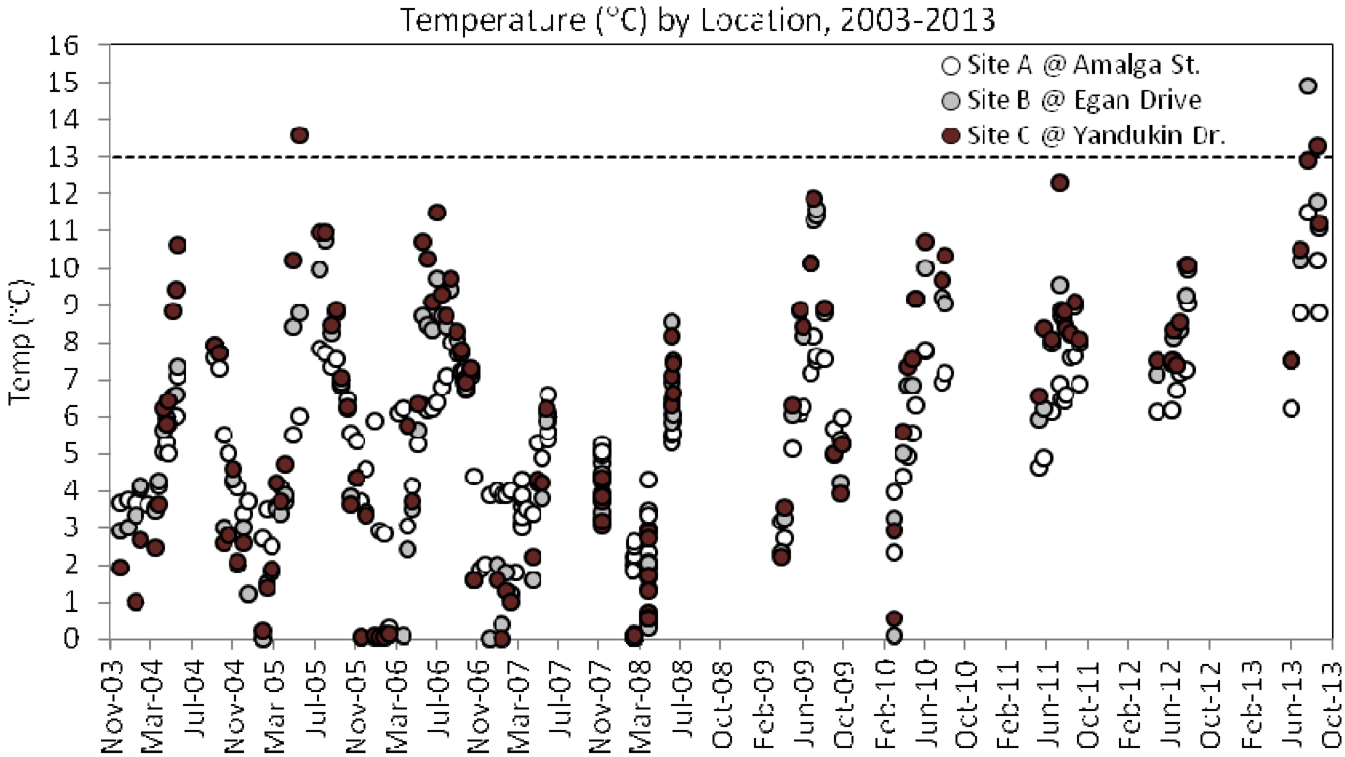
Figure 6: Temperature values from Jordan Creek water quality monitoring by location for the period of record in 2013. The dashed blue line correlates with the required Alaska WQS of 13 degree Celsius or lower for anadromous fish spawning habitat.

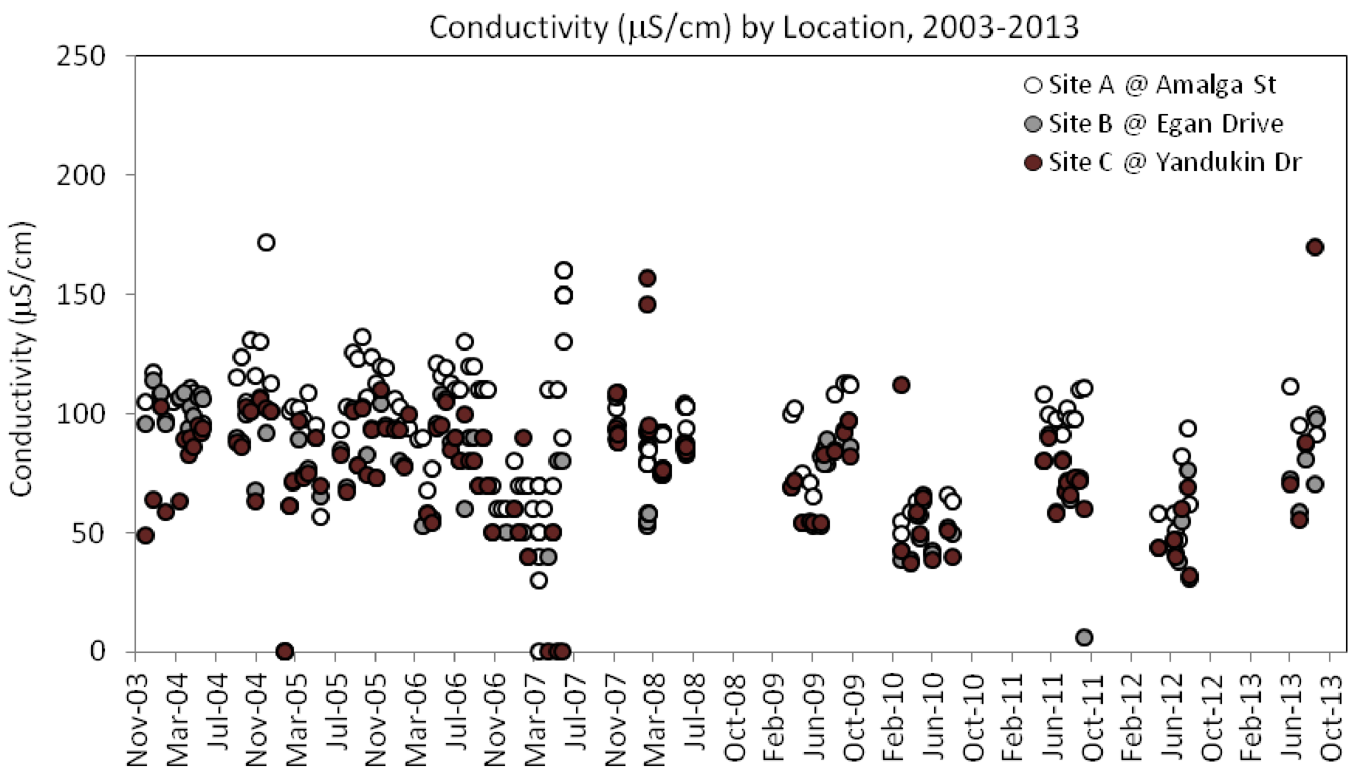
Long-Term Monitoring – Brief Summary Including 2013 Results

