Volunteer Monitoring Quarterly Data Report

Beaver Lake Watershed - Benton, Washington and Madison counties in Arkansas

February 2017

Monitoring Period: February 4 – 19, 2017

A project of Ozarks Water Watch in Arkansas

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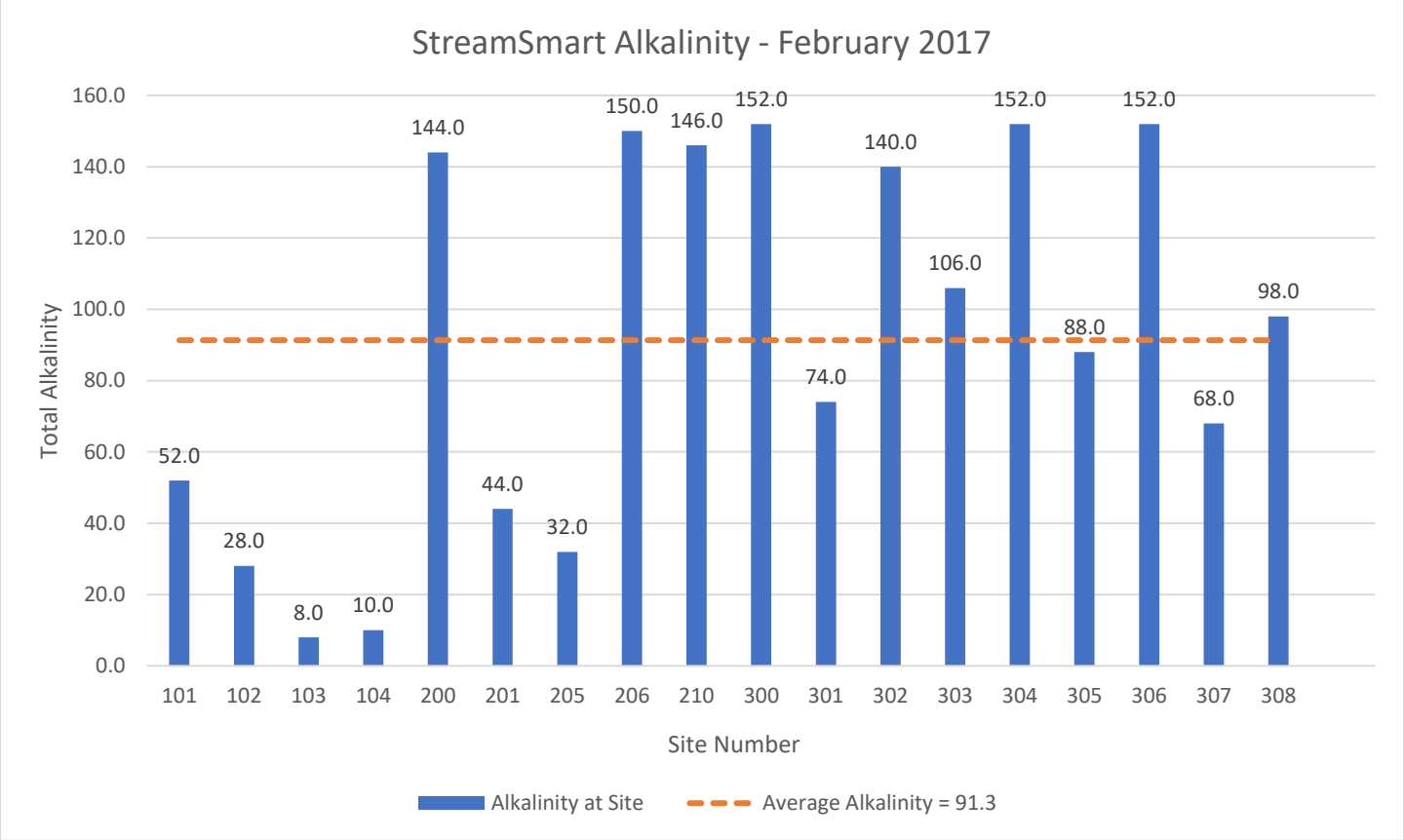
Site Number	Site Name	Monitoring Status	Lat/Long	Watershed
101	West Fork (Baptist Ford Bridge)	currently monitored	35.982714, -94.173129	West Fork
102	West Fork (Brentwood Park)	currently monitored	35.865723, -94.117257	West Fork
103	Baldwin Creek Near St. Paul	currently monitored	35.822256, -93.758937	Headwaters
104	White River Near St. Paul	currently monitored	35.818676, -93.779774	Headwaters
107	War Eagle Creek	not currently monitored - ended spring 2016	35.888319, -93.679017	War Eagle
108	Ogden Creek	not currently monitored - ended spring 2016	35.887777, -93.679069	War Eagle
200	Ward Slough	New Monitoring Site - August 2016	35.997178, -94.173949	West Fork
201	Middle Fork of W.R. at Harris Rd	currently monitored	35.995825, -94.072894	Middle Fork
202	College Branch - U of A	New Monitoring Site - November 2016		West Fork
205	Hock Creek	New Monitoring Site - November 2016	36.022453, -93.859784	Richland Creek
206	Spout Spring Branch	currently monitored	36.055019, -94.161107	West Fork
210	Town Branch (White River Ball fields)	currently monitored	36.043179, -94.135852	West Fork
300	Brush Creek	currently monitored	36.131947, -93.947956	Beaver Reservoir
301	War Eagle Creek (Huntsville)	currently monitored	36.149997, -93.740137	War Eagle
302	Glade Creek	currently monitored	36.159851, -93.811690	War Eagle
303	Clear Creek	currently monitored	36.195153, -93.789276	War Eagle
304	Clifty Creek	currently monitored	36.239342, -93.907653	War Eagle
305	War Eagle (Mill)	currently monitored	36.267597, -93.943130	War Eagle
306	Prairie Creek	currently monitored	36.341208, -94.096513	Beaver Reservoir
307	Holman Creek Upstream of Huntsville	currently monitored	36.104418, -93.756750	War Eagle
308	Holman Creek Downstream of Huntsville	currently monitored	36.124453, -93.734211	War Eagle



