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**How to Turn 3000 Water Quality
Measurements from 11 Sources
into an 8 Page Report Written for
the General Public**

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UPPER WHITE RIVER BASIN

14,000 square miles

2 States

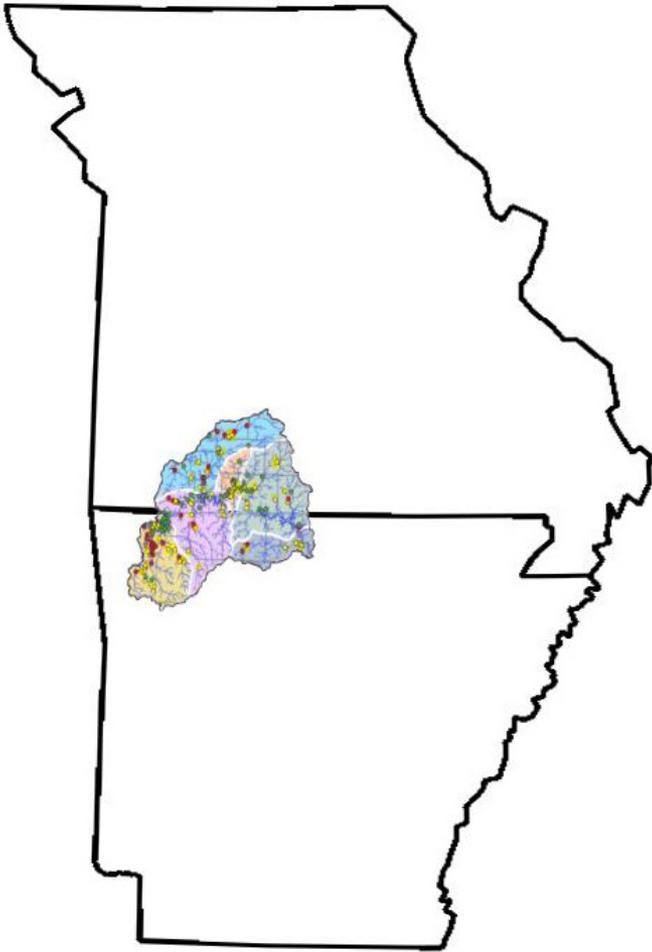
19 Counties

Over 1 million people

>300 miles of river

4 large reservoirs covering

190 miles² (494 km²)





- ➔ **Not-for-profit founded in 2001**
- ➔ **Mission is to promote water quality in Upper White River Watershed**
- ➔ **Research, Education, Public Policy, and Watershed Projects**
- ➔ **ozarkwaterwatch.org**

Status of the Watershed Report

Annual Report that:

- answers the question “How’s the water?”**
- provides insight into seasonal and annual variations in water quality**
- identifies locations of concern for management**
- identifies areas of high ecologic quality for protection**