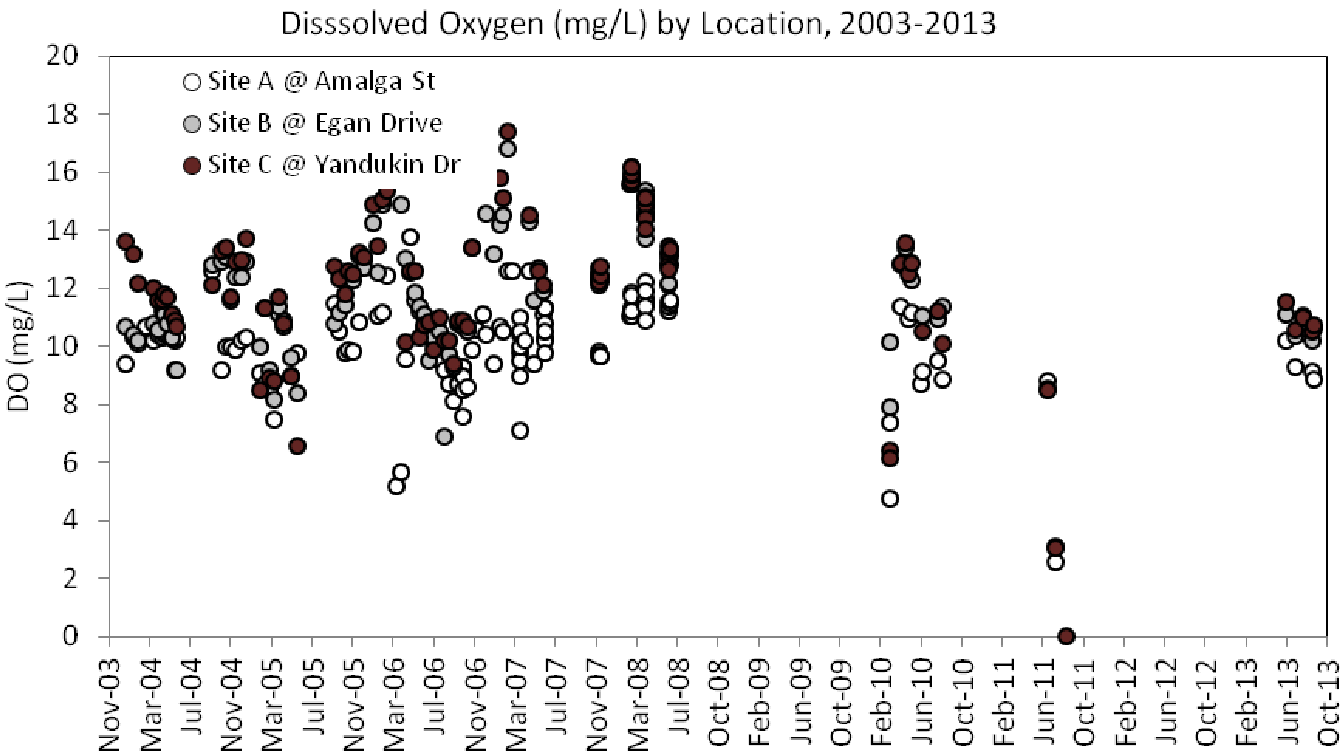
Long-term trends in temperature, pH, conductivity, turbidity, dissolved oxygen, and suspended sediment are shown in figures below. Data collected in 2013 are similar to long-term record values, though mean pH was higher than in previous years, and mean turbidity and SSC were lower, without peaks, than in years past. This is probably due to a lack of sampling in early spring and late winter in 2013, when seasonal storms and snowmelt are likely to introduce peak flows capable of delivering large volumes of sediment and pollutants. The higher apparent temperature is due to a lack of early spring and late winter sampling in 2013 as well as above average summer temperatures for the 2013 season. In the future, for long term analysis at a yearly scale to be reasonable, we must sample at least bi-monthly every month.

