CLACKAMAS COUNTY
Soil and Water Conservation District

Clackamas Water Quality Monitoring Program: 4th Quarter/Final Progress Report

Project Overview

The Clackamas Water Quality Monitoring Program is an initiative undertaken through a partnership between the Clackamas County Soil and Water Conservation District and Oregon Department of Agriculture. These agencies have a long standing commitment to promoting the economic viability of our communities while preserving the integrity of our natural resources. This program was established to quantify the effects that our land use practices have on water quality and overall ecological health.

Initiated in 2009, the Clackamas Water Quality Monitoring Program seeks to assess the impacts of urban and agricultural land practices on water quality within the Clackamas River Basin.

Ten sites within the Deep Creek sub-basin were identified to define the overall study area (*Figure 1*). These sites were selected based on their accessibility and their widespread distribution throughout the Deep Creek sub-basin. One site was changed after the first year of monitoring due to access issues.

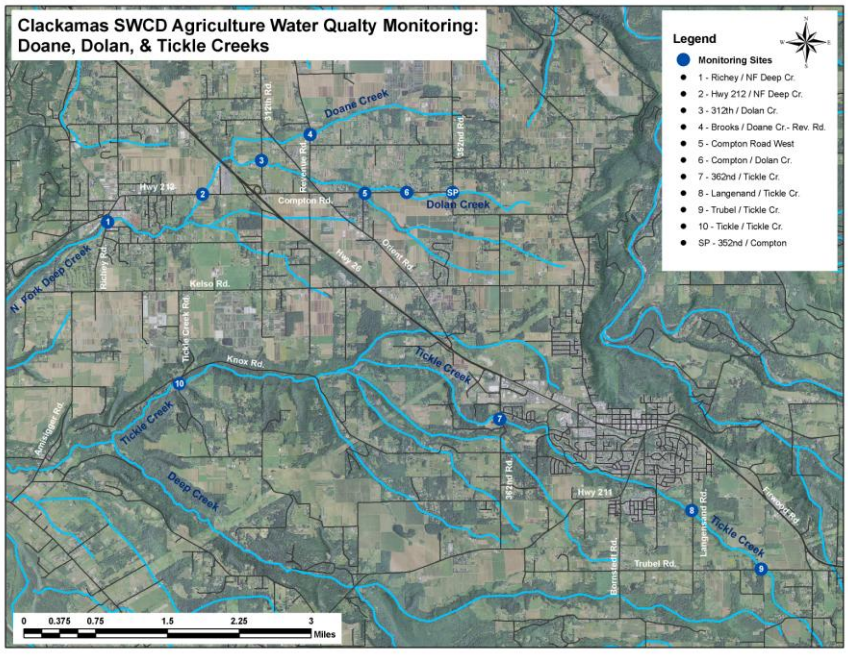


Figure 1. The Clackamas Water Quality Monitoring Program Study Area.

The desired result of this sampling program is greater insight into the effects of various land use practices on water quality. These findings will allow us to make more informed management decisions to protect our natural resources while preserving our economic viability.

4th Quarter Program Activities

Stream Sampling

Stream sampling continued in April, May and June. Total phosphorus, nitrate/nitrites, total suspended solids and E-coli concentrations were analyzed at the contracted laboratories. Dissolved oxygen, pH, temperature and conductivity parameters were measured with the YSI probe at the ten sampling sites. Since the last report, samples were collected on April 20, 2011; May 31, 2011; and June 20, 2011 (*Appendix I*). The sites were sampled for total phosphorus (mg/L), *E. coli* (MPN/100), nitrate-nitrite (mg/L), and total suspended solids (mg/L). The nutrient metrics have been analyzed through the Columbia Analytical Laboratory. The e-coli samples were analyzed by TestAmerica Laboratory.

Stream temperature data has been continually recorded since data loggers were placed at the sampling locations in the 2nd Quarter of 2009-2010. Data loggers collecting stream temperature were collected on June 20, 2011.

Data analysis can be found in Appendix II.

Pesticide Sampling

One storm event sampling took place in October 2010. All samples were submitted, but due to an accident with a sample tray at the laboratory, the Organochlorine pesticides 8081B series was not run. In December water samples were collected to run the 8081B series. The collection day followed a number of days of heavy rain and water levels were very high. Pesticides levels have been evaluated at each of the study locations. Water samples were collected following a strong winter storm event on October 25, 2010. The water samples collected in October were tested for pesticides by Columbia Analytical Services. Pesticide samples were analyzed for Pesticides and Polychlorinated Biphenyls (EPA method 508.1), Semi-volatile Organics (EPA method 525.2), Organochlorine pesticides (EPA method 8081B), and Organophosphorus Pesticides (EPA method 8141). Duplicate samples and blanks were processed along with samples from each location. See Appendix II for pesticide analysis results.

The Clackamas Conservation District is currently working to coordinate spring pesticide sampling as outlined in the Scope of Work.

4th Quarter Results

Stream Sampling

Analysis of the water quality data was carried out for water samples collected between April, 2010 and June, 2010. The data represented is cumulative and incorporates all data collected between September

2010 and June, 2011. Each of the water quality metrics were analyzed and compared to published freshwater aquatic life standards or benchmarks whenever available using the chronic criteria.

A summary graph for each metric is provided for all observation times at each of the sites. Averages across all samples periods were also calculated for each metric. 95% confidence intervals (± SE ×1.96) were calculated for each of the summary graphs. Sampling sites are depicted upstream to downstream moving from left to right. The North Fork Deep Creek and Tickle Creek systems are separated in each graph.

pH

Standard: 6.5 to 8.5 for all basin waters [2]
Figure: 2 & 3
Results: pH values exhibited similar patterns between sites for each sampling event, with the exception of the first sampling event in September. Values for pH varied from 5.3 to7.3 with a mean 6.53 (S_n=0.35). Average pH values were more acidic than the DEQ standards at 2of the 10 sample sites.

Dissolved Oxygen

Standard: For Steelhead and Salmon spawning (Oct 15-June 15), the DO level should be 11mg/L. For other cold water aquatic life, it should be 9 mg/L.[2]
Figure: 4 & 5
Results: Dissolved oxygen was generally lower in the early fall and late spring measurements. Observed values have ranged from 5.75 mg/L and 14.08 mg/L with a mean of 11.02 mg/L (S_n=1.58). Values generally increased following the onset of seasonal rains in October. Samples taken in September had observed dissolved oxygen levels below the state standards at five sites. October dissolved oxygen levels were below the acceptable range for spawning salmonids at all sites, but was above the cold water aquatic life criteria for all but one site. Dissolved oxygen levels on the November sampling date were all within the acceptable range for spawning salmonids at 9 of 10 sites. December and January sampling dates were above the acceptable range for spawning salmonids at all sampling sites. It should be noted that at the Compton Dolan site, although higher in the watershed, had consistently lower dissolved oxygen levels than downstream sites in October and November and February.

E. coli

Standard: The average of five samples shall not exceed 126 MPN/100 and no single sample may exceed 406 MPN/100.[3]
TMDL: mandates a 78% reduction from current conditions to attain standard.

Figure: 6 & 7
Results: *E. coli* values have ranged from Non-detect to 2420 MPN/100. Mean *E. coli* values were 460 MPN/100 (S_n=206.84). Observed *E. coli* values peaked in October following the onset of seasonal rains. Samples did not exceed the single sample criteria of 406MPN/100 in September, but did exceed the criteria at 6 of 10 sites in October and three sites during this event were significantly higher than any sample events from September through June. One of 10 sites in November and 5 of 10 sites in December and 1 of 10 sites in June exceeded the single sample criteria. Note that the October and December sample events were during heavy precipitation.

Total Phosphorus:

Standard: No accepted standard
Benchmark: < 0.08 mg/L[1]
Figure: 8 & 9
Results: Total phosphorus values ranged from non-detect to 0.23 mg/L. Average phosphorus values were 0.03 mg/L (S_n=0.04). Due to miscommunication and beginner learning curve, Total Phosphorus measurements were not taken in September and October. Values typically were less than ODA recommended benchmark, with the exception of the downstream sites on Dolan Creek and the site on Doane Creek and the sites on North Fork Deep Creek in the December sampling event. There was also one site on Tickle Creek in June with elevated Total Phosphorus levels. Note that stream levels were markedly higher during the December sampling event than the other sampling events.

Nitrate-Nitrite

Standard: No accepted standard
Benchmark: < 0.5 mg/L [1]
Figure: 10 & 11
Results: The nitrate-nitrite values ranged from 0.38 mg/L and 2.99 mg/L. The mean nitrate-nitrite value was 1.74 mg/L (S_n=0.63). Nitrate-nitrite values continued to be generally higher in North Fork Deep Creek than in Tickle Creek. The observed nitrate-nitrite levels exceeded the ODA recommended benchmark at all sites for sample date with the exception of one measurement on Tickle Creek in October.

Total Suspended Solids

Standard: No accepted standard
Benchmark: < 25 mg/L [1]
Figure: 12 & 13
Results: The Total suspended solids ranged from non-detect to 336 mg/L. The mean was 17.68 mg/L (S_n=48.49). Samples generally were less than the ODA recommended benchmark at all sites from January through June. The sampling date in December, during a very heavy rain event, had exceptionally high observations of total suspended solids. The Brooks/Doane and 312th and Dolan

Creek sites were consistently higher in total suspended solids than the other sites in October, November and December.

Conductivity

Standard: No accepted standard
Benchmark: None accepted
Figure: 14 & 15
Results: Conductivity values ranged from 28 µS to 168 µS, with a mean of 57.14 µS (S_n=27). Conductivity values were relatively unchanged over time. Observations in the North Fork Deep Creek section showed markedly increasing values moving upstream to downstream in September and October and June. All other observations in both North Fork Deep Creek and Tickle Creek show conductivity trending upwards as you moved downstream.