2008 Report looked at water quality at 10 sites

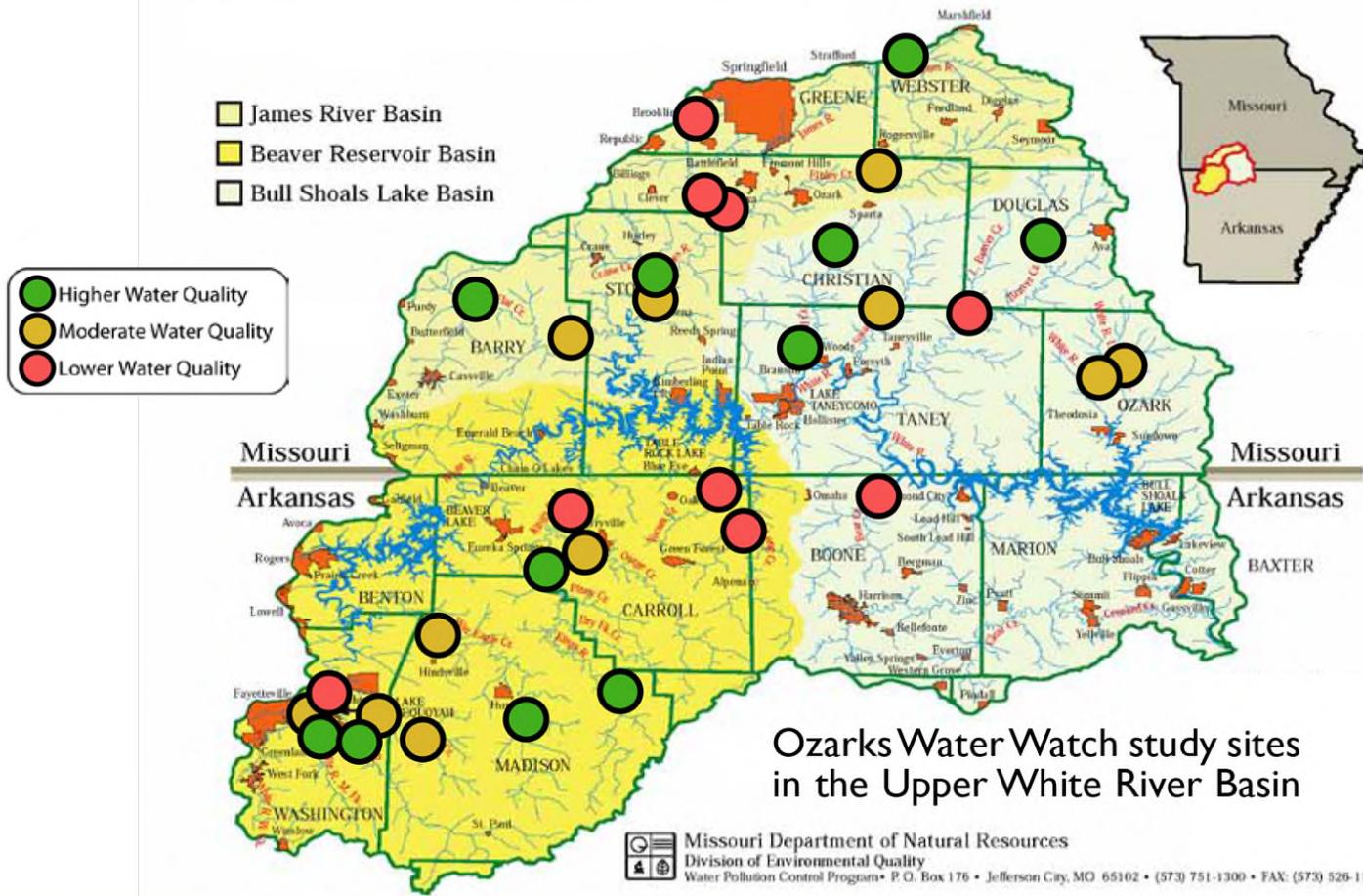
**2009 Report covered water quality at 11 sites
and biological assessments at 10 sites**

**2010 Report focused on water quality at 9
sites and bio-assessment at 10 sites**

**2011 Report summarized all data including 12
sites monitored for water quality and 10 bio-
assessment sites from 2011**

Water Quality data from USGS and included: Dissolved Oxygen, Total Nitrogen, Total Phosphorus and E. Coli

Bio-assessments conducted by University of Arkansas, following Missouri Department of Natural Resources protocol (Taxa Richness, E.P.T., Shannon's Diversity, and Biotic Index)



31 sites total
12 monitored for Water Quality
30 monitored for Invertebrates

Decision was made to take different approach for 2012 data report



**Desire to include more sites across basin.
Include data collected by citizens volunteers.
Report audience is general public.**