Year 2013 and Long Term (2003-2013) Mean Parameter Values- All Sites and Individual Sites

	2013 Mean	2003-2013 Mean	2003-2013 Mean		
	All Sites	**All Sites**	**JC-A**	**JC-B**	**JC-C**
Temperature (□C)	10.4	5.43	5.3	5.4	5.6
Conductivity (□S/cm)	88.4	82.5	94.7	74.6	78.2
pH	7.31	6.87	6.7	6.9	7.0
Dissolved Oxygen (mg/L)	10.38	11.44	10.2	12.0	12.12
Turbidity (NTU)	4.80	3.6	1.8	3.7	5.3
TSS (mg/L)	8.8	4.2	2.4	4.7	5.5


Temperature (°C) by Location, 2003-2013
Site A @ Amalga St.
Site B @ Egan Drive
Site C @ Yandukin Dr.
Temp (°C)
Nov-03 Mar-04 Jul-04 Nov-04 Mar 05 Jul-05 Nov-05 Mar-06 Jul-06 Nov-06 Mar-07 Jul-07 Nov-07 Mar-08 Jul-08 Oct-08 Feb-09 Jun-09 Oct-09 Feb-10 Jun-10 Oct-10 Feb-11 Jun-11 Oct-11 Feb-12 Jun-12 Oct-12 Feb-13 Jun-13 Oct-13


Conductivity (µS/cm) by Location, 2003-2013
Site A @ Amalga St
Site B @ Egan Drive
Site C @ Yandukin Dr
Conductivity (µS/cm)
Nov-03 Mar-04 Jul-04 Nov-04 Mar-05 Jul-05 Nov-05 Mar-06 Jul-06 Nov-06 Mar-07 Jul-07 Nov-07 Mar-08 Jul-08 Oct-08 Feb-09 Jun-09 Oct-09 Feb-10 Jun-10 Oct-10 Feb-11 Jun-11 Oct-11 Feb-12 Jun-12 Oct-12 Feb-13 Jun-13 Oct-13


Disssolved Oxygen (mg/L) by Location, 2003-2013
Site A @ Amalga St
Site B @ Egan Drive
Site C @ Yandukin Dr
DO (mg/L)
20
18
16
14
12
10
8
6
4
2
0
Nov-03
Mar-04
Jul-04
Nov-04
Mar-05
Jul-05
Nov-05
Mar-06
Jul-06
Nov-06
Mar-07
Jul-07
Nov-07
Mar-08
Jul-08
Oct-08
Feb-09
Jun-09
Oct-09
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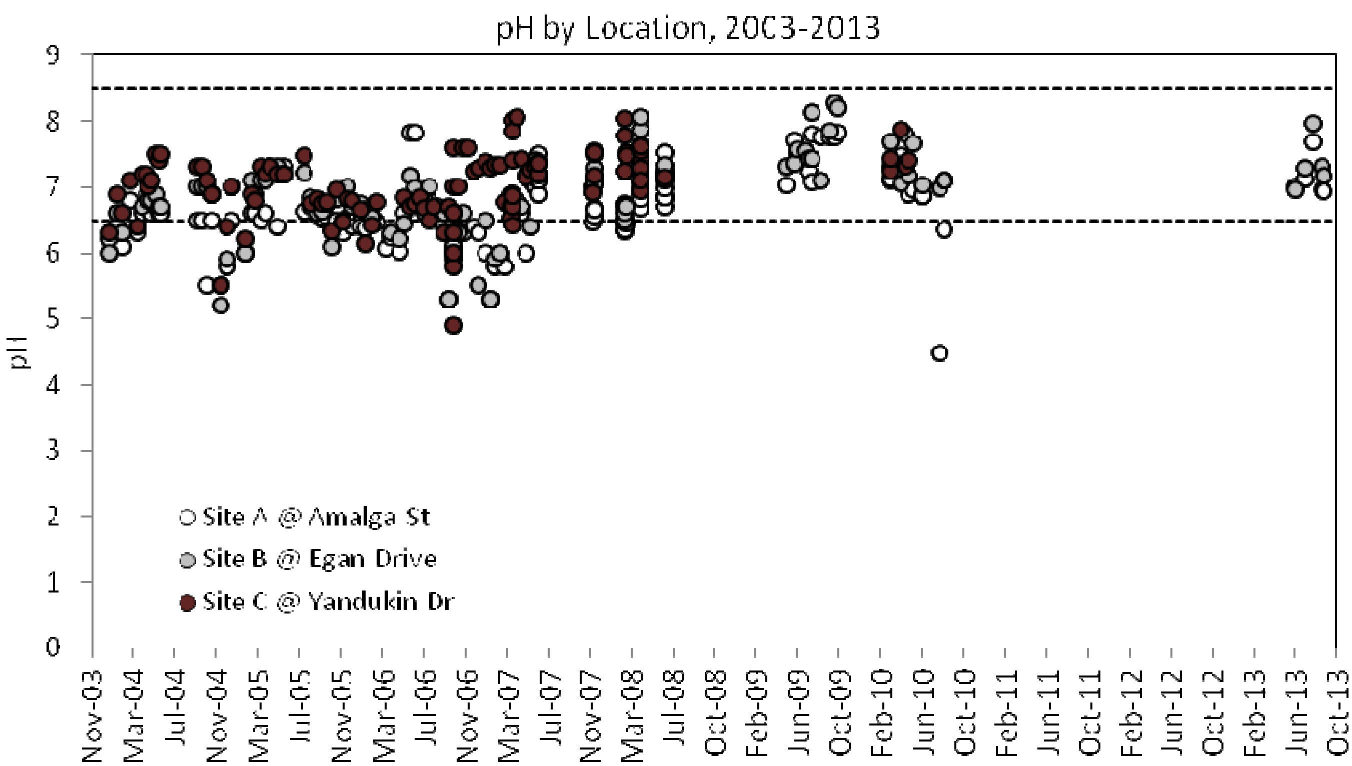
Feb-13
Jun-13
Oct-13


