

STATUS OF THE WATERSHED

Summarizing 2012 water quality in the Upper White River Basin using data from volunteer groups and state, federal and municipal agencies.

2012



Compiled March 2013



**OZARKS
WATER
WATCH**



P.O. Box 636
2 Kissee Ave., Ste C
Kimberling City, MO 65686
(417) 739-5001

Arkansas Office:
1200 W. Walnut, Ste. 3405
Rogers, AR 72756
(479) 295-7717

contact@ozarkswaterwatch.org



Ozarks Water Watch is excited to bring you our 5th annual Status of the Watershed Report designed to answer the question, “How is the water?” in the Upper White River basin. By monitoring the waters in southwest Missouri and northwest Arkansas we can help protect our economic prosperity and attractive lifestyle enjoyed by those who call the Ozarks home. Our watershed’s natural resources and especially our beautiful rivers, lakes and streams are the engine that drives our vibrant economy and brings us the visitors who enjoy our region’s natural assets.

This report is based on data collected in 2012 and has been compiled and printed in March of 2013. In last year’s report I indicated that while we would continue to use the U.S. Geological Survey (USGS) data in our future reports, we would also utilize many other sources of water quality monitoring. There are many groups collecting water quality data in the Upper White River Basin (UWRB). Some are paid professionals working for government agencies at the local, state and federal levels, while others are volunteers venturing to the water out of genuine love and concern. This report is a summary of data from 11 monitoring projects in the UWRB, including 5 volunteer groups.

Using data from multiple sources means comparing different sampling protocols and laboratory methods. Because of this, we limited our scope to a few of the

most commonly measured water quality variables. Even with this limitation, what you hold in your hands is the result of over 4,000 water quality measurements taken on 1,600 occasions at over 160 locations in the UWRB. We have condensed that information into an accessible map at the center of this document and an interactive online map where you can zero in on each site and parameter. The online map can be found at: www.ozarkswaterwatch.org/status2012.

Many sites had low water quality and fixing the problem will require us to look uphill to the landscape around the streams and lakes, as pollution sources may be miles away. Thankfully, there were also many sites that had high water quality. However, that doesn’t mean our work is done at those locations. We must work hard to protect our fantastic water resources for future generations, a job that can’t be done by professionals alone. This is why we’re thankful that volunteer water quality monitors step up and do what needs to be done. We encourage you to become involved and help protect our natural resources.

President/Executive Director
Ozarks Water Watch Foundation

Front cover photo: Angela Sieg

How's the water?



This report assesses water quality in the White River Basin using stream, river and lake data collected through eleven different monitoring programs. Assessments are based on six different water quality parameters. Together, these parameters provide a good measure of how healthy the basin's streams, rivers and lakes are. Sites with high water quality will display minimal human influences, have healthy aquatic life and provide recreational opportunities. Sites with low water quality will be affected by pollution, have threatened aquatic life and have limited value for recreation.

What was measured?

- 744 dissolved oxygen values
- 704 total nitrogen values
- 1013 total phosphorus values
- 506 E. coli counts
- 35 Invertebrate scores
- 258 Water clarity readings

Proper **dissolved oxygen** levels are important for maintaining healthy streams and rivers. Organic and chemical pollutants can reduce oxygen concentrations to the point where the stream is uninhabitable to aquatic life. Extremely high levels of dissolved oxygen are also bad and may occur when the stream has too much algae.

Total phosphorus and **total nitrogen** are nutrients that act as fertilizers and promote algal growth in streams, rivers and lakes. While these nutrients occur naturally, human activities in the watershed can increase nutrient inputs into waterways and reduce water quality. Nutrient pollution is common in the nation's waters.

