ENGLISH RIVER WATERSHED: WATER QUALITY SNAPSHOTS 2014

Environmental Programs & Services
IOWA SOYBEAN ASSOCIATION

11/1/2014

Summary of Findings

English River Watershed: Water Quality Snapshots 2014

As part of the English River Watershed Management Authority's ongoing effort to develop a comprehensive watershed management plan for the 627 square mile English River watershed the Iowa Soybean Association was hired as a subcontractor to support the planning effort. One of the tasks charged to the Iowa Soybean Association was to conduct three water quality snapshots at approximately twenty locations in the English River Watershed. The Iowa Soybean Association conducted these three water quality snapshots on April 28th, July 17th and October 21st, 2014. This report summarizes the monitoring locations and reports the results from these three snapshots. All samples were collected by Iowa Soybean Association staff and were analyzed in the Iowa Soybean Association's accredited water lab in Ankeny, Iowa.

Site Selection

The Iowa Soybean Association used maps of the English River watershed to select the twenty monitoring locations. The locations are all located at bridge crossings and were selected as close as possible to the outlet of the twenty subwatersheds (HUC-12) which are contained in the larger English River watershed. A listing of the site locations and UTM coordinates is provided in Table 1. A map of the site locations is provided at the end of this report. It should be noted that site ERW1 is the location of the Iowa Department of Natural Resources' single ambient monitoring location in the watershed. Data from this location can be downloaded from the SRORET Database (https://programs.iowadnr.gov/iastoret/), the station ID is 10920001. This location has monthly monitoring results dating back to 1998.

Table 1. Site Locations.

Site Name	UTM X	UTM Y
ERW1	621760.7	4593097.0
ERW2	609271.2	4590957.7
ERW3	609526.0	4591535.3
ERW4	602897.3	4594610.7
ERW5	601802.1	4592576.0
ERW6	597741.6	4593411.9
ERW7	588167.9	4594131.4
ERW8	587940.5	4596736.9
ERW9	579880.6	4600696.1
ERW10	576383.5	4598444.8
ERW11	576353.1	4598011.9
ERW12	571656.7	4590985.0
ERW13	572749.9	4606617.2
ERW14	570648.9	4606018.7
ERW15	561127.1	4608197.1
ERW16	560150.4	4604047.0
ERW17	553053.9	4593967.3
ERW18	552208.2	4593649.7
ERW19	555900.9	4609806.8
ERW20	545386.1	4610691.1

