

Establishing and Monitoring Stream Stabilization Practices for Water Quality Enhancement

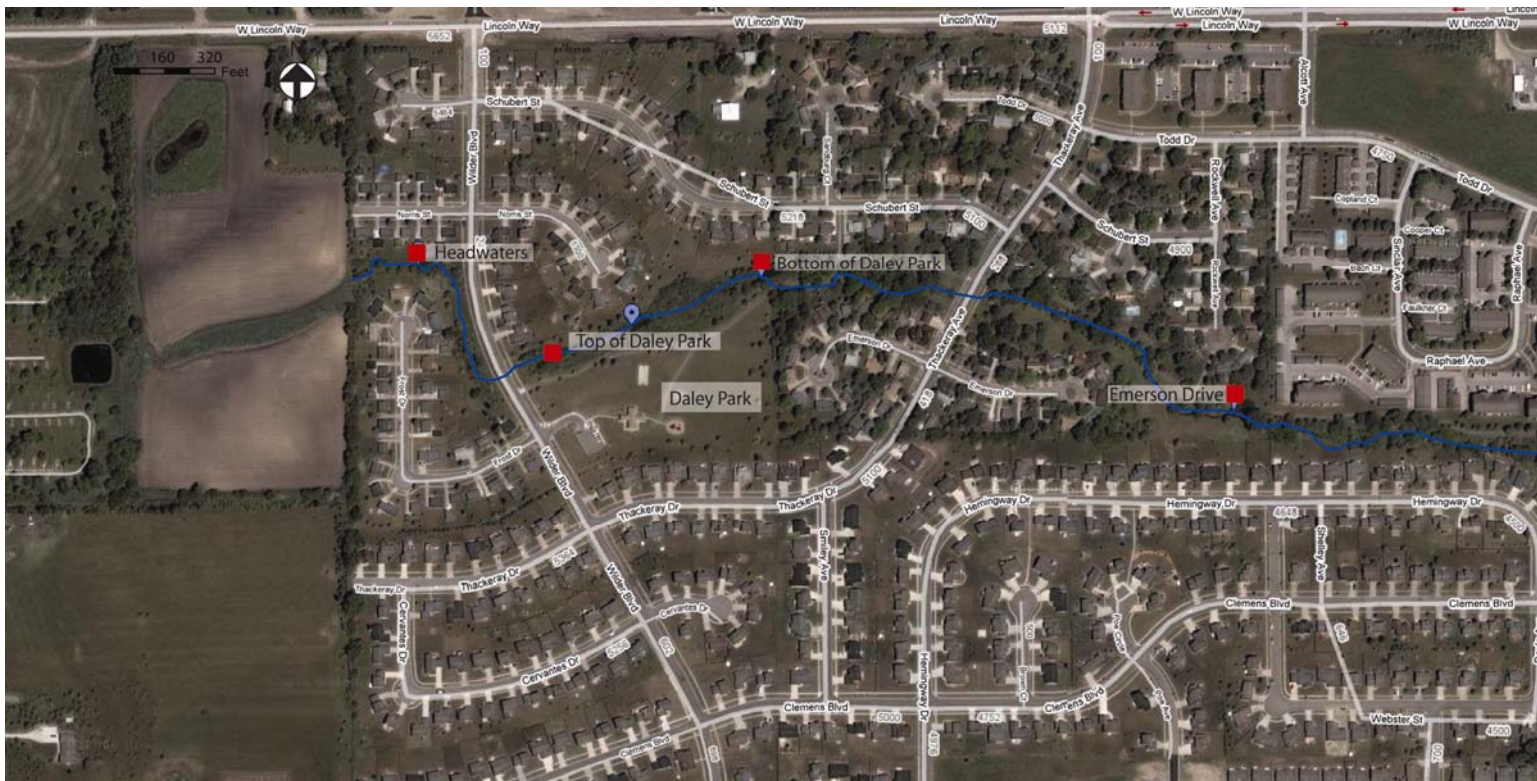
Surface Water Quality Monitoring Final Report

College Creek 2008 – 2010
City of Ames

Four sample sites in the WIRB project area were monitoring seasonally for the three grant years (see map below). Sample sites (from upstream to downstream) include:

- Headwaters site – slightly downstream of rural tile drain; also the location where College Creek first becomes an open channel
- Top of Daley Park site – slightly east of intersection of Wilder Avenue and College Creek; also the upper end of the Daley Park wetland
- Bottom of Daley Park site – slightly east and downstream of the Daley Park wetland area
- Emerson Drive site – East of Thackeray and behind Emerson Drive and Rockwell Circle

Samples were collected and analysis on a near-monthly basis for the duration of the WIRB grant. Samples were not collected during the 2010 summer construction duration. Monitoring included: total phosphorus, ortho phosphorus, total nitrogen, ammonia, total suspended solids, alkalinity, coliform bacteria, E. coli bacteria, pH, and dissolved oxygen. Table results for each pollutant are included as well as graphs for total phosphorus, ortho phosphorus, total nitrogen, E.coli, pH, and dissolved oxygen. Graphed pollutants are compared to established standards as noted.

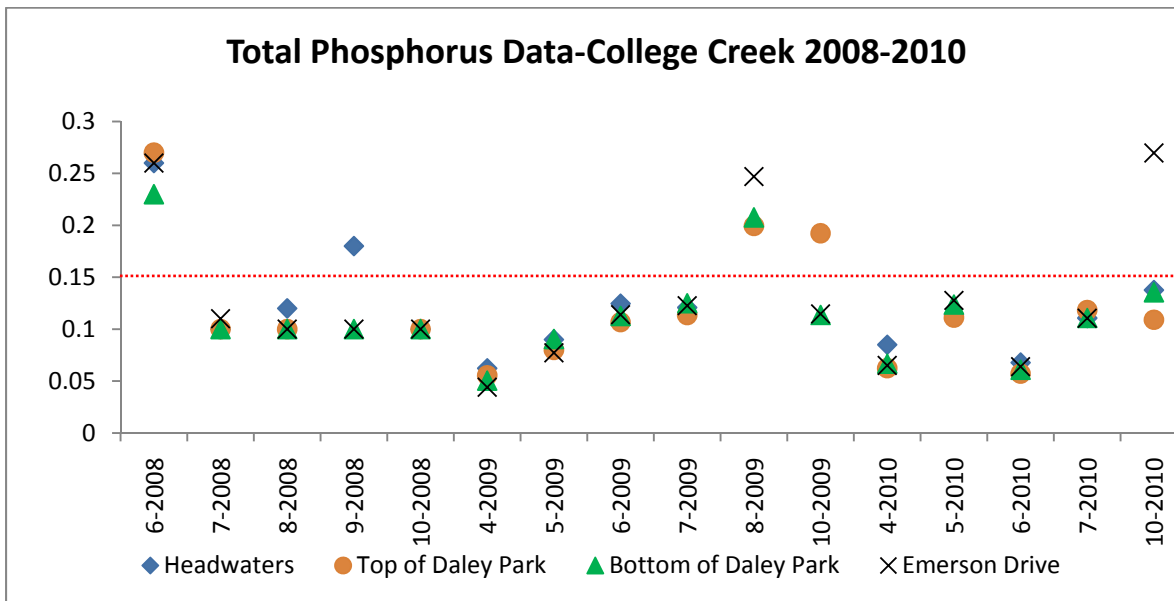


College Creek Monitoring Site Map (2008 – 2010).

Establishing and Monitoring Stream Stabilization Practices for Water Quality Enhancement

Total Phosphorus

Total P (mg/L)		Headwaters	Top of Daley Park	Bottom of Daley Park	Emerson Drive	
2008	6-2008	0.26	0.27	0.23	0.26	
	7-2008	0.1	0.1	0.1	0.11	
	8-2008	0.12	0.1	0.1	0.1	
	9-2008	0.18	0.37	0.1	0.1	
	10-2008	0.1	0.1	0.1	0.1	
2009	3-2009					
	4-2009	0.06	0.06	0.05	0.04	
	5-2009	0.09	0.08	0.09	0.08	
	6-2009	0.12	0.11	0.11	0.11	
	7-2009	0.12	0.11	0.12	0.12	
	8-2009	0.35	0.20	0.21	0.25	
	9-2009					
	10-2009	0.34	0.19	0.11	0.11	
	2010	3-2010				
		4-2010	0.09	0.06	0.07	0.06
5-2010		0.11	0.11	0.12	0.13	
6-2010		0.07	0.06	0.06	0.06	
7-2010		0.11	0.12	0.11	0.11	
10-2010		0.14	0.11	0.14	0.27	