Turbidity

Standard: No more than a ten percent cumulative increase in natural stream turbidities may be allowed, as measured relative to a control point immediately upstream of the turbidity causing activity.[2]
Figure:
Results: No turbidity measurements were taken.

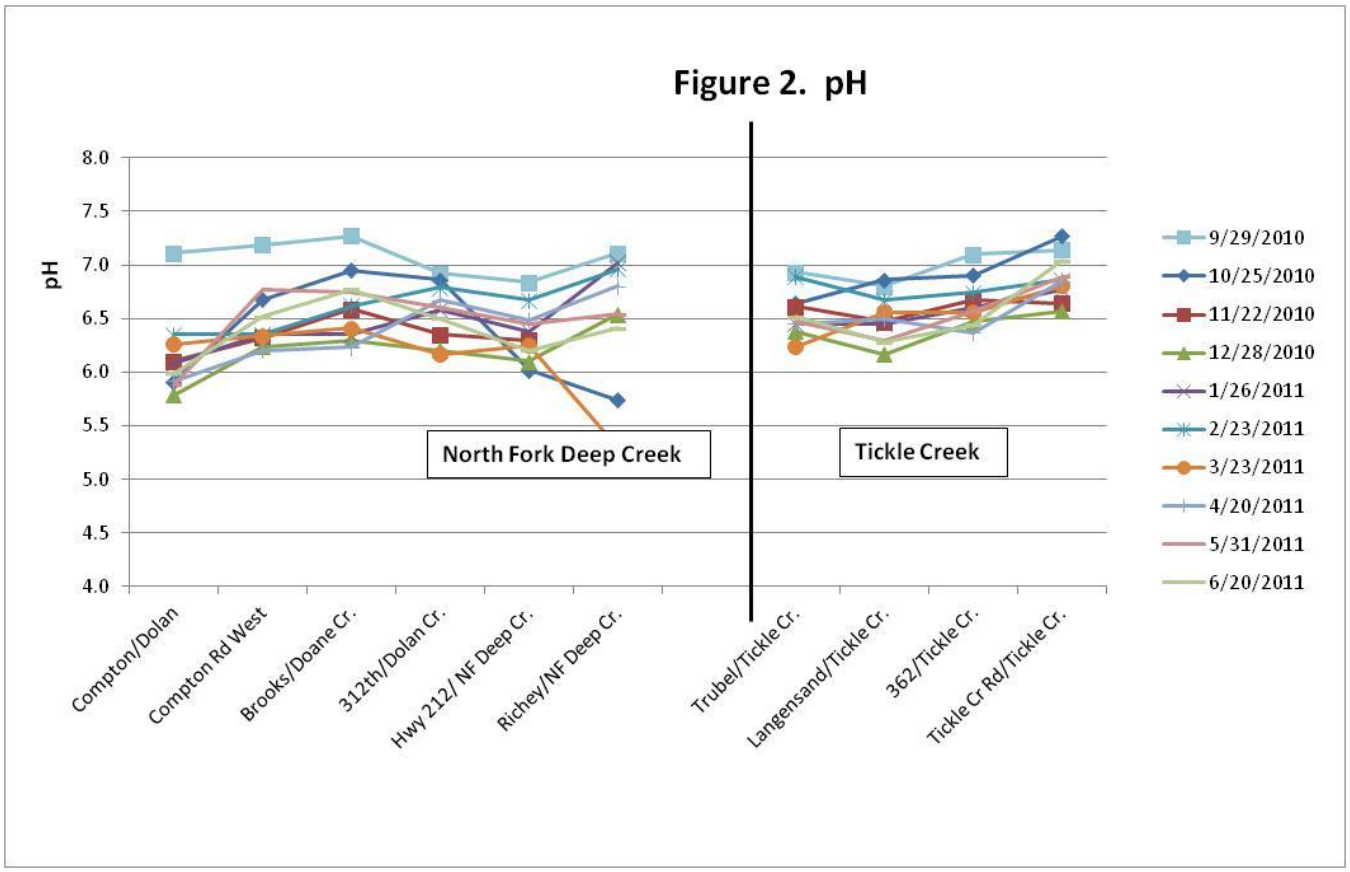


Figure 2. pH
pH
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
North Fork Deep Creek
Tickle Creek
Compton/Dolan
Compton Rd West
Brooks/Doane Cr.
312th/Dolan Cr.
Hwy 212/ NF Deep Cr.
Richey/NF Deep Cr.
Trubel/Tickle Cr.
Langensand/Tickle Cr.
362/Tickle Cr.
Tickle Cr Rd/Tickle Cr.
9/29/2010
10/25/2010
11/22/2010
12/28/2010
1/26/2011
2/23/2011
3/23/2011
4/20/2011
5/31/2011
6/20/2011

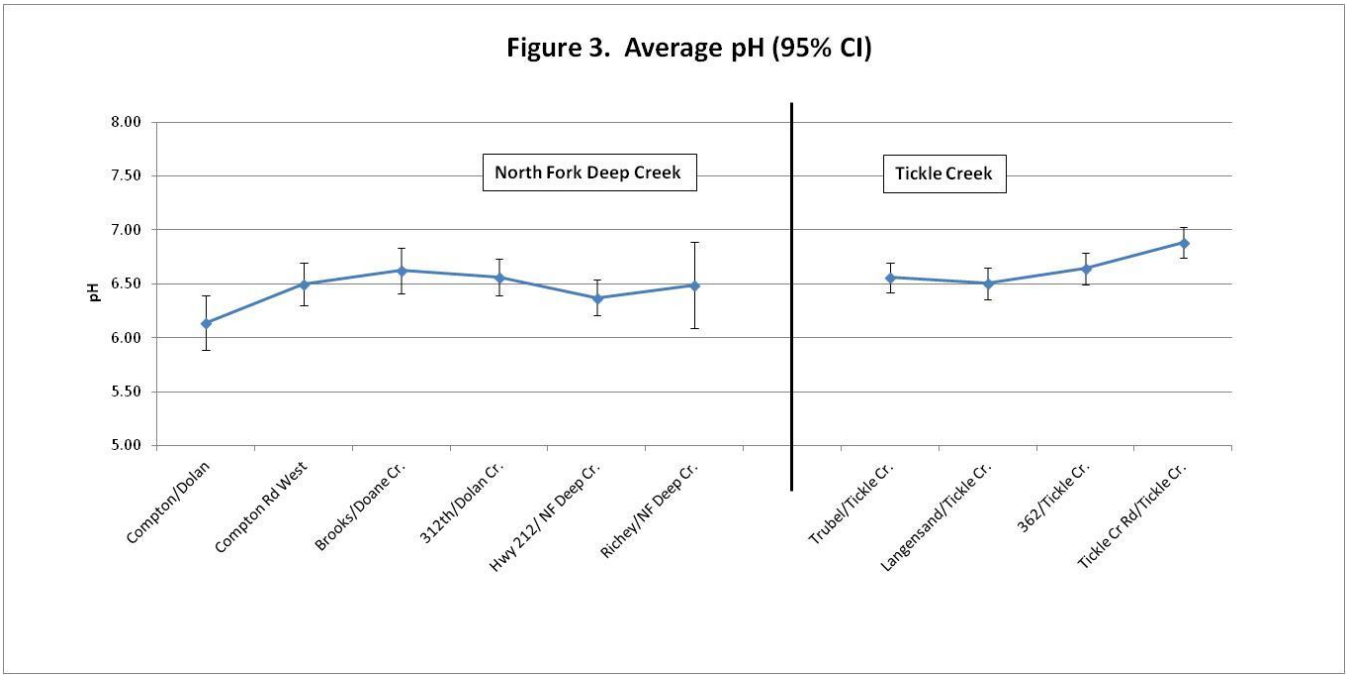


Figure 3. Average pH (95% CI)
pH
8.00
7.50
7.00
6.50
6.00
5.50
5.00
North Fork Deep Creek
Tickle Creek
Compton/Dolan
Compton Rd West
Brooks/Doane Cr.
312th/Dolan Cr.
Hwy 212/ NF Deep Cr.
Richey/NF Deep Cr.
Trubel/Tickle Cr.
Langensand/Tickle Cr.
362/Tickle Cr.
Tickle Cr Rd/Tickle Cr.