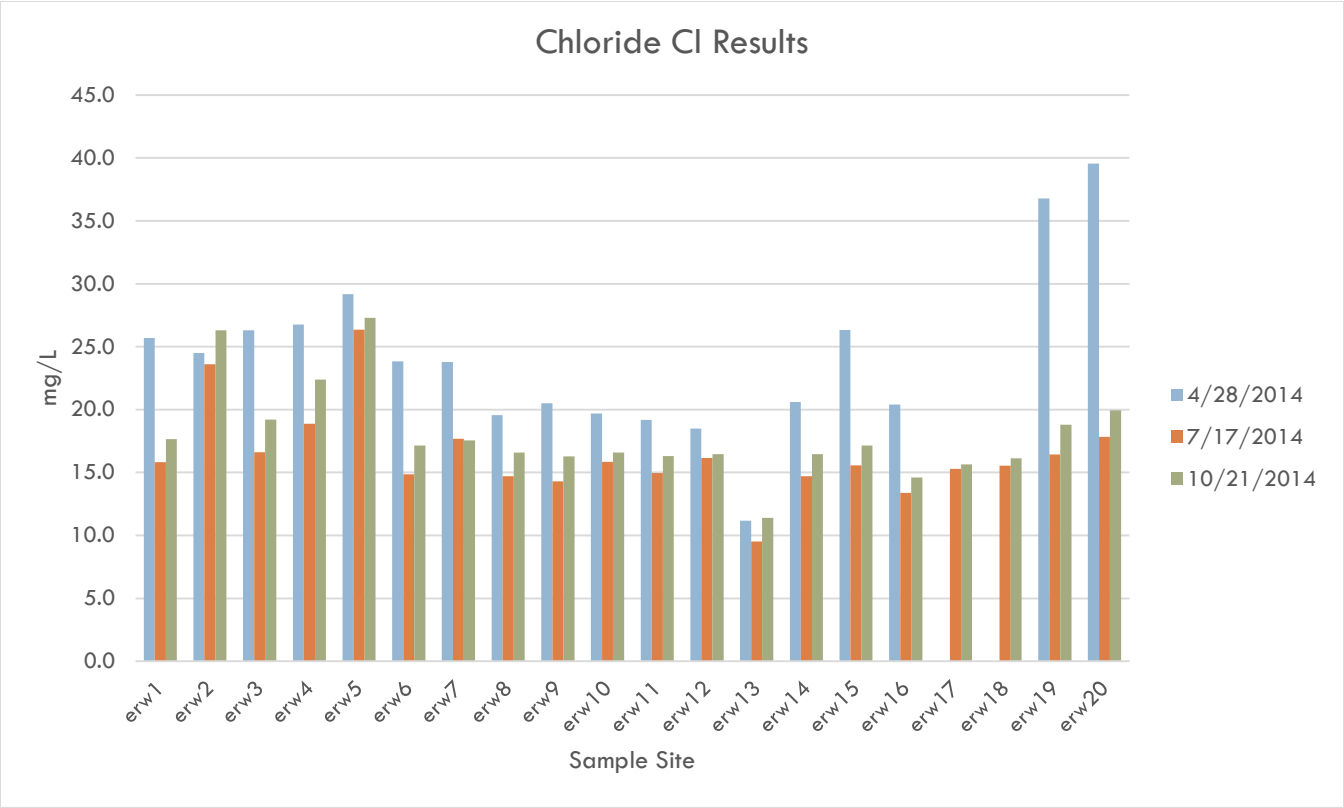
Results

Samples collected by the Iowa Soybean Association were analyzed for chloride, nitrite, nitrate, phosphates, and sulfates. The April 28th sample also was analyzed for turbidity. Since the April 28th samples was the only runoff/event sample this was the only set of samples analyzed for turbidity. Samples were not collected from ERW17 and ERW18 on April 28th due to a severe thunderstorm warning for the area of sample sites.

Chloride

From IOWATER Chemical Assessment guidance document:

Chloride is a chemical found in salts, which tend to dissolve easily in water. In natural waters, elevated levels of chloride may indicate inputs of human or animal waste, or inputs from fertilizers, many of which contain salts. During winter months, elevated chloride levels in streams may occur as a result of road salt runoff to nearby streams. Chloride can be used as a "conservative" measure of water contamination since other natural processes, such as breakdown by bacteria, do not affect it. The amount of chloride dissolved in water is expressed in milligrams per liter of water (mg/L). Average chloride concentrations for Iowa streams range from 16 to 29 mg/L.



