2017

STATUS OF THE WATERSHED

Summarizing 2016 Water Quality in the Upper White River Basin

OZARKS WATER WATCH

INTRODUCTION

When I started my water quality career in 2000, I had no idea I would end up focusing on the pollution caused by failing septic systems and small wastewater treatment plants. In 2002, we received a $2 million EPA grant to find solutions to this wastewater pollution entering our lakes, streams, rivers and ground water. And we did just that. We demonstrated that advanced onsite treatment systems utilizing drip irrigation in imported soil was the answer for the lack of soil, steep slopes and karst topography found around Table Rock Lake and throughout the Ozarks. We are currently administering a $2 million State Revolving Fund Septic Remediation grant through the Missouri Department of Natural Resources to help property owners replace their failing septic systems.

Through that same EPA grant, we also formed Ozarks Clean Water Company (OCWC), a nonprofit sewer and water company that owns and operates small decentralized wastewater and drinking water systems mainly serving small rural subdivisions. Today OCWC is a thriving utility with over 1,800 customers served by 18 wastewater treatment plants and drinking water systems and a pipeline from Stone Bridge and Meadow Ridge subdivisions to the City of Branson, MO.

Whether your home is served by an onsite septic system, a small treatment plant, or a municipal wastewater system, there is one common thread, all of these systems require regular ongoing maintenance to function properly and prevent pollution from entering our Ozarks waters. In 2016, Ozarks Water Watch formed Ozarks Environmental Services (OES), a nonprofit maintenance provider with 11 professionally trained and licensed operators. OES maintains over 100 wastewater treatment facilities and drinking water systems, installs and services grinder pumps, maintains septic onsite systems, along with other maintenance-related activities.

Through the activities of our "family" of three nonprofit organizations, Ozarks Water Watch, Ozarks Clean Water Company and Ozarks Environmental Services, we carry forward with the common mission of protecting the water quality of our Ozarks' streams, lakes, rivers and ground water.

David L. Casaletto

President / CEO

Ozarks Water Watch
Ozarks Clean Water Company
Ozarks Environmental Services

Healthy Septic Systems

Rural residents in the Ozarks mainly utilize septic systems to treat their bathroom and kitchen wastewater. A typical septic system consists of a concrete tank that is buried in the yard next to the home and receives the flushed or drained wastewater from the house. From this tank, the wastewater flows through a buried pipe and drainage system that allows the liquid to drain under the yard and soak into the soil where microbes help decompose and recycle the waste. Since the soils in the Ozarks are often thin and prone to oversaturation or poor absorption, it is extremely important that rural homeowners make sure they have an adequate system and that it is properly installed and maintained. Often an advanced treatment tank is needed in order to properly treat the septic effluent.

The Environmental Protection Agency estimates that over 30% of all home septic systems are inadequate due to either improper installation, improper use or lack of regular maintenance. A failing septic system may contaminate local streams and rivers, and may even contaminate drinking water wells. With tens of thousands of rural households in the Ozarks, this amounts to millions of gallons of wastewater that is not being treated adequately.

There are several do's and don'ts that will help ensure proper function of your septic system to help protect your investment and your water quality. As a rule, nothing should be disposed into any wastewater system that hasn't first been ingested, other than toilet tissue, mild detergents, and wash water.