DATA SOURCES

Citizen Volunteers

Ozark Water Watch

Missouri Stream Team

The Lakes of Missouri Volunteer Program

Stream Smart

Secchi Day on Beaver Lake

Agency/Non-Profit/Quasi-Government

United States Geological Survey

Arkansas Department of Environmental Quality

Taney County

Arkansas Water Resources Center

Watershed Committee of the Ozarks

Beaver Water District

SOURCE	# Sites	DO	TN	TP	E. Coli	Inverts	Secchi
ADEQ	23	X	X	X			
AWRC	9		X	X			
Beaver Water	10	X	X	X	X		
MO LMVP	33		X	X			X
MO Stream Team	36	X				X	
Oz. Water Watch	19		X	X			
Secchi Day	41			X			X
Stream Smart	6		X	X			
Taney Co.	10		X	X	X		
USGS	10	X	X	X	X		
Watershed Oz.	3				X		

THE DATA

4000 water quality measurements

1600 sample events

160 sites

744 Dissolved Oxygen readings

1105 Total Nitrogen values

1414 Total Phosphorus values

506 E. Coli counts

35 Invertebrate scores

258 Secchi Transparency readings

DATA REDUCTION/MANAGEMENT

Values below the limit of detection were reported as half the limit of detection

E. Coli values reported as $>x$ were entered into data set as x

Values of zero were replaced with a minimal value (e.g. E. Coli of 0 was replaced with 1)

Used geometric means (for TN, TP, Secchi and E. Coli) to limit influence of extreme high values

Invertebrates were scored following MO Stream Team protocol

Dissolved Oxygen was assessed based on % of time it met state criteria

If a site was monitored by more than one project, a weighted average was calculated