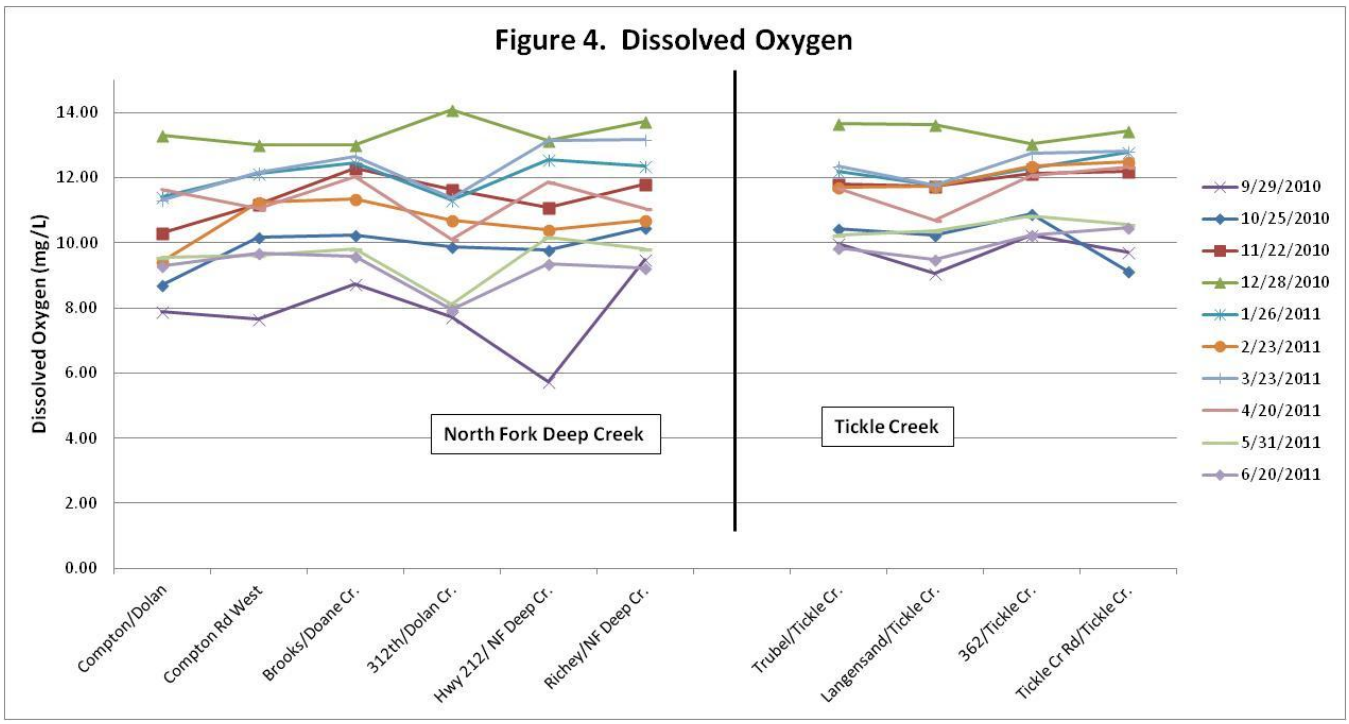


Figure 4. Dissolved Oxygen
Dissolved Oxygen (mg/L)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
North Fork Deep Creek
Tickle Creek
Compton/Dolan
Compton Rd West
Brooks/Doane Cr.
312th/Dolan Cr.
Hwy 212/ NF Deep Cr.
Richey/NF Deep Cr.
Trubel/Tickle Cr.
Langensand/Tickle Cr.
362/Tickle Cr.
Tickle Cr Rd/Tickle Cr.
9/29/2010
10/25/2010
11/22/2010
12/28/2010
1/26/2011
2/23/2011
3/23/2011
4/20/2011
5/31/2011
6/20/2011

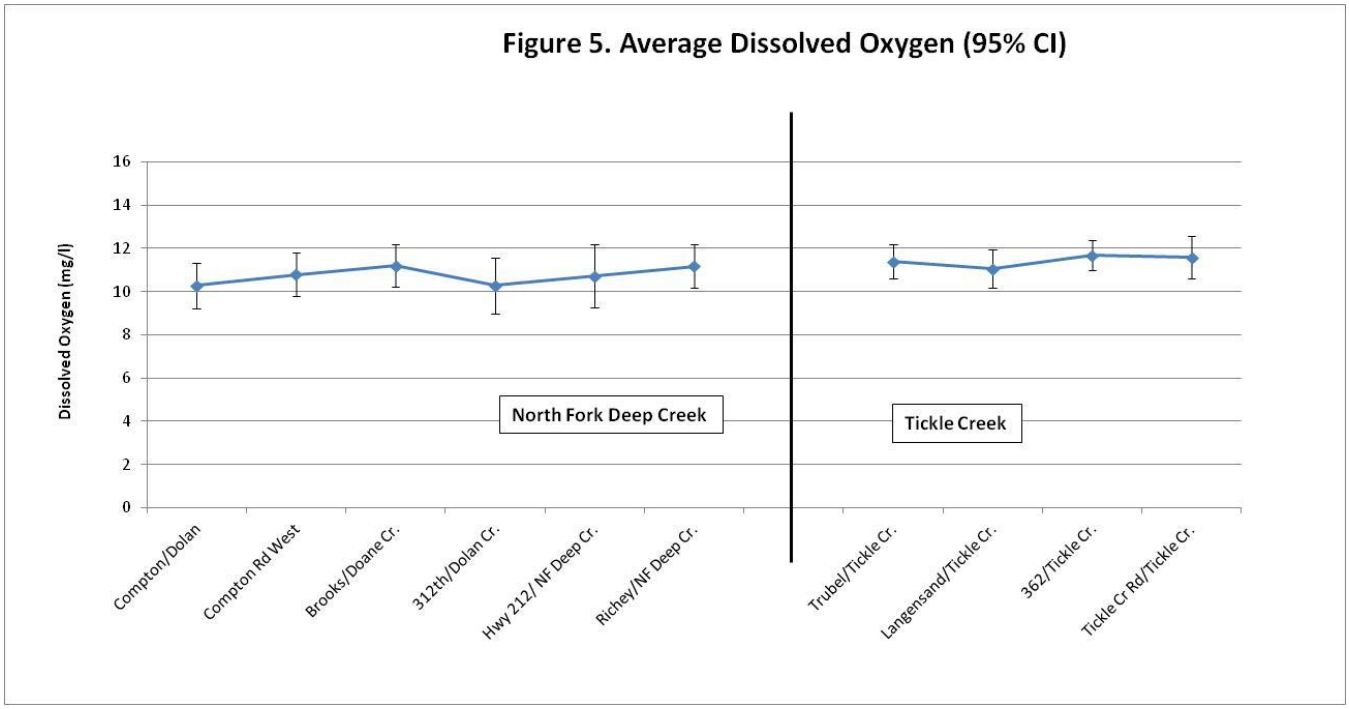


Figure 5. Average Dissolved Oxygen (95% CI)
Dissolved Oxygen (mg/l)
16
14
12
10
8
6
4
2
0
North Fork Deep Creek
Tickle Creek
Compton/Dolan
Compton Rd West
Brooks/Doane Cr.
312th/Dolan Cr.
Hwy 212/ NF Deep Cr.
Richey/NF Deep Cr.
Trubel/Tickle Cr.
Langensand/Tickle Cr.
362/Tickle Cr.
Tickle Cr Rd/Tickle Cr.

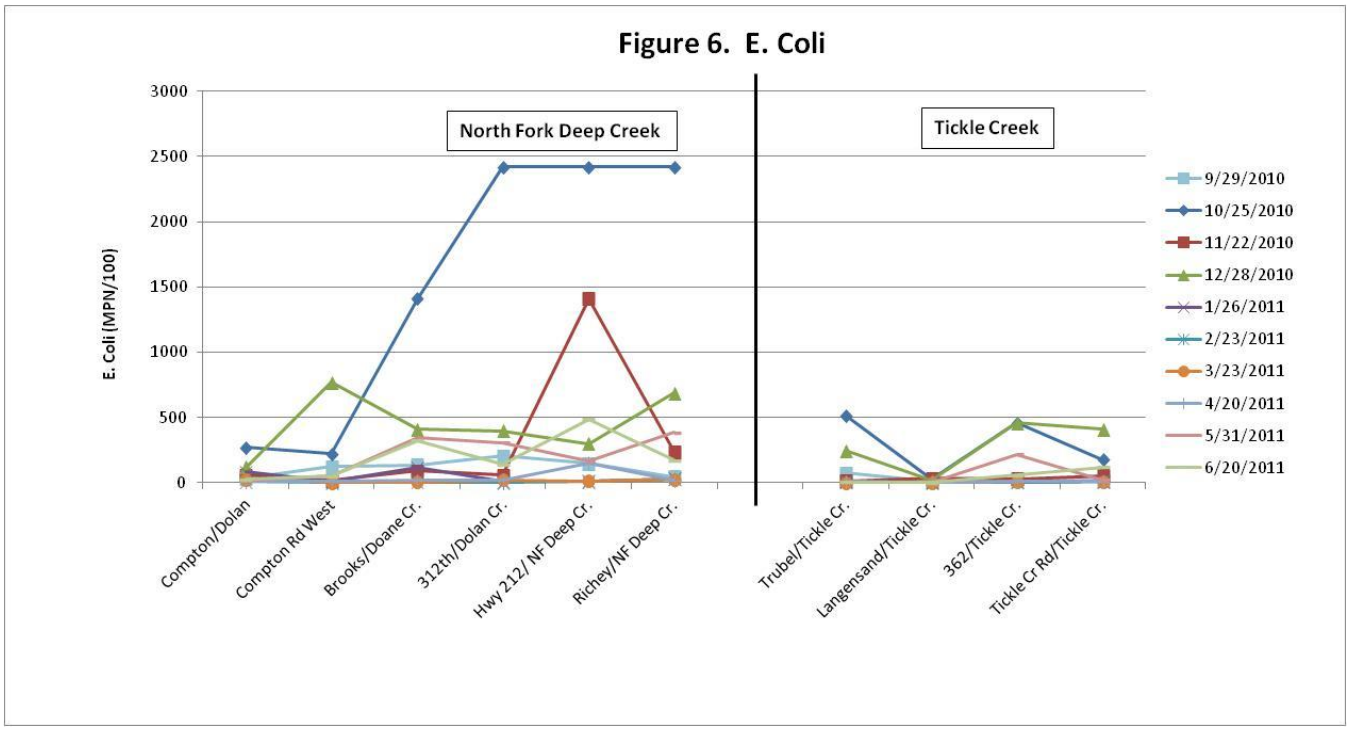


Figure 6. E. Coli
North Fork Deep Creek
Tickle Creek
E. Coli (MPN/100)
3000
2500
2000
1500
1000
500
0
9/29/2010
10/25/2010
11/22/2010
12/28/2010
1/26/2011
2/23/2011
3/23/2011
4/20/2011
5/31/2011
6/20/2011
Compton/Dolan
Compton Rd West
Brooks/Doane Cr.
312th/Dolan Cr.
Hwy 212/ NF Deep Cr.
Richey/NF Deep Cr.
Trubel/Tickle Cr.
Langensand/Tickle Cr.
362/Tickle Cr.
Tickle Cr Rd/Tickle Cr.