DO

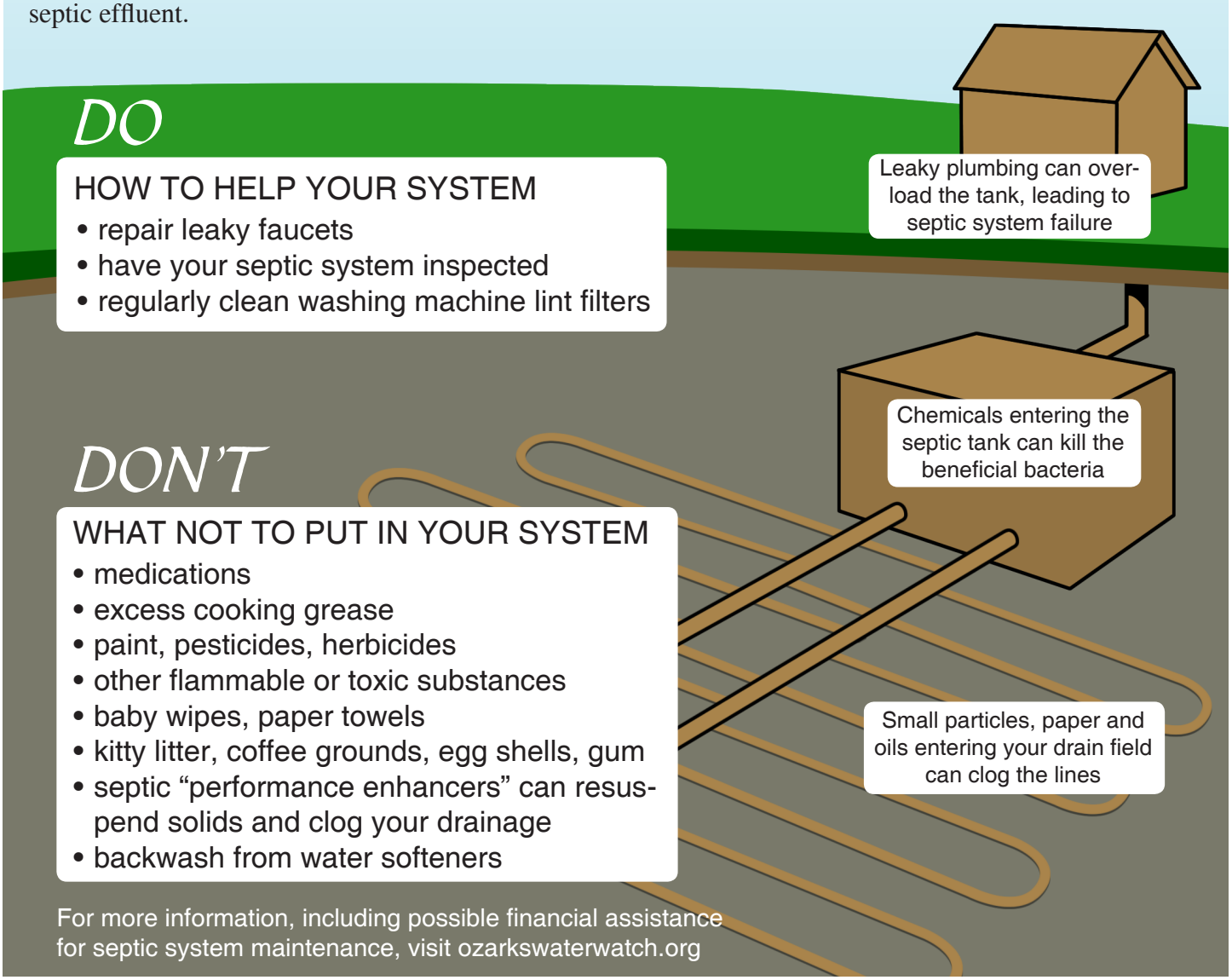
HOW TO HELP YOUR SYSTEM

- repair leaky faucets
- have your septic system inspected
- regularly clean washing machine lint filters

DON'T

WHAT NOT TO PUT IN YOUR SYSTEM

- medications
- excess cooking grease
- paint, pesticides, herbicides
- other flammable or toxic substances
- baby wipes, paper towels
- kitty litter, coffee grounds, egg shells, gum
- septic "performance enhancers" can resuspend solids and clog your drainage
- backwash from water softeners



For more information, including possible financial assistance for septic system maintenance, visit ozarkswaterwatch.org

