
SUMMARY OF NR 216 ACTIVITIES 2013-2014

PUBLIC HEALTH MADISON AND DANE COUNTY ENVIRONMENTAL PROTECTION UNIT

BACKGROUND

Public Health Madison and Dane County (PHMDC) has long engaged in a number of activities that link well with the goals of Madison's storm water permit. Two City ordinances, promulgated circa 1975, have been the impetus behind these efforts, Madison General Ordinance (MGO) 7.46 and MGO 7.47.

MGO 7.46 "is designed to prevent any potentially polluting substance from reaching lakes or streams where it can create hazard to health, a nuisance, or produce ecological damage, and to assess responsibility and costs of clean-up to the responsible party". It prohibits releases, discharges, and unsecure storage of potentially polluting substances. Further, the ordinance provides for penalties and assigns enforcement responsibility to PHMDC.

MGO 7.47 requires a discharge license from PHMDC for point-source discharges to the storm sewer system within the City. Its goal is to ensure permitted discharges are of suitable quantity and quality to prevent degradation of surface and groundwater within the City's jurisdiction.

Other, more recent programs and additions to the code of ordinances further address non-point source pollution. MGO 7.48 regulates or prohibits the sale or use of phosphorus containing fertilizer and coal tar sealcoats. Additionally, City Engineering's Illicit Discharge Detection and Elimination program actively searches for cross-connections and sanitary inputs to the storm sewer system.

ILLICIT DISCHARGE DETECTION AND ELIMINATION

The Illicit Discharge Detection and Elimination (IDDE) program will survey all 590 major outfalls in the city on a four year rotation. City of Madison Engineering surveys one quarter of the outfalls once each year. They notify PHMDC whenever standing or flowing water is found. We sample, analyze the water, and determine if the quality indicates the presence of an inappropriate source.

Escherichia coli (*E. coli*) levels are used as the primary indicator of a sanitary discharge in a flowing storm sewer. Any result greater than 1000 MPN (Most Probable Number)/100mL (level that triggers a beach closure) when coupled with a positive fluoride and high ammonia and/or potassium results is considered suspect. Other analytes used and their trigger levels are as follows:

- Calcium and magnesium are used for hardness calculations. Hardness can be used in conjunction with fluoride concentration to determine the approximate ratio of storm water and City water in a sample. Excessive hardness can also indicate evaporation. Hardness above 500 mg CaCO₃/L is abnormal.
- Fluoride is maintained in City drinking water at 0.7-0.8 mg/L. Sample concentration can be used to determine the approximate ratio of storm water and City water. Fluoride levels above 0.3 mg/L in standing water suggest City water influence.
- Ammonia is an indicator of sanitary waste. Concentrations over 1 mg/L are considered high.
- Dissolved oxygen is measured during sample collection. Values less than 4 mg/L are considered low.
- Total phosphorus is used as an indicator of nutrient load.
- Potassium is an indicator of sanitary waste. Concentrations greater than 5 mg/L are high. An ammonia to potassium ratio greater than one is a strong indicator of sanitary waste.

High *E. coli*, ammonia, or potassium in a storm sewer with standing water is tested for resident raccoons (*Procyon lotor*) before searching for a sanitary sewer input. This is accomplished by hanging marshmallows in storm sewer inlets near the suspect standing water. The sites are checked at 24 and 48 hour intervals. Missing marshmallows within 48 hours are considered positive tests for resident raccoons. A resident population of raccoons will cause significant water quality degradation to standing water in a storm sewer. Therefore, no further investigation is conducted when resident raccoons are noted.

City Engineering identified 32 structures for follow up in the past biennium. Thirteen of these sites were sampled. Only one site, CB 5859-033 had very poor water quality and fluoride. Since there was no flow, it was tested for resident raccoons. Two storm inlets were baited with marshmallows. One was missing within 24 hours; the other was taken the following day. Given that fluoride and hardness were low and raccoons were present, no further testing was performed.

Several of the identified structures were within the active hydrant flushing zone when sampling time was available so they were not sampled. The Chippewa @ Council Crest site was sampled when a dry weather flow was reported by a work crew. It contained no fluoride, so no further action was taken.

Four additional sites were investigated. Sewer structure AS 5020-019 could not be accessed because of road construction throughout the area. Structure IN 5159-014 was repaired after an issue was previously identified. It was sampled to ensure that the problem was corrected. AS 4657-001 was sampled after a citizen reported a dry weather flow at an outfall. It was determined to be a foundation dewatering discharge. IN 5250-008 was revisited to check for a cooling water discharge. Results were inconclusive. All sampling results are tabulated at the end of this report.

ENVIRONMENTAL COMPLAINT RESPONSE

The EPU investigates citizen complaints and referrals from other City and County Departments and outside agencies regarding illicit discharges and spills of potentially polluting substances. Complaints involving individual citizens focus on education in proper disposal practices and environmental consequences if they are not used. Referral of individuals for prosecution is generally reserved for repeat violations or in cases where the offense is so egregious that it warrants a fine.

When a business is involved in a complaint, it is handled differently due to a greater potential for repeat violations. Businesses are expected to know proper waste disposal procedures, and commercial activities with a history of illicit discharges are sent an annual letter describing best management practices. Therefore, in the absence of some extenuating circumstance, illicit discharges from commercial activities are prosecuted under MGO 7.46, and may also incur additional clean-up costs.

Illicit discharge investigation files for 2013 and 2014 are attached separately.

NON-STORM WATER DISCHARGES

There are 160 permitted discharges ranging from construction site de-watering to swimming pools to non-contact cooling water. The number of permits in each of the six discharge volume categories is:

<u>Gallons per Year</u>	<u>Number of Discharges</u>
<50,000	89
50,000-100,000	32
100,000-1,000,000	30
1,000,000-10,000,000	8
10,000,000-100,000,000	5
>100,000,000	2

In the past biennium, 182 pool samples were analyzed for permit compliance. Backflush samples were collected at 16 of these pools to monitor long-term changes in backflush contaminants. Fifteen non-contact cooling water discharges were also analyzed.

Discharge monitoring data is summarized at the end of this report.

MONTHLY OUTFALL SAMPLING

Grab samples were collected monthly from nine outfalls into Lake Monona, Lake Mendota, and Dunn's Marsh. The sample sites and their sources are listed below.

<u>SITE</u>	<u>SOURCE</u>
Mills and College	Large cooling water discharge from UW
Spring and Brooks	Large cooling water discharge from UW
Weeks Hall	UW discharge to City storm sewer
Elm St Outfall	UW discharge to Lake Mendota
University Bay Creek	Major outfall
Pennsylvania and Commercial	Cooling water from Oscar Mayer
Fordem Ave and Fordem Ct	Cooling water from Webcrafters
Livingston Street Outfall	Cooling water from MG & E
Dunn's Marsh Outfall	Major Outfall
Lake Mendota @ Spring Harbor Outfall	Major Outfall
AS 4751-032	Upstream of Spring & Brooks

In 2013, an additional sample point, storm structure AS 4751-032 was added. It is upstream of the Spring and Brooks sample point, and is being monitored to discern sources of water quality impairment observed there. Overall, 129 outfall samples were collected and analyzed for metals, general indicators, and nutrients. Conductivity, pH, and temperature values were collected in the field

<u>METALS</u>		<u>GENERAL INDICATORS</u>		<u>NUTRIENTS</u>
Aluminum	Arsenic	Barium	Chloride	Ammonia
Cadmium	Calcium	Chromium	Fluoride	Orthophosphorus
Copper	Iron	Lead	Hardness	Total Phosphorus
Magnesium	Manganese	Molybdenum	Sulfate	Nitrate & Nitrite
Nickel	Selenium	Sodium		
Strontium	Zinc			

Outfall monitoring data is summarized at the end of this report.

MONTHLY ROAD SALT MONITORING

Samples were collected at the outlets of the Yahara Lakes and Dunn's Marsh and at the Yahara River upstream from Lake Mendota each month to monitor long-term effects of road salt use. Additional long-term water quality monitoring is achieved through analysis of the suite of metals and nutrients used for outfall analysis. Ninety-seven road salt samples were collected in 2013 and eighty-three samples were collected in 2014. An additional sample point was added in 2013, the Nakoma Road spring. It is monitored to detect seasonal chloride fluctuations in ground water. Findings from this program are reported in the annual PHMDC Road Salt Report. Monitoring data is tabulated at the end of this report.

WATER QUALITY MONITORING OF STARKWEATHER CREEK

Water quality monitoring of Starkweather Creek was started in 2008 to assess trends in water quality, document the impact of road salt, and detect illicit discharges to the creek. Sampling sites were established to isolate the different sections of the stream. Both branches (north and east) are sampled as near to the headwaters as practical. The north branch is sampled downstream of the airport to detect changes in water quality caused by airport operations. Both branches are sampled again before they merge and a final sample point is near the mouth of the creek at Lake Monona.