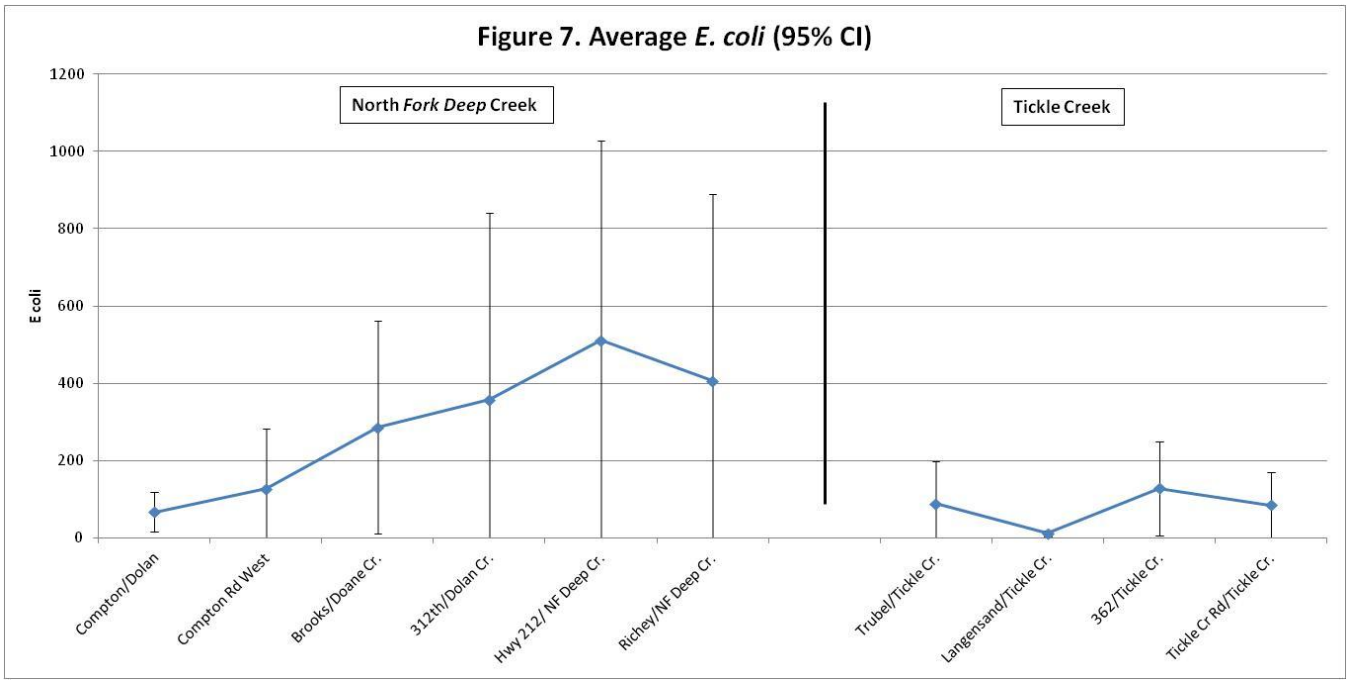


Figure 7. Average E. coli (95% CI)
North Fork Deep Creek
Tickle Creek
E coli
1200
1000
800
600
400
200
0
Compton/Dolan
Compton Rd West
Brooks/Doane Cr.
312th/Dolan Cr.
Hwy 212/ NF Deep Cr.
Richey/NF Deep Cr.
Trubel/Tickle Cr.
Langensand/Tickle Cr.
362/Tickle Cr.
Tickle Cr Rd/Tickle Cr.

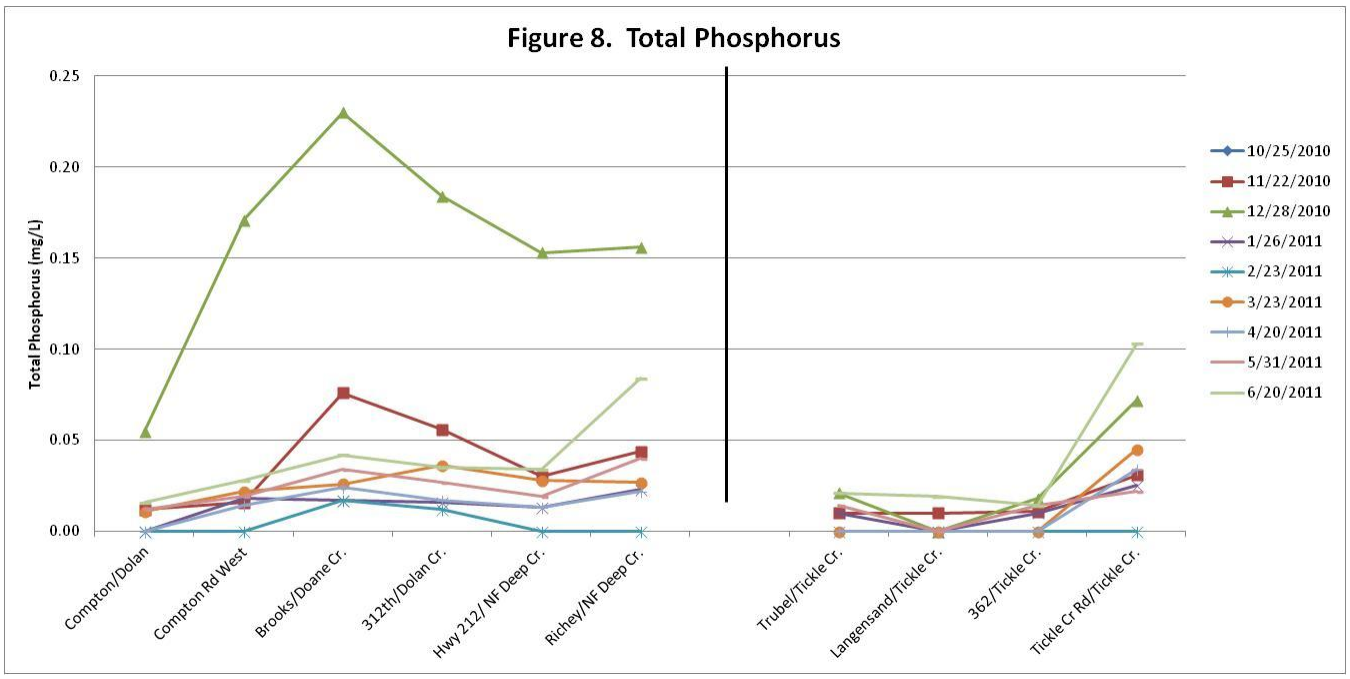


Figure 8. Total Phosphorus
Total Phosphorus (mg/L)
0.25
0.20
0.15
0.10
0.05
0.00
Compton/Dolan
Compton Rd West
Brooks/Doane Cr.
312th/Dolan Cr.
Hwy 212/ NF Deep Cr.
Richey/NF Deep Cr.
Trubel/Tickle Cr.
Langensand/Tickle Cr.
362/Tickle Cr.
Tickle Cr Rd/Tickle Cr.
10/25/2010
11/22/2010
12/28/2010
1/26/2011
2/23/2011
3/23/2011
4/20/2011
5/31/2011
6/20/2011