E. coli bacteria are associated with the fecal material of warm-blooded animals.

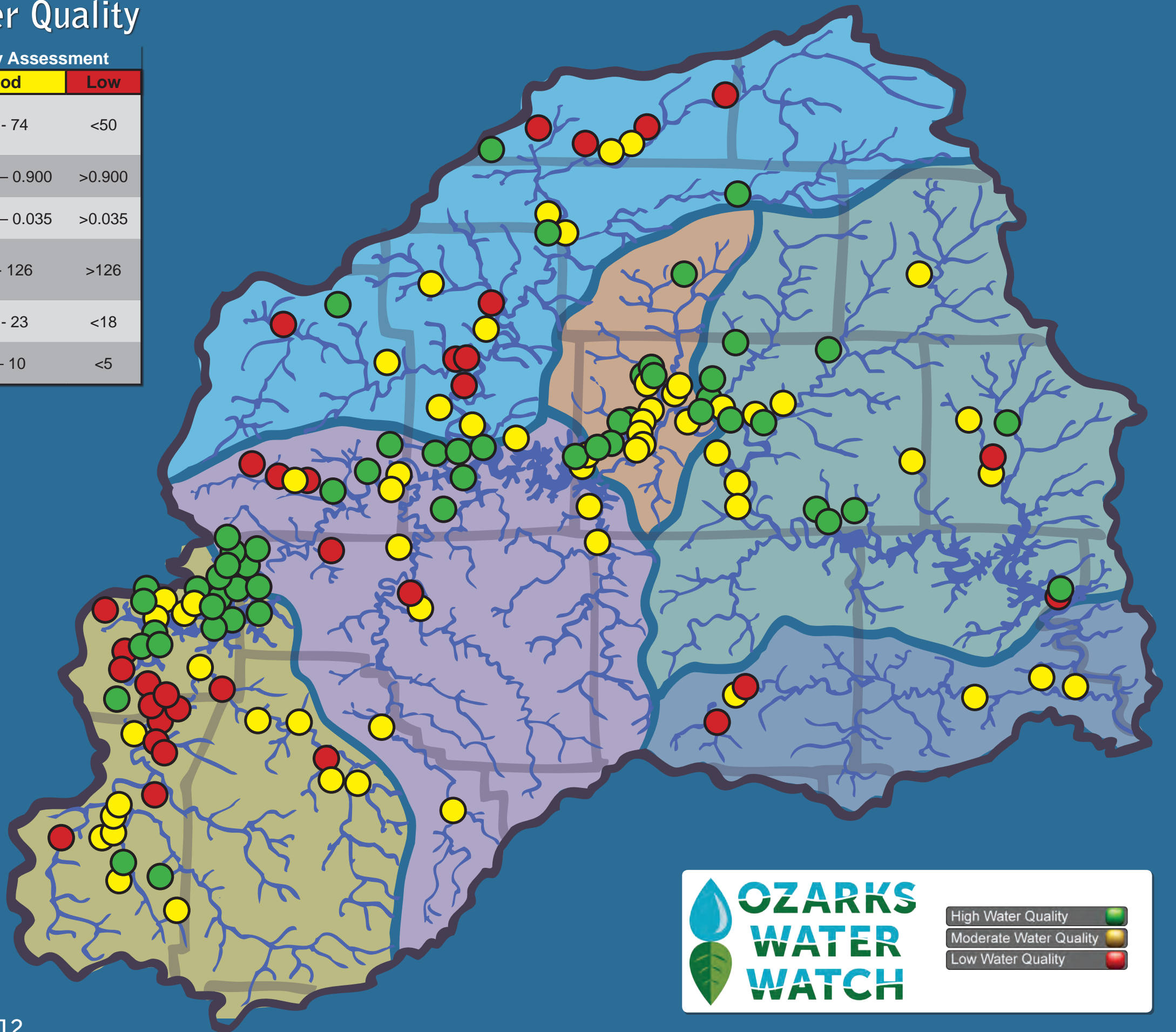
Because wildlife is a source of E. coli, low background levels in our waterways are common. While most E. coli are harmless, elevated levels indicate a fecal contamination and the possible presence of other, more dangerous microbes.

Benthic invertebrates are the small creatures that live on the stream bottom. Some invertebrates are very sensitive to pollution, while others are quite tolerant. The invertebrate community at a stream site provides us with a measure of current and long-term water quality.