The creek is monitored for common metals, nutrients, bacteria, road salt, and dissolved oxygen. Eighty-one samples were collected over the past two years. Sections of Starkweather Creek are seasonally impaired by low dissolved oxygen or high chloride concentrations.

Monitoring data is tabulated below.

MONITORING DATA

DISCHARGE MONITORING DATA SUMMARY

Twenty-one pool backflush samples were analyzed in the past two years. Pool backflush discharges frequently exceed the chronic discharge limit for copper. However, the state does not require copper monitoring of pool discharges. PHMDC is investigating sources of copper in pool water.

	Cl ⁻ mg/L	Copper µg/L	Lead µg/L	Nickel µg/L	Total P mg/L	Sus Solids mg/L	Zinc µg/L
Minimum	75.0	28.3	0.800	0.500	0.107	3.00	14.4
25 th %	130	132	0.800	2.01	0.216	24.0	32.9
Median	787	704	5.88	9.35	0.422	147	139
75 th %	1560	1700	20.9	17.3	1.97	322	270
Maximum	5350	13,200	401	170	14.4	702	4730

Fifteen non-contact cooling water discharges were monitored in the past two years. One discharge contained copper near the chronic discharge limit. The licensee is replacing equipment which should lower the amount of copper in the flow.

	As µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	F ⁻ mg/L	Pb µg/L	Mo µg/L	Ni µg/L	NO ₃ mg/L	P _T mg/L	Se µg/L	SO ₄ mg/L	Zn µg/L
Minimum	0.100	3.01	0.100	3.09	0.252	0.800	1.00	0.500	0.160	0.003	1.30	1.20	1.48
25 th %	0.100	16.6	0.100	8.42	0.704	0.800	1.00	0.500	0.160	0.003	1.30	21.2	5.45
Median	1.04	31.9	0.100	21.3	0.796	0.800	2.59	0.500	0.800	0.015	1.30	25.3	9.19
75 th %	1.50	45.9	0.330	63.8	0.841	1.83	3.29	0.810	1.85	0.018	2.85	36.1	24.4
Maximum	6.10	128	1.78	130	2.13	6.33	24.0	4.09	3.56	2.81	5.68	105	316

One hundred eighty-two pool discharges were analyzed for compliance in the biennium. Pool discharges exceed the chronic discharge limit for chloride at times.

	Cl ⁻ mg/L	Copper µg/L	Lead µg/L	Nickel µg/L	Total P mg/L	Zinc µg/L
Minimum	39.0	1.77	1.62	1.01	0.012	1.24
25 th %	200	12.0	1.92	1.53	0.181	12.9
Median	440	32.1	2.33	3.02	0.325	22.7
75 th %	789	86.7	3.83	5.26	0.648	40.0
Maximum	2820	1830	37.0	23.8	8.14	675

MONTHLY OUTFALL MONITORING DATA SUMMARY

One hundred thirty-one discharge/outfall samples were analyzed in 2013 and 2014. One storm water retention pond, four storm sewers with multi-million gallon discharges, three year-round discharges from the University of Wisconsin, and two large storm sewers comprise the sample points.

	As µg/L	Ba µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	F ⁻ mg/L	Hardness mg/L CaCO ₃	Pb µg/L
Minimum	0.100	15.5	16.7	0.100	0.500	0.120	34.6	0.800
25 th %	0.100	34.2	85.0	0.312	5.30	0.120	286	0.800
Median	0.227	42.6	128	0.704	9.94	0.438	368	1.61
75 th %	1.21	62.0	270	1.24	17.7	0.666	433	2.32
Maximum	30.1	274	1660	16.6	122	1.00	699	7.02

	Mn µg/L	Mo µg/L	NO ₃ mg/L	Ortho P mg/L	P _T mg/L	Na mg/L	SO ₄ mg/L	Zn µg/L
Minimum	1.00	1.00	0.080	0.002	0.005	9.35	1.77	1.91
25 th %	8.54	1.00	0.813	0.017	0.020	38.1	20.4	6.69
Median	17.3	2.10	1.31	0.027	0.047	61.1	28.9	11.0
75 th %	34.8	4.25	2.22	0.045	0.103	154	38.0	20.0
Maximum	242	200	3.48	0.264	0.641	2830	268	62.3

Cadmium, nickel, ammonia, and selenium are also monitored. There were no detects for cadmium with a detection limit of 0.200 µg/L. No nickel was detected above the detection limit of 1.00 µg/L in over half the samples analyzed. The highest concentration of nickel was 20.1 µg/L. Less than 50% of the 92 samples analyzed contained ammonia above the detection limit of 0.0170 mg/L. The highest concentration of ammonia recorded was 0.302 mg/L. Twenty-five of 122 selenium samples had concentrations above the detection limit of 2.60 µg/L. The highest concentration was 17.6 µg/L.

DUNN'S MARSH

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
3/14/13	151	3.44	79.5	< 0.200	514	0.282	< 1.00	< 0.240	159	1.34	< 1.60	1110
5/8/13	31.9	2.29	41.5		137	< 0.200	< 1.00	< 0.240	100	1.29	< 1.60	634
6/19/13	129	3.81	13.8	< 0.200	53.8	0.501	1.41	< 0.240	39.7	0.582		68.9
3/20/14	250	0.835	88.4	< 0.200	323	0.369	2.19	< 0.240	142	3.86	< 1.60	1260
4/17/14	890	< 0.200	43.4	< 0.200	157	1.45	3.19	< 0.240	76.1	1.04	< 1.60	144
6/25/14	70.7	0.870	13.4	< 0.200	40.4	0.231	1.48	0.255	47.9	0.920	< 1.60	190
7/17/14	66.4	0.588	16.7	< 0.200	50.9	< 0.200	< 1.00	< 0.240	52.7	1.25	< 1.60	309
9/8/14	163	1.42	13.7	< 0.200	20.4	0.467	1.12	< 0.240	41.5	0.777	< 1.60	63.3
10/29/14					39.9			< 0.240				
12/11/14					140			< 0.240				

DUNN'S MARSH

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	pH s.u.	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
3/14/13	< 2.00	< 1.00		0.374		6.76	0.127	< 2.60	319	129	19.5	10.9
5/8/13	< 2.00	1.27		< 0.320		7.01	0.260	< 2.60	92.3	73.6	8.79	1.98
6/19/13	< 2.00	< 1.00		< 0.320		9.05	0.375	< 2.60	38.0	31.1	3.05	2.63
3/20/14	4.71	< 1.00		0.322	0.0400	6.49	0.206	< 2.60	198	102	12.4	7.43
4/17/14	2.82	< 1.00	0.135	0.370	0.032	7.32	0.175	< 2.60	90.4	56.3	11.4	13.2
6/25/14	< 2.00	< 1.00	0.0640	< 0.320	0.299	8.70	0.363	< 2.60	29.2	42.5	3.53	6.70
7/17/14	< 2.00	< 1.00	0.0680	< 0.320	0.250	7.26	0.380	< 2.60	34.9	52.8	3.37	8.26
9/8/14	2.55	< 1.00	< 0.0170	< 0.320		7.13	0.232	< 2.60	15.0	31.9	3.65	6.49
10/29/14			0.383	< 0.320	0.0200	6.82					6.40	
12/11/14			0.315	0.377		7.93					13.7	