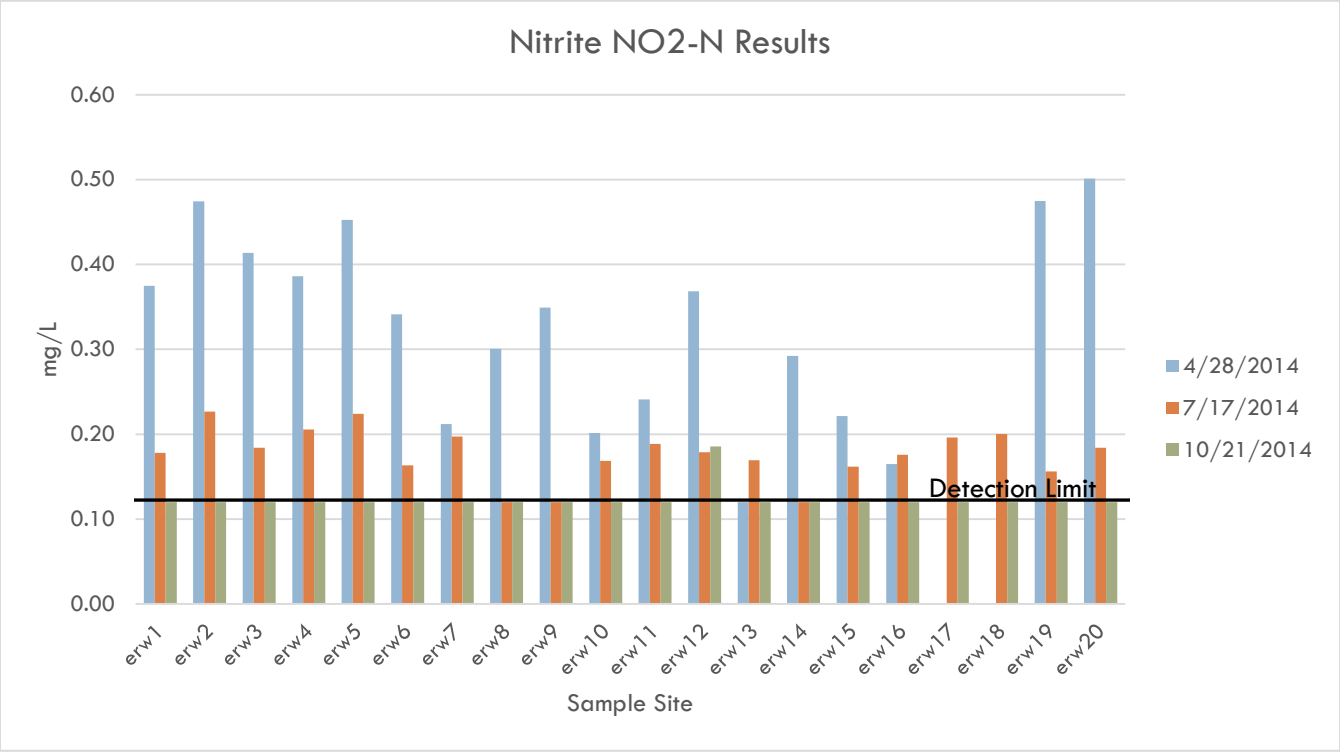
	4/28/2014	7/17/2014	10/21/2014
erw1	25.7	15.8	17.6
erw2	24.5	23.6	26.3
erw3	26.3	16.6	19.2
erw4	26.8	18.9	22.4
erw5	29.2	26.4	27.3
erw6	23.8	14.9	17.2
erw7	23.8	17.7	17.6
erw8	19.6	14.7	16.6
erw9	20.5	14.3	16.3
erw10	19.7	15.8	16.6

	4/28/2014	7/17/2014	10/21/2014
erw11	19.2	15.0	16.3
erw12	18.5	16.2	16.5
erw13	11.2	9.52	11.4
erw14	20.6	14.7	16.5
erw15	26.3	15.6	17.2
erw16	20.4	13.4	14.6
erw17		15.3	15.6
erw18		15.5	16.1
erw19	36.8	16.4	18.8
erw20	39.6	17.8	19.9