*Total phosphorus results compared to 0.15 mg/l standard

Establishing and Monitoring Stream Stabilization Practices for Water Quality Enhancement

Ortho P (SRP as mg/L)

		Headwaters	Top of Daley Park	Bottom of Daley Park	Emerson Drive	
2008	6-2008	0.23	0.22	0.22	0.20	
	7-2008	0.07	0.06	0.08	0.07	
	8-2008	0.08	0.07	0.08	0.09	
	9-2008	0.14	0.09	0.08	0.08	
	10-2008	0.06	0.06	0.06	0.07	
2009	3-2009					
	4-2009	0.05	0.04	0.04	0.03	
	5-2009	0.07	0.06	0.06	0.06	
	6-2009	0.09	0.08	0.09	0.09	
	7-2009	0.10	0.09	0.10	0.09	
	8-2009	0.23	0.13	0.13	0.18	
	9-2009	0.00				
	10-2009	0.20	0.07	0.00	0.06	
	2010	3-2010	0.00			
		4-2010	0.07	0.05	0.05	0.05
5-2010		0.09	0.09	0.09	0.09	
6-2010		0.04	0.04	0.04	0.04	
7-2010		0.09	0.09	0.09	0.08	
10-2010		0.11	0.07	0.11	0.20	

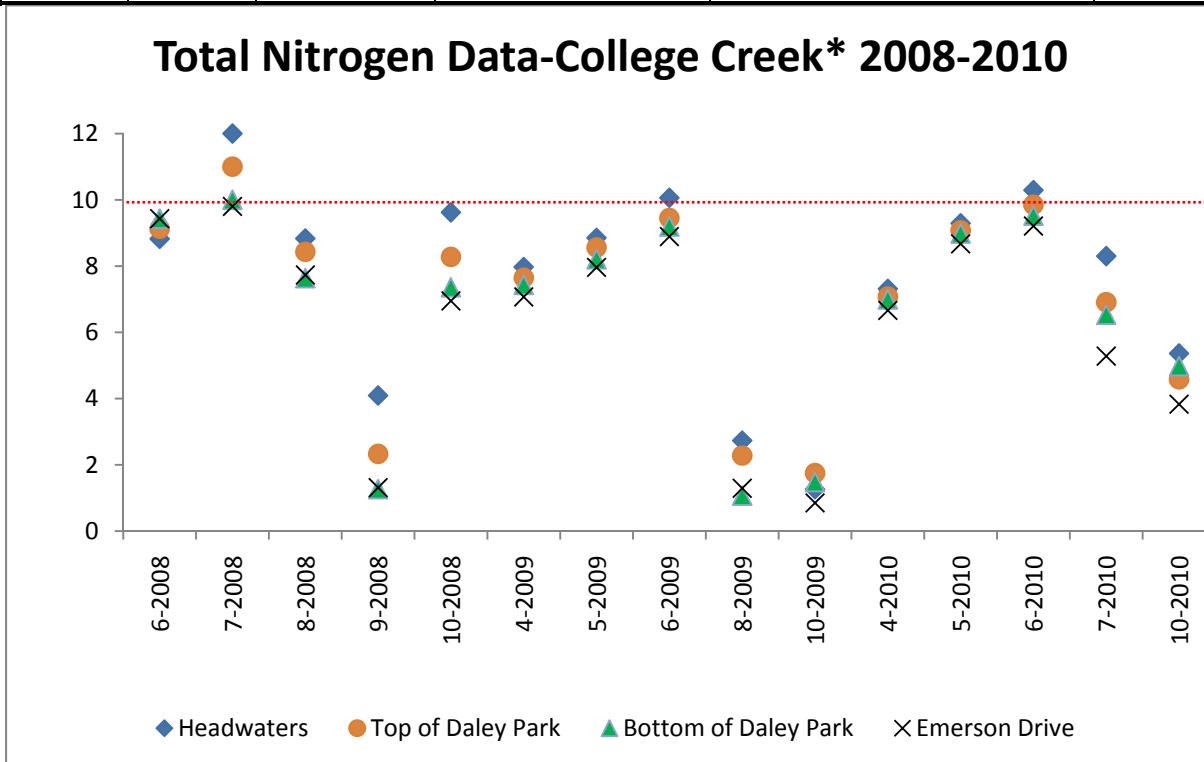
Ammonia (N mg/L)