Maximum = 152- Site 300 (Brush Creek), 302 (Glade Creek), and 306 (Prairie Creek)
Minimum = 8.0 - Sites 103 (Baldwin Creek)
Average = 91.3

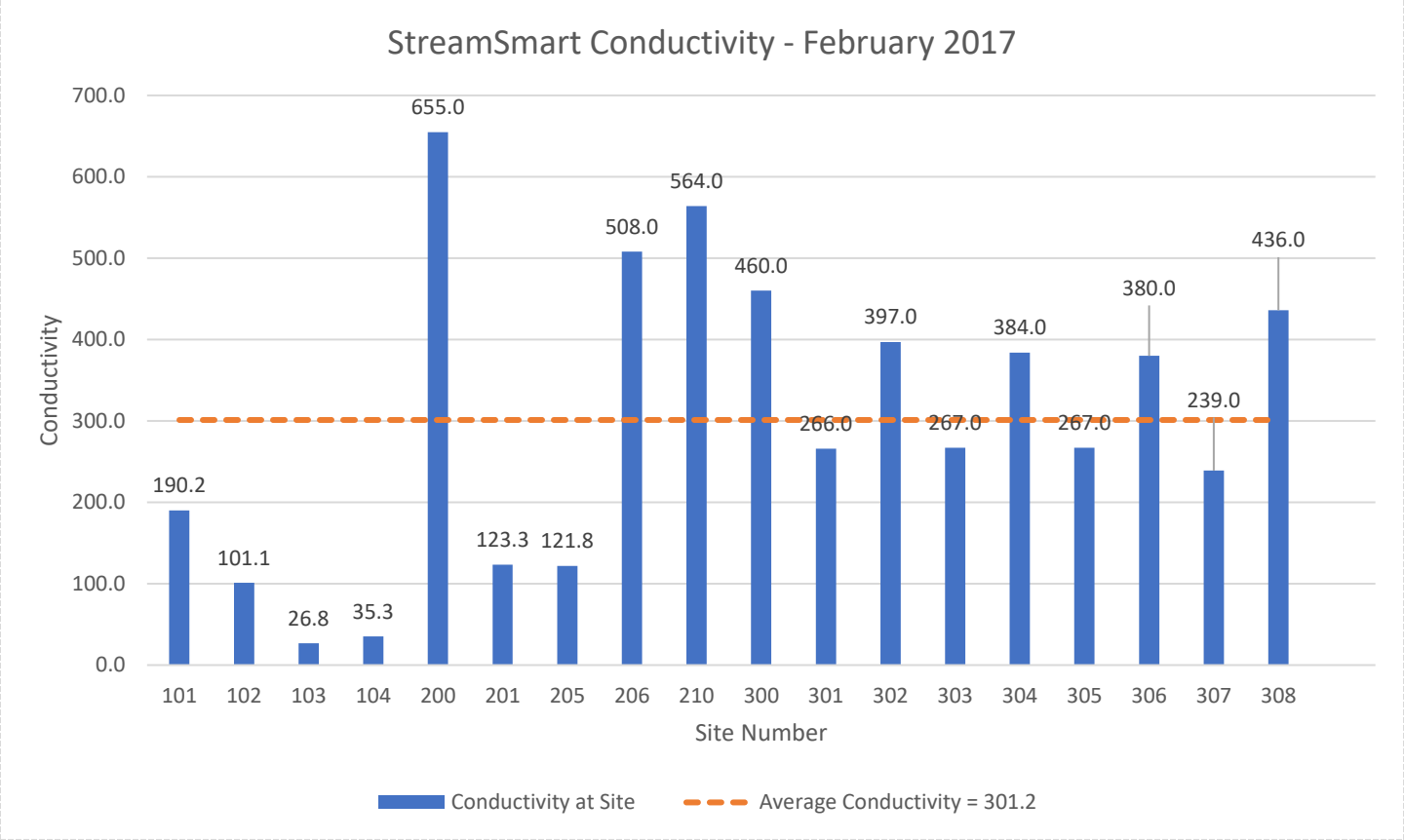
Site Number	Result
101	52.0
102	28.0
103	8.0
104	10.0
200	144.0
201	44.0
205	32.0
206	150.0
210	146.0
300	152.0
301	74.0
302	140.0
303	106.0
304	152.0
305	88.0
306	152.0
307	68.0
308	98.0

What is Alkalinity?

Alkalinity is the water's capacity to resist changes in pH that would make the water more acidic. Alkalinity refers to the capability of water to neutralize acid. The alkalinity of natural water is determined by the soil and bedrock through which it passes. The main sources for natural alkalinity are rocks which contain carbonate, bicarbonate, and hydroxide compounds. Limestone is rich in carbonates, so waters flowing through limestone regions or bedrock containing carbonates generally have high alkalinity - hence good buffering capacity. Conversely, areas rich in granites and some conglomerates and sandstones may have low alkalinity and, therefore, poor buffering capacity.