pH by Location, 2003-2013
pH
9
8
7
6
5
4
3
2
1
0
Site A @ Amalga St
Site B @ Egan Drive
Site C @ Yandukin Dr
Nov-03
Mar-04
Jul-04
Nov-04
Mar-05
Jul-05
Nov-05
Mar-06
Jul-06
Nov-06
Mar-07
Jul-07
Nov-07
Mar-08
Jul-08
Oct-08
Feb-09
Jun-09
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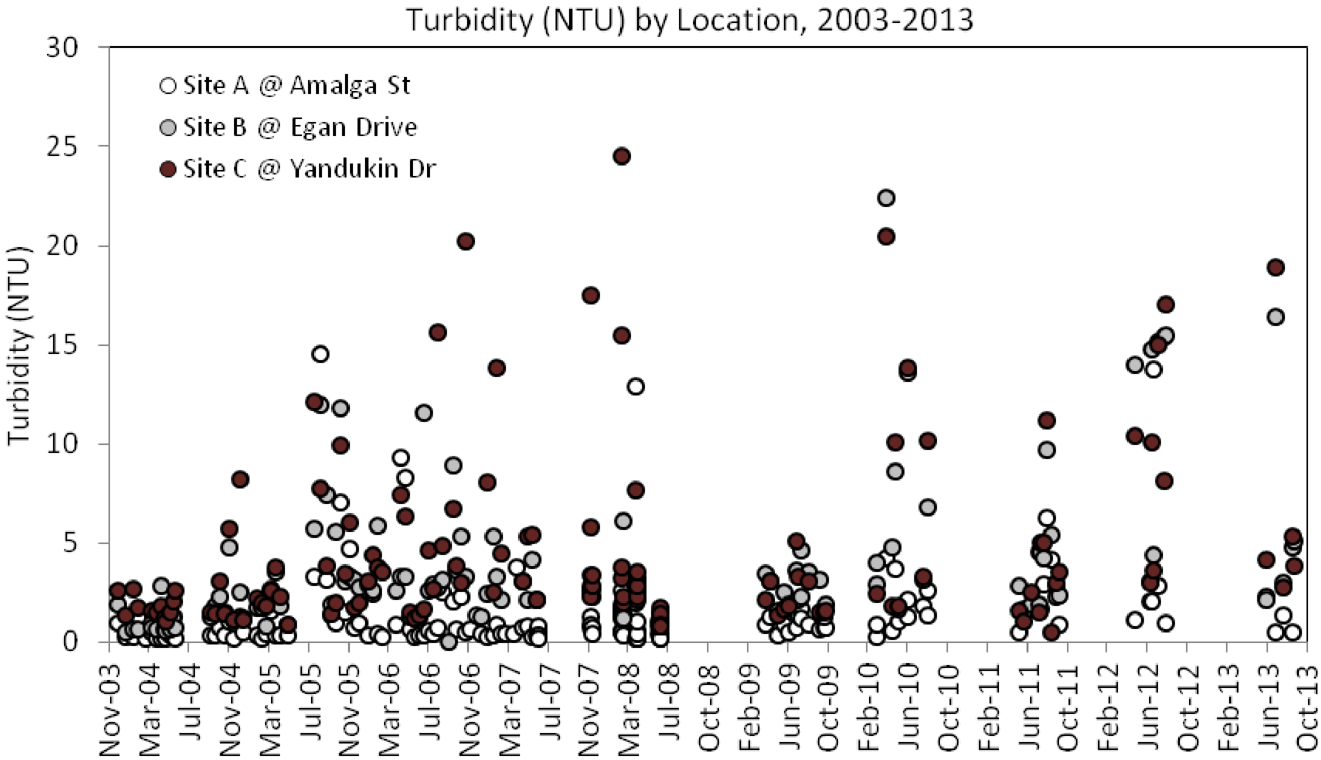