Nitrite & Nitrate

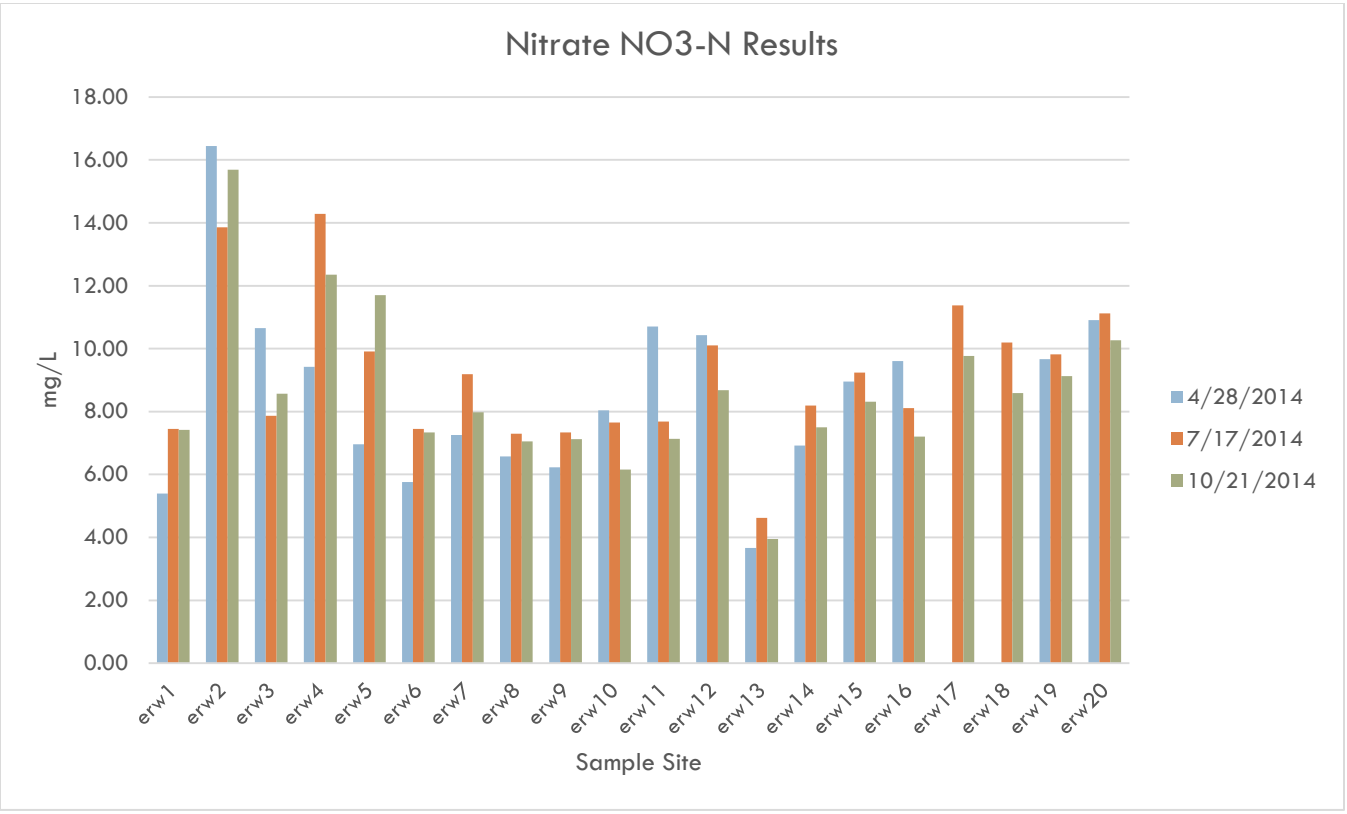
From IOWATER Chemical Assessment guidance document:

Nitrate and nitrite are two forms of nitrogen. Nitrate is very easily dissolved in water and is more common in streams. Sources of nitrate include soil organic matter, animal wastes, decomposing plants, sewage, and fertilizers. Because nitrate is very soluble in water it can move readily into streams. Nitrite is another form of nitrogen that is rare because it is quickly converted to nitrate or returned back to the atmosphere as nitrogen gas. Due to its instability, detectable levels of nitrite in streams and lakes are uncommon. Detectable nitrite levels in streams and lakes may indicate a relatively fresh source of ammonia. The amount of nitrate or nitrite dissolved in water is reported as nitrate-N (nitrate expressed as the element nitrogen) or nitrite-N in milligrams per liter of water (mg/L). Iowa's drinking water standard for nitrate is 10 mg/L as nitrate-N. The concentration of nitrate-N in water may vary greatly depending on season and rainfall, fertilizer application rates, tillage methods, land use practices, soil types, and drainage systems. Consistently high nitrate readings (over 10 mg/L) may be cause for concern and warrant further investigation.