Alkalinity is important for fish and aquatic life because it protects or buffers against rapid pH changes. Living organisms, especially aquatic life, function best in a pH range of 6.0 to 9.0. Alkalinity is a measure of how much acid can be added to a liquid without causing a large change in pH. Higher alkalinity levels in surface waters will buffer acid rain and other acid wastes and prevent pH changes that are harmful to aquatic life.

http://www.water-research.net/index.php/the-role-of-alkalinity-citizen-monitoring



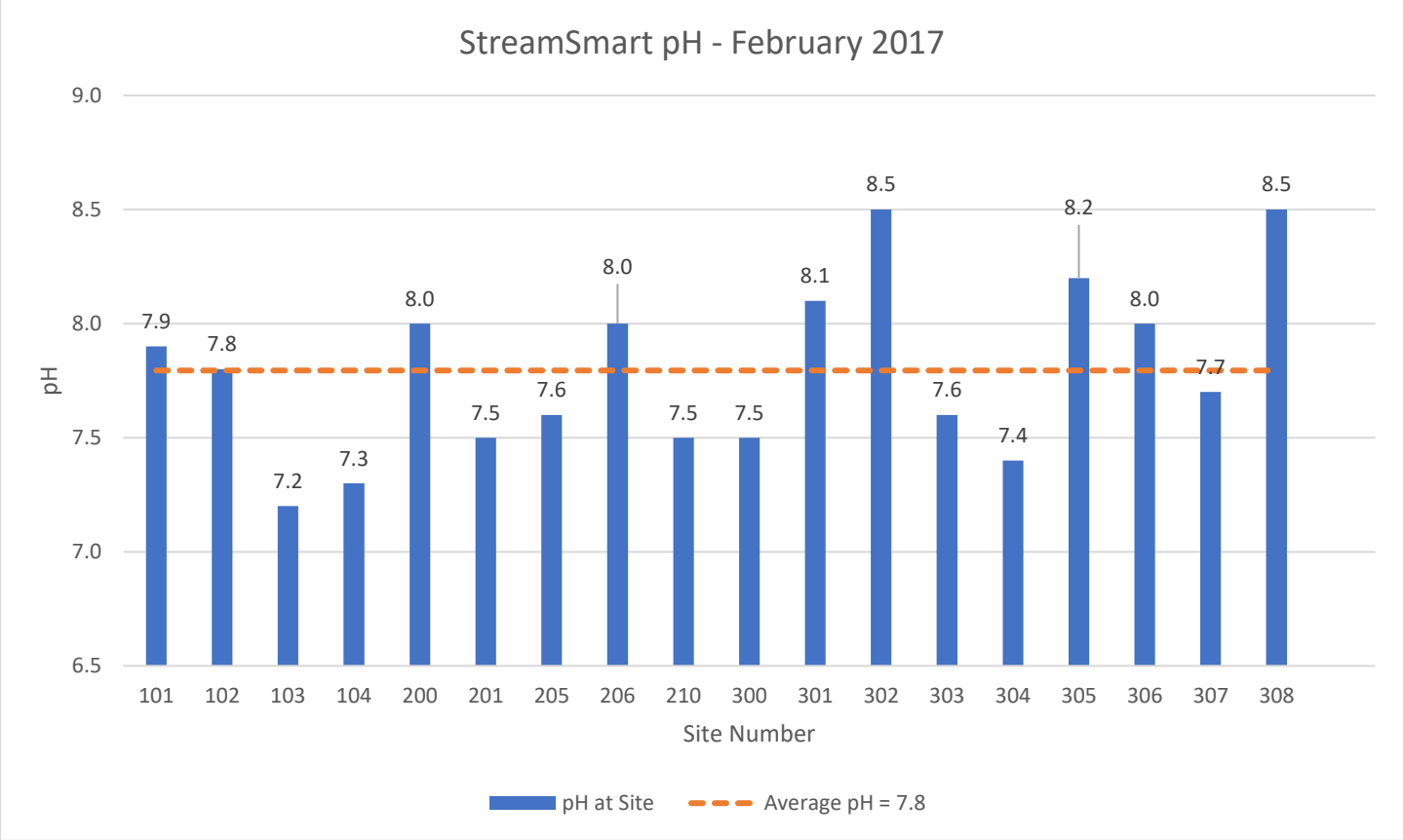
Maximum = 655 at Site 200 (Ward Slough)
Minimum = 26.8 at site 103 (Baldwin Creek)
Average = 301.2

Site Number	Conductivity Result
101	190.2
102	101.1
103	26.8
104	35.3
200	655.0
201	123.3
205	121.8
206	508.0
210	564.0
300	460.0
301	266.0
302	397.0
303	267.0
304	384.0
305	267.0
306	380.0
307	239.0
308	436.0

What is Conductivity:

Conductivity is a measurement of the ability of an aqueous solution to carry an electrical current. Typically, the units of measure are microhms/cm (uohms/cm) or microsiemens/cm (uS/cm). Conductivity or specific conductance is a measure of the ability of a fluid to carry a charge which is directly related to the concentration of dissolved substances. As the total dissolved substances in the water increases, the conductivity of the water also increases.

http://www.water-research.net/index.php/drinking-water-testing-and-conductivity-of-water



Site Number	pH Result
101	7.9
102	7.8
103	7.2
104	7.3
200	8.0
201	7.5
205	7.6
206	8.0
210	7.5
300	7.5
301	8.1
302	8.5
303	7.6
304	7.4
305	8.2
306	8.0
307	7.7
308	8.5