		Headwaters	Top of Daley Park	Bottom of Daley Park	Emerson Drive	
2008	6-2008	0.1	0.1	0.1	0.1	
	7-2008	0.1	0.1	0.1	0.1	
	8-2008	0.1	0.1	0.1	0.1	
	9-2008	0.57	0.16	0.15	0.1	
	10-2008	0.1	0.1	0.1	0.1	
2009	3-2009					
	4-2009	0.03	0.03	0.04	0.04	
	5-2009	0.03	0.03	0.12	0.1	
	6-2009	0.03	0.03	0.07	0.04	
	7-2009	0.03	0.03	0.19	0.12	
	8-2009	0.12	0.06	1	0.13	
	9-2009					
	10-2009	0.35	0.03	2.15	0.31	
	2010	3-2010				
		4-2010	0.03	0.03	0.12	0.03
5-2010		0.03	0.04	0.05	0.04	
6-2010		0.03	0.09	0.2	0.1	
7-2010		0.03	0.03	0.11	0.08	
10-2010		0.11	0.15	0.17	0.17	

Establishing and Monitoring Stream Stabilization Practices for Water Quality Enhancement

Total N (mg/L)

		Headwaters	Top of Daley Park	Bottom of Daley Park	Emerson Drive	
2008	6-2008	8.82	9.13	9.43	9.43	
	7-2008	12	11.00	10.00	9.80	
	8-2008	8.83	8.43	7.63	7.73	
	9-2008	4.09	2.33	1.27	1.31	
	10-2008	9.62	8.28	7.36	6.95	
2009	3-2009					
	4-2009	7.97	7.65	7.43	7.07	
	5-2009	8.85	8.56	8.2	7.96	
	6-2009	10.06	9.45	9.19	8.89	
	7-2009					
	8-2009	2.73	2.28	1.07	1.29	
	9-2009					
	10-2009	1.26	1.75	1.48	0.85	
	2010	3-2010				
		4-2010	7.31	7.08	6.99	6.66
5-2010		9.29	9.08	8.98	8.67	
6-2010		10.29	9.85	9.52	9.21	
7-2010		8.3	6.91	6.53	5.28	
8-2010						
9-2010						
10-2010		5.36	4.58	4.98	3.83	



*Total nitrogen results compared to Iowa DNR Class C standard of 10.0 mg/l

Establishing and Monitoring Stream Stabilization Practices for Water Quality Enhancement

Sediment (TSS in mg/L)

		Headwaters	Top of Daley Park	Bottom of Daley Park	Emerson Drive
2008	6-2008	20	18.00	16.00	46.00
	7-2008	7.3	3.7	6.3	3.8
	8-2008	4	3.40	8.00	5.10
	9-2008	5.5	65.00	14.00	3.90
	10-2008	15	8.70	8.40	2.60
2009	3-2009				
	4-2009	4.4	4.9	4	2.2
	5-2009	18.3	6.5	3.8	3.9
	6-2009	21.3	15.6	6.5	7.6
	7-2009	7.1	9.3	11.1	8.6
	8-2009	36.4	16.9	6.3	28.8
	9-2009				
	10-2009	19	8	5	4
2010	3-2010				
	4-2010	3	3	16	9
	5-2010	24	15	18	19
	6-2010	22	1	<1	8
	7-2010	68	6	6	9
	10-2010	14	36	22	17