	4/28/2014	7/17/2014	10/21/2014
erw1	0.38	0.18	<0.12
erw2	0.47	0.23	<0.12
erw3	0.41	0.18	<0.12
erw4	0.39	0.21	<0.12
erw5	0.45	0.22	<0.12
erw6	0.34	0.16	<0.12
erw7	0.21	0.20	<0.12
erw8	0.30	<0.12	<0.12
erw9	0.35	<0.12	<0.12
erw10	0.20	0.17	<0.12

	4/28/2014	7/17/2014	10/21/2014
erw11	0.24	0.19	<0.12
erw12	0.37	0.18	0.19
erw13	0.09	0.17	<0.12
erw14	0.29	<0.12	<0.12
erw15	0.22	0.16	<0.12
erw16	0.16	0.18	<0.12
erw17		0.20	<0.12
erw18		0.20	<0.12
erw19	0.47	0.16	<0.12
erw20	0.50	0.18	<0.12



	4/28/2014	7/17/2014	10/21/2014
erw1	5.39	7.45	7.42
erw2	16.4	13.9	15.7
erw3	10.7	7.87	8.57
erw4	9.43	14.3	12.4
erw5	6.96	9.91	11.7
erw6	5.76	7.45	7.34
erw7	7.26	9.19	7.98
erw8	6.57	7.29	7.05
erw9	6.22	7.33	7.12
erw10	8.04	7.65	6.15

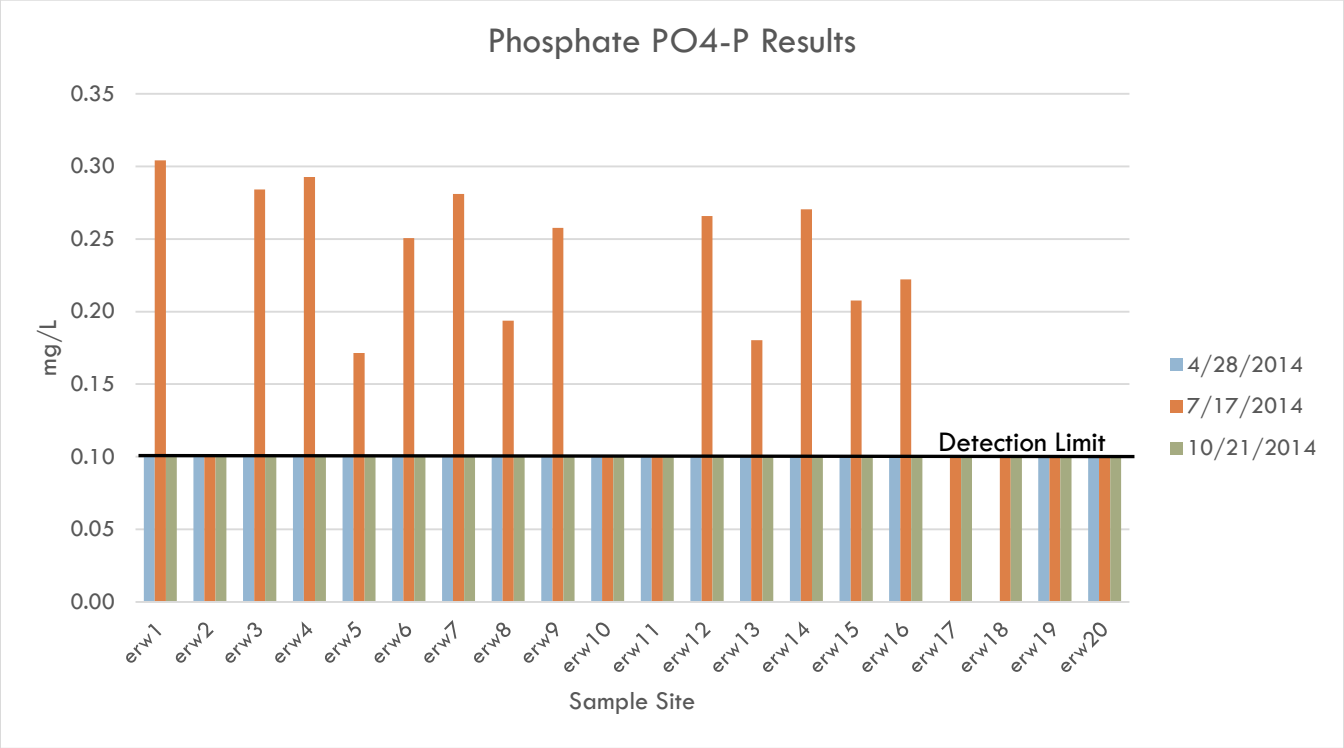
	4/28/2014	7/17/2014	10/21/2014
erw11	10.7	7.68	7.14
erw12	10.4	10.1	8.68
erw13	3.66	4.62	3.94
erw14	6.91	8.19	7.49
erw15	8.95	9.24	8.31
erw16	9.60	8.11	7.20
erw17		11.4	9.77
erw18		10.2	8.58
erw19	9.66	9.81	9.12
erw20	10.9	11.1	10.3