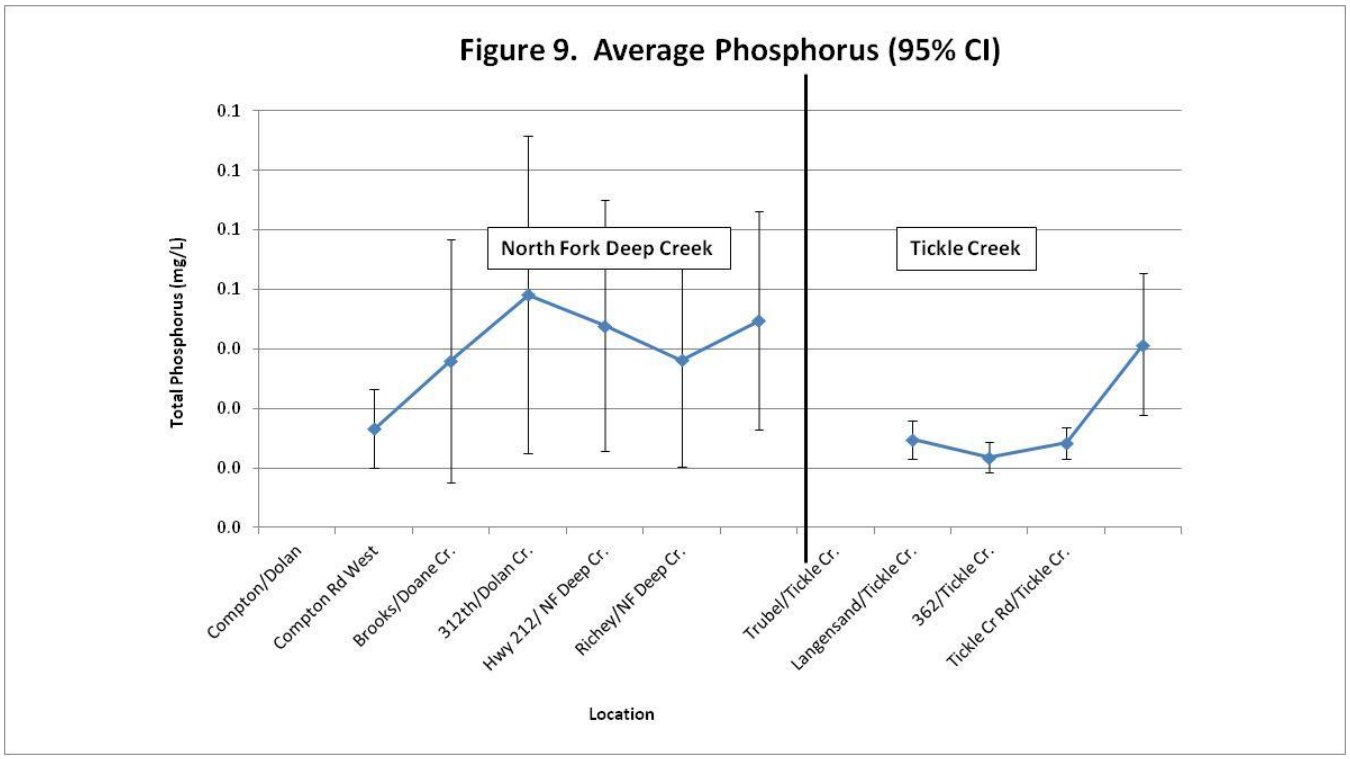


Figure 9. Average Phosphorus (95% CI)
Total Phosphorus (mg/L)
0.1
0.1
0.1
0.1
0.0
0.0
0.0
0.0
North Fork Deep Creek
Tickle Creek
Compton/Dolan
Compton Rd West
Brooks/Doane Cr.
312th/Dolan Cr.
Hwy 212/ NF Deep Cr.
Richey/NF Deep Cr.
Trubel/Tickle Cr.
Langensand/Tickle Cr.
362/Tickle Cr.
Tickle Cr Rd/Tickle Cr.
Location

Figure 10. Nitrate-Nitrite

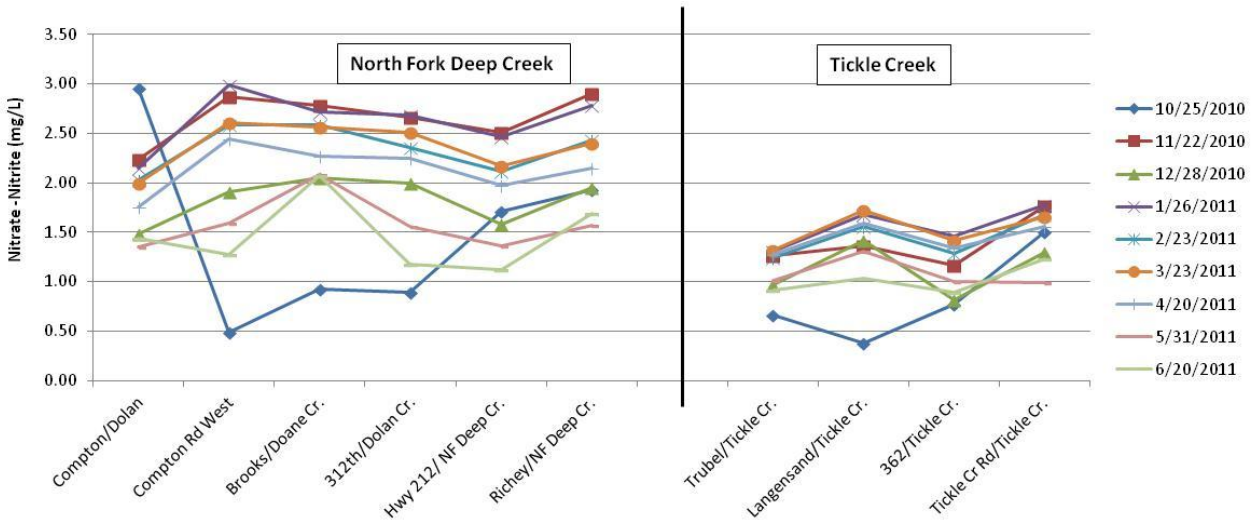


Figure 11. Average Nitrate-Nitrite (95% CI)

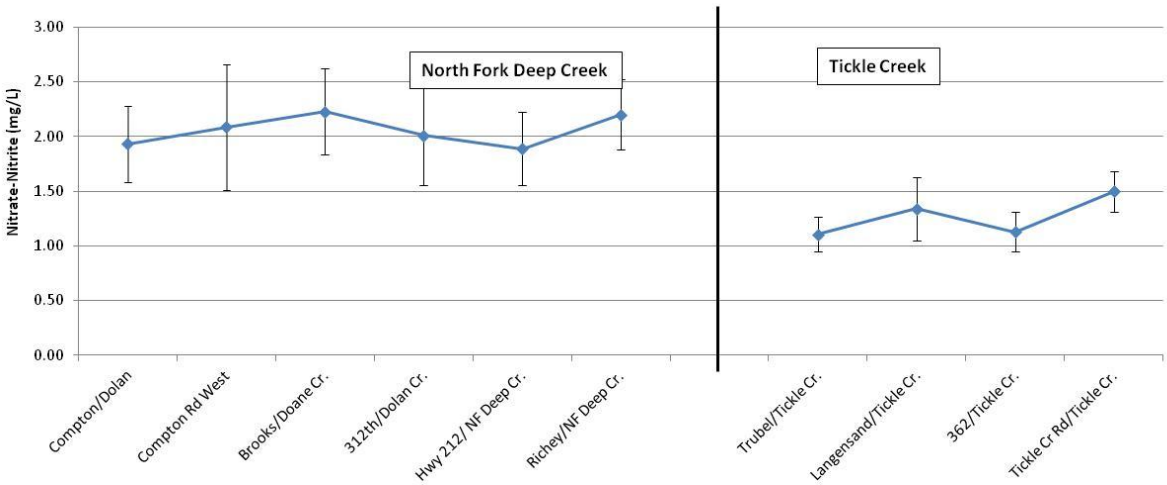


Figure 12. Total Suspended Solids

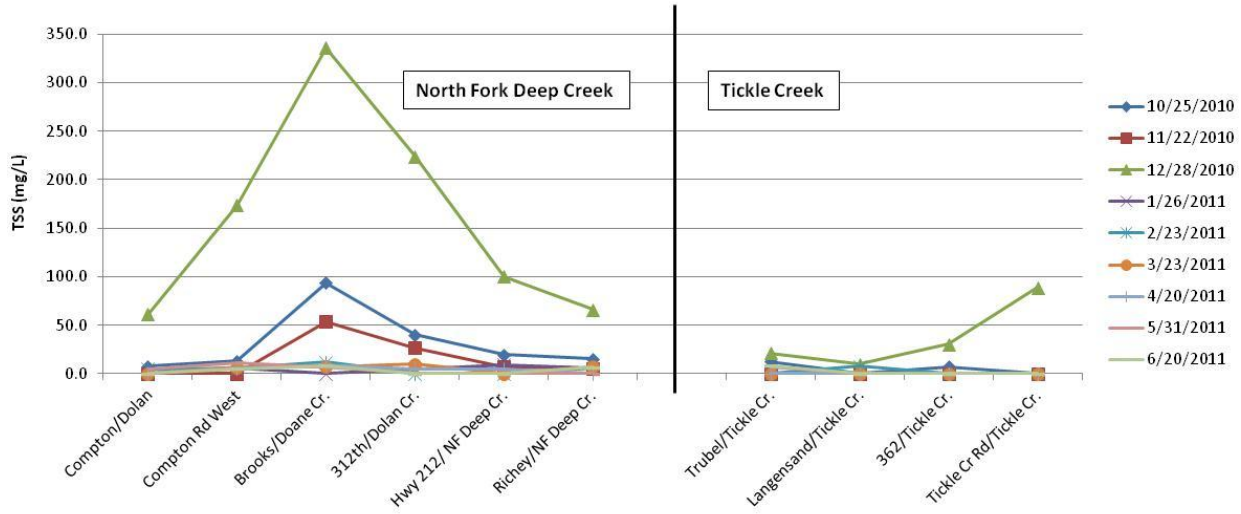
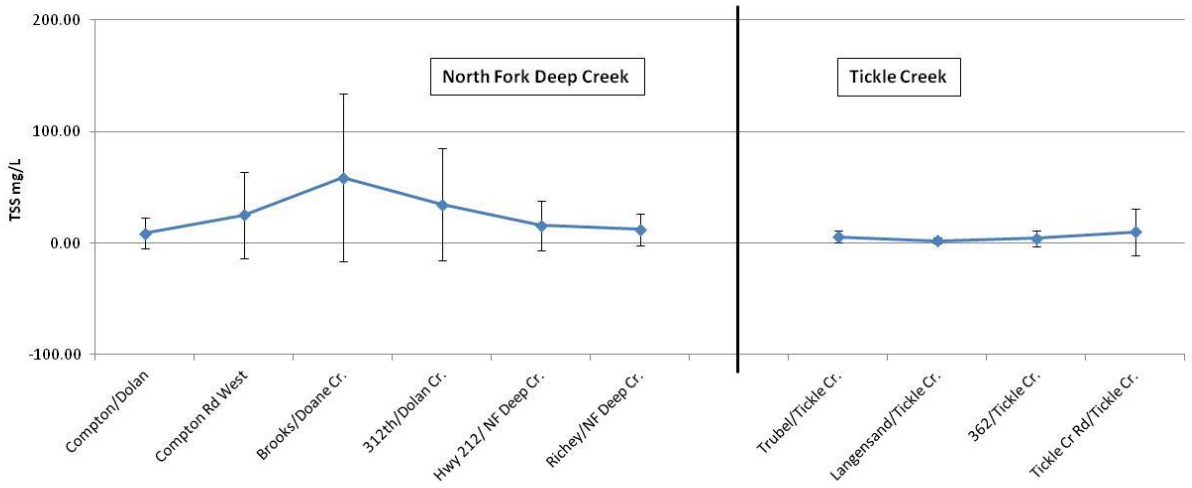