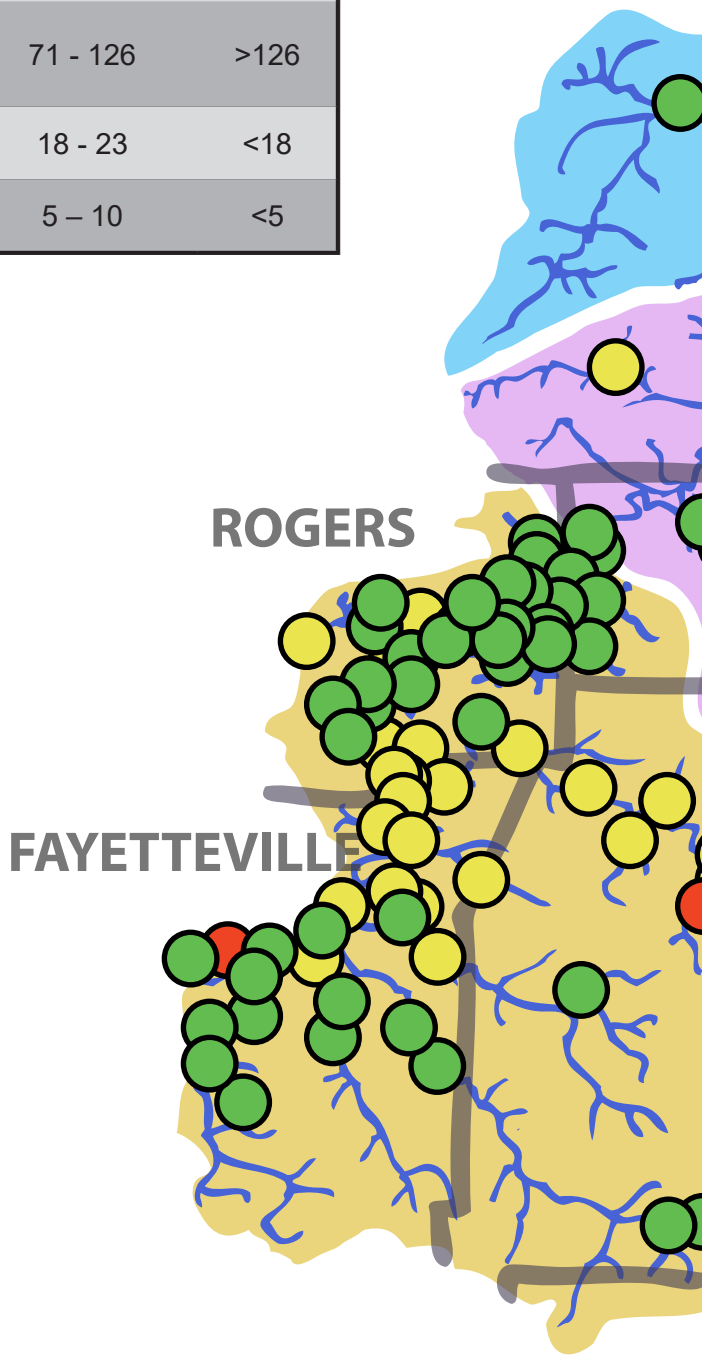
How We Assessed Water Quality

Parameter	Evaluation Method	Water Quality Assessment		
		HIGH	MID	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