Phosphate

From IOWATER Chemical Assessment guidance document:

Phosphorus is an essential nutrient for plants and animals and is usually present in natural waters attached to sediment, in organic material, and dissolved in the water. Plant growth in surface waters is generally limited by the amount of orthophosphate, the dissolved form of phosphorus, present. It is the simplest form of phosphorus found in natural waters and is most available for plants to use. In most waters, orthophosphate is present in very low concentrations. The amount of phosphate dissolved in water is expressed in milligrams per liter of water (mg/L).

There are natural sources of phosphorus, such as certain soils and rocks, but most elevated levels of phosphorus are caused by human activities. These include human, animal, and industrial wastes, as well as runoff from fertilized lawns and cropland. Excess phosphorus in water speeds up plant growth, causes algal blooms, and can result in low dissolved oxygen, or hypoxic, conditions that can lead to the death of certain fish, invertebrates, and other aquatic animals.



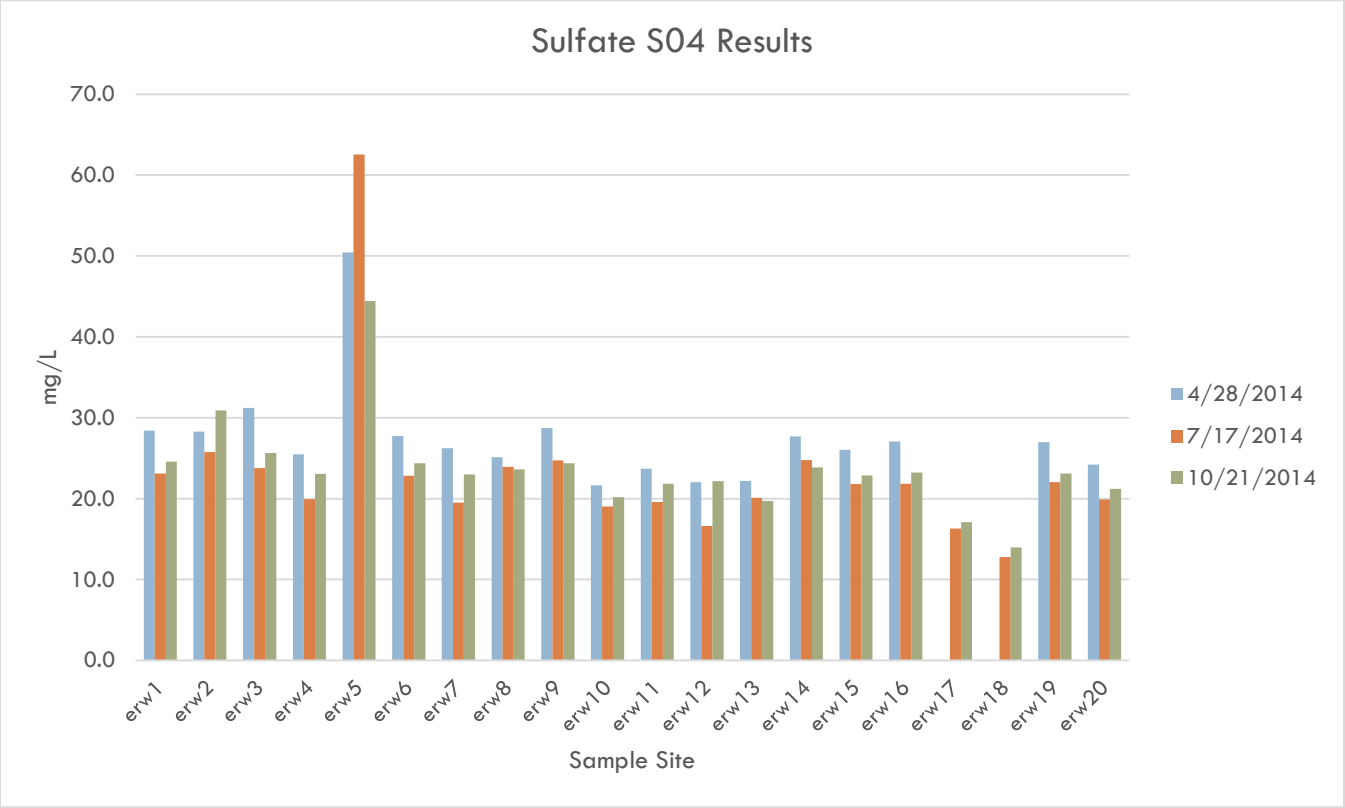
	4/28/2014	7/17/2014	10/21/2014
erw1	<0.10	0.30	<0.10
erw2	<0.10	<0.10	<0.10
erw3	<0.10	0.28	<0.10
erw4	<0.10	0.29	<0.10
erw5	<0.10	0.17	<0.10
erw6	<0.10	0.25	<0.10
erw7	<0.10	0.28	<0.10
erw8	<0.10	0.19	<0.10
erw9	<0.10	0.26	<0.10
erw10	<0.10	<0.10	<0.10