Turbidity (NTU) by Location, 2003-2013
Site A @ Amalga St
Site B @ Egan Drive
Site C @ Yandukin Dr
Turbidity (NTU)
0
5
10
15
20
25
30
Nov-03
Mar-04
Jul-04
Nov-04
Mar-05
Jul-05
Nov-05
Mar-06
Jul-06
Nov-06
Mar-07
Jul-07
Nov-07
Mar-08
Jul-08
Oct-08
Feb-09
Jun-09
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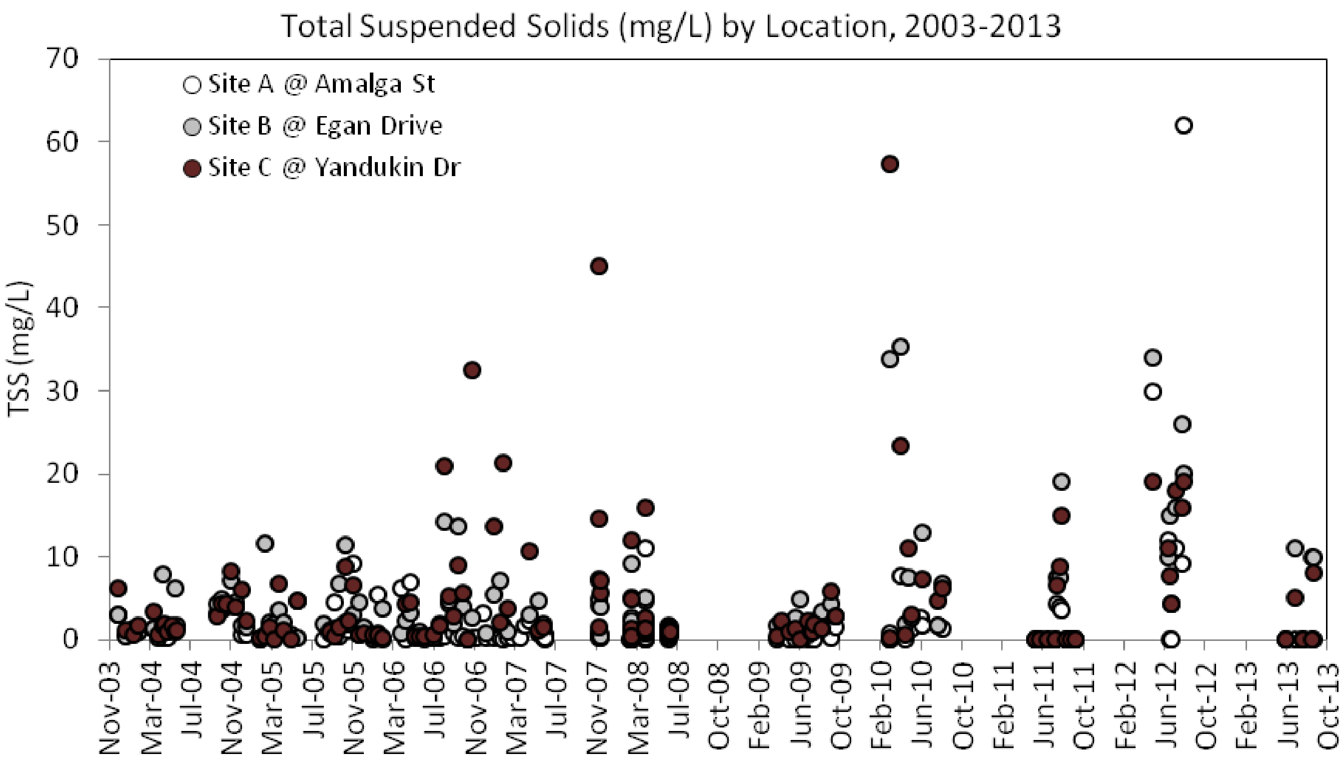

Total Suspended Solids (mg/L) by Location, 2003-2013
Site A @ Amalga St
Site B @ Egan Drive
Site C @ Yandukin Dr
TSS (mg/L)
0
10
20
30
40
50
60
70
Nov-03
Mar-04
Jul-04
Nov-04
Mar-05
Jul-05
Nov-05
Mar-06
Jul-06
Nov-06
Mar-07
Jul-07
Nov-07
Mar-08
Jul-08
Oct-08
Feb-09
Jun-09
Oct-09
Feb-10
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Oct-10
Feb-11
Jun-11
Oct-11
Feb-12
Jun-12
Oct-12
Feb-13
Jun-13
Oct-13

Conclusion and Recommendations

Water Quality in Jordan Creek met state water quality criteria at JWP sample sites sampled from June through August 2013.

The 2013 monitoring activities added another year to the continuous Jordan Creek water quality dataset, as well as captured data for a couple of high Spring and Summer runoff events to guide future stormwater and runoff treatment work. Jordan Creek habitat and water quality are excellent in many reaches upstream of Egan Drive. Periods of low flow, freezing, and stormwater runoff occasionally compromise Jordan Creek habitat and water quality, yet results of 2013 monitoring demonstrate that no increase in solids was observed this season. Water quality critieria was generally met at all of the sample locations and the only exceedances to report was a temperature increase above the most strigent of anadromous fish spawning habitat. These concepts are thoroughly explored in the 2009 TMDL for Sediment and Interstitial Dissovled Oxygen report by ADEC.

Future study in Jordan Creek would benefit from a more scientific approach adopting specific questions answerable by monitoring. For example, re-establishing a discharge record should remain a high priority, as it will aid in future studies of stream capacity and pollutant loading. Mapping stormwater inputs (outfalls, swale and ditch "tributaries," surface sheet flow into riparian areas) is underway now, sponsored by the US Fish and Wildlife Service and the Alaska Department of Environmental Conservation. Once finished, the stormwater mapping project should be complemented with monitoring end-of-pipe water quality during several storms to demonstrate whether or not a stormwater retrofit or BMP plan specific to Jordan Creek watershed is necessary or needs consideration in locations where stream water quality may be compromised. Results of this 2013 monitoring effort have narrowed a specific list of outfall locations where monitoring for additional parameters, including PAH, oil and grease, and some metals will aid in identifying pollutant "hot spots" where additional BMP work could best improve water quality in Lower Jordan Creek. The JWP is interested in expanding monitoring and mapping efforts within the Jordan Creek Watershed and welcomes the CBJ's input on project scope and partnership opportunities in the future.

Acknowledgements

The JWP wishes to thank the City and Borough of Juneau for ongoing project and financial support that made this work possible. Eran Hood and Sonia Nagorski, at the University of Alaska Southeast, provided much-appreciated guidance, laboratory space, monitoring equipment, and advice to get this sampling effort under way. Thanks also to Terry Schwarz at Alaska DNR, who generously loaned JWP his extra discharge measurement equipment.