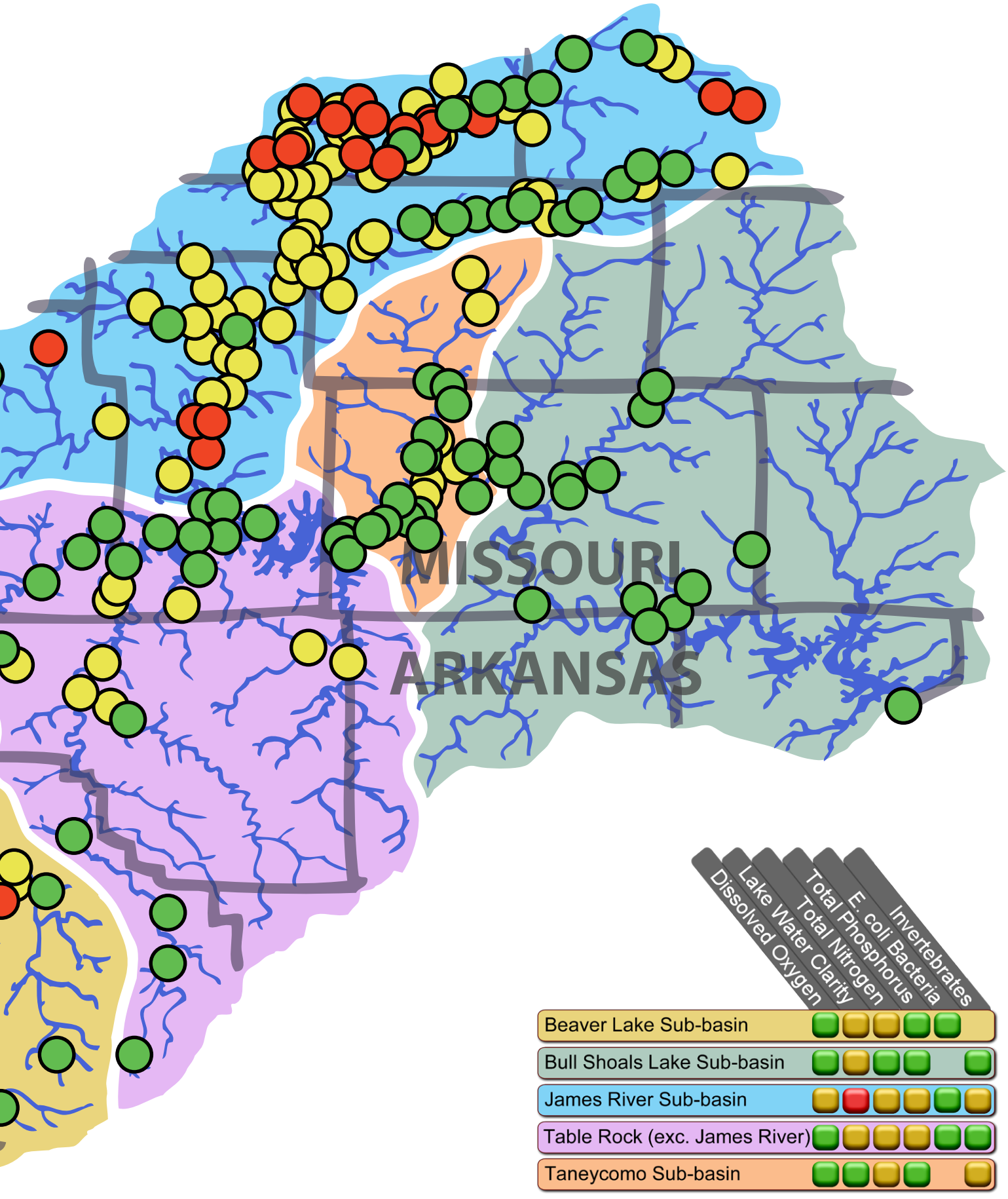
WHAT WAS MEASURED IN 2016?

- 691 Dissolved oxygen values
- 1014 Total Nitrogen values
- 1067 Total Phosphorus values
- 393 E. coli counts
- 43 Invertebrate scores
- 262 Water clarity readings

The scores in this report show how the numerous monitoring sites in the region compare to one another and are not intended to define “good” or “bad” water quality. What this report attempts to do is show where the highest and lowest *relative* water quality is. Identifying these sites will help us to focus our efforts where they are needed and let us allocate our limited resources accordingly.



For an interactive map, visit
OZARKSWATERWATCH.ORG


MISSOURI
ARKANSAS
Invertebrates
E. coli Bacteria
Total Phosphorus
Total Nitrogen
Lake Water Clarity
Dissolved Oxygen
Beaver Lake Sub-basin
Bull Shoals Lake Sub-basin
James River Sub-basin
Table Rock (exc. James River)
Taneycomo Sub-basin

There are many ways to measure water quality.

Depending on what is measured, one can determine if a lake or stream can support the many life forms within it. Measurements can also help us ascertain if a lake or stream is likely to have problems in the future, has experienced a problem in the past or is unsafe for humans to swim in. We looked at six such water quality parameters to help us rank water quality in the region.

Oxygen and water clarity show current water quality. The nutrients, nitrogen and phosphorus, show the potential for future problematic algae blooms. Aquatic invertebrates are used to estimate the historical water quality. E. coli is an indicator of pontential danger to human health.