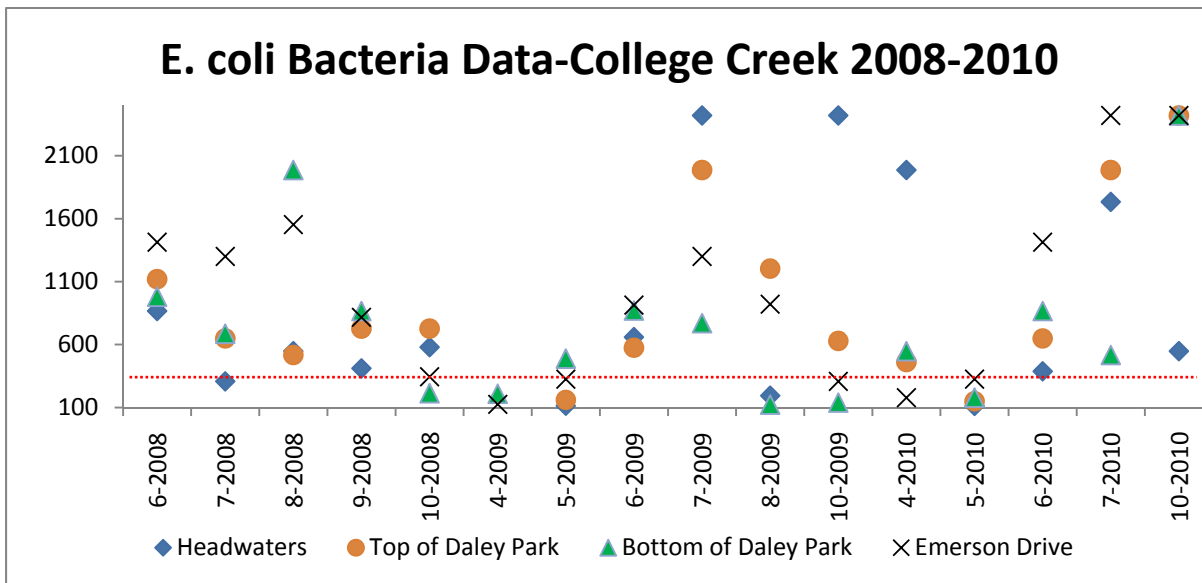
Akalinity (mg/L as CaCO₃)

		Headwaters	Top of Daley Park	Bottom of Daley Park	Emerson Drive
2008	6-2008	177	187	161	198
	7-2008	281	284	289	198
	8-2008	298	304	302	305
	9-2008	368	349	358	350
	10-2008	340	345	354	345
2009	3-2009				
	4-2009	334.7	334.8	336.3	339.8
	5-2009	317.55	327.6	330.7	334
	6-2009	313.6	310	364.2	308.6
	7-2009	333	339.1	336.3	338.4
	8-2009	377.3	362.1	361.5	312.45
	9-2009				
	10-2009	446.8	417.7	413.4	400.3
2010	3-2010				
	4-2010	294.1	295.9	296.5	300.9
	5-2010	244.6	242.6	243.8	248.3
	6-2010	290.5	293.9	285.3	288.7
	7-2010	283	282	263.5	222.2
	10-2010	293.7	251.7	294.2	200.9

Establishing and Monitoring Stream Stabilization Practices for Water Quality Enhancement

E. coli (MPN/100mL)

		Headwaters	Top of Daley Park	Bottom of Daley Park	Emerson Drive
2008	6-2008	866.4	1119.9	980.4	1413.6
	7-2008	307.6	648.8	686.7	1299.7
	8-2008	547.5	517.2	1986.3	1553.1
	9-2008	410.6	727	866.4	816.4
	10-2008	579.4	727	214.3	344.1
2009	4-2009	14.4		209.8	125
	5-2009	113.7	160.7	488.4	325.5
	6-2009	658.6	574.8	870.4	913.9
	7-2009	2419.6	1986.3	770.1	1299.7
	8-2009	193.5	1203.3	123.6	920.8
	9-2009				
	10-2009	2419.6	629.4	139.6	307.6
2010	3-2010				
	4-2010	1986.3	461.1	547.5	178.2
	5-2010	112.6	150	178.9	325.5
	6-2010	387.3	648.8	866.4	1413.6
	7-2010	1732.9	1986.3	517.2	2419.6
	10-2010	547.5	2419.6	2419.6	2419.6



