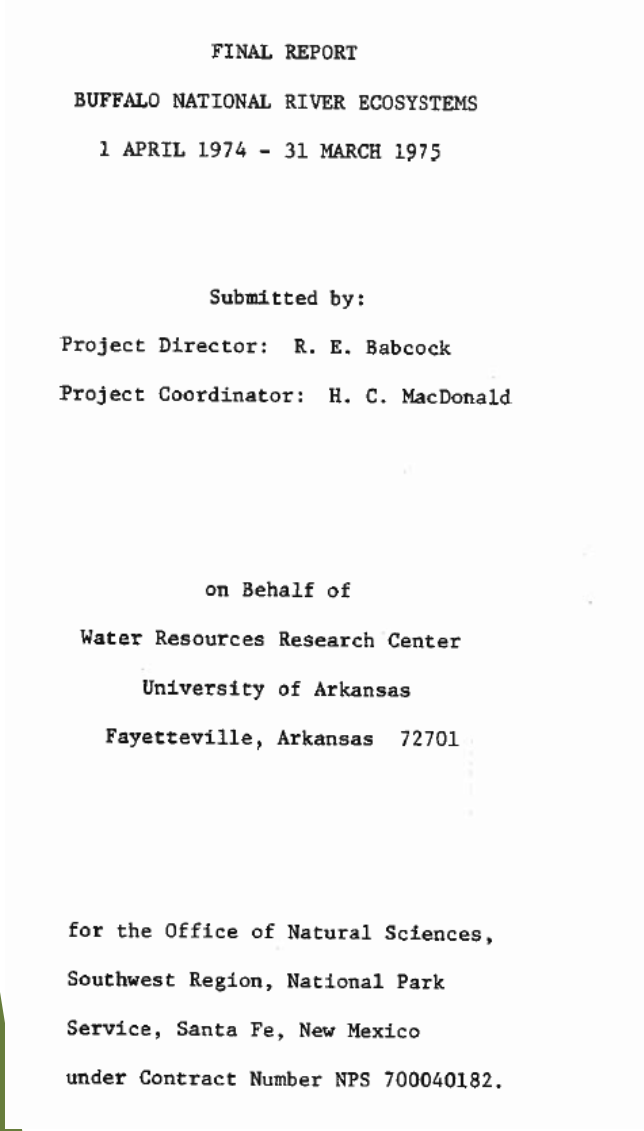
History of Filamentous Algae in the Buffalo National River

Tate Wentz
Stream Team Coordinator
Arkansas Game and Fish Commission

1974-1975 Buffalo River Water Quality Study



FINAL REPORT

BUFFALO NATIONAL RIVER ECOSYSTEMS

1 APRIL 1974 - 31 MARCH 1975

Submitted by:

Project Director: R. E. Babcock

Project Coordinator: H. C. MacDonald

on Behalf of

Water Resources Research Center

University of Arkansas

Fayetteville, Arkansas 72701

for the Office of Natural Sciences,

Southwest Region, National Park

Service, Santa Fe, New Mexico

under Contract Number NPS 700040182.

Laura L. Rippy and Richard L. Meyer

Spatial and Temporal Distribution of Algae and Associated Parameters

Objective: determine distribution of periphyton community. Pool vs. riffle association collected along length of river at four intervals

1974 Rippy and Meyer

Major findings:

- Late spring and early summer composed of *Spirogyra* and *Oedogonium*
- *Spirogyra* most dominate in July and August
- *Oedogonium* was present in almost every sample period

Source: http://www.aquaticmgmtservices.com/spirogyra

Source: https://microscopesandmonsters.files.wordpress.com

1974 Rippy and Meyer

Major findings:

- No great algal blooms developed in autumn as typically occur in lakes.
- Visually evidenced as extensive expanses of clean gravel.
- One year of study suggested some change from upper to lowe Buffalo.

1978 Water Quality and Phycological Studies

Richard Meyer and Neil Woomer

Major findings:

- No significant deviations from previously reported patterns of periphyton growth were observed.
- 28 additional taxa were added.

1978 Meyer and Woomer

Major findings:

- September, *Chara* beds completely overgrown with thick extensive coating of filamentous blue-green, *Anabena unispora*
- Copious blooms of *Spirogyra* are associated with deep pools with large rocks and a sand-silt base.

Source: http://istudy.pk/chara/

1978 Meyer and Woomer

Major findings:

- Cattle access at Tyler Bend appears to be directly related to localized and extremely heavy *Spirogyra* bloom.

1991 Survey of Mill Creek

Martin Maner and David Mott…

"Dissolved oxygen in the Buffalo varied from 7.2 mg/l (88.9% saturation) upstream to 9.5 mg/l (120.3% saturation) downstream. The extreme value downstream was apparently caused by photosynthesis from numerous algal clumps on the bottom of the pool and other forms of periphyton at this point. These clumps were up to a foot or more in diameter."