Figure 13. Average Total Suspended Solids (95% CI)



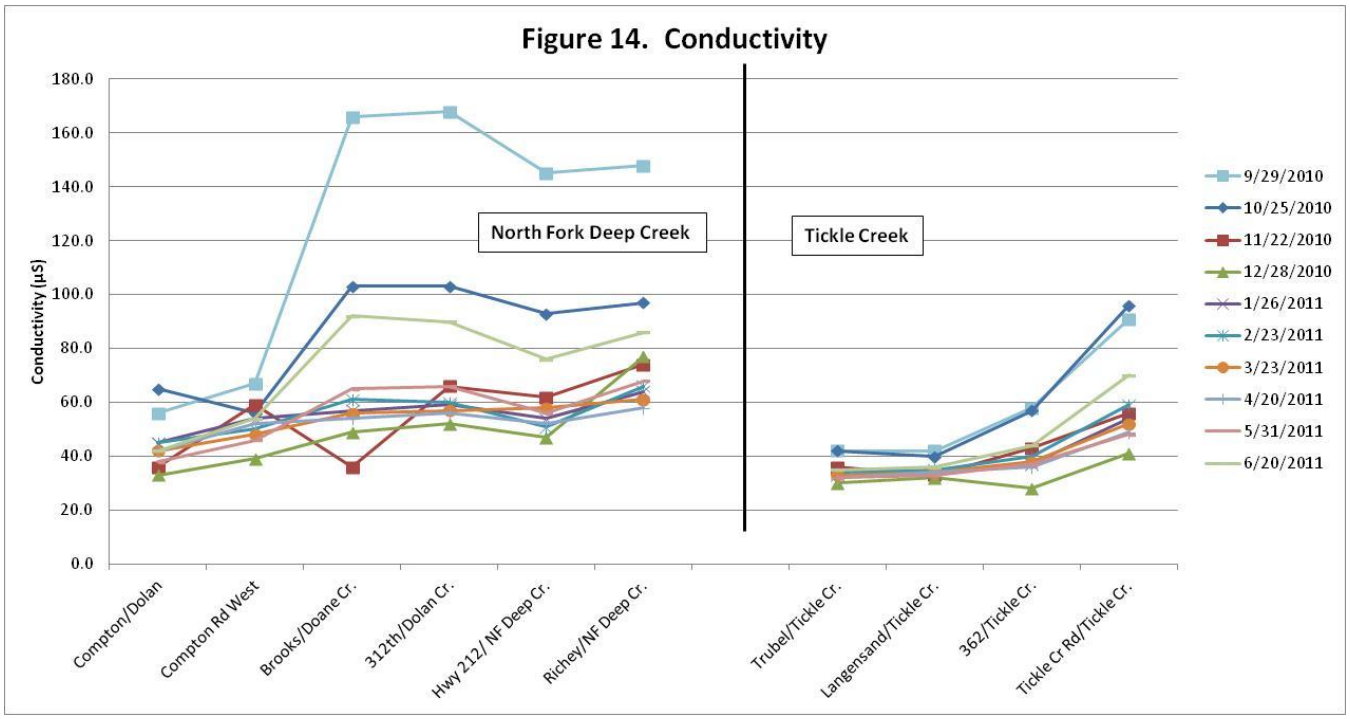


Figure 14. Conductivity
Conductivity (µS)
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
North Fork Deep Creek
Tickle Creek
9/29/2010
10/25/2010
11/22/2010
12/28/2010
1/26/2011
2/23/2011
3/23/2011
4/20/2011
5/31/2011
6/20/2011
Compton/Dolan
Compton Rd West
Brooks/Doane Cr.
312th/Dolan Cr.
Hwy 212 / NF Deep Cr.
Richey/NF Deep Cr.
Trubel/Tickle Cr.
Langensand/Tickle Cr.
362/Tickle Cr.
Tickle Cr Rd/Tickle Cr.

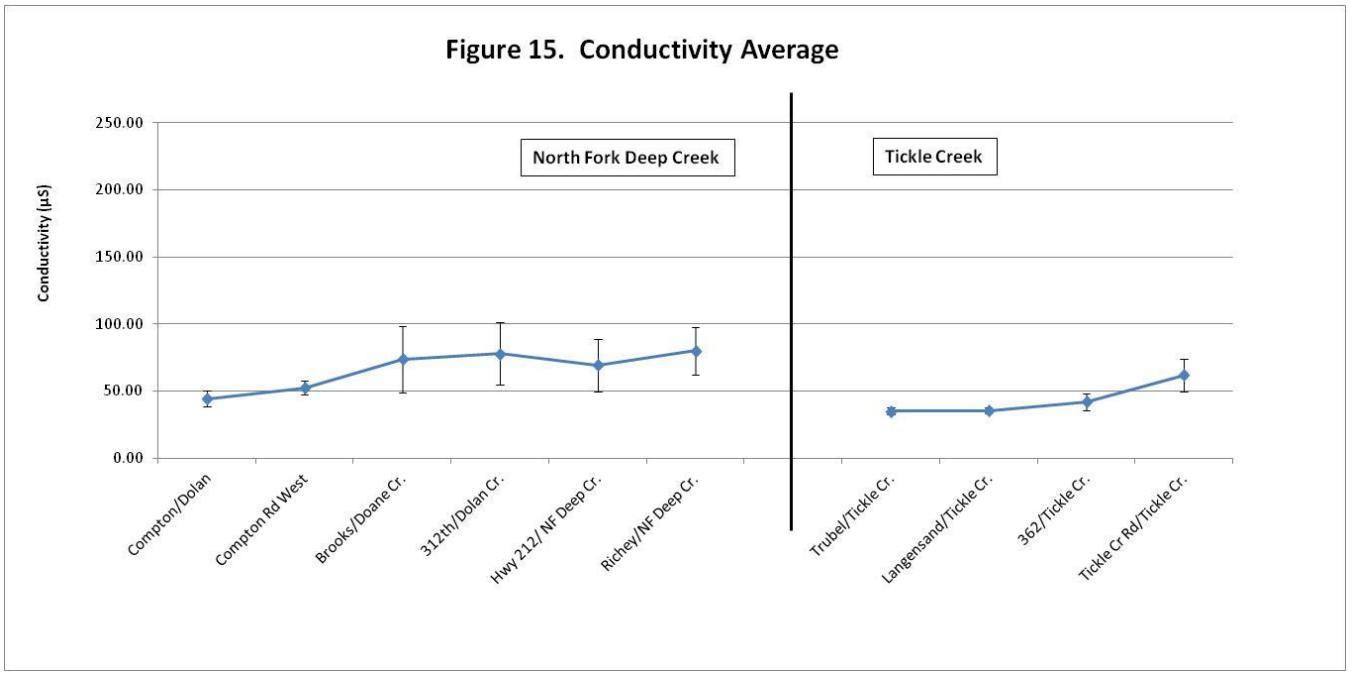


Figure 15. Conductivity Average
Conductivity (µS)
250.00
200.00
150.00
100.00
50.00
0.00
North Fork Deep Creek
Tickle Creek
Compton/Dolan
Compton Rd West
Brooks/Doane Cr.
312th/Dolan Cr.
Hwy 212 / NF Deep Cr.
Richey/NF Deep Cr.
Trubel/Tickle Cr.
Langensand/Tickle Cr.
362/Tickle Cr.
Tickle Cr Rd/Tickle Cr.

Summary table of urban and agricultural land uses.

Site	Latitude	Longitude	Location	Urban	Agricultural	Ave. Total Phosphorus	Ave. Dissolved Oxygen	Ave. Conductivity	Ave. pH	*Ave. E. Coli*	Ave. Nitrate	Ave. TSS
1	45.428550	-122.375083	Richey / NF Deep Cr.	15.58%	64.00%	0.05	11.18	79.9	6.5	405.51	2.20	12.39
2	45.432650	-122.354600	Hwy 212 / NF Deep Cr.	13.84%	65.51%	0.04	10.73	69.4	6.4	512.3	1.89	15.67
3	45.427030	-122.311526	312th / Dolan Cr.	13.78%	77.66%	0.05	10.29	77.7	6.6	358.49	2.01	34.50
4	45.441568	-122.331395	Brooks / Doane Cr.	7.72%	65.49%	0.06	11.21	73.9	6.6	268.59	2.23	58.61
5			Compton Rd. West	13.83%	67.38%	0.04	10.8	52.5	6.5	126.57	2.08	25.71
6	45.432667	-122.310750	Compton / Dolan Cr.	14.08%	69.90%	0.01	10.28	44.4	6.1	66.74	1.93	8.83
7	45.403980	-122.359951	Tickle Creek Rd. / Tickle Cr.	15.92%	37.08%	0.04	11.59	61.6	6.9	84.56	1.50	9.89
8	45.398209	-122.291191	362nd / Tickle Cr.	27.45%	31.28%	0.01	11.68	41.8	6.6	128.10	1.13	4.17
9	45.384083	-122.250100	Langensand / Tickle Cr.	5.40%	47.14%	0.00	11.06	35.3	6.5	10.91	1.34	2.00
10	45.375117	-122.235317	Trubel / Tickle Cr.	8.09%	20.01%	0.01	11.39	34.9	6.6	88.62	1.11	5.56

Compton Road West is a replacement for a nearby site that was inaccessible in the winter. It is only a short distance and we do not feel that the land use analysis would be significantly different for the replacement site.