What is pH:

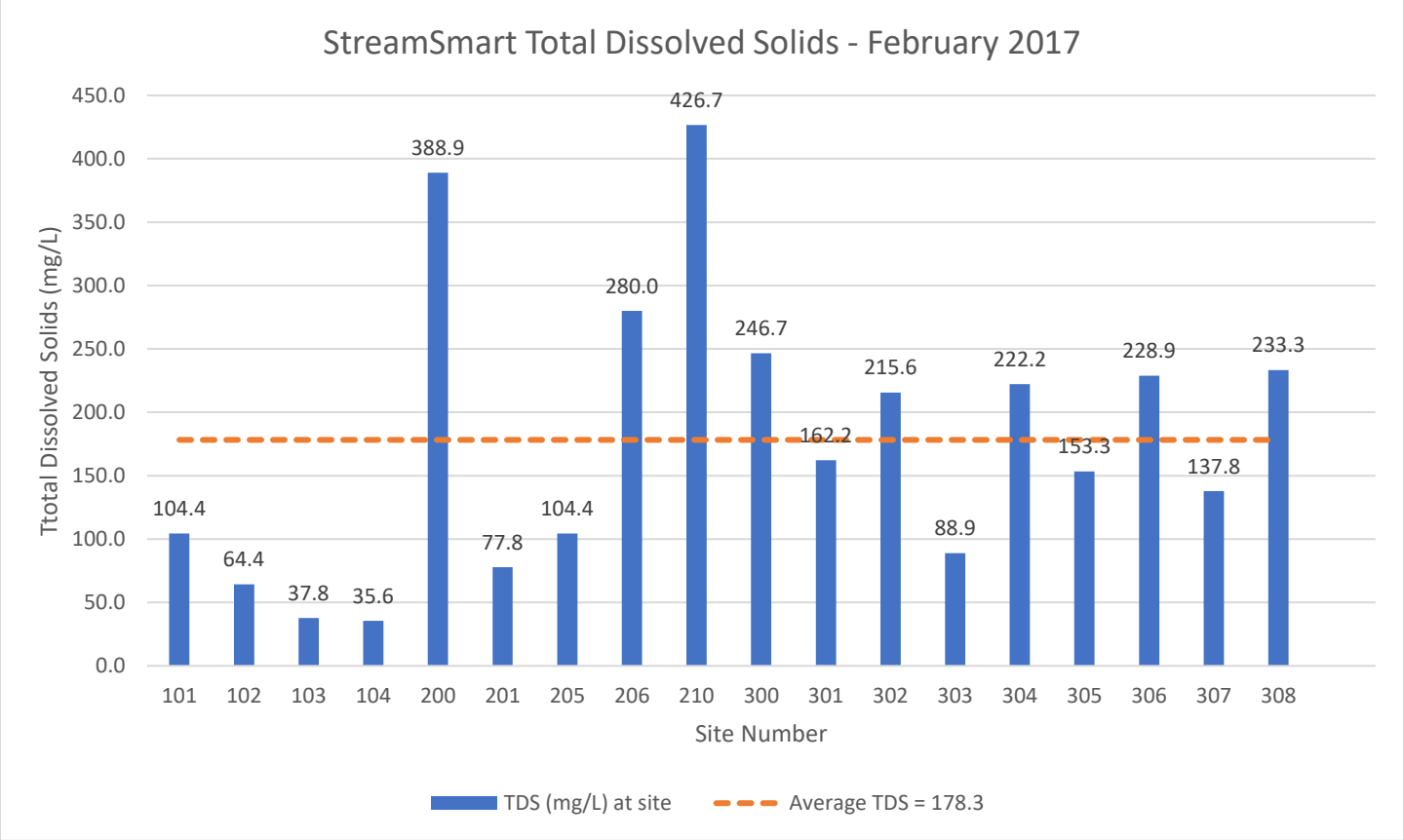
pH measurements run on a scale from 0 to 14, with 7.0 considered neutral. Solutions with a pH below 7.0 are considered acids. Solutions with a pH above 7.0, up to 14.0 are considered bases. Living organisms, especially aquatic life, function best in a pH range of 6.0 to 9.0.

The pH scale is logarithmic, so every one-unit change in pH represents a ten-fold change in acidity. In other words, pH 6.0 is ten times more acidic than pH 7.0; pH 5 is one hundred times mores acidic than pH 7.0.

The pH of a body of water is affected by several factors including the bedrock and soil composition through which the water moves. Some rock types such as limestone can, to an extent, neutralize acid. Another factor which affects the pH is the amount of plant growth and organic material within a body of water. When this material decomposes carbon dioxide is released. The carbon dioxide combines with water to form carbonic acid. Although this is a weak acid, large amounts of it will lower the pH. A third factor which determines the pH of a body of water is the dumping of chemicals into the water by individuals, industries, and communities.