*E. coli results compared to Iowa DNR Class A3 (Children's Recreational Use) standard of 235

Establishing and Monitoring Stream Stabilization Practices for Water Quality Enhancement

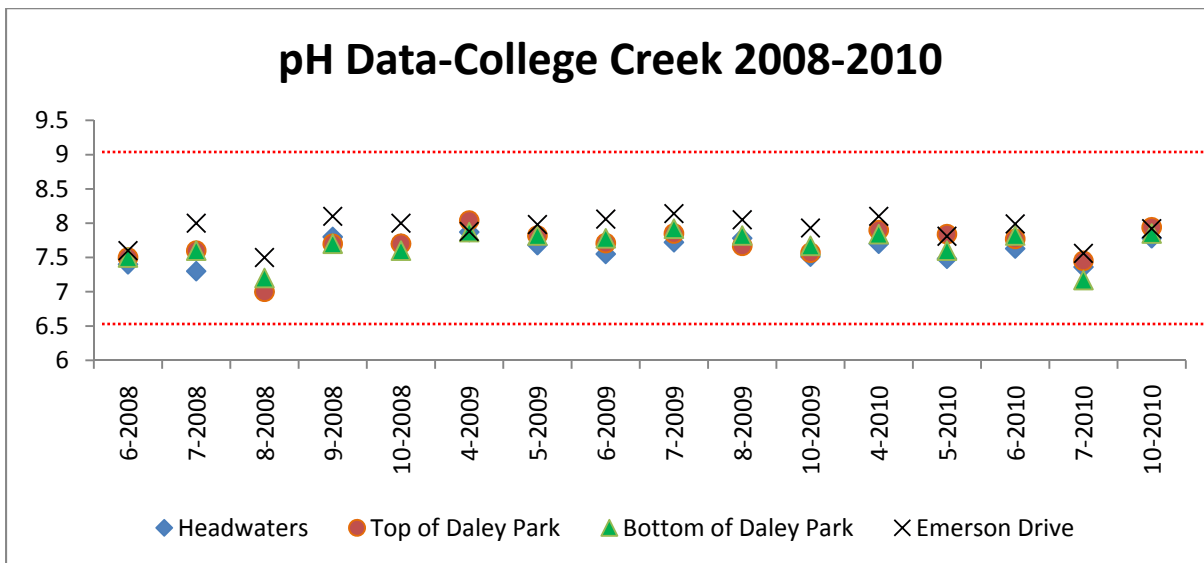
Coliforms (MPN/100mL)

		Headwaters	Top of Daley Park	Bottom of Daley Park	Emerson Drive
2008	6-2008	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	7-2008	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	8-2008	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	9-2008	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	10-2008	> 2419.6	> 2419.6	> 2419.6	> 2419.6
2009	4-2009	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	5-2009	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	6-2009	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	7-2009	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	8-2009	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	9-2009	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	10-2009	> 2419.6	> 2419.6	> 2419.6	> 2419.6
2010	3-2010	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	4-2010	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	5-2010	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	6-2010	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	7-2010	> 2419.6	> 2419.6	> 2419.6	> 2419.6
	10-2010	> 2419.6	> 2419.6	> 2419.6	> 2419.6

Establishing and Monitoring Stream Stabilization Practices for Water Quality Enhancement

pH

		Headwaters	Top of Daley Park	Bottom of Daley Park	Emerson Drive
2008	6-2008	7.4	7.5	7.5	7.6
	7-2008	7.3	7.6	7.6	8
	8-2008	7	7	7.2	7.5
	9-2008	7.8	7.7	7.7	8.1
	10-2008	7.7	7.7	7.6	8
2009	3-2009				
	4-2009	7.87	8.04	7.87	7.88
	5-2009	7.68	7.82	7.82	7.98
	6-2009	7.55	7.71	7.78	8.06
	7-2009	7.72	7.85	7.92	8.14
	8-2009	7.78	7.67	7.82	8.05
	9-2009				
	10-2009	7.51	7.57	7.67	7.93
	2010	3-2010			
4-2010		7.7	7.9	7.84	8.1
5-2010		7.48	7.84	7.6	7.81
6-2010		7.63	7.77	7.82	7.99
7-2010		7.36	7.45	7.17	7.56
10-2010		7.78	7.94	7.85	7.92