Water clarity in lakes is measured using a tool called a Secchi disk, which is lowered with a rope into the water until it is no longer visible. The depth at which the disk disappears in the water is determined by the amount of algae and sediment in the water.

Upper White River Basin Water Quality

Parameter	Evaluation Method	Water Quality Assessment		
		High	Mod	Low
Dissolved Oxygen	% of samples with >5 mg/L but less than 110% saturation	>75	50 - 74	<50
Total Nitrogen	Geometric mean of all values in mg/L	<0.500	0.501 – 0.900	>0.900
Total Phosphorus	Geometric mean of all values in mg/L	<0.020	0.021 – 0.035	>0.035
E. coli	Geometric mean of colony forming units per 100mL	<70	71 - 126	>126
Invertebrates	Missouri Stream Team Score	>23	18 - 23	<18
Lake Water Clarity	Geometric mean of all values in feet of clarity	>10	5 – 10	<5



Lake Water Clarity
 Invertebrates
 E. coli Bacteria
 Total Phosphorus
 Total Nitrogen
 Dissolved Oxygen



Water quality ratings by region and parameter



For an interactive map, visit:
www.ozarkswaterwatch.org/status2012

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- High Water Quality (Green circle)
- Moderate Water Quality (Yellow circle)
- Low Water Quality (Red circle)

Water quality by region



We divided the Upper White River Basin into six regions or sub-basins. The number of sites monitored within each sub-basin ranges from seven below Bull Shoals Lake to 55 sites in the Beaver Lake watershed. All of the sub-basins had stream, river and lake sites with the exception of the White River below Bull Shoals, which only had stream and river sites. On average, the water quality in all regions was found to be MODERATE.

For specific information by site, visit the interactive map at: www.ozarkswaterwatch.org/status2012

Beaver Lake Sub-basin had 55 sites, 35 on the lake and 20 sites on inflowing streams and rivers. Water quality in the lake varied from LOW to HIGH, with lower rankings in the upper reaches of the lake. This gradient of water quality is common in large lakes. Stream and river sites also varied from LOW to HIGH water quality, with the majority of sites ranking as MODERATE. Dissolved oxygen concentrations were at healthy levels and E. coli counts low. Water quality assessments at stream and river sites tended to suffer due to high concentrations of nitrogen and phosphorus.

Table Rock Sub-basin includes all of the lake and its inflows with the exception of the James River Arm and its tributaries. Of the 13 lake sites, 8 sites had HIGH water quality, and only one site received a LOW rating. The 12 stream and river sites did not score as well, with 33% and 50% of sites receiving LOW and MODERATE water quality ratings, respectively. At these sites the nutrient levels brought rankings down, while dissolved oxygen levels were not a problem.

James River Sub-basin had 26 sites monitored, with 19 of them located on streams and rivers. Four of the seven lake sites had LOW water quality, with shallow Secchi readings and high nutrient concentrations being the problem. Stream and river sites varied in their assessments, with 42% having LOW and 32% having HIGH water quality. Problems varied, with some sites dis-

playing low dissolved oxygen readings, high E. coli levels or high phosphorus concentrations. All but one site had high nitrogen levels.

Lake Taneycomo Sub-basin is small in size, but still had 20 monitoring sites in 2012. All five of the lake sites had MODERATE water quality scores, with high nitrogen concentrations keeping scores from reaching HIGH status. Ten of the fifteen stream and river sites had HIGH water quality. The sites with MODERATE water quality scores suffered from high phosphorus concentrations.

Bull Shoals Lake Sub-basin had 27 sites, with 8 on the lake and 19 on streams and rivers. The one LOW water quality score for the region was in the upper reaches of the Little North Fork Arm of Bull Shoals Lake. The lake sites that did not receive a HIGH rating suffered from low water clarity. The stream and river sites were split between MODERATE and HIGH rankings. Those sites that ranked MODERATE generally suffered from either high nitrogen or phosphorus levels.