Changes in the pH value of water are important to many organisms. Most organisms have adapted to life in water of a specific pH and may die if it changes even slightly. This is especially true of aquatic macroinvertebrates and fish eggs and fry.

http://www.water-research.net/index.php/ph-in-the-environment



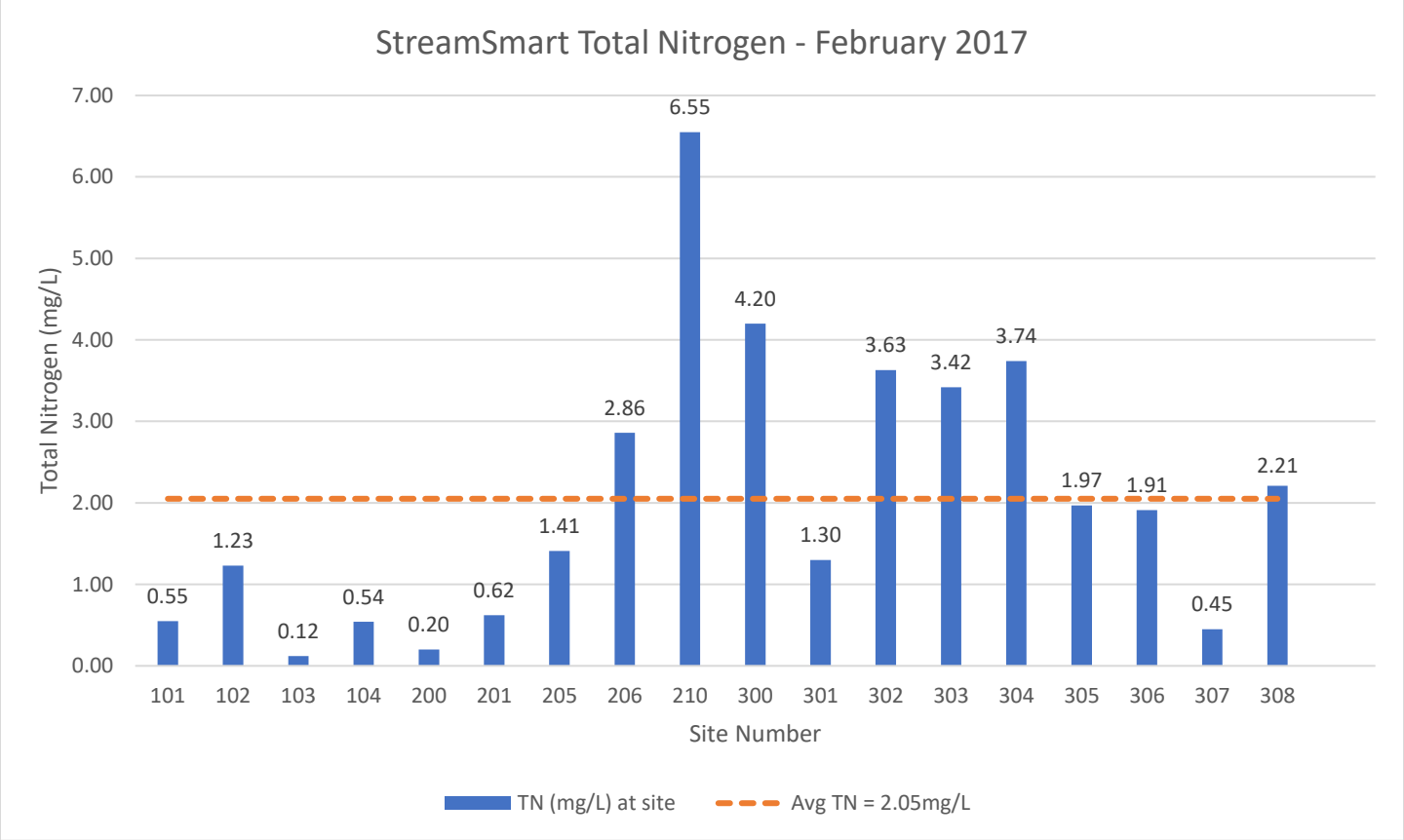
Maximum = 426.7 mg/L Site 210 (Town Branch)
Minimum = 35.6 mg/L Site 104 (White River near St. Paul)
Average = 178.3 mg/L

Site Number	TDS Result (mg/L)
101	104.4
102	64.4
103	37.8
104	35.6
200	388.9
201	77.8
205	104.4
206	280.0
210	426.7
300	246.7
301	162.2
302	215.6
303	88.9
304	222.2
305	153.3
306	228.9
307	137.8
308	233.3

What is Total Dissolved Solids?

A water quality parameter defining the concentration of dissolved organic and inorganic chemicals in water. After suspended solids are filtered from water and water is evaporated, dissolved solids are the remaining residue. An elevated total dissolved solids concentration does not mean that the water is a health hazard, but it does mean the water may have aesthetic problems, such as taste and odor, or cause nuisance problems.

http://www.water-research.net/index.php/water-treatment/tools/total-dissolved-solids