Related Documents

Alaska Department of Environmental Conservation, 2012. 18 AAC 70 Water Quality Standards as amended through April 8, 2012. http://dec.alaska.gov/commish/regulations/pdfs/18%20AAC%2070.pdf

ADEC (Alaska Department of Enviromental Conservarion), 2009. Total Maximum Daily Load (TMDL) to Address the Sediment and Interstitial Dissolved Oxygen Impairments in Jordan Creek, Alaska.

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Hood, E. L. Hoferkamp, J. Hudson, 2005. Duck and Jordan Creek Protection and Recovery: FY 2005 Final Report to the ADEC. Project #ACWA 05-010.

Nagorski, S., E. Hood, L. Hoferkamp, E. Neal, J. Hudson, 2006. Watershed Protection and Recovery for Jordan Creek, Juneau, AK. Prepared for the Alaska Department of Enviornmental Conservation.

Nagorski, S., L. Hoferkamp, 2007. Watershed Protection and Recovery for Jordan Creek, Juneau, AK. Prepared for the Alaska Department of Environmental Conservation.

Nagorski, S., 2008. Watershed Protection and Recovery for Jordan Creek, Juneau, AK. Prepared for the Alaska Department of Environmental Conservation.

Appendix A: State Water Quality Criteria for Designated Uses

Temperature	
Water Recreation: Contact	May not exceed 30° C
Growth and Propagation of Fish, Shellfish, Other Aquatic Life and Wildlife	May not exceed 20° C at any time. The following maximum temperatures may not be exceeded, where applicable: Migration routes 15° C Spawning areas 13° C Rearing areas 15° C Egg & fry incubation 13° C For all other waters, the weekly average temperature may not exceed site-specific requirements needed to preserve normal species diversity or to prevent appearance of nuisance organisms.
Turbidity	
Water Recreation: Contact	May not exceed 5 NTU above natural conditions when the natural turbidity is 50 NTU or less, and may not have more than 10% increase in turbidity when the natural turbidity is more than 50 NTU, not to exceed a maximum increase of 15 NTU. May not exceed 5 NTU above natural turbidity for all lake waters.
Water recreation: Secondary	May not exceed 10 NTU above natural conditions when natural turbidity is 50 NTU or less, and may not have more than 20% increase in turbidity when the natural turbidity is greater than 50 NTU, not to exceed a maximum increase of 15 NTU. For all lake waters, turbidity may not exceed 5 NTU above natural turbidity.
Growth and Propagation of Fish, Shellfish, Other Aquatic Life and Wildlife	May not exceed 25 NTU above natural conditions. For all lake waters, may not exceed 5 NTU above natural conditions.
pH	
Water Recreation: Contact	May not be less than 6.5 or greater than 8.5. If the natural condition pH is outside this range, substances may not be added that cause an increase in the buffering capacity of the water.
Growth and Propagation of Fish, Shellfish, Other Aquatic Life and Wildlife	May not be less than 6.5 or greater than 8.5. May not vary more than 0.5 pH unit from natural conditions.

Sediment	
Water Recreation: Contact	No measurable increase in concentration of settleable solids above natural conditions, as measured by the volumetric Imhoff cone method (see note 11).
Growth and Propagation of Fish, Shellfish, Other Aquatic Life and Wildlife	The percent accumulation of fine sediment in the range of 0.1 mm to 4.0 mm in the gravel bed of waters used by anadromous or resident fish for spawning may not be increased more than 5% by weight above natural conditions (as shown from grain size accumulation graph). In no case may the 0.1 mm to 4.0 mm fine sediment range in those gravel beds exceed a maximum of 30% by weight (see notes 3 and 4). In all other surface waters no sediment loads (suspended or deposited) that can cause adverse effects on aquatic animal or plant life, their reproduction or habitat may be present.

3. Wherever criteria for fine sediments are provided in this chapter, fine sediments must be sampled by the method described in *An Improved Technique for Freeze Sampling Streambed Sediments*, by William J. Walkotten, United States Department of Agriculture, United States Forest Service, Forest Service Research Note PNW-281, October 1976, adopted by reference, or by the technique found in *Success of Pink Salmon Spawning Relative to Size of Spawning Bed Materials*, by William J. McNeil and W.H. Ahnell, United States Department of the Interior, United States Fish and Wildlife Service, Special Scientific Report - Fisheries No. 469, January 1964, pages 1 - 3, adopted by reference.

4. Wherever criteria for fine sediments are provided in this chapter, percent accumulation of fine sediments will be measured by the technique found in the *Manual on Test Sieving Methods*, *Guidelines for Establishing Sieve Analysis Procedures*, by the American Society for Testing and Materials (ASTM), STP 447A, 1972 edition,

11. Volumetric measurements of settleable solids must be determined according to the following procedure: first, an Imhoff cone must be filled to the one-liter mark with thoroughly mixed sample; second, the sample must settle for 45 minutes; third, the sides of the cone must be gently stirred with a rod or by spinning; fourth, the sample must settle 15 minutes longer, and the volume of settleable matter in the cone must be recorded as milliliters per liter; fifth, if the settled matter contains pockets of liquid between large settled particles, the volume of these pockets must be estimated and subtracted from the volume of settled matter.