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

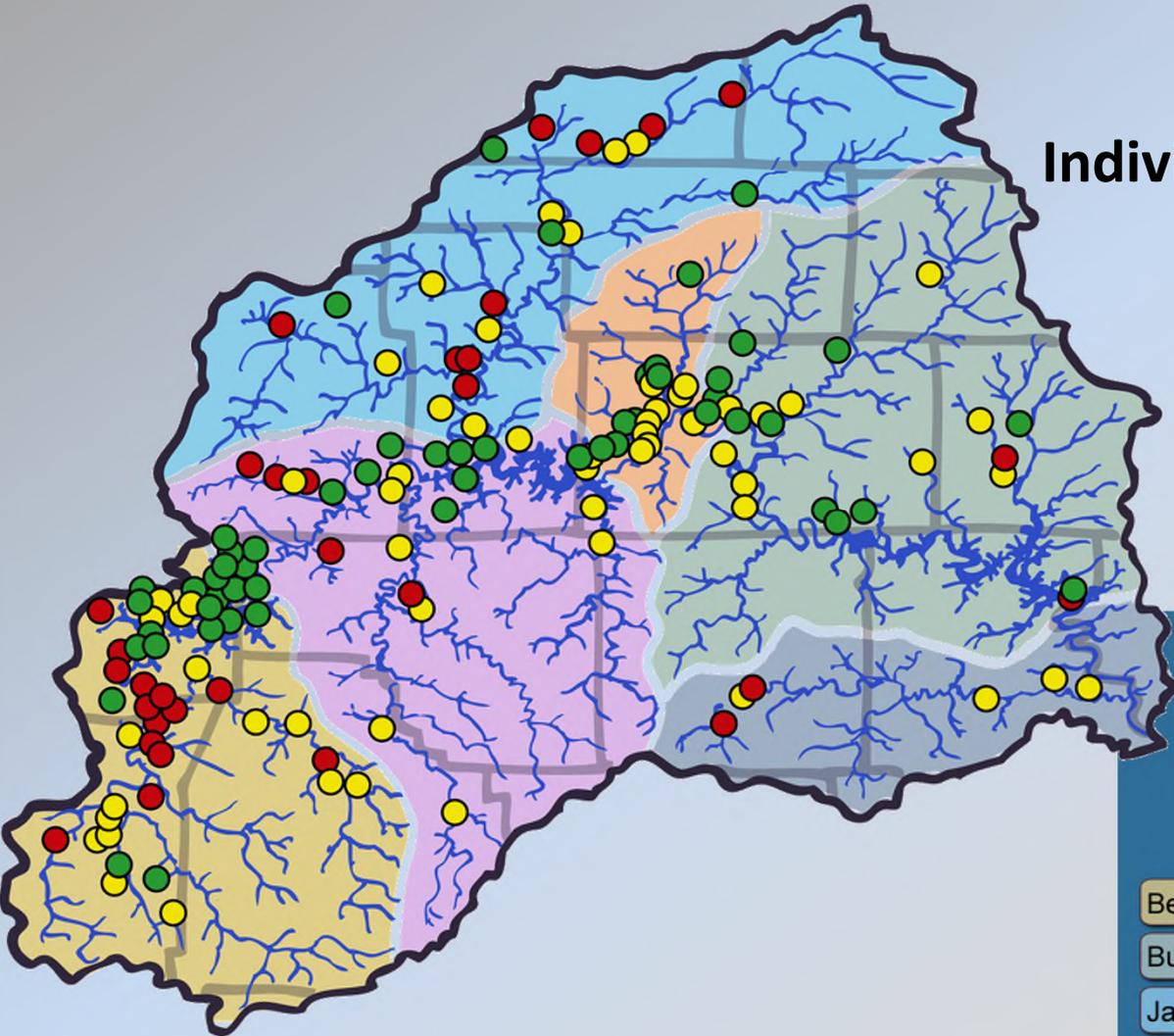
IF MULTIPLE PARAMETERS WERE MEASURED

- 1) Each Parameter scored: High = 5 Moderate = 3 Low = 1
- 2) Scores averaged for all parameters
- 3) Final Assessment based on average
 - 1 – 2.0 was LOW
 - 2.1 – 4.0 was MODERATE
 - 4.1 – 5 was HIGH

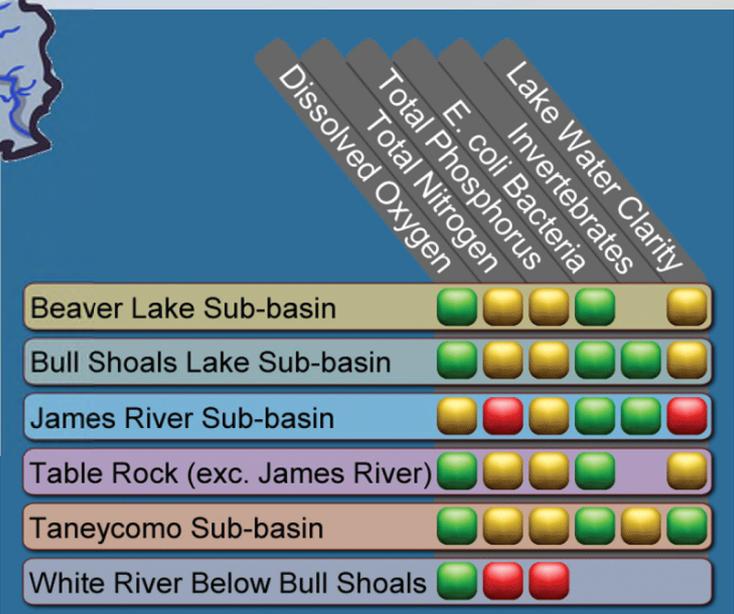
Parameter	Geometric mean	Assessment	Score
Total Nitrogen	0.48 mg/L	High	5
Total Phosphorus	0.03 mg/L	Moderate	3
Secchi	6.5 feet	Moderate	3

Average = 3.67
so site was rated MODERATE

Individual Site Assessments



Sub-basin Assessments



Water quality ratings by region and parameter

	PROS	CONS
Old Report	-High Quality Data	-Limited Coverage
New Report	-More Sites -Different Water Body Types -Color Coded Rating is Easy to Understand	-Data Quality Varies -Different Methods

Another con of using other's data

The site “Beaver low” is located at Hwy 125 and Old Cheese Plant Road due north from Bradleyville, give or take 2 miles.

Yes, it is beautiful there. Site is 200 yards off of Hwy 125 at the Cheese Plant Road low water slab.

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