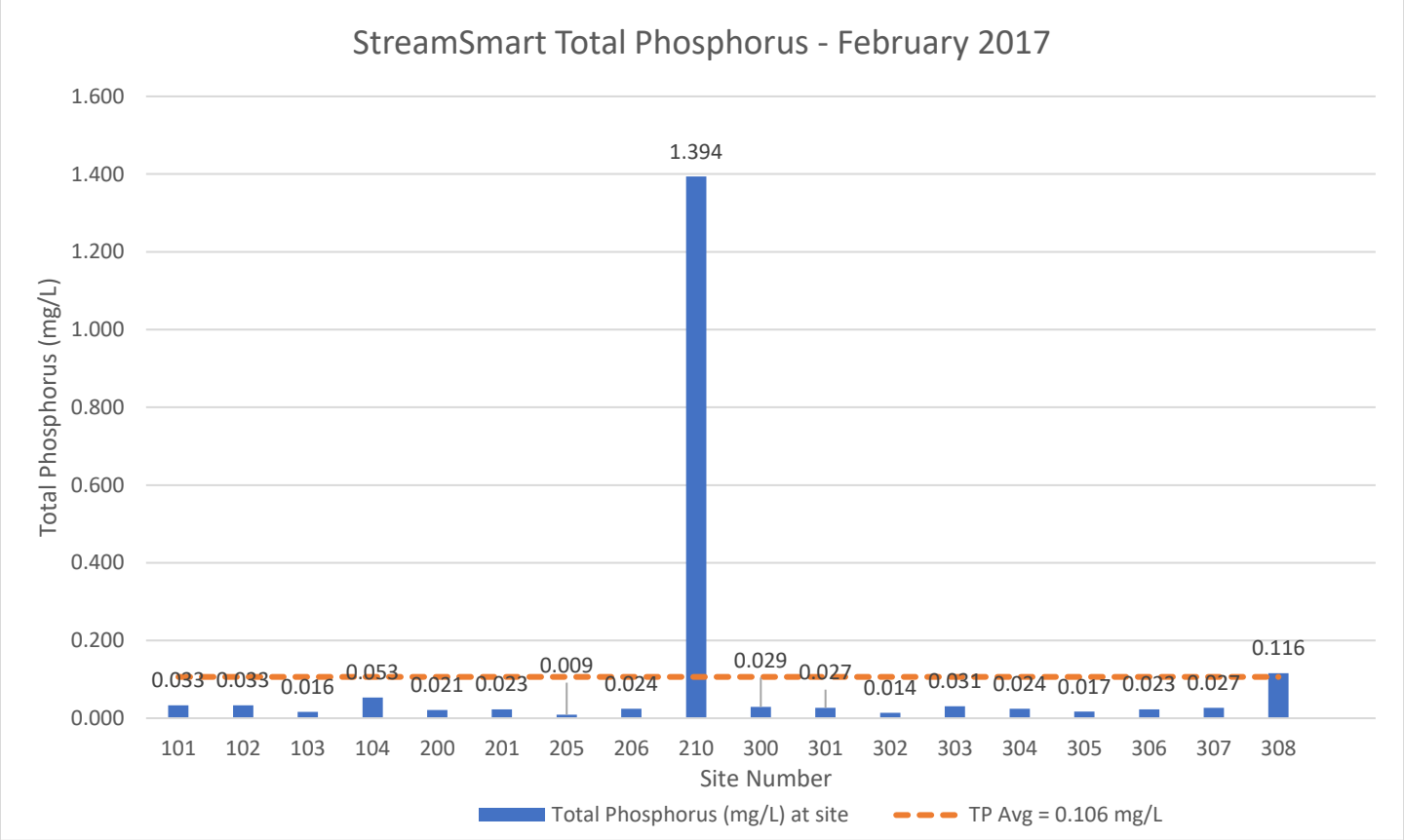


Maximum = 6.55 Site 210 (Town Branch)
Minimum = 0.12 Site 103 (Baldwin Creek)
Average = 2.05 mg/L

Site Number	TN (mg/L)
101	0.55
102	1.23
103	0.12
104	0.54
200	0.20
201	0.62
205	1.41
206	2.86
210	6.55
300	4.20
301	1.30
302	3.63
303	3.42
304	3.74
305	1.97
306	1.91
307	0.45
308	2.21

What is Total Nitrogen?

There are three forms of nitrogen that are commonly measured in water bodies: ammonia, nitrates and nitrites. Total nitrogen is the sum of total kjeldahl nitrogen (ammonia, organic and reduced nitrogen) and nitrate-nitrite. It can be derived by monitoring for organic nitrogen compounds, free-ammonia, and nitrate-nitrite individually and adding the components together. An acceptable range of total nitrogen is 2 mg/L to 6 mg/L, though variations from this range can occur. We measure total Nitrogen as part of our on-going monitoring of nutrients concentrations in surface water.