	4/28/2014	7/17/2014	10/21/2014
erw11	<0.10	<0.10	<0.10
erw12	<0.10	0.27	<0.10
erw13	<0.10	0.18	<0.10
erw14	<0.10	0.27	<0.10
erw15	<0.10	0.21	<0.10
erw16	<0.10	0.22	<0.10
erw17		<0.10	<0.10
erw18		<0.10	<0.10
erw19	<0.10	<0.10	<0.10
erw20	<0.10	<0.10	<0.10

Sulfate

From Iowa DNR Fact Sheet on Understanding Iowa's Water Quality Standards:

Sulfate is a constituent of total dissolved solids and may form salts with sodium, potassium, magnesium and other cations. Sulfate is widely distributed in nature and may be present in natural water at concentrations ranging from a few to several hundred milligrams per liter.

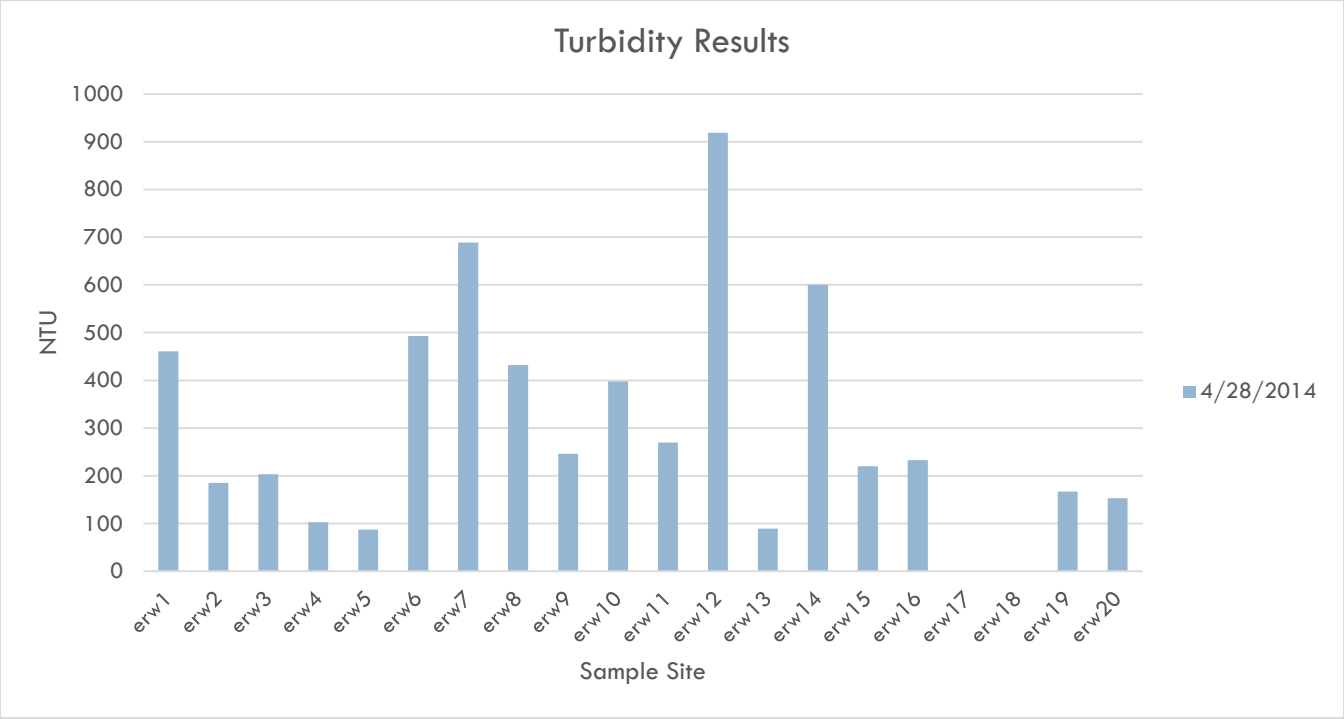


	4/28/2014	7/17/2014	10/21/2014
erw1	28.4	23.1	24.6
erw2	28.3	25.8	30.9
erw3	31.2	23.8	25.6
erw4	25.5	20.0	23.1
erw5	50.4	62.5	44.4
erw6	27.7	22.8	24.4
erw7	26.3	19.5	23.0
erw8	25.1	23.9	23.6
erw9	28.7	24.7	24.4
erw10	21.6	19.0	20.2

	4/28/2014	7/17/2014	10/21/2014
erw11	23.7	19.6	21.8
erw12	22.1	16.6	22.2
erw13	22.2	20.1	19.7
erw14	27.7	24.8	23.9
erw15	26.0	21.8	22.9
erw16	27.1	21.9	23.2
erw17		16.3	17.1
erw18		12.8	14.0
erw19	27.0	22.0	23.1
erw20	24.2	19.9	21.2

Turbidity

Turbidity is a measure of water clarity, the more suspended material in the water the less light is able to pass through a sample of water. Turbidity is measured by how much light is scattered by suspended particles using NTUs or Nephelometric Turbidity Units. Higher turbidity increases water temperatures because