Sources

1. Measeles, Paul. 2010. *Personal Communication*. Oregon Department of Agriculture, Natural Resource Division.
2. Oregon Secretary of State. 2010. Oregon Administrative Rules 340.041. State of Oregon.
3. Oregon Department of Environmental Quality. 2006. *Willamette TMDLs: Chapter 6- Clackamas River.* State of Oregon
4. EPA. Office of Pesticide Program, Office of Water. 2009. Aquatic Life Criteria Benchmarks. http://www.epa.gov/oppefed1/ecorisk_ders/aquatic_life_benchmark.htm
5. Extoxnet. 2010. *Extoxnet:Pesticide information Project.* http://extoxnet.orst.edu/pips/simazine.htm
6. EPA. Office of Water Regulations and Standards. 1980. Ambient Water Quality Criteria for Heptachlor. http://water.epa.gov/scitech/swguidance/standards/current/upload/2001_10_12_criteria_ambientwqc_heptachlor80.pdf

Appendix I.
Laboratory Analysis Reports
&
SWCD Routine Surface Water Monitoring Field Sheets

Appendix II.
Pesticide Sampling

Fall Pesticide Sampling

As described in the monitoring plan, the Clackamas Water Quality Monitoring Program includes a test for pesticides following a fall and spring storm event. After discussions with Josh Seed of DEQ, it was decided to sample following a couple of days of rain allowing the soil to reach field capacity before sampling. Hydrographs were monitored from several USGS sites on the Clackamas River. On October 25, 2010 conditions seemed to be optimal for the first field runoff to be occurring. Water samples were collected and analyzed for Pesticides and Polychlorinated Biphenyls (EPA method 508.1), Semi-volatile Organics (EPA method 525.2) and Organophosphorus Pesticides (EPA method 8141). Duplicate samples and blanks were processed along with samples from each location. An unfortunate accident at the laboratory caused the samples prepared for Organochlorine pesticides (EPA method 8081B) analysis not to be run.

The Oregon Department of Agriculture was consulted following report of the laboratory problem and it was determined that a second collection of water samples to be run for Organochlorine pesticides (EPA method 8081B) would take place on another heavy precipitation event. As a result a second pesticide sampling period was carried on December 28, 2010 following a significant winter storm.

Following the October 25, 2010 storm event, one pesticide, simazine, was detected at 5 of the 10 study site locations. The aquatic life criteria, for this pesticide is "slightly to practically nontoxic to aquatic organisms"[5].

Following the December 28, 2010 storm event pesticides were detected using the EPA method 8081B at all 10 of the sampling locations. Recommended benchmarks and standards were exceeded at all 10 sampling locations.

Note that Isophorone was detected in the field blank at 0.78 µg/L (no accepted standard for aquatic life) in the October 25, 2010 sampling event. Also, gamma-BHC (Lindane) was detected in the field blank at 0.0007 µg/L (<0.95 µg/L).

Site 1 (Richey/NF Deep Cr.):

Date: Oct 25, 2010
Pesticide detected: Simazine
Criteria: "Slightly to practically nontoxic to aquatic organisms"[5]
Discussion: Simazine was detected at 0.080 µg/L.

Date: Dec 28, 2010
Pesticide detected: Aldrin
Criteria: < 3.0
Discussion: Aldrin was detected at 0.0006 µg/L which does not exceed the criteria for aquatic organisms.

Date: Dec 28, 2010
Pesticide detected: Chlorpyrifos
Criteria: < 0.041 [2]
Discussion: Chlorpyrifos was detected at 0.028 µg/L which does not exceed the criteria for aquatic organisms.

Date: Dec 28, 2010
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at 0.0061 µg/L, which exceeds the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: Endosulfane Sulfate
Criteria: No accepted standard for aquatic life
Discussion: Endosulfane Sulfate was detected at 0.0043 µg/L.

Date: Dec 28, 2010
Pesticide detected: 4,4 DDE
Criteria: < 0.001 [4]
Discussion: 4,4 DDE was detected at 0.0061 µg/L. The detected value exceeds the recommended freshwater criterion.

Date: Dec 28, 2010
Pesticide detected: 2,4-DDT
Criteria: No accepted standard for aquatic life
Discussion: 2,4-DDT was detected at 0.0014 µg/L.

Date: Dec 28, 2010
Pesticide detected: trans-Nonachlor
Criteria: No accepted standard for aquatic life
Discussion: trans-Nonachlor was detected at 0.0006 µg/.

Date: Dec 28, 2010
Pesticide detected: 4,4 DDD
Criteria: < 0.001 [4]
Discussion: 4,4 DDD was detected at 0.0005 µg/L. The detected value exceeds the recommended freshwater aquatic life criteria benchmark.

Site 2: (Hwy 212/ NF Deep Cr.)

Date: Oct 25, 2010
Pesticide detected: Simazine
Criteria: "Slightly to practically nontoxic to aquatic organisms"[5]
Discussion: Simazine was detected at 0.092 µg/L.

Date: Dec 28, 2010
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at 0.014 µg/L, which is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: 4,4 DDE
Criteria: < 0.001 [4]
Discussion: 4,4 DDE was detected at 0.021 µg/L The detected value exceeds the recommended freshwater criteria.

Date: Dec 28, 2010
Pesticide detected: Chlorpyrifos
Criteria: < 0.041 [2]
Discussion: Chlorpyrifos was detected at 0.0048 µg/L exceeds the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: Endosulfane Sulfate
Criteria: No accepted standard for aquatic life
Discussion: Endosulfane Sulfate was detected at 0.0052 µg/L.

Date: Dec 28, 2010
Pesticide detected: Endosulfan II
Criteria: < 0.056 [2]
Discussion: Endosulfan II was detected at 0.0008 µg/L, below the DEQ recommended level.

Date: Dec 28, 2010
Pesticide detected: trans-Nonachlor
Criteria: No accepted standard for aquatic life
Discussion: trans-Nonachlor was detected at 0.0019 µg/.

Date: Dec 28, 2010
Pesticide detected: Endrin Aldehyde
Criteria: No accepted standard for aquatic life
Discussion: Endrin Aldehyde was detected at 0.0026 µg/L.

Date: Dec 28, 2010
Pesticide detected: 4,4 DDT.
Criteria: < 0.001 [4]
Discussion: 4,4 DDT was detected at 0.024 µg/L. The greatly exceeds the recommended freshwater criterion.

Date: Dec 28, 2010
Pesticide detected: 2,4-DDT
Criteria: No accepted standard for aquatic life
Discussion: 2,4-DDT was detected at 0.0058 µg/L.

Date: Dec 28, 2010
Pesticide detected: 2,4-DDD
Criteria: No accepted standard for aquatic life
Discussion: 2,4-DDD was detected at 0.0020 µg/L

Date: Dec 28, 2010
Pesticide detected: 4,4 DDD.
Criteria: < 0.001 [4]
Discussion: 4,4 DDD was detected at 0.013 µg/L and exceeds the recommended freshwater criterion.

Site 3: (312th/Dolan Cr.)

Date: Dec 28, 2010
Pesticide detected: Simazine
Criteria: "Slightly to practically nontoxic to aquatic organisms"[5]
Discussion: Simazine was detected at 0.11 µg/L.

Date: Dec 28, 2010
Pesticide detected: gamma-BHC (Lindane)
Criteria: < 0.95[4]
Discussion: gamma-BHC (Lindane) was detected at 0.0009 µg/L is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: 4,4 DDE & 4,4 DDT.
Criteria: < 0.001 [4]
Discussion: 4,4 DDE was detected at 0.0085 µg/L & 4,4 DDT was detected at 0.011 µg/L, both greatly exceeding the recommended freshwater criteria.

Date: Dec 28, 2010
Pesticide detected: Chlorpyrifos
Criteria: < 0.041 [2]
Discussion: Chlorpyrifos was detected at 0.0023 µg/L is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at 0.015 µg/L, which is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: Endrin Aldehyde
Criteria: No accepted standard for aquatic life
Discussion: Endrin Aldehyde was detected at 0.0021 µg/L.

Date: Dec 28, 2010
Pesticide detected: 2,4-DDT

Criteria: No accepted standard for aquatic life
Discussion: 2,4-DDT was detected at 0.002 µg/L.

Site 4: (Brooks/Doane Cr.)

Date: Oct 25, 2010
Pesticide detected: Simazine
Criteria: "Slightly to practically nontoxic to aquatic organisms"[5]
Discussion: Simazine was detected at 0.12 µg/L.

Date: Dec 28, 2010
Pesticide detected: gamma-BHC (Lindane)
Criteria: < 0.95[4]
Discussion: gamma-BHC (Lindane) was detected at 0.0013 µg/L is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: Endosulfane Sulfate
Criteria: No accepted standard for aquatic life
Discussion: Endosulfane Sulfate was detected at 0.0024 µg/L.

Date: Dec 28, 2010
Pesticide detected: 2,4-DDT
Criteria: No accepted standard for aquatic life
Discussion: 2,4-DDT was detected at 0.0036 µg/L.

Date: Dec 28, 2010
Pesticide detected: Chlorpyrifos
Criteria: < 0.041 [2]
Discussion: Chlorpyrifos was detected at 0.0039 µg/L is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: 4,4 DDE & 4,4 DDT.
Criteria: < 0.001 [4]
Discussion: 4,4 DDE was detected at 0.013 µg/L & 4,4 DDT was detected at 0.02 µg/L, both greatly exceeding the recommended freshwater criteria.

Date: Dec 28, 2010
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at 0.03 µg/L, which is below the recommended DEQ level.

Site 5: (Compton Rd. West)

Date: Dec 28, 2010
Pesticide detected: Oxychlordane
Criteria: No accepted standard for aquatic life
Discussion: Oxychlordane was detected at 0.0006 µg/L.