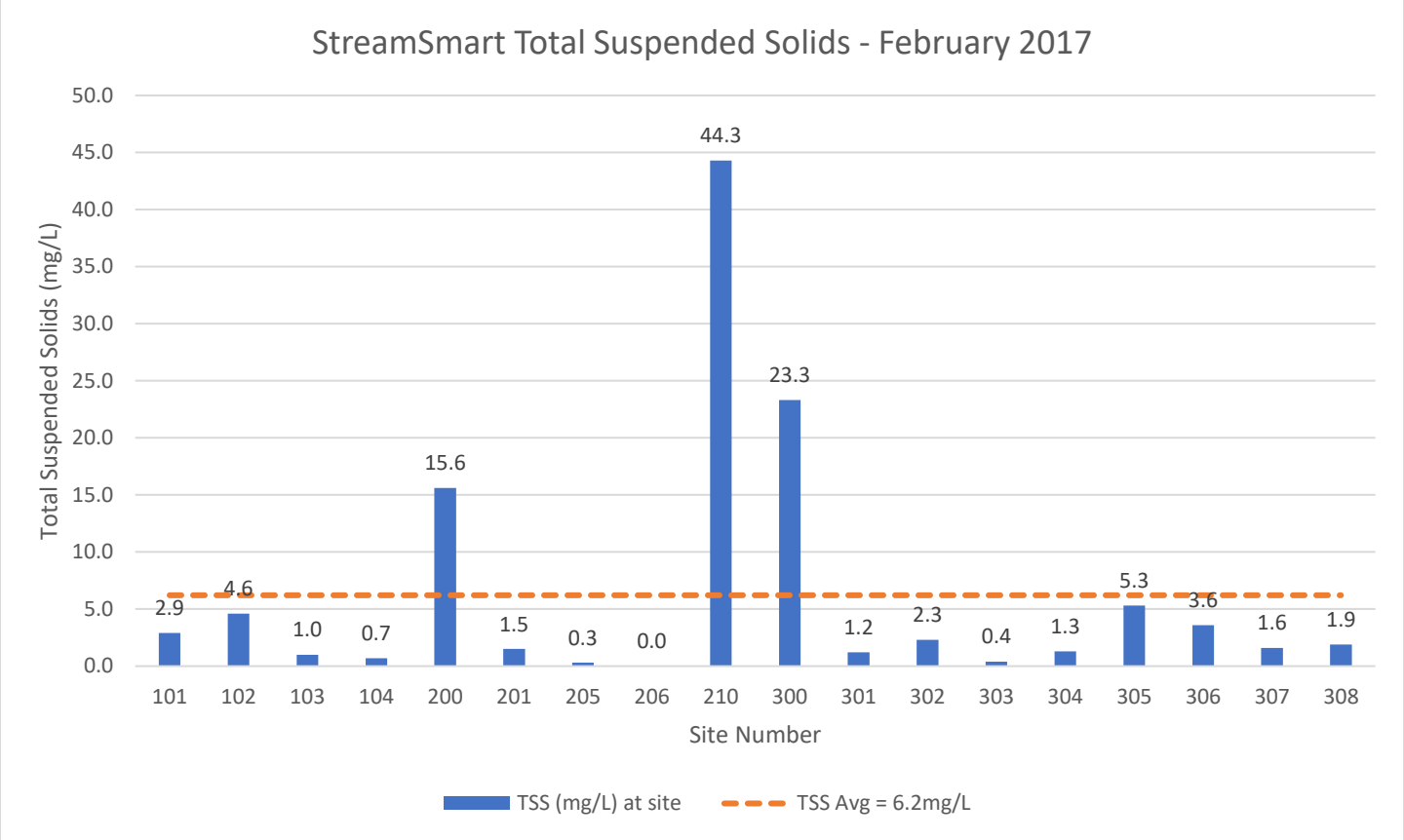
Maximum = 1.394 Site 210 (Town Branch)
Minimum = 0.009 at site 205 (Hock Creek)
Average = 0.106 mg/L

Site Number	TP (mg/L)
101	0.033
102	0.033
103	0.016
104	0.053
200	0.021
201	0.023
205	0.009
206	0.024
210	1.394
300	0.029
301	0.027
302	0.014
303	0.031
304	0.024
305	0.017
306	0.023
307	0.027
308	0.116

What is Total Phosphorus?

Phosphorus occurs naturally in rocks and other mineral deposits. During the natural process of weathering, the rocks gradually release the phosphorus as phosphate ions which are soluble in water and the mineralize phosphate compounds breakdown. Phosphorus is one of the key elements necessary for the growth of plants and animals and in lake ecosystems it tends to be the growth-limiting nutrient.

Total phosphorus is a measure of all the forms of phosphorus in the sample (orthophosphate, condensed phosphate, and organic phosphate). This is accomplished by first "digesting" (heating and acidifying) the sample to convert all the other forms to orthophosphate. Then the orthophosphate is measured by the ascorbic acid method. Because the sample is not filtered, the procedure measures both dissolved and suspended orthophosphate. Monitoring phosphorus is challenging because it involves measuring very low concentrations down to 0.01 milligram per liter (mg/L) or even lower. Even such very low concentrations of phosphorus can have a dramatic impact on streams.



Maximum = 44.3 Site 210 (Town Branch)
Minimum = 0.0 Site 206 (Spout Spring Branch)
Average = 6.2 mg/L

Site Number	TSS (mg/L)
101	2.9
102	4.6
103	1.0
104	0.7
200	15.6
201	1.5
205	0.3
206	0.0
210	44.3
300	23.3
301	1.2
302	2.3
303	0.4
304	1.3
305	5.3
306	3.6
307	1.6
308	1.9

What is Total Suspended Solids?

The suspended or colloidal particles, commonly referred to as total suspended solids (TSS), are all the extremely small suspended solids in water which will not settle out by gravity. TSS is measured on a sample of water (which has been settled) and are those particles which will not pass through a very fine filter.

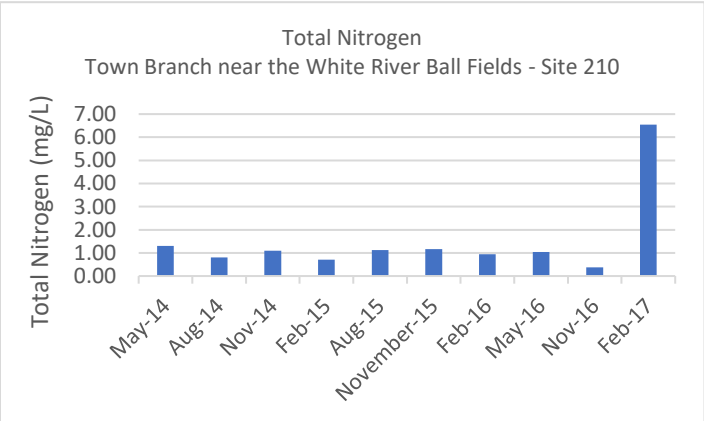
TSS in streams in northwest Arkansas usually range from 0.1 to 20 mg/L but can get as high as 500 mg/L during storm flows because the faster water moves the more sediment it can carry and the more force it has to cause erosion of the stream banks and channel.