LAKE KEGONSA

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
2/4/13	23.9	3.69	31.4	< 0.200	66.3	< 0.200	< 1.00	< 0.240	252	0.0242	< 1.60	9.88
2/18/13	10.40	3.07	30.0	< 0.200	65.8	< 0.200	< 1.00	< 0.240	243	0.0130	< 1.60	8.08
3/14/13	< 5.00	1.77	31.1	< 0.200	71.7	< 0.200	< 1.00	< 0.240	250	0.0125	< 1.60	9.86
5/8/13	< 5.00	0.467	28.5		62.0	< 0.200	< 1.00	< 0.240	229	0.0119	< 1.60	7.36
6/19/13	< 5.00	0.372	30.3	< 0.200	65.4	< 0.200	< 1.00	< 0.240	224	0.0084		27.3
7/16/13	< 5.00	0.366	33.2	< 0.200	60.2	0.206	< 1.00	< 0.240	204	0.0134		12.2
8/14/13	< 5.00	1.82	32.2	< 0.200	61.9	< 0.200	< 1.00	< 0.240	202	0.0059	< 1.60	15.7
9/10/13	16.3	0.931	25.7	< 0.200	63.2	< 0.200	< 1.00	< 0.240	205	0.0264	< 1.60	36.3
10/24/13	< 5.00	< 0.200	32.1	< 0.200	64.5	0.237	< 1.00	< 0.240	211	0.0254	1.69	11.8
12/2/13	< 5.00	< 0.200	31.8	< 0.200	64.8	< 0.200	< 1.00	< 0.240	223	0.0027	< 1.60	3.24
12/18/13	< 5.00	< 0.200	32.7	< 0.200	67.0	< 0.200	< 1.00	< 0.240	227	0.0031	1.85	4.28
2/24/14	< 5.00	0.334	35.0	< 0.200	72.6	< 0.200	< 1.00	< 0.240	256	0.0073	< 1.60	17.4
3/20/14	< 5.00	< 0.200	34.7	< 0.200	71.2	< 0.200	< 1.00	< 0.240	256	0.0062	< 1.60	28.9
4/17/14	55.10	1.64	33.1	< 0.200	62.1	< 0.200	< 1.00	< 0.240	234	0.0810	< 1.60	61.0
6/25/14	< 5.00	0.696	28.3	< 0.200	63.1	< 0.200	< 1.00	< 0.240	211	0.0085	< 1.60	16.2
7/17/14	11.9	< 0.200	33.2	< 0.200	64.9	< 0.200	< 1.00	< 0.240	216	0.0163	< 1.60	26.2
8/14/14	10.3	1.27	30.4	< 0.200	64.5	< 0.200	< 1.00	< 0.240	200	0.0084	< 1.60	26.7
9/8/14	9.09	1.60	23.0	< 0.200	65.1	< 0.200	< 1.00	< 0.240	199	0.0067	< 1.60	19.7
10/29/14					65.5			< 0.240				
12/11/14					68.2							

LAKE KEGONSA

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	pH s.u.	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
2/4/13	< 2.00	< 1.00	0.136	0.426		8.09	0.0547	< 2.60	32.0	59.8	26.2	1.88
2/18/13	< 2.00	< 1.00	0.150	0.397	0.0200		0.0429	< 2.60	31.9	58.4	23.9	0.524
3/14/13	< 2.00	< 1.00		0.441		8.02	0.0500	< 2.60	33.4	60.5	24.5	1.49
5/8/13	< 2.00	< 1.00		0.466		8.64	0.0354	< 2.60	31.2	56.3	24.1	0.972
6/19/13	< 2.00	< 1.00		< 0.320		8.52	0.0380	< 2.60	32.1	56.8	22.0	1.36
7/16/13	< 2.00	< 1.00		< 0.320	0.0110	8.76	0.0665	< 2.60	29.7	53.2	17.5	0.909
8/14/13	< 2.00	< 1.00	< 0.0170	< 0.320	0.00592	8.83	0.0646	< 2.60	30.3	55.7	16.7	< 0.400
9/10/13	< 2.00	< 1.00		< 0.320		8.81	0.0745	< 2.60	30.1	56.4	16.6	3.27
10/24/13	< 2.00	< 1.00	0.115	< 0.320	0.00611	8.66	0.1030	< 2.60	30.1	55.6	16.7	1.99
12/2/13	< 2.00	< 1.00	0.068	0.402	0.0190	8.29	0.0508	< 2.60	30.9	57.0	19.3	1.67
12/18/13	< 2.00	< 1.00	0.102	0.434	0.0240	8.14	0.0433	< 2.60	30.8	58.8	20.1	3.53
2/24/14	2.77	< 1.00	0.191	0.524	0.0460	7.97	0.0596	< 2.60	34.8	64.4	21.5	5.01
3/20/14	2.23	< 1.00		0.550	0.0210	8.10	0.0634	< 2.60	34.7	64.1	21.6	1.93
4/17/14	< 2.00	< 1.00	0.0390	0.622	0.00818	8.75	0.0869	< 2.60	29.2	56.1	20.3	1.32
6/25/14	5.32	< 1.00	< 0.0170	< 0.320	< 0.0050	8.77	0.0658	3.34	29.9	54.7	18.4	3.72
7/17/14	2.91	< 1.00	< 0.0170	< 0.320	0.0120	8.96	0.1450	< 2.60	29.8	56.5	17.4	5.46
8/14/14	2.13	< 1.00	< 0.0170	< 0.320	0.0130	8.92	0.0878	< 2.60	31.6	55.1	16.5	5.29
9/8/14	< 2.00	< 1.00	< 0.0170	< 0.320		9.05	0.0836	< 2.60	31.1	52.8	16.2	5.79
10/29/14			0.0640	0.498	0.0100	8.45					17.2	
12/11/14			0.0590	0.382		8.37					20.1	

LAKE MENDOTA

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
2/18/13	16.0	1.82	26.6	< 0.200	47.3	< 0.200	< 1.00	< 0.240	221	0.0183	< 1.60	3.44
3/14/13	< 5.00	< 0.200	29.0	< 0.200	54.1	< 0.200	< 1.00	< 0.240	236	0.0070	< 1.60	5.47
5/8/13	< 5.00	0.666	27.8		48.8	< 0.200	< 1.00	< 0.240	223	0.0085	< 1.60	6.78
6/19/13	< 5.00	< 0.200	33.9	< 0.200	51.9	< 0.200	< 1.00	< 0.240	221	0.0153		15.5
7/16/13	7.50	< 0.200	24.9	< 0.200	46.2	< 0.200	< 1.00		193	0.0139		7.32
8/14/13	9.44	< 0.200	27.4	< 0.200	46.8	< 0.200	< 1.00	< 0.240	199	0.0134	< 1.60	7.79
9/10/13	11.6	< 0.200	26.0	< 0.200	52.1	< 0.200	< 1.00	0.129	195	0.0236	< 1.60	8.38
10/24/13	55.6	< 0.200	28.5	< 0.200	49.2	< 0.200	< 1.00	< 0.240	212	0.0898	< 1.60	37.6
12/2/13	80.2	< 0.200	29.9	< 0.200	48.3	0.239	< 1.00	< 0.240	218	0.104	< 1.60	20.7
3/20/14	9.22	< 0.200	27.0	< 0.200	47.8	< 0.200	< 1.00	< 0.240	215	0.0054	< 1.60	4.84
4/17/14	34.2	< 0.200	29.3	< 0.200	53.4	< 0.200	< 1.00	< 0.240	226	0.0422	< 1.60	52.2
6/25/14	12.5	0.222	23.2	< 0.200	48.2	< 0.200	< 1.00	< 0.240	202	0.0353	< 1.60	12.0
7/17/14	11.3	< 0.200	26.3	< 0.200	49.2	< 0.200	< 1.00	< 0.240	198	0.0109	< 1.60	4.95
8/14/14	11.7	1.94	26.0	< 0.200	48.9	< 0.200	< 1.00	< 0.240	192	0.0107	< 1.60	5.93
9/8/14	6.09	0.274	24.7	< 0.200	49.2	< 0.200	< 1.00	< 0.240	196	0.0064	< 1.60	4.77
10/29/14					49.5			< 0.240				
12/11/14					49.9			0.243				

LAKE MENDOTA

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	pH s.u.	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
2/18/13	< 2.00	< 1.00	0.0720	< 0.320	0.0130	9.13	0.0584	< 2.60	22.9	55.1	18.1	0.938
3/14/13	< 2.00	< 1.00		0.378		8.63	0.0704	< 2.60	24.7	59.1	19.6	0.452
5/8/13	< 2.00	< 1.00		0.520		8.85	0.0499	< 2.60	23.4	66.6	18.9	0.727
6/19/13	< 2.00	< 1.00		0.427		8.79	0.0330	< 2.60	23.1	54.0	18.5	4.02
7/16/13	< 2.00	< 1.00		< 0.320	0.00561	8.69	0.0327	< 2.60	21.7	47.9	17.7	< 0.400
8/14/13	< 2.00	< 1.00	< 0.0170	< 0.320	< 0.0050	8.89	0.0353	< 2.60	21.9	52.7	17.9	0.744
9/10/13	3.92	< 1.00		< 0.160		8.58	0.0341	< 2.60	22.1	51.4	18.5	1.68
10/24/13	< 2.00	< 1.00	0.103	< 0.320	0.00773	8.55	0.0543	< 2.60	22.3	54.6	19.0	2.51
12/2/13	< 2.00	< 1.00	0.418	0.343	0.0540	8.29	0.0836	< 2.60	22.3	55.0	19.1	2.03
3/20/14	< 2.00	< 1.00		0.711	0.0290	7.95	0.0535	< 2.60	22.3	53.2	18.8	1.19
4/17/14	< 2.00	< 1.00	0.0910	0.886	0.0360	8.32	0.0921	< 2.60	23.3	55.0	19.9	2.29
6/25/14	< 2.00	< 1.00	0.140	< 0.320	< 0.0050	8.79	0.0380	< 2.60	22.0	51.2	17.5	4.85
7/17/14	< 2.00	< 1.00	< 0.0170	< 0.320	0.00854	8.90	0.0579	< 2.60	21.8	51.0	18.4	6.19
8/14/14	< 2.00	< 1.00	< 0.0170	< 0.320	0.00575	8.91	0.0313	< 2.60	22.4	51.4	18.0	3.72
9/8/14	< 2.00	< 1.00	< 0.0170	< 0.320		8.87	0.0220	< 2.60	22.7	49.7	18.1	5.03
10/29/14			0.128	< 0.320	0.0190	8.49					18.4	
12/11/14			0.388	0.411		8.42					18.8	