Dissolved Oxygen:
Essential for aquatic life

We humans can breathe oxygen directly from the air around us. Aquatic organisms like fish and invertebrates have to extract Dissolved Oxygen (DO) from the water they live in. Certain pollutants can reduce DO, making water unsuitable for aquatic life. Sometimes, due to excessive algae growth, DO levels are too high. This is also bad for aquatic life.

The DO levels were a problem at 17 of the 82 sites where they were measured. In most cases where DO concentrations are a concern, the actual values were higher than desired. This condition suggests the presence of too much algae. The solution is usually to reduce the amount of nutrients entering the water.

Phosphorus and Nitrogen:
Nutrients that drive algae growth

High nutrient levels lead to higher than normal algae growth. Changes in algae growth can alter the natural aquatic communities in our lakes and streams.

Among the 165 sites monitored for nitrogen, the highest levels were primarily located in the James River below Springfield, Missouri and the region between Huntsville, Rogers and Fayetteville, Arkansas.

Phosphorus was measured at 204 sites in the watershed, and 52% of the sites had low concentrations. The sites with the highest phosphorus concentrations were typically stream and river sites located near urban areas and lake sites located in the upper portion of tributary arms.

Secchi Transparency:
A measure of water clarity

The Secchi disk is a small plate-like device that is lowered into lakes to determine water clarity. Poor water clarity is usually caused by algae or sediment in the water.

Of the 66 sites in the watershed where Secchi measurements were taken, 73% had at least 5 feet of clarity. The sites with the least clarity tended to be near inflowing streams. Because of their proximity to sediment and nutrient sources, it is expected that these sites would have lower water clarity than sites in the main lake channels.

Aquatic Invertebrates:
Living indicators of stream health

Invertebrates are simply animals without spines. Many insects (one goup of invertebrates) commonly seen around lakes and streams begin their life in the water. Dragonflies, mayflies and caddisflies spend most of their lives in the water, eventually emerging to mate and die. Other invertebrates, like mussels and crayfish, may live their entire lives under water.

Some stream invertebrates are very sensitive to pollution, while others are very tolerant of pollution. The presence of certain invertebrates in the stream provide insight to a stream's health, both short and long-term.

Most of the 25 invertebrate collection sites were in the James River region. The sites with the lowest scores were within Springfield area. Urban runoff will usually have a negative effect on invertebrate communities.

E. coli:
Bacteria associated with fecal matter

While some strains of E. coli can be harmful to humans, these bacteria are used as an indicator of other harmful organisms associated with human fecal contamination. Low background levels are common, due to the presence of pets and wildlife.

E. coli was measured at 85 sites in the watershed during 2016. Levels of this bacteria were low in 75% of the monitored sites. The streams around the urban Springfield area had the highest counts of E. coli.

White River Valley Electric Cooperative

A Touchstone Energy® Cooperative

Ozarks Water Watch would like to thank White River Valley Electric Cooperative for their generous support of this report.

Ozarks Water Watch volunteers collected total nitrogen and total phosphorus samples at 15 Missouri stream sites.

Missouri Stream Team volunteers monitored 28 sites in the Upper White River Basin (UWRB). This report features their dissolved oxygen and invertebrate data.

The Lakes of Missouri Volunteer Program volunteers monitored 26 lake sites. Their total nitrogen, total phosphorus and water clarity data are featured in this report

Stream Smart volunteers monitored 18 stream sites in the UWRB. 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.

Beaver LakeSmart volunteers sampled at 5 sites on Beaver lake. This report features their Secchi, total phosphorus and total nitrogen data.

James River Basin Partnership volunteers montored 68 sites in the James River watershed. Their total phosphorus, total nitrogen and E. coli data are included in this report.

United States Geologic Survey (USGS) monitored 9 sites for total nitrogen, total phosphorus, dissolved oxygen and E. coli bacteria.

Arkansas Water Resources Center measured total nitrogen and total phosphorus at 6 sites.

Arkansas Department of Environmental Quality (ADEQ) measured total nitrogen, total phosphorus and dissolved oxygen at 22 sites.

Taney County monitored 28 sites for concentrations of dissolved oxygen.

Beaver Water District measured total nitrogen, total phosphorus, dissolved oxygen and E. coli bacteria at 7 locations.

The City of Springfield measured E. coli at 13 locations.