1997 BNR Ten Years of Water Quality Monitoring

BUFFALO NATIONAL RIVER,

ARKANSAS

TEN YEARS OF WATER QUALITY MONITORING

David N. Mott[1]

May, 1997

[1]Hydrologist, U.S. Department of the Interior, National Park Service, Buffalo National River, Harrison, Arkansas

United States Department of the Interior
National Park Service

effect of dampening out the small perturbations that might otherwise be observed between individual stations.

Figure 19 represents an attempt to remove the effects of higher turbidity in the spring and to highlight the relative degree of turbidity at each station caused by algae by focusing only on those samples collected during the summer months. During the summer growth season, the correlation between higher nutrients and higher turbidities is especially pronounced at Hasty (R4). Summer base-flow turbidity is typically related to phytoplankton and algal growth, which in the case of R4 may result from the nutrient loading from Mill Creek and Little Buffalo River which confluence above Hasty.

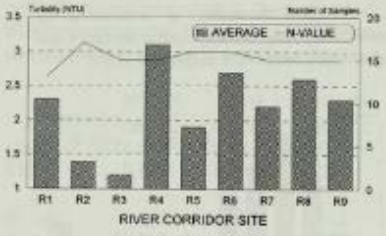


Fig. 19. *Average summer turbidity values at nine Buffalo River sampling sites.*

Generally, the base-flow turbidity of the Buffalo River is between 1 and 3 NTU's (Nephelometric Turbidity Unit). Turbidities as high as 420 NTU's have been recorded in association with rain events. The dominant source of turbidity during high flow times is from erosion of road surfaces and ditches, cattle pastures and other cleared land, and unprotected rapidly eroding cutbanks. Although turbidity and FC concentrations correlate very well during rainstorms (Mott, 1990), a similar relationship is not observed during base-flows, except to say that both are typically low.

Turbidity - Tributaries

The highest average turbidity values shown in Figure 20 come from Beech Creek, Richland Creek, and Cecil Creek. Each of these tributaries drains Boston Mountain sandstones and shales which contribute a higher proportion of suspended load, and thus turbidity, as discussed previously. Indeed, all the tributaries with average turbidities in excess of one NTU have a significant portion of Boston Mountain strata in their watershed, while those under one NTU drain Springfield and Salem Plateau strata.

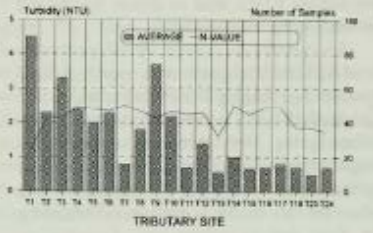
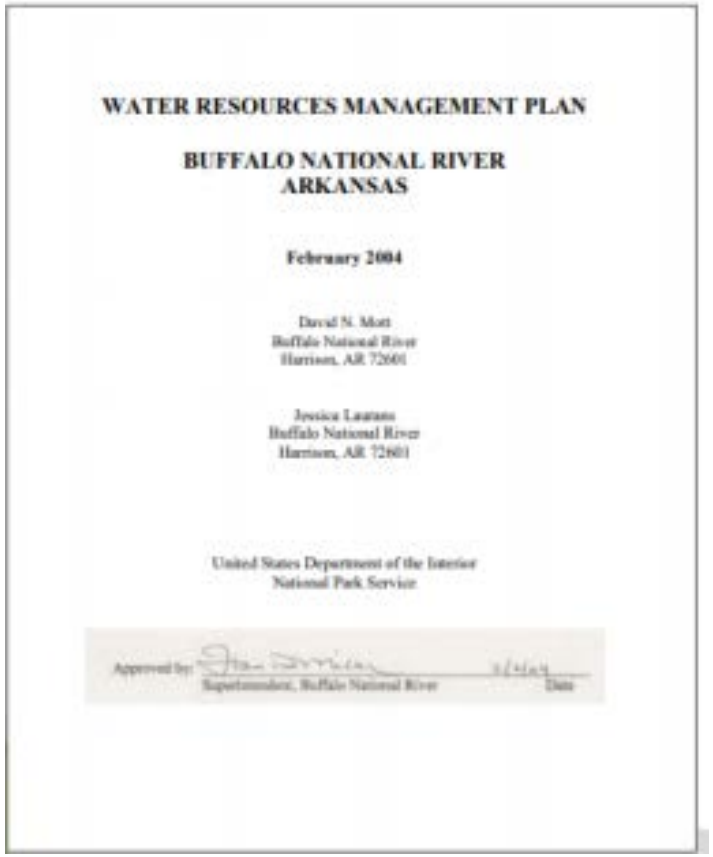


Fig. 20. *Average turbidity values in the tributaries to the Buffalo River.*

Beech Creek has a relatively high turbidity because it is dry most of the summer and samples are therefore not collected during this relatively clearer period (see Figure 18). At Richland Creek, the higher turbidity values resulted in part from samples collected in 1988 during a period of very low-flow. Direct deposition of cattle waste into pools on lower Richland Creek spawned a phytoplankton bloom which increased turbidity by an order of magnitude for a three month duration (summer 1988 average was 11.9 NTU). Cecil Creek's higher turbidity, while related to geology, may also result from the higher phosphate concentrations associated with this stream.