suspended particles absorb more heat. This, in turn, reduces the concentration of dissolved oxygen (DO) because warm water holds less DO than cold. Higher turbidity also reduces the amount of light penetrating the water, which reduces photosynthesis and the production of DO. Suspended materials can clog fish gills, reducing resistance to disease in fish, lowering growth rates, and affecting egg and larval development. As the particles settle, they can blanket the stream bottom, especially in slower waters, and smother fish eggs and benthic macroinvertebrates. Sources of turbidity include soil erosion, waste discharge, urban runoff, eroding stream banks, large numbers of bottom feeders (such as carp), which stir up bottom sediments and excessive algal growth (EPA).



	4/28/2014
erw1	461
erw2	185
erw3	203
erw4	103
erw5	87.6
erw6	493
erw7	689
erw8	432
erw9	246
erw10	398

	4/28/2014
erw11	270
erw12	919
erw13	89.1
erw14	600
erw15	220
erw16	233
erw17	
erw18	
erw19	167
erw20	153

Photos

The following photos were taken while conducting water quality monitoring of the English River watershed.

Site 1. 4/28/14

Site 2. 4/28/14

Site 3. 4/28/14

Site 4. 4/28/14

Site 5. 4/28/14

Site 6. 4/28/14

Site 7. 4/28/14

Site 8. 4/28/14

Site 9. 4/28/14

Site 10. 4/28/14

Site 11. 4/28/14

Site 12. 4/28/14

Site 13. 4/28/14

Site 14. 4/28/14

Site 15. 4/28/14

Site 16. 4/28/14

Site 19. 4/28/14

Site 20. 4/28/14

English River Watershed
Monitoring Locations