LAKE MONONA

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
2/4/13	22.9	3.34	32.6	< 0.200	68.0	< 0.200	< 1.00	< 0.240	234	0.0316	< 1.60	9.46
2/18/13	16.2	1.86	31.2	< 0.200	70.2	< 0.200	< 1.00	< 0.240	227	0.0183	< 1.60	6.24
3/14/13	6.22	3.05	30.9	< 0.200	78.3	< 0.200	< 1.00	< 0.240	226	0.00956	< 1.60	4.88
5/8/13	305	1.12	44.4		78.6	0.433	< 1.00	< 0.240	223	0.1380	< 1.60	7.56
6/19/13	< 5.00	< 0.200	29.0	< 0.200	71.3	0.327	< 1.00	< 0.240	209	0.0158		19.6
7/16/13	7.54	< 0.200	28.6	< 0.200	65.2	< 0.200	< 1.00		195	0.0133		8.53
8/14/13	8.57	0.538	29.3	< 0.200	63.1	0.241	< 1.00	< 0.240	194	0.0166	< 1.60	12.2
9/10/13	6.47	< 0.200	29.2	< 0.200	65.4	< 0.200	< 1.00	< 0.240	197	0.0144	< 1.60	8.92
10/24/13	11.0	< 0.200	30.9	< 0.200	68.7	0.241	2.05	< 0.240	205	0.0246	< 1.60	21.8
12/2/13	5.57	< 0.200	31.0	< 0.200	66.4	< 0.200	< 1.00	< 0.240	212	0.00956	< 1.60	7.68
12/18/13	< 5.00	< 0.200	32.0	< 0.200	68.4	< 0.200	< 1.00	< 0.240	218	0.00626	< 1.60	7.50
2/24/14	< 5.00	1.51	31.7	< 0.200	68.1	< 0.200	< 1.00	< 0.240	230	0.00314	< 1.60	2.87
3/20/14	< 5.00	< 0.200	31.1	< 0.200	70.2	< 0.200	< 1.00	< 0.240	223	0.00517	< 1.60	4.38
4/17/14	22.7	< 0.200	29.8	< 0.200	76.9	< 0.200	< 1.00	< 0.240	214	0.0293	< 1.60	27.6
6/25/14	13.7	< 0.200	26.1	< 0.200	68.4	< 0.200	1.23	< 0.240	191	0.0234	< 1.60	16.9
7/17/14	10.0	< 0.200	29.6	< 0.200	69.5	< 0.200	1.01	< 0.240	196	0.0165	< 1.60	12.3
8/14/14	15.3	2.33	29.9	< 0.200	66.3	< 0.200	1.01	< 0.240	191	0.0148	1.78	12.5
9/8/14	10.5	1.28	28.6	< 0.200	66.3	< 0.200	< 1.00	< 0.240	192	0.0136	< 1.60	9.51
10/29/14					69.4			< 0.240				
12/11/14					67.3			< 0.240				

LAKE MONONA

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	pH s.u.	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
2/4/13	< 2.00	< 1.00	0.308	< 0.320		7.93	0.0874	< 2.60	34.1	62.8	19.9	1.38
2/18/13	< 2.00	< 1.00	0.241	< 0.320	0.0590	8.12	0.0830	< 2.60	35.3	61.3	19.5	1.47
3/14/13	< 2.00	< 1.00		0.344		8.20	0.0835	< 2.60	34.9	61.0	20.4	1.75
5/8/13	< 2.00	< 1.00		< 0.320		8.94	0.0748	< 2.60	40.4	72.0	19.9	1.22
6/19/13	< 2.00	< 1.00		< 0.320		8.67	0.0500	< 2.60	36.0	57.1	19.3	1.55
7/16/13	< 2.00	< 1.00		< 0.320	0.00602	8.75	0.0418	< 2.60	32.3	52.0	17.7	1.14
8/14/13	< 2.00	< 1.00	< 0.0170	< 0.320	< 0.0050	8.73	0.0381	< 2.60	31.0	56.9	18.0	2.02
9/10/13	< 2.00	< 1.00		< 0.320		8.66	0.0300	< 2.60	31.9	57.0	18.5	3.00
10/24/13	< 2.00	< 1.00	0.0170	< 0.320	< 0.0050	8.64	0.0408	< 2.60	32.2	58.2	18.6	5.05
12/2/13	< 2.00	< 1.00	0.218	< 0.320	0.0330	8.47	0.0552	< 2.60	31.3	58.8	18.9	2.98
12/18/13	< 2.00	< 1.00	0.211	< 0.320	0.0310	8.51	0.0533	< 2.60	31.8	60.4	19.5	2.67
2/24/14	< 2.00	< 1.00	0.168	0.328	0.0510	8.34	0.0589	< 2.60	32.4	61.2	20.3	1.56
3/20/14	< 2.00	< 1.00		0.392	0.0190	8.52	0.0550	< 2.60	33.3	60.6	19.7	1.70
4/17/14	< 2.00	< 1.00	0.0960	< 0.320	0.0140	8.55	0.0621	< 2.60	35.8	57.8	19.6	6.40
6/25/14	< 2.00	< 1.00	0.0430	< 0.320	< 0.0050	8.68	0.0436	< 2.60	33.1	54.4	17.6	6.18
7/17/14	< 2.00	< 1.00	< 0.0170	< 0.320	0.00591	8.86	0.0439	< 2.60	33.0	52.1	17.6	5.20
8/14/14	< 2.00	< 1.00	< 0.0170	< 0.320	0.00564	8.76	0.0350	< 2.60	32.6	56.0	17.5	4.85
9/8/14	2.04	< 1.00	< 0.0170	< 0.320		8.72	0.0221	< 2.60	32.2	53.9	17.6	11.3
10/29/14			0.0890	< 0.320	0.0170	8.35					17.1	
12/11/14			0.0910	< 0.320		8.69					18.3	

LAKE WAUBESA

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
2/4/13	22.8	2.68	32.2	< 0.200	70.7	< 0.200	< 1.00	< 0.240	247	0.0332	< 1.60	9.51
2/18/13	8.48	3.45	30.8	< 0.200	71.0	< 0.200	< 1.00	< 0.240	246	0.01130	< 1.60	7.16
3/14/13	< 5.00	3.43	31.4	< 0.200	78.8	< 0.200	< 1.00	< 0.240	253	0.0116	< 1.60	7.97
5/8/13	7.22	0.496	26.5		72.1	< 0.200	< 1.00	< 0.240	226	0.0166	< 1.60	9.39
6/19/13	7.82	0.563	31.1	< 0.200	72.1	< 0.200	< 1.00	< 0.240	215	0.0163		14.8
7/16/13	7.79	1.70	36.5	< 0.200	64.0	< 0.200	< 1.00		198	0.0303		15.8
8/14/13	10.4	0.757	34.4	< 0.200	65.1	0.202	< 1.00	< 0.240	199	0.0162	< 1.60	11.6
9/10/13	9.22	0.359	32.3	< 0.200	65.8	< 0.200	< 1.00	< 0.240	197	0.0154	< 1.60	16.4
10/24/13	< 5.00	0.913	33.0	< 0.200	68.6	< 0.200	< 1.00	< 0.240	213	0.00600	< 1.60	10.5
12/2/13	< 5.00	< 0.200	32.4	< 0.200	68.1	< 0.200	< 1.00	< 0.240	223	0.0122	1.80	4.49
12/18/13	< 5.00	< 0.200	33.1	< 0.200	69.4	0.233	< 1.00	< 0.240	229	0.00573	< 1.60	5.14
1/30/14	5.95	0.375	34.8	< 0.200	73.8	< 0.200	1.05	< 0.240	247	0.00917	< 1.60	7.44
2/24/14	< 5.00	< 0.200	34.6	< 0.200	78.6	< 0.200	1.07	< 0.240	253	0.00562	2.13	6.34
3/20/14	10.2	0.230	33.8	< 0.200	76.5	< 0.200	< 1.00	< 0.240	251	0.0125	< 1.60	8.61
4/17/14	25.1	< 0.200	30.7	< 0.200	70.2	< 0.200	< 1.00	< 0.240	230	0.0380	< 1.60	30.2
6/25/14	5.97	< 0.200	30.7	< 0.200	70.2	< 0.200	< 1.00	< 0.240	205	0.0151	< 1.60	14.8
7/17/14	6.72	< 0.200	34.5	< 0.200	69.8	< 0.200	< 1.00	< 0.240	205	0.0137	1.67	29.6
8/14/14	8.01	1.53	32.9	< 0.200	68.8	< 0.200	< 1.00	< 0.240	198	0.0104	< 1.60	31.7
9/8/14	7.30	1.33	31.6	< 0.200	69.6	< 0.200	< 1.00	< 0.240	200	0.0264	< 1.60	28.8
10/29/14					67.7			< 0.240				
12/11/14					72.0			< 0.240				