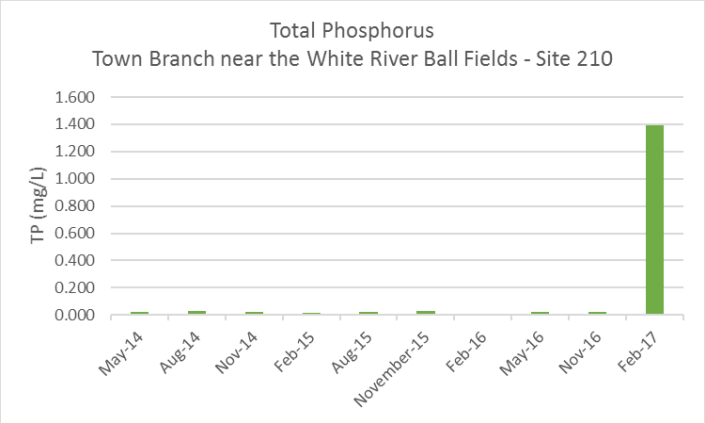
Notes and Comments

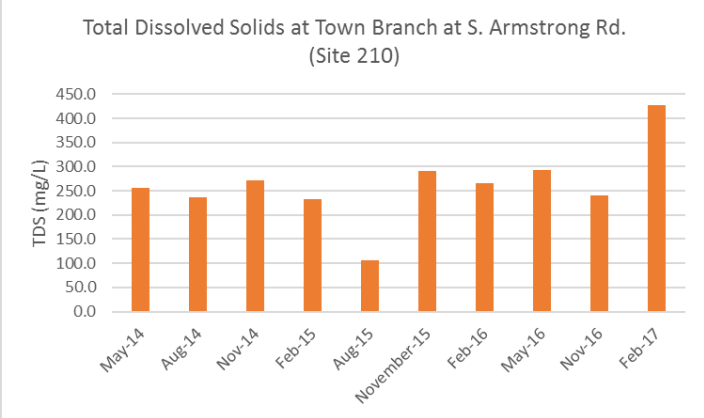
Eighteen sites were monitored during the February monitoring period. No rainfall occurred the week before monitoring began and limited precipitation occurred during the month of February, with most of it (0.97 inches) occurring on February 14.

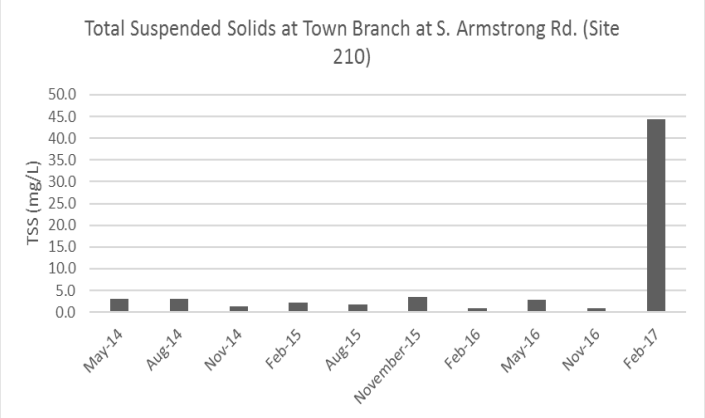
Several notable results were identified in the February monitoring data.

Site 210, Town Branch, had abnormally high TN, TP, TDS, and TSS. The site was sampled by the StreamSmart volunteer on Friday, February 10 at approximately 10:45am. The sample was collected when the creek was visibly white. A spill was identified by staff from the city of Fayetteville who were already on site. A USGS monitoring crew was also on site and collected samples on the same day. In February, TP, TN, TSS, and TDS concentrations at Town Branch reached the highest recorded concentrations in the streamsmart record for the site.









February data from Holman Creek continue to show a general trend of increased conductivity, TN, TP and TDS downstream of the city of Huntsville (site 308) compared with the site upstream of Huntsville (site 307).

February data from the West Fork site 102 (Brentwood Park, upstream of the town of West Fork) and site 101 (Baptist Ford, downstream of West Fork) show a deviation from past trends with total nitrogen concentrations dropping from the upstream to downstream site. Total phosphorus concentrations were equal between the two sites. Total dissolved solids increased from 64.4mg/L at Brentwood Park (site 102) to 104.4mg/L at Baptist Ford (site 101). Conductivity also increased from 101.1 at Brentwood Park (site 102) to 190.2 at Baptist Ford (site 101). Data from February monitoring show the total nitrogen concentration at Brentwood Park was the highest concentration in the streamsmart record for that site with a reading of 1.23mg/L.

Headwater stream chemistry data from Baldwin Creek (site 103) and Headwaters of the White River near St. Paul (site 104) indicate water quality continues to be good in these locations with overall lower TDS, TSS, TN, and TP. However, total P concentration at the headwaters of the white river near St. Paul (site 104) show the highest concentration in the streamsmart record for that site, with a reading of 0.053mg/L. This was twice the concentration of the next highest reading of 0.021mg/L recorded in August 2016.

Data at Ward Slough maintained from the previous monitoring period. February 2017 was the third monitoring event on Ward Slough. There was a spike in TSS compared to previous monitoring on Ward Slough. This could be a result of the site being covered in a layer of sediment and organic material combined with an extremely low discharge. Wading into the stream to take a sample resulted in plumes of sediment and organic material becoming suspended in the water and not resettling, even after standing still for several minutes before taking a sample.

Monitoring continued on Hock Creek in February, with the second monitoring event at the site. The data showed a substantial increase in TDS and TN concentrations. There was also a substantial decrease in TSS at the site in February. Total P concentrations remained the same as concentrations found in November.