Date: Dec 28, 2010
Pesticide detected: 2,4-DDT
Criteria: No accepted standard for aquatic life
Discussion: 2,4-DDT was detected at 0.0034 µg/L.

Date: Dec 28, 2010
Pesticide detected: 2,4-DDD
Criteria: No accepted standard for aquatic life
Discussion: 2,4-DDD was detected at 0.0007 µg/L.

Date: Dec 28, 2010
Pesticide detected: Endrin Aldehyde
Criteria: No accepted standard for aquatic life
Discussion: Endrin Aldehyde was detected at 0.0013 µg/L.

Date: Dec 28, 2010
Pesticide detected: Endosulfan II
Criteria: < 0.056 [2]
Discussion: Endosulfan II was detected at 0.0011 µg/L, below the DEQ recommended level.

Date: Dec 28, 2010
Pesticide detected: Chlorpyrifos
Criteria: < 0.041 [2]
Discussion: Chlorpyrifos was detected at 0.0024 µg/L is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: trans-Nonachlor
Criteria: No accepted standard for aquatic life
Discussion: trans-Nonachlor was detected at 0.0006 µg/.

Date: Dec 28, 2010
Pesticide detected: cis-Nonachlor
Criteria: No accepted standard for aquatic life
Discussion: trans-Nonachlor was detected at 0.0038 µg/.

Date: Dec 28, 2010
Pesticide detected: alpha-Chlordane
Criteria: No accepted standard for aquatic life
Discussion: alpha-Chlordane was detected at 0.0061 µg/L.

Date: Dec 28, 2010
Pesticide detected: Chlordane
Criteria: <0.0043
Discussion: Chlordane was detected at 0.088 µg/L exceeding the recommended freshwater criteria.

Date: Dec 28, 2010
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at .03 µg/L, which is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: 4,4 DDE & 4,4 DDT.
Criteria: < 0.001 [4]
Discussion: 4,4 DDE was detected at 0.012 µg/L & 4,4 DDT was detected at 0.016 µg/L, both greatly exceeding the recommended freshwater criteria.

Site 6: (Compton/Dolan)

Date: Oct 25, 2010
Pesticide detected: Simazine
Criteria: "Slightly to practically nontoxic to aquatic organisms"[5]
Discussion: Simazine was detected at 0.10 µg/L.

Date: Dec 28, 2010
Pesticide detected: Chlorpyrifos
Criteria: < 0.041 [2]
Discussion: Chlorpyrifos was detected at 0.0006 µg/L is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: 2,4-DDT
Criteria: No accepted standard for aquatic life
Discussion: 2,4-DDT was detected at 0.0006 µg/L.

Date: Dec 28, 2010
Pesticide detected: Endrin Aldehyde
Criteria: No accepted standard for aquatic life
Discussion: Endrin Aldehyde was detected at 0.0007 µg/L.

Date: Dec 28, 2010
Pesticide detected: 4,4 DDE & 4,4 DDT.
Criteria: < 0.001 [4]

Discussion: 4,4 DDE was detected at 0.0031 µg/L & 4,4 DDT was detected at 0.0031 µg/L, both exceeding the recommended freshwater criteria.

Site 8: (Langensand/Tickle Cr.)

Date: Dec 28, 2010
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at .0005 µg/L, which is below the recommended DEQ level.

Site 9: (Trubel/Tickle Cr.)

Date: Dec 28, 2010
Pesticide detected: Endosulfan II
Criteria: < 0.056 [2]
Discussion: Endosulfan II was detected at 0.0012 µg/L which is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at .0012 µg/L, which is below the recommended DEQ level.

Site 10: (Tickle Cr/Tickle Cr.)

Date: Dec 28, 2010
Pesticide detected: 4,4 DDT.
Criteria: < 0.001 [4]
Discussion: 4,4 DDT was detected at 0.0027 µg/L, exceeding the recommended freshwater criterion.

Date: Dec 28, 2010
Pesticide detected: Chlorpyrifos
Criteria: < 0.041 [2]
Discussion: Chlorpyrifos was detected at 0.0034 µg/L is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at .0012 µg/L, which is below the recommended DEQ level.

Date: Dec 28, 2010
Pesticide detected: Endrin Aldehyde
Criteria: No accepted standard for aquatic life
Discussion: Endrin Aldehyde was detected at 0.0013 µg/L.

Date: Dec 28, 2010
Pesticide detected: 2,4-DDD
Criteria: No accepted standard for aquatic life
Discussion: 2,4-DDD was detected at 0.0007 µg/L.

Spring Pesticide Sampling

As described in the monitoring plan, the Clackamas Water Quality Monitoring Program includes a test for pesticides following a fall and spring storm event. After discussions with Josh Seed of DEQ, it was decided to sample following a couple of days of rain allowing the soil to reach field capacity before sampling. Hydrographs were monitored from several USGS sites on the Clackamas River. We had a surprisingly light rain events at the end of April and during the month of May. We did collect samples on May 31, 2011 however someone at the laboratory preserved all the bottles they received and ruined the samples.

The next available date to sample was June 20, 2011. We had a light rain, but not a true runoff event. Water samples were collected and analyzed for Pesticides and Polychlorinated Biphenyls (EPA method 508.1), Semi-volatile Organics (EPA method 525.2) and Organophosphorus Pesticides (EPA method 8141). Duplicate samples and blanks were processed along with samples from each location.

Below you will find the report of all samples that contained detectable levels of pesticides.

Site 1 (Richey/NF Deep Cr.):

Date: June 30, 2011
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at 0.0015 µg/L, which is below the recommended DEQ level.

Date: June 30, 2011
Pesticide detected: Aldrin
Criteria: < 3.0
Discussion: Aldrin was detected at 0.00072 µg/L which does not exceed the criteria for aquatic organisms.

Date: June 30, 2011
Pesticide detected: 4,4 DDE
Criteria: < 0.001 [4]
Discussion: 4,4 DDE was detected at 0.008 µg/L. The detected value exceeds the recommended freshwater criterion.

Date: June 30, 2011

Pesticide detected: alpha-BHC
Criteria: No accepted standard for aquatic life
Discussion: alpha-BHC was detected at 0.00058 µg/L.

Site 2: (Hwy 212/ NF Deep Cr.)

Date: June 30, 2011
Pesticide detected: 4,4 DDE
Criteria: < 0.001 [4]
Discussion: 4,4 DDE was detected at 0.0078 µg/L. The detected value exceeds the recommended freshwater criterion.

Date: June 30, 2011
Pesticide detected: Aldrin
Criteria: < 3.0
Discussion: Aldrin was detected at 0.00065 µg/L which does not exceed the criteria for aquatic organisms.

Date: June 30, 2011
Pesticide detected: alpha-BHC
Criteria: No accepted standard for aquatic life
Discussion: alpha-BHC was detected at 0.00067 µg/L.

Date: June 30, 2011
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at 0.0017 µg/L, which is below the recommended DEQ level.

Date: June 30, 2011
Pesticide detected: Endosulfane Sulfate
Criteria: No accepted standard for aquatic life
Discussion: Endosulfane Sulfate was detected at 0.0021 µg/L.

Date: June 30, 2011
Pesticide detected: Heptachlor
Criteria: No accepted standard for aquatic life
Discussion: Heptachlor was reported at 0.0023 µg/L.

Site 3: (312th/Dolan Cr.)

Date: June 30, 2011
Pesticide detected: 4,4 DDT
Criteria: < 0.001 [4]
Discussion: 4,4 DDT was detected at 0.0011µg/L. The detected value is below the recommended DEQ level.

Date: June 30, 2011
Pesticide detected: Chlorpyrifos
Criteria: < 0.041 [2]
Discussion: Chlorpyrifos was detected at 0.0028 µg/L is below the recommended DEQ level.

Date: June 30, 2011
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at 0.0026 µg/L, which is below the recommended DEQ level.

Date: June 30, 2011
Pesticide detected: Heptachlor
Criteria: No accepted standard for aquatic life
Discussion: Heptachlor was reported at 0.0022 µg/L.

Site 4: (Brooks/Doane Cr.)

Date: June 30, 2011
Pesticide detected: Chlorpyrifos
Criteria: < 0.041 [2]
Discussion: Chlorpyrifos was detected at 0.0051 µg/L is below the recommended DEQ level.

Date: June 30, 2011
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at 0.0027 µg/L, which is below the recommended DEQ level.

Site 5: (Compton Rd. West)

Date: June 30, 2011
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at 0.00083 µg/L, which is below the recommended DEQ level.

Date: June 30, 2011
Pesticide detected: trans-Nonachlor
Criteria: No accepted standard for aquatic life
Discussion: trans-Nonachlor was detected at 0.00064 µg/.

Site 10: (Tickle Cr/Tickle Cr.)

Date: June 30, 2011
Pesticide detected: 4,4 DDE
Criteria: < 0.001 [4]
Discussion: 4,4 DDE was detected at 0.0021µg/L. The detected value exceeds the recommended DEQ level.

Date: June 30, 2011
Pesticide detected: Chlorpyrifos
Criteria: < 0.041 [2]
Discussion: Chlorpyrifos was detected at 0.0063 µg/L is below the recommended DEQ level.

Date: June 30, 2011
Pesticide detected: Dieldrin
Criteria: < 0.056 [2]
Discussion: Dieldrin was reported at 0.0099 µg/L, which is below the recommended DEQ level.

Date: June 30, 2011
Pesticide detected: Endosulfane Sulfate
Criteria: No accepted standard for aquatic life
Discussion: Endosulfane Sulfate was detected at 0.0054 µg/L.

Date: June 30, 2011
Pesticide detected: Isophorone
Criteria: No accepted standard for aquatic life
Discussion: Isophorone was detected at 0.38 µg/L.

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