LAKE WAUBESA

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	pH s.u.	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
2/4/13	< 2.00	< 1.00	0.0850	0.366		8.22	0.0603	< 2.60	34.4	62.1	22.6	0.894
2/18/13	< 2.00	< 1.00	0.167	0.392	0.0240	8.12	0.0550	< 2.60	34.8	61.7	22.6	0.759
3/14/13	< 2.00	< 1.00		0.544		8.11	0.0568	< 2.60	38.3	64.5	23.0	1.41
5/8/13	< 2.00	< 1.00		< 0.320		8.76	0.0460	< 2.60	36.7	59.1	22.0	0.441
6/19/13	< 2.00	< 1.00		< 0.320		8.78	0.0516	< 2.60	35.7	57.5	19.4	1.12
7/16/13	< 2.00	< 1.00		< 0.320	0.0110	8.80	0.0677	< 2.60	31.7	54.0	16.2	0.500
8/14/13	< 2.00	< 1.00	< 0.0170	< 0.320	< 0.0050	8.85	0.0619	< 2.60	32.3	57.6	16.7	1.97
9/10/13	< 2.00	< 1.00		< 0.320		8.82	0.0473	< 2.60	32.4	55.7	16.9	2.70
10/24/13	< 2.00	< 1.00	0.182	< 0.320	0.00788	8.54	0.0712	< 2.60	32.3	57.9	17.5	2.64
12/2/13	< 2.00	< 1.00	0.213	0.462	0.0390	8.14	0.0647	< 2.60	31.8	59.1	19.5	4.98
12/18/13	< 2.00	< 1.00	0.216	0.472	0.0390	8.08	0.0517	< 2.60	32.5	60.6	20.0	1.62
1/30/14	2.22	< 1.00		0.589		7.75	0.0616	< 2.60	34.9	64.8	21.1	5.94
2/24/14	2.04	< 1.00	0.190	0.681	0.0500	7.75	0.0572	< 2.60	34.6	64.8	21.5	2.36
3/20/14	< 2.00	< 1.00		0.606	0.0200	8.34	0.0571	< 2.60	36.2	64.6	21.0	1.57
4/17/14	< 2.00	< 1.00	< 0.0170	0.580	0.00717	8.68	0.0438	< 2.60	33.2	57.1	19.7	2.40
6/25/14	< 2.00	< 1.00	0.0350	< 0.320	< 0.0050	8.63	0.0549	< 2.60	33.6	55.9	17.2	4.41
7/17/14	5.33	< 1.00	< 0.0170	< 0.320	0.0140	8.86	0.0723	3.36	32.7	58.4	16.9	6.16
8/14/14	2.13	< 1.00	< 0.0170	< 0.320	0.0110	8.75	0.0531	< 2.60	33.9	57.5	16.5	12.3
9/8/14	< 2.00	< 1.00	< 0.0170	< 0.320		8.71	0.0457	< 2.60	33.0	54.5	16.6	5.83
10/29/14			0.0950	< 0.320	0.00563	8.56					16.2	
12/11/14			< 0.0170	0.383		8.77					18.8	

LAKE WINGRA

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
2/4/13	49.5	3.97	40.4	< 0.200	112	< 0.200	< 1.00	< 0.240	323	0.0511	< 1.60	10.5
2/18/13	20.6	2.32	41.8	< 0.200	119	< 0.200	< 1.00	< 0.240	319	0.0325	< 1.60	33.4
3/14/13	13.3	2.84	37.5	< 0.200	123	0.272	< 1.00	< 0.240	293	0.0330	< 1.60	41.3
5/8/13	< 5.00	0.374	32.4		124	0.307	< 1.00	< 0.240	233	0.00604	< 1.60	24.3
6/19/13	5.61	1.50	32.9	< 0.200	119	< 0.200	< 1.00	< 0.240	212	0.0201		40.1
7/16/13	8.70	0.209	25.1	< 0.200	97.5	< 0.200	< 1.00		155	0.0128		24.1
8/14/13	7.55	< 0.200	29.1	< 0.200	97.7	< 0.200	< 1.00	< 0.240	168	0.0136	< 1.60	18.8
9/10/13	< 5.00	< 0.200	24.5	< 0.200	103	< 0.200	< 1.00	< 0.240	185	0.00935	1.81	23.3
10/24/13	< 5.00	< 0.200	34.4	< 0.200	106	< 0.200	< 1.00	< 0.240	222	0.00363	1.81	9.61
12/2/13	< 5.00	< 0.200	37.6	< 0.200	107	< 0.200	< 1.00	< 0.240	264	0.00946	1.71	6.88
12/18/13	< 5.00	0.920	39.2	< 0.200	104	0.250	< 1.00	< 0.240	277	0.00656	< 1.60	11.7
1/30/14	< 5.00	< 0.200	48.7	< 0.200	117	< 0.200	< 1.00	< 0.240	330	0.0189	1.88	143
2/13/14					119	< 0.200						
2/19/14					143							
2/24/14	< 5.00	< 0.200	49.7	< 0.200	117		< 1.00	< 0.240	351	0.0144	< 1.60	150
3/13/14					118							
3/20/14	< 5.00	< 0.200	45.8	< 0.200	111	< 0.200	< 1.00	< 0.240	340	0.00987	< 1.60	28.6
4/17/14	5.76	< 0.200	35.7	< 0.200	119	< 0.200	< 1.00	< 0.240	278	0.0108	< 1.60	20.2
6/25/14	< 5.00	< 0.200	29.8	< 0.200	107	< 0.200	< 1.00	< 0.240	208	0.00592	< 1.60	16.7
7/17/14	9.30	< 0.200	21.7	< 0.200	111	< 0.200	< 1.00	< 0.240	168	0.0155	< 1.60	13.8
8/14/14	5.45	1.18	22.1	< 0.200	108	< 0.200	< 1.00	< 0.240	160	0.00634	< 1.60	14.6
9/8/14	< 5.00	< 0.200	16.6	< 0.200	108	< 0.200	< 1.00	< 0.240	202	0.00502	< 1.60	16.5
10/29/14					98.3			< 0.240				
12/11/14					109			< 0.240				

LAKE WINGRA

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	pH s.u.	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
2/4/13	3.14	< 1.00	0.065	0.391		7.85	0.0538	< 2.60	51.5	67.8	24.4	2.11
2/18/13	< 2.00	< 1.00	0.187	0.377	< 0.0050	7.85	0.0457	< 2.60	57.1	69.1	24.3	1.23
3/14/13	< 2.00	< 1.00		0.489		7.48	0.0390	< 2.60	61.4	67.2	22.6	1.72
5/8/13	< 2.00	< 1.00		< 0.320		8.62	0.0385	< 2.60	66.7	57.2	18.1	0.521
6/19/13	< 2.00	< 1.00		< 0.320		7.96	0.0711	< 2.60	62.3	55.2	17.0	0.93
7/16/13	< 2.00	< 1.00		< 0.320	0.00762	8.54	0.0496	< 2.60	47.4	44.1	13.5	1.11
8/14/13	< 2.00	< 1.00	0.047	< 0.320	< 0.0050	7.96	0.0311	< 2.60	46.2	50.4	14.1	0.991
9/10/13	< 2.00	< 1.00		< 0.320		8.24	0.0295	< 2.60	48.1	51.7	15.4	1.55
10/24/13	< 2.00	< 1.00	0.026	2.51	< 0.0050	8.39	0.0222	< 2.60	46.4	56.6	16.6	1.94
12/2/13	< 2.00	< 1.00	0.029	0.333	< 0.0050	8.33	0.0265	< 2.60	46.7	63.1	18.4	2.27
12/18/13	< 2.00	< 1.00	0.141	< 0.320	0.00597	7.84	0.0331	< 2.60	50.1	65.9	19.5	4.73
1/30/14	4.08	< 1.00		< 0.320		7.11	0.0238	< 2.60	53.2	76.0	21.5	2.28
2/13/14												
2/19/14												
2/24/14	3.57	< 1.00	0.820	< 0.320	0.0160	7.09	0.0230	< 2.60	54.4	77.4	22.2	0.907
3/13/14				< 0.160			0.0350		53.1		24.0	
3/20/14	2.92	< 1.00		< 0.320	0.02000	7.17	0.0258	< 2.60	50.9	74.1	21.1	3.79
4/17/14	< 2.00	< 1.00	< 0.0170	< 0.320	< 0.0050	8.36	0.0306	< 2.60	54.2	62.3	19.1	1.78
6/25/14	< 2.00	< 1.00	0.034	< 0.320	< 0.0050	8.41	0.0304	2.71	52.3	52.6	15.6	5.47
7/17/14	< 2.00	< 1.00	0.022	< 0.320	< 0.0050	8.87	0.0242	< 2.60	47.9	45.3	15.4	5.31
8/14/14	2.13	< 1.00	< 0.0170	< 0.320	0.00521	8.82	0.0254	3.66	48.4	43.1	14.9	4.97
9/8/14	< 2.00	< 1.00	0.023	< 0.320		8.02	0.0190	< 2.60	47.8	51.1	15.5	3.64
10/29/14			< 0.0170	< 0.320	0.00733	8.18					14.5	
12/11/14			0.029	< 0.320		8.17					17.5	