2004 BNR Water Resource Management Plan



WATER RESOURCES MANAGEMENT PLAN

BUFFALO NATIONAL RIVER
ARKANSAS

February 2004

David N. Mott
Buffalo National River
Harrison, AR 72601

Jessica Laarans
Buffalo National River
Harrison, AR 72601

United States Department of the Interior
National Park Service

Approved by: _____ 3/4/04
Superintendent, Buffalo National River Date

David Mott and Jessica Larson

"There has been limited research on the algae community along the Buffalo River. This is an area that needs more attention…"

2004 BNR Water Resource Management Plan

Mott and Larson

- “Filamentous algae blooms have posed problems on the Buffalo, algal blooms in late summer are extensive enough to warrant complaints by visitors.”
- “Spirogyra sp. Is the most common, occurring in dense, floating masses in pools along the middle to lower river.”
- “It was found in 60 percent of the macro algae samples taken from sites along the Buffalo River (Petersen and Femmer, 2002).”

What do we know now?

2016

First reported September15, 2016

~20 miles long

Primarily *Oedogonium*

Lasted approximately two weeks

2017

First reported August 7,2017

Lasted approximately four months

~70 miles long

Primarily *Spirogyra* and *Oedogonium*

Pollution Complaints

Complaint Reporting Forms

- Submit Air Pollution Complaint
- Submit Asbestos Complaint
- Submit Hazardous Waste Complaint
- Submit Mining Complaint
- Submit Petroleum Product Spills and Leaks Complaint
- Submit Solid Waste / Illegal Dumps Complaint
- Submit Water Pollution Complaint
- **Submit Nuisance Algae Bloom Complaint**
- Submit Harmful Algae Bloom Complaint
- Tire Accountability Program Complaint

Complaints, Incidents, & Inspections Searchable Data Forms

- Search ADEQ Complaints and Inspections Data
- Search Regional Solid Waste Management Districts Complaints & Inspections Data
- Search Solid Waste/Illegal Dumps Complaints and Inspections Data

Nuisance Algae Bloom Complaint Form

The information you submit will be forwarded to ADEQ environmental enforcement personnel. If you send a complaint to the wrong division, it will be referred to appropriate staff.

ADEQ's Mobile App - Pollution Complaints
Get our app and start sending complaints from your phone.

Download on the App Store | ANDROID APP ON Google play

Online Nuisance Algae Bloom Complaint Reporting Form

***Asterisk indicates item is mandatory;** all others are optional*

Owner/Location Information

Instructions

Property Owner (if known):

*** County (if known):** Select County (or Unknown)

*** Location/Driving Directions:**
Provide the exact address, including street, city, and zip and/or location/driving directions.

Description of Problem

Instructions

Public Access: Yes

After-Hours Emergencies

If you are reporting a spill/leak of petroleum products or hazardous materials or gases requiring an immediate emergency response, call the:

Arkansas Department of Emergency Management
800-322-4012

Please also call:

ADEQ
501-682-0716

Leave a message and your call will be returned.