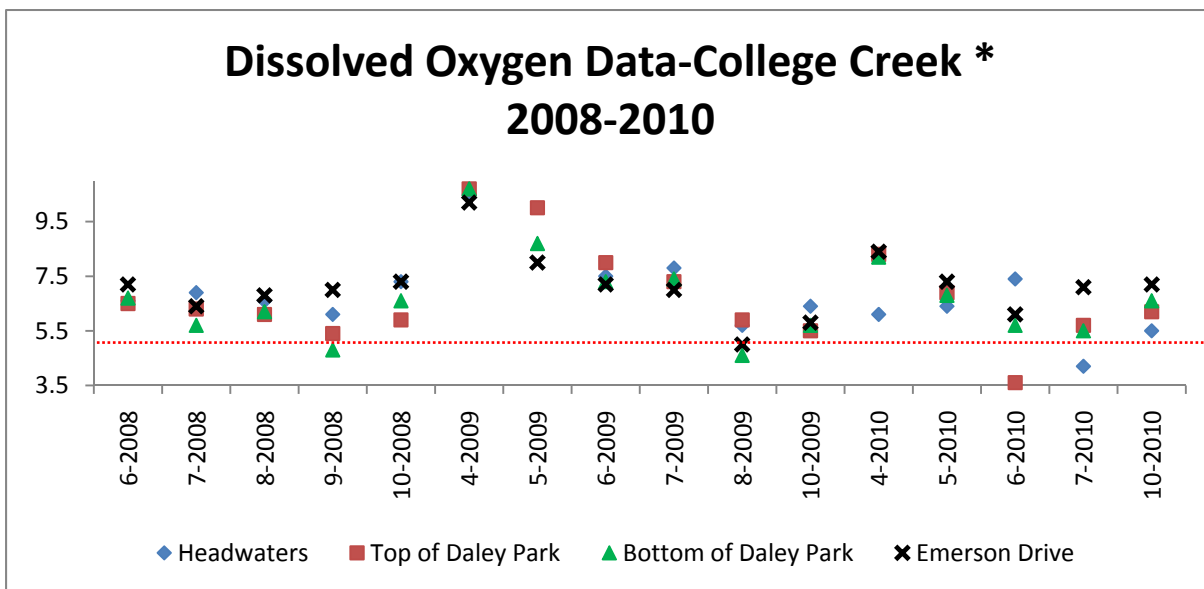


*pH results compared to Iowa DNR standard of not less than 6.5 nor greater than 9.0

Establishing and Monitoring Stream Stabilization Practices for Water Quality Enhancement

Dissolved oxygen mg/L

		Headwaters	Top of Daley Park	Bottom of Daley Park	Emerson Drive	
2008	6-2008	6.6	6.5	6.7	7.2	
	7-2008	6.9	6.3	5.7	6.4	
	8-2008	6.6	6.1	6.2	6.8	
	9-2008	6.1	5.4	4.8	7	
	10-2008	7.3	5.9	6.6	7.3	
2009	3-2009					
	4-2009	10.5	10.7	10.7	10.2	
	5-2009	9.3	10.01	8.7	8	
	6-2009	7.5	8	7.3	7.2	
	7-2009	7.8	7.3	7.4	7	
	8-2009	5.7	5.9	4.6	5	
	9-2009					
	10-2009	6.4	5.5	5.7	5.8	
	2010	3-2010				
		4-2010	6.1	8.3	8.2	8.4
5-2010		6.4	6.9	6.8	7.3	
6-2010		7.4	3.6	5.7	6.1	
7-2010		4.2	5.7	5.5	7.1	
10-2010		5.5	6.2	6.6	7.2	



*Dissolved oxygen results compared to Iowa DNR Class B (WW) standard of 5.0 mg/l