YAHARA RIVER

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
2/18/13	50.1	3.55	46.0	< 0.200	51.9	0.571	< 1.00	< 0.240	373	0.108	< 1.60	47.6
3/14/13	431	1.15	33.5	< 0.200	27.9	1.06	9.84	< 0.240	151	0.543	< 1.60	71.8
5/8/13	308	1.22	49.5		49.8	1.08	1.01	0.240	352	0.486	< 1.60	99.9
6/19/13	435	0.676	58.3	< 0.200	48.2	1.13	< 1.00	< 0.240	372	0.629		96.6
7/16/13	249	2.31	56.4	< 0.200	46.4	0.941	< 1.00		375	0.381		69.4
8/14/13	99.0	< 0.200	49.4	< 0.200	46.3	0.750	< 1.00	< 0.240	380	0.133	1.67	30.5
9/10/13	53.8	0.307	48.9	< 0.200	44.3	0.567	< 1.00	< 0.240	377	0.0987	1.71	38.6
10/24/13	21.2	< 0.200	45.4	< 0.200	42.9	0.711	< 1.00	< 0.240	384	0.0642	1.77	24.1
12/2/13	22.3	< 0.200	46.7	< 0.200	45.0	0.689	< 1.00	< 0.240	388	0.0689	2.95	31.0
3/20/14	1180	< 0.200	49.3	< 0.200	34.2	1.48	7.62	< 0.240	188	1.00	< 1.60	83.0
4/17/14	317	< 0.200	52.2	< 0.200	51.9	0.865	1.57	< 0.240	334	0.407	< 1.60	66.8
6/25/14	494	< 0.200	62.6	< 0.200	42.9	0.857	2.07	< 0.240	335	0.757	< 1.60	119
7/17/14	133	< 0.200	50.7	< 0.200	48.8	0.550	1.29	< 0.240	370	0.205	< 1.60	40.4
8/14/14	77.2	< 0.200	51.3	< 0.200	46.7	0.370	1.42	< 0.240	368	0.124	2.28	37.8
9/8/14	152	2.05	51.7	< 0.200	47.2	0.479	< 1.00	< 0.240	370	0.253	< 1.60	59.7
10/29/14					47.0			< 0.240				
12/11/14					47.6			< 0.240				

YAHARA RIVER

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	pH s.u.	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
2/18/13	< 2.00	1.18	0.0410	7.18	0.0370	8.15	0.0524	< 2.60	22.7	80.6	35.4	1.06
3/14/13	< 2.00	< 1.00		2.96		7.46	0.5620	< 2.60	13.3	38.2	19.9	6.79
5/8/13	< 2.00	< 1.00		5.24		8.14	0.0579	< 2.60	21.9	78.1	28.8	2.33
6/19/13	< 2.00	< 1.00		6.45		8.01	0.114	< 2.60	21.3	81.7	24.5	3.57
7/16/13	< 2.00	< 1.00		6.87	0.0450	7.92	0.0776	< 2.60	19.9	80.3	23.0	1.51
8/14/13	< 2.00	< 1.00	< 0.0170	7.40	0.0310	8.11	0.0473	< 2.60	18.9	81.7	23.2	0.821
9/10/13	< 2.00	< 1.00		7.72		8.12	0.0602	< 2.60	17.8	79.7	23.1	1.20
10/24/13	< 2.00	< 1.00	< 0.0170	8.22	0.0150	8.19	0.0269	< 2.60	17.2	81.4	24.7	0.942
12/2/13	< 2.00	< 1.00	< 0.0170	8.71	0.0260	8.05	0.0274	< 2.60	17.7	82.4	27.9	1.60
3/20/14	2.85	2.45		3.02	0.955	7.57	1.04	< 2.60	15.2	49.8	19.4	8.58
4/17/14	3.06	< 1.00	0.0170	6.98	0.0450	8.11	0.0934	< 2.60	21.2	77.2	29.7	3.74
6/25/14	4.56	< 1.00	0.0730	5.68	0.129	7.92	0.173	3.88	19.1	82.0	21.5	7.67
7/17/14	2.92	< 1.00	< 0.0170	7.50	0.0300	8.24	0.0478	3.33	19.2	80.2	23.8	6.18
8/14/14	3.86	< 1.00	0.0210	7.38	0.0520	8.08	0.0630	< 2.60	18.9	81.3	23.3	5.44
9/8/14	3.08	1.15	< 0.0170	7.03		8.06	0.0839	< 2.60	19.3	78.7	22.3	5.13
10/29/14			< 0.0170	7.45	0.0260	8.11					23.9	
12/11/14			< 0.0170	7.77		8.25					24.7	

STARKWEATHER CREEK @ AIRPORT

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	<i>E. coli</i> MPN/100 mL	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
2/21/13	319	3.00	63.8	<0.2	169	0.907	<1.0	30	<0.24	406	1.00	<1.6	161
3/18/13		3.66	68.1	0.531	137	1.45	2.55	20	<0.48	375	1.11	<1.6	214
4/22/13	80.8	1.42	64.3	<0.2	78.8	0.662	1.01	40	<0.24	362	0.658		138
6/3/13		2.35	71.7		68.2	0.741	1.07	109	<0.24	394	0.936		136
7/2/13	31.0	4.11	62.3	<0.2	38.9	0.270	<1.0	<10	<0.24	252	0.804		110
7/17/13	7.33	2.26	63.5	<0.2	69.4	<0.2	<1.0	31	0.190	391	0.277	<1.6	91.0
8/15/13	46.7	<0.2	52.4	<0.2	78.5	0.342	<1.0	52	<0.24	392	0.234	<1.6	23.5
9/17/13	160	<0.2	51.8	<0.2	75.8	0.343	<1.0	130	<0.24	318	0.387	<1.6	47.7
10/29/13	548	2.43	60.3	<0.2	85.5	1.20	1.04	86	<0.24	425	1.09	1.91	131
12/19/13	1020	1.29	64.8	<0.2	102	2.29	2.10	78	<0.24	430	1.95	3.15	184
2/25/14	168	<0.2	62.8	<0.2	394	0.564	1.66	<10	<0.24	393	0.757	1.84	182
6/26/14	7.14	1.11	62.9	<0.2	70.8	<0.2	1.20	97	<0.24	349	0.477	1.63	44.0
7/18/14	6.88	4.84	53.5	<0.2	78.6	<0.2	<1.0	31	<0.24	347	0.238	2.28	35.9
8/15/14	13.8	2.91	54.2	<0.2	73.3	<0.2	<1.0	41	<0.24	378	0.177	<1.6	39.4
9/29/14	522	1.93	74.8	<0.2	77.4	0.587	3.16	240	<0.24	410	1.17	2.45	337
12/10/14					176			62	<0.60				