Appendix B: 2011-2013 Jordan Creek Water Quality Data

2011 Jordan Creek Water Quality Data, Collected by Beverly Schoonover, JWP

Turbidity

	Site A - Amalga St.		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
Date	**Time**	**Turbidity (NTU)**	**Time**	**Turbidity (NTU)**	**Time**	**Turbidity (NTU)**
5/25/2011	10:00	2.60	10:20	2.85	10:43	1.60
6/7/2011	10:30	0.47	11:00	1.41	11:30	1.07
7/1/2011	10:45	1.63	12:05	1.86	12:38	2.55
7/22/2011	12:26	1.68	13:00	1.86	14:00	1.49
7/29/2011	11:30	4.52	11:15	4.52	11:00	5.05
8/5/2011	9:50	1.65	10:20	4.26	10:45	5.04
8/12/2011	10:30	2.87	10:50	9.66	10:40	11.20
8/26/2011	12:50	6.25	13:10	5.37	13:25	0.52
9/9/2011	12:14	4.16	12:45	2.86	13:15	3.02
9/22/2011	12:30	2.29	13:00	2.40	13:40	3.53

Temperature

	Site A - Amalga St.		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
Date	**Time**	**Temp (degC)**	**Time**	**Temp (degC)**	**Time**	**Temp (degC)**
5/25/2011	10:00	4.63	10:20	5.91	10:43	6.53
6/7/2011	10:30	4.86	11:00	6.22	11:30	8.38
7/1/2011	10:45	6.13	12:05	7.98	12:38	8.10
7/22/2011	12:26	6.87	13:00	9.56	14:00	12.28
7/29/2011	11:30	6.46	11:15	8.71	11:00	8.88
8/5/2011	9:50	6.43	10:20	8.57	10:45	8.84
8/12/2011	10:30	6.60	10:50	8.47	10:40	8.39
8/26/2011	12:50	7.57	13:10	8.23	13:25	8.27
9/9/2011	12:14	7.61	12:45	8.95	13:15	9.09
9/22/2011	12:30	6.89	13:00	7.97	13:40	8.09

Conductivity (Specific Conductance)

	Site A - Amalga St.		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
Date	**Time**	**Conductivity (µS/cm)**	**Time**	**Conductivity (µS/cm)**	**Time**	**Conductivity (µS/cm)**
5/25/2011	10:00	108	10:20	80	10:43	80
6/7/2011	10:30	100	11:00	91	11:30	90
7/1/2011	10:45	98	12:05	59	12:38	58
7/22/2011	12:26	91	13:00	81	14:00	80

Conductivity (Specific Conductance) - continued

	Site A - Amalga St.		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
Date	**Time**	**Conductivity (µS/cm)**	**Time**	**Conductivity (µS/cm)**	**Time**	**Conductivity (µS/cm)**
7/29/2011	11:30	100	11:15	68	11:00	67
8/5/2011	9:50	102	10:20	72	10:45	71
8/12/2011	10:30	98	10:50	64	10:40	66
8/26/2011	12:50	98	13:10	73	13:25	73
9/9/2011	12:14	110	12:45	73	13:15	72
9/22/2011	12:30	111	13:00	6.2	13:40	60

Total Suspended Solids

	Site A - Amalga St.		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
Date	**Time**	**TSS (mg/L)**	**Time**	**TSS (mg/L)**	**Time**	**TSS (mg/L)**
5/25/2011	10:00	<4	10:20	<4	10:43	<4
6/7/2011	10:30	<4	11:00	<4	11:30	<4
7/1/2011	10:45	<4	12:05	<4	12:38	<4
7/22/2011	12:26	<4	13:00	<4	14:00	<4
7/29/2011	11:30	4.3	11:15	7.6	11:00	6.5
8/5/2011	9:50	<4	10:20	7.6	10:45	8.8
8/12/2011	10:30	<4	10:50	19	10:40	15
8/26/2011	12:50	<4	13:10	<4	13:25	<4
9/9/2011	12:14	<4	12:45	<4	13:15	<4
9/22/2011	12:30	<4	13:00	<4	13:40	<4

Dissolved Oxygen (DO)

	Site A - Amalga St.		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
Date	**Time**	**DO %**	**Time**	**DO (%)**	**Time**	**DO (%)**
5/25/2011	10:00	96.9	10:20	98.0	10:43	98.6
6/7/2011	10:30	83.1	11:00	82.5	11:30	83.0
7/1/2011	10:45	---	12:05	---	12:38	---
7/22/2011	12:26	---	13:00	---	14:00	---
7/29/2011	11:30	76.5	11:15	96.9	11:00	97.6
8/5/2011	9:50	77.1	10:20	98.0	10:45	98.6
8/12/2011	10:30	77.4	10:50	97.6	10:40	98.8
8/26/2011	12:50	81.8	13:10	92.5	13:25	92.4
9/9/2011	12:14	80.4	12:45	92.9	13:15	93.3
9/22/2011	12:30	77.9	13:00	9.3	13:40	92.3

2012 Jordan Creek Water Quality Data, Collected by Samantha Davis, JWP

Turbidity

Date	*Site A - Amalga St.*		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
	Time	Turbidity (NTU)	Time	Turbidity (NTU)	Time	Turbidity (NTU)
5/6/2012	12:59	0.89	12:59	13.97	13:49	10.4
6/19/2012	14:45	1.11	14:45	3.06	14:45	3.0
6/26/2012	13:55	2.03	14:10	14.8	14:29	10.1
7/2/2012	12:21	2.06	12:42	4.40	12:53	3.58
7/13/2012	10:46	13.8	10:46	15.17	11:20	15.0
7/31/2012	13:20	2.82	13:37	15.43	13:48	8.11
8/6/2012	12:20	58.5	12:35	15.47	12:50	17.1