White River below Bull Shoals Lake consisted of only seven stream/river sites, with six located on Crooked Creek. This was the only sub-basin that did not have a site with HIGH water quality (but it's also the sub-basin with the fewest sites). Dissolved oxygen levels at these sites tended to be good, but high nutrient concentrations reduced the sites' scores.

The value of long-term monitoring

Long term monitoring by the USGS in the James River at Boaz shows that total phosphorus concentrations have decreased by 94% since 2000.

USGS data in the James River at Galena and Finley Creek near Riverdale also show a decline in total phosphorus concentrations. These reductions are a result of efforts by various communities to reduce phosphorus releases from sewage treatment effluent within the watershed.

According to Lakes of Missouri Volunteer Program data our lakes have also benefitted from reduced total phosphorus. Lower phosphorus values have been observed not only throughout the James River Arm of the lake, but also at Table Rock dam and even in Lake Taneycomo and Bull Shoals Lake.

Long-term water quality monitoring is important, not only to catch pollution when it happens, but also to document improvements in water quality. To improve water quality across the Upper White River Basin, the state and the country, we need to document what works and what doesn't. Reducing the phosphorus that comes out of our sewage treatment plants helps our streams!



2012 Data Contributors



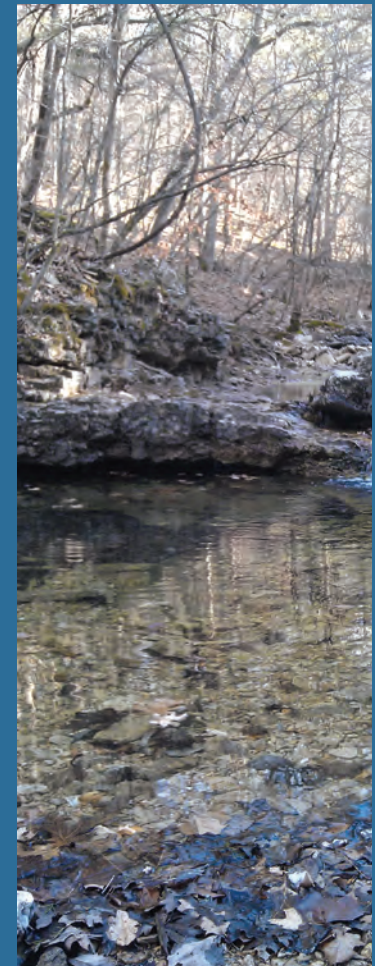
Ozarks Water Watch volunteers collected total nitrogen and total phosphorus samples at 19 Missouri stream sites.

Missouri Stream Team volunteers monitored 36 sites in the Upper White River Basin (URWB). This report features their dissolved oxygen and invertebrate data.

The Lakes of Missouri Volunteer Program volunteers monitored 31 lake and 2 stream sites in the URWB. Their total nitrogen, total phosphorus and water clarity data are featured in this report

Stream Smart volunteers monitored 6 stream sites in the URWB. Included in this report are their total nitrogen and total phosphorus data.

Secchi Day on Beaver Lake volunteers sampled at 41 Beaver Lake sites. This report features their total phosphorus and water clarity data.



United States Geologic Survey (USGS) monitored 10 sites for total nitrogen, total phosphorus, dissolved oxygen and E. coli bacteria.

Watershed Committee of the Ozarks measured E. coli at 3 stream sites.

Arkansas Water Resources Center measured total nitrogen and total phosphorus at 9 sites.

Arkansas Department of Environmental Quality (ADEQ) measured total nitrogen, total phosphorus and dissolved oxygen at 23 sites.

Taney County monitored 10 sites for concentrations of total nitrogen, total phosphorus and E. coli bacteria.

Beaver Water District measured total nitrogen, total phosphorus, dissolved oxygen and E. coli bacteria at 10 locations.



Not all agency-monitored sites and parameters are listed. Each agency may have monitored additional sites and for additional parameters.