STARKWEATHER CREEK @ AIRPORT

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	DO mg/L	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
2/21/13	<2.0	1.90	0.085	3.43	0.010	10.0	0.0535	<2.6	94.2	113	56.0	4.67
3/18/13	3.41	2.29		2.83		8.8	0.0982	<2.6	72.0	99.6	56.6	7.33
4/22/13	<2.0	1.23		2.47	0.007	9.5	0.0411	<2.6	38.5	93.9	49.1	2.85
6/3/13	<2.0	1.33		1.74	0.030	8.0	0.0861	<2.6	33.8	100	40.0	4.17
7/2/13	<2.0	1.77		<0.32	0.170	2.1	0.267	<2.6	23.4	71.6	17.3	3.58
7/17/13	<2.0	1.21		1.45	0.041	3.2	0.0726	<2.6	32.2	93.2	31.2	3.70
8/15/13	<2.0	<1.0	0.041	2.05	0.021	6.2	0.0346	<2.6	33.2	84.6	27.5	2.12
9/17/13	<2.0	1.22		2.29	0.020	6.7	0.0427	<2.6	34.9	73.1	24.6	2.78
10/29/13	<2.0	2.12	0.059	3.56	0.025	10.5	0.0584	<2.6	33.5	86.5	35.5	5.90
12/19/13	<2.0	2.64	0.111	3.77	0.048	11.9	0.0882	<2.6	44.2	88.2	37.9	13.4
2/25/14	6.58	1.19		3.07	0.041	12.1	0.0799	<2.6	230	139	38.7	5.22
6/26/14	5.86	1.74	0.153	0.48	0.086	7.5	0.131	<2.6	34.1	95.9	25.8	6.99
7/18/14	3.15	<1.0	<0.017	0.90	0.025	9.2	0.147	<2.6	33.1	83.2	26.7	7.63
8/15/14	3.50	<1.0	0.027	1.13	0.032	4.6	0.0451	<2.6	31.7	85.7	27.5	6.75
9/29/14	4.23	1.85	0.230	2.74		5.4	0.0754	2.85	32.9	87.7	30.0	10.4
12/10/14				3.02		10.4					37.2	

NORTH BRANCH OF STARKWEATHER CREEK

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	<i>E. coli</i> MPN/100 mL	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
3/18/13		3.46	71.9	<0.2	135	3.46	4.05	84	<0.48	386	2.60	3.53	233
4/22/13	380	2.45	52.7	<0.2	78.1	1.21	1.63	<10	<0.24	357	0.788		125
6/3/13		2.01	52.5		70.5	0.661	<1.0	355	<0.24	382	0.501		87.0
7/2/13	45.5	1.82	50.7	<0.2	39.9	0.406	<1.0	<10	<0.24	236	0.622		47.6
7/17/13	7.62	1.89	48.4	<0.2	65.7	0.205	<1.0	72	0.174	380	0.144	<1.6	65.8
8/15/13	<5.0	<0.2	41.8	<0.2	75.5	0.363	2.39	160	<0.24	390	0.051	<1.6	20.4
9/17/13	3190	1.75	76.0	<0.2	74.6	5.20	5.86	400	<0.24	354	4.33	5.25	283
10/29/13	481	0.266	48.6	<0.2	82.8	1.26	1.13	52	<0.24	406	0.809	<1.6	87.3
6/26/14	5.56	0.369	46.0	<0.2	72.4	<0.2	<1.0	420	<0.24	337	0.245	1.86	22.2
7/18/14	8.44	3.14	38.9	<0.2	76.1	<0.2	5.35	120	<0.24	362	0.071	<1.6	25.9
8/15/14	38.2	1.68	41.9	<0.2	70.9	<0.2	4.67	150	<0.24	382	0.116	1.69	48.9
12/10/14					175			40	<0.60				

NORTH BRANCH OF STARKWEATHER CREEK

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	DO mg/L	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
3/18/13	2.07	2.56		3.56		9.6	0.158	<2.6	69.4	92.6	61.1	11.3
4/22/13	<2.0	1.60		2.71	0.016	13.2	0.0674	<2.6	40.0	80.7	49.1	4.86
6/3/13	<2.0	1.28		2.26	0.042	9.7	0.110	<2.6	34.7	83.1	42.6	1.09
7/2/13	<2.0	1.04		0.389	0.206	2.3	0.265	<2.6	23.6	60.2	18.0	1.13
7/17/13	<2.0	<1.0		2.00	0.044	2.7	0.066	<2.6	30.7	78.2	31.1	0.548
8/15/13	<2.0	<1.0	<0.017	2.60	0.012	5.8	0.023	<2.6	32.5	76.4	26.2	18.0
9/17/13	<2.0	6.06		2.86	0.029	7.1	0.223	<2.6	34.6	74.1	24.0	17.7
10/29/13	<2.0	<1.0	0.018	4.06	0.019	12.9	0.0549	<2.6	32.6	76.0	34.0	6.97
6/26/14	4.22	1.51	0.084	0.935	0.099	7.7	0.130	3.22	33.5	80.0	27.5	4.63
7/18/14	7.16	<1.0	<0.017	1.54	0.028	5.8	0.0363	3.21	33.1	76.2	26.9	47.5
8/15/14	3.29	<1.0	0.024	1.78	0.035	5.0	0.0455	2.69	30.9	76.3	26.8	13.5
12/10/14				3.66		10.5					36.6	

STARKWEATHER CREEK @ ZEIER ROAD

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	<i>E. coli</i> MPN/100 mL	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
2/21/13	34.0	4.89	89.6	<0.2	866	0.405	<1.0	16	<0.60	466	0.104	<1.6	69.8
3/18/13		2.17	60.5	<0.2	289	0.742	<1.0	19	<0.48	390	0.225	<1.6	57.9
4/22/13	142	0.266	50.2	<0.2	146	0.768	<1.0	<10	<0.24	351	0.171		32.6
6/3/13		4.05	60.8		159	0.794	<1.0	417	<0.24	408	0.211		58.5
7/2/13	480	2.65	58.3	<0.2	93.9	0.893	<1.0	110	<0.24	227	0.879		125
7/17/13	63.3	2.41	64.1	<0.2	188	0.494	<1.0	810	0.100	437	0.155	2.38	70.9
8/15/13	72.4	<0.2	58.8	<0.2	152	0.644	<1.0	63	<0.24	428	0.138	1.96	37.8
9/17/13	66.1	<0.2	54.0	<0.2	145	0.621	<1.0	190	<0.24	392	0.113	2.37	38.4
10/29/13	20.5	<0.2	51.8	<0.2	133	0.543	<1.0	41	<0.24	410	0.062	2.73	33.2
12/19/13	155	<0.2	54.0	<0.2	158	0.939	<1.0	27	<0.24	411	0.334	2.12	99.4
2/25/14	147	<0.2	53.9	<0.2	192	0.606	<1.0	41	<0.24	417	0.230	1.91	49.6
6/26/14	101	<0.2	57.3	<0.2	136	0.315	1.27	360	<0.24	382	0.336	2.53	89.3
7/18/14	79.3	0.849	52.0	<0.2	150	0.402	<1.0	414	<0.24	406	0.183	3.10	44.0
8/15/14	95.0	1.60	51.9	<0.2	139	0.609	<1.0	190	<0.24	412	0.184	2.16	47.1
9/29/14	36.4	1.12	51.8	<0.2	157	<0.2	<1.0	310	<0.24	381	0.210	<1.6	59.0
12/10/14					231			11	<0.60				

STARKWEATHER CREEK @ ZEIER ROAD

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	DO mg/L	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
2/21/13	2.32	1.35	0.054	3.79	0.02	10.5	0.0179	<2.6	503	187	35.9	6.21
3/18/13	<2.0	<1.0		3.35		9.8	0.0368	<2.6	176	108	30.3	4.04
4/22/13	<2.0	<1.0		2.77	0.01	14.5	0.0323	<2.6	79.0	88.4	27.0	1.97
6/3/13	<2.0	<1.0		3.18	0.03	8.1	0.0486	<2.6	78.4	93.2	24.1	1.88
7/2/13	<2.0	<1.0		1.78	0.08	6.8	0.157	<2.6	44.5	64.4	14.4	4.55
7/17/13	<2.0	<1.0		3.75	0.02	7.5	0.0341	<2.6	94.3	99.6	25.3	1.21
8/15/13	<2.0	<1.0	<0.017	4.08	0.01	9.2	0.0248	<2.6	78.5	93.2	25.8	1.29
9/17/13	<2.0	<1.0		3.62	0.02	8.7	0.0260	<2.6	72.6	86.4	23.6	3.53
10/29/13	<2.0	<1.0	<0.017	4.24	0.02	9.0	0.0167	<2.6	64.4	85.3	26.3	3.00
12/19/13	<2.0	<1.0	0.048	4.38	0.02	10.0	0.0332	<2.6	78.5	85.7	26.7	2.04
2/25/14	4.75	<1.0		4.35	0.03	10.9	0.0306	3.92	96.5	91.3	26.9	4.59
6/26/14	3.89	<1.0	0.023	3.30	0.03	8.2	0.0512	3.68	66.1	87.3	22.3	5.75
7/18/14	5.30	<1.0	<0.017	3.89	0.02	8.9	0.0279	4.72	67.2	87.9	25.2	7.26
8/15/14	6.52	<1.0	<0.017	3.92	0.02	8.9	0.0256	3.78	67.1	88.0	24.8	5.01
9/29/14	3.85	<1.0	0.019	3.03		5.8	0.0390	<2.6	76.4	89.7	20.8	5.08
12/10/14				3.89		10.0					26.1	