Temperature

Date	*Site A - Amalga St.*		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
	Time	Temp (degC)	Time	Temp (degC)	Time	Temp (degC)
5/6/2012	12:59	6.12	12:59	7.12	13:49	7.50
6/19/2012	14:45	6.19	14:45	7.42	14:45	7.52
6/26/2012	13:55	7.50	14:10	8.12	14:29	8.34
7/2/2012	12:21	6.71	12:42	7.36	12:53	7.37
7/13/2012	10:46	7.17	10:46	8.32	11:20	8.55
7/31/2012	13:20	7.26	13:37	9.26	13:48	10.09
8/6/2012	12:20	9.06	12:35	9.94	12:50	10.09

Conductivity (Specific Conductance)

Date	*Site A - Amalga St.*		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
	Time	Conductivity (µS/cm)	Time	Conductivity (µS/cm)	Time	Conductivity (µS/cm)
5/6/2012	12:59	58	12:59	44	13:49	44
6/19/2012	14:45	58	14:45	47	14:45	47
6/26/2012	13:55	51	14:10	41	14:29	40
7/2/2012	12:21	47	12:42	38	12:53	38
7/13/2012	10:46	82	10:46	55	11:20	60
7/31/2012	13:20	94	13:37	76	13:48	69
8/6/2012	12:20	62	12:35	31	12:50	32

Total Suspended Solids

Date	Site A - Amalga St.		Site B - Egan Dr.		Site C - Yandukin Dr.	
	Time	TSS (mg/L)	Time	TSS (mg/L)	Time	TSS (mg/L)
5/6/2012	12:59	30	12:59	34	13:49	19
6/19/2012	14:45	12	14:45	10	14:45	11
6/26/2012	13:55	<4	14:10	15	14:29	7.7
7/2/2012	12:21	<4	12:42	4.4	12:53	4.4
7/13/2012	10:46	11	10:46	16	11:20	18
7/31/2012	13:20	9.2	13:37	26	13:48	16
8/6/2012	12:20	62	12:35	20	12:50	19

2013 Jordan Creek Water Quality Data, Collected by Jackie Ebert, JWP

Turbidity

Date	Site A - Amalga St.		Site B - Egan Dr.		Site C - Yandukin Dr.	
	Time	Turbidity (NTU)	Time	Turbidity (NTU)	Time	Turbidity (NTU)
6/5/2013	10:14	0.94	9:55	2.13	9:48	4.2
7/9/2013	8:55	2.3	8:39	16.4	8:33	18.9
7/24/2013	14:48	0.52	14:30	2.95	14:25	2.77
8/20/2013	15:13	1.35	14:56	4.75	14:51	5.36
8/26/2013	8:40	0.51	8:26	5.09	8:20	3.82

Temperature

Date	Site A - Amalga St.		Site B - Egan Dr.		Site C - Yandukin Dr.	
	Time	Temp (degC)	Time	Temp (degC)	Time	Temp (degC)
6/5/2013	10:14	6.2	9:55	7.5	9:48	7.5
7/9/2013	8:55	8.8	8:39	10.2	8:33	10.5
7/24/2013	14:48	11.5	14:30	14.9	14:25	12.9
8/20/2013	15:13	10.2	14:56	11.8	14:51	13.3
8/26/2013	8:40	8.8	8:26	11.1	8:20	11.2

Conductivity (Specific Conductance)

Date	Site A - Amalga St.		Site B - Egan Dr.		Site C - Yandukin Dr.	
	Time	Conductivity (µS/cm)	Time	Conductivity (µS/cm)	Time	Conductivity (µS/cm)
6/5/2013	10:14	111.6	9:55	72.4	9:48	70.4
7/9/2013	8:55	95	8:39	59	8:33	55.4
7/24/2013	14:48	87	14:30	80.6	14:25	87.9
8/20/2013	15:13	99.8	14:56	70.2	14:51	170.2
8/26/2013	8:40	91.3	8:26	97.7	8:20	78

pH

Date	*Site A - Amalga St.*		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
	Time	**pH**	**Time**	**pH**	**Time**	**pH**
6/5/2013	10:14	7.00	9:55	6.97	9:48	7.23
7/9/2013	8:55	7.12	8:39	7.29	8:33	7.44
7/24/2013	14:48	7.68	14:30	7.97	14:25	7.87
8/20/2013	15:13	6.95	14:56	7.32	14:51	7.30
8/26/2013	8:40	6.94	8:26	7.18	8:20	7.40

Total Suspended Solids (TSS)

Date	*Site A - Amalga St.*		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
	Time	**TSS (mg/L)**	**Time**	**TSS (mg/L)**	**Time**	**TSS (mg/L)**
6/5/2013	10:14	<4	9:55	<4	9:48	<4
7/9/2013	8:55	<4	8:39	11	8:33	5
7/24/2013	14:48	<4	14:30	<4	14:25	<4
8/20/2013	15:13	<4	14:56	10	14:51	<4
8/26/2013	8:40	<4	8:26	10	8:20	8

Dissolved Oxygen (DO)

Date	*Site A - Amalga St.*		*Site B - Egan Dr.*		*Site C - Yandukin Dr.*	
	Time	**DO (mg/L)**	**Time**	**DO (mg/L)**	**Time**	**DO (mg/L)**
6/5/2013	10:14	10.22	9:55	11.12	9:48	11.53
7/9/2013	8:55	9.27	8:39	10.35	8:33	10.58
7/24/2013	14:48	10.45	14:30	11.03	14:25	10.99
8/20/2013	15:13	9.15	14:56	10.21	14:51	10.52
8/26/2013	8:40	8.86	8:26	10.65	8:20	10.75