File a complaint with ADEQ

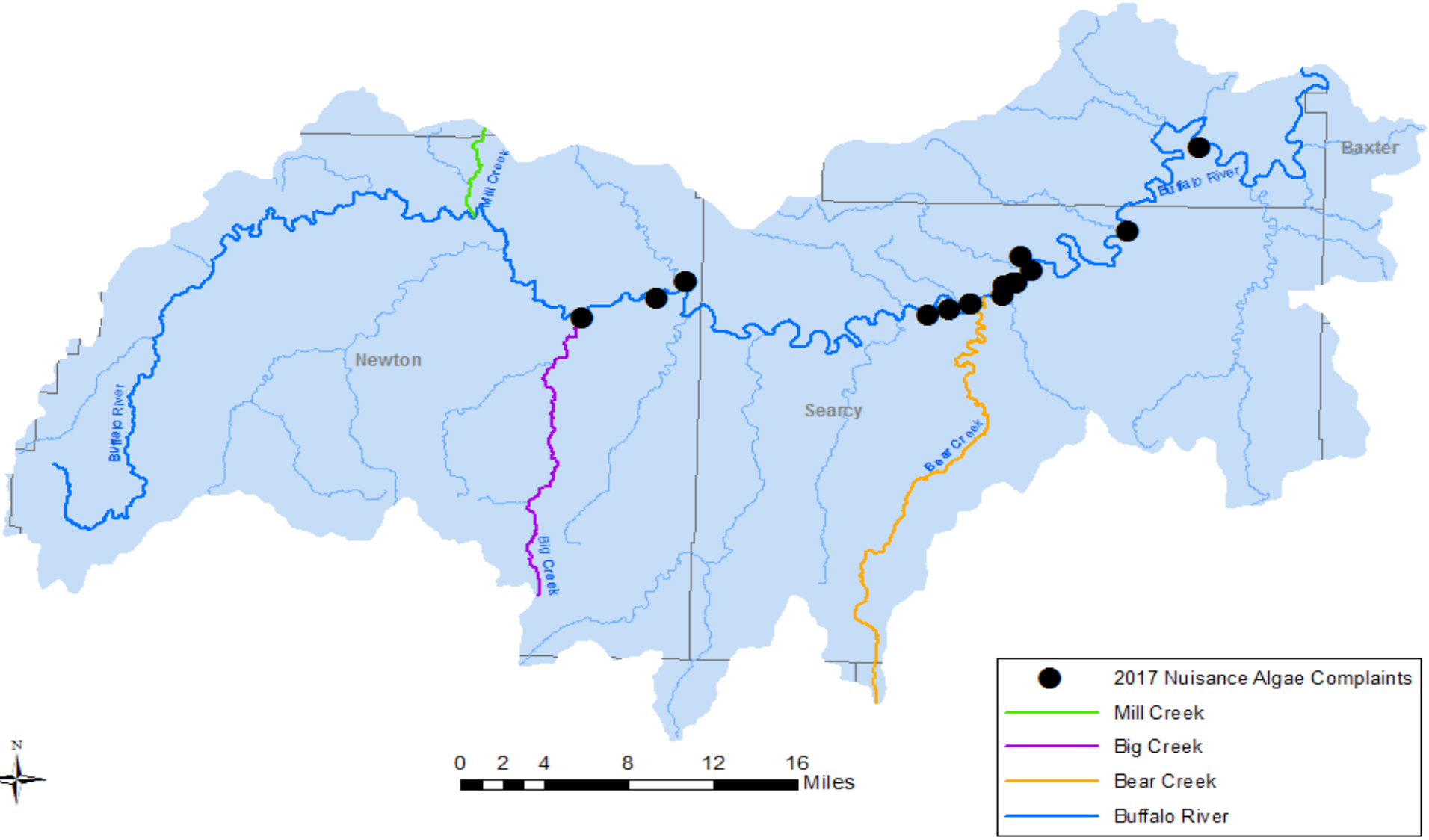
ONLINE
Online Complaint Reporting Form
<-- fill in the online complaint form

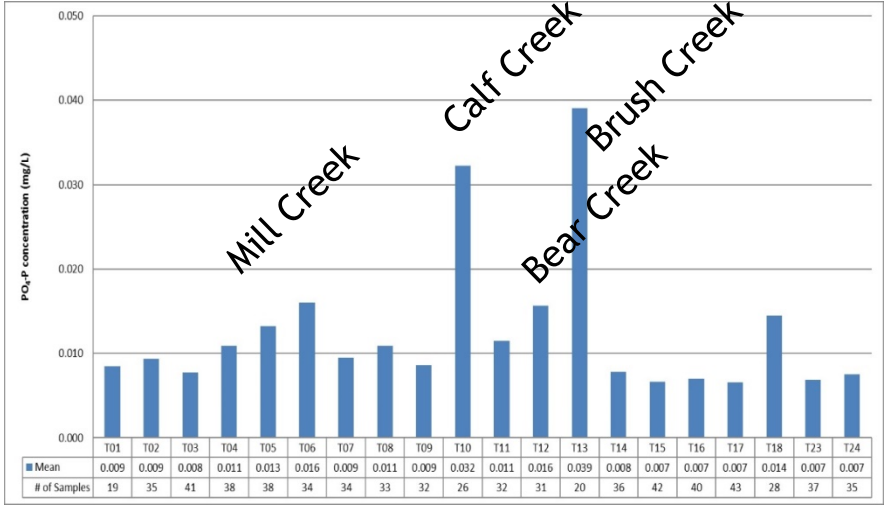
8:00 am - 4:30 pm
Monday - Friday

Contact
Water Division
Inspection Branch
501-682-0634
FAX: 501-682-0880

Or

Buffalo River Watershed