EAST BRANCH OF STARKWEATHER CREEK

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	<i>E. coli</i> MPN/100 mL	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
3/18/13		3.09	64.3	<0.2	345	1.57	3.00	71	<0.48	341	1.05	3.07	143
4/22/13	26.0	<0.2	55.7	<0.2	187	0.538	<1.0	30	<0.24	356	0.179		49.5
7/2/13	72.7	1.71	54.4	<0.2	110	0.305	<1.0	75	<0.24	280	0.520		97.0
8/15/13	39.1	0.774	59.7	<0.2	157	<0.2	<1.0	120	<0.24	414	0.167	< 1.6	41.5
9/17/13	29.3	0.907	51.8	<0.2	123	0.205	<1.0	190	<0.24	326	0.127	1.75	40.7
10/29/13	101	1.01	60.8	<0.2	162	0.432	<1.0	<10	<0.24	441	0.195	2.42	30.0
12/19/13	87.3	0.989	67.7	<0.2	400	0.446	<1.0	26	<0.24	439	0.267	2.44	116
6/26/14	32.5	<0.2	59.8	<0.2	170	<0.2	<1.0	840	<0.24	393	0.365	< 1.6	68.0
7/18/14	32.7	2.78	60.2	<0.2	161	<0.2	3.35	85	<0.24	390	0.149	< 1.6	21.6
8/15/14	28.8	1.25	63.7	<0.2	161	<0.2	3.81	63	<0.24	408	0.152	< 1.6	59.6
9/29/14	19.3	0.910	61.0	<0.2	177	<0.2	<1.0	74	<0.24	434	0.064	< 1.6	25.8
12/10/14					464			520	<0.60				

EAST BRANCH OF STARKWEATHER CREEK

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	DO mg/L	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
3/18/13	<2.0	1.03		2.08		9.3	0.167	<2.6	206	134	39.9	24.5
4/22/13	<2.0	<1.0		2.30	0.030	11.6	0.0723	<2.6	107	109	42.6	5.51
7/2/13	<2.0	<1.0		1.08	0.116	5.8	0.1950	<2.6	59.7	87.1	19.1	2.44
8/15/13	<2.0	<1.0	0.047	2.24	0.028	7.5	0.0710	<2.6	77.7	101	28.9	1.80
9/17/13	<2.0	1.48		2.04	0.043	4.4	0.0648	<2.6	61.2	83.8	25.7	3.41
10/29/13	4.14	<1.0	0.052	3.45	0.017	9.6	0.0329	<2.6	72.3	97.9	31.7	4.56
12/19/13	<2.0	<1.0	0.328	3.49	0.058	10.1	0.0895	<2.6	229	112	32.6	10.1
6/26/14	4.11	<1.0	0.190	1.91	0.072	8.9	0.138	3.93	82.2	114	28.7	6.01
7/18/14	3.67	<1.0	0.036	1.87	0.018	6.5	0.0453	<2.6	74.1	101	31.5	7.10
8/15/14	4.90	<1.0	0.040	1.78	0.034	5.6	0.0566	<2.6	77.2	101	27.4	7.43
9/29/14	3.13	<1.0	0.028	2.58		5.2	0.0395	<2.6	79.7	99.7	28.4	5.25
12/10/14						10.2					31.2	

STARKWEATHER CREEK @ SOUTH FAIR OAKS AVENUE

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl- mg/L	Cr µg/L	Cu µg/L	<i>E. coli</i> MPN/100 mL	F- mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
3/18/13		2.12	67.4	<0.2	189	0.558	1.43	30	<0.48	373	0.784	< 1.6	198
4/22/13	68.6	3.56	71.1	<0.2	106	0.763	1.35	10	<0.24	393	0.595		133
6/3/13		3.85	76.8		91.0	0.531	<1.0	156	0.30	413	0.822		144
7/2/13	37.5	4.48	62.7	<0.2	41.9	0.475	<1.0	97	<0.24	239	0.878		458
7/17/13	15.2	1.41	68.0	<0.2	82.0	<0.2	<1.0	74	0.22	392	0.283	< 1.6	84.6
8/15/13	31.0	<0.2	59.3	<0.2	88.5	0.224	<1.0	98	<0.24	392	0.240	< 1.6	44.3
9/17/13	39.5	1.42	53.5	<0.2	83.9	0.344	<1.0	500	<0.24	318	0.182	2.36	29.6
10/29/13	128	3.03	59.3	<0.2	96.6	0.591	<1.0	98	<0.24	427	0.503	1.96	104
12/19/13	95.4	<0.2	58.3	<0.2	91.7	0.490	<1.0	46	<0.24	422	0.451	2.68	146
6/26/14	13.2	1.90	68.3	<0.2	92.3	<0.2	1.72	340	<0.24	354	0.603	< 1.6	110
7/18/14	25.4	1.57	65.9	<0.2	105	<0.2	<1.0	86	<0.24	375	0.300	2.36	39.1
8/15/14	70.6	3.27	62.7	<0.2	89.3	<0.2	<1.0	2400	<0.24	383	0.308	1.97	85.6
12/10/14					238			120	<0.60				

STARKWEATHER CREEK @ SOUTH FAIR OAKS AVENUE

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	DO mg/L	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
3/18/13	2.21	1.6		2.64		7.3	0.118	<2.6	109	111	66.5	8.24
4/22/13	2.35	1.9		2.77	0.013	8.9	0.0560	<2.6	58.3	110	65.9	6.46
6/3/13	<2.0	2.3		1.46	0.048	7.2	0.111	<2.6	47.6	113	58.0	3.12
7/2/13	<2.0	1.1		<0.32	0.275	7.3	0.396	<2.6	26.0	73.0	21.8	6.87
7/17/13	<2.0	2.1		1.10	0.097	2.7	0.140	<2.6	40.1	102	35.9	3.16
8/15/13	<2.0	<1.0	0.039	1.46	0.038	4.6	0.0633	<2.6	40.1	90.6	31.6	1.76
9/17/13	<2.0	1.5		1.87	0.024	5.4	0.0454	<2.6	37.9	75.7	30.4	2.64
10/29/13	<2.0	1.5	0.070	3.13	0.028	9.8	0.0440	<2.6	39.5	91.7	39.7	3.08
12/19/13	<2.0	1.7	0.185	3.35	0.024	10.9	0.0365	<2.6	60.1	92.7	42.9	5.09
6/26/14	4.23	1.3	0.346	0.401	0.169	4.9	0.238	<2.6	46.0	107	43.2	9.03
7/18/14	3.90	1.1	0.050	0.760	0.045	5.3	0.0700	<2.6	50.2	102	33.6	6.47
8/15/14	3.86	<1.0	0.077	0.668	0.054	6.4	0.0778	2.61	39.4	93.7	30.2	6.31
12/10/14				2.58		9.1					44.8	

STARKWEATHER CREEK @ ATWOOD AVENUE

Date	Al µg/L	As µg/L	Ba µg/L	Cd µg/L	Cl ⁻ mg/L	Cr µg/L	Cu µg/L	<i>E. coli</i> MPN/100 mL	F ⁻ mg/L	Hardness mg CaCO ₃ /L	Fe µg/L	Pb µg/L	Mn µg/L
7/2/13	36.1	3.98	61.4	<0.2	59.5	0.472	<1.0	31	<0.24	240	0.812		345
10/29/13	71.2	<0.2	56.2	<0.2	113	0.298	<1.0	63	<0.24	416	0.245	2.16	63.8
12/19/13	114	1.11	57.5	<0.2	166	0.532	<1.0	73	<0.24	414	0.377	1.89	127
2/25/14	223	<0.2	67.0	<0.2	439	0.422	1.67	31	<0.24	404	0.711	2.75	238
12/10/14					434			980	<0.60				

Date	Mo µg/L	Ni µg/L	NH ₃ mg/L	NO ₃ mg/L	Ortho P mg/L	DO mg/L	P _{Total} mg/L	Se µg/L	Na mg/L	Sr µg/L	SO ₄ mg/L	Zn µg/L
7/2/13	<2.0	1.86		0.344	0.247	3.2	0.348	<2.6	33.2	75.2	20.9	5.96
10/29/13	<2.0	<1.0	0.046	2.92	0.021	12.3	0.0278	<2.6	49.5	90.4	36.2	2.11
12/19/13	<2.0	<1.0	0.193	3.11	0.029	10.9	0.0488	<2.6	85.8	95.6	36.2	3.36
2/25/14	7.02	<1.0		2.66	0.072	10.3	0.104	4.4	254	148	40.1	12.9
12/10/14				2.47		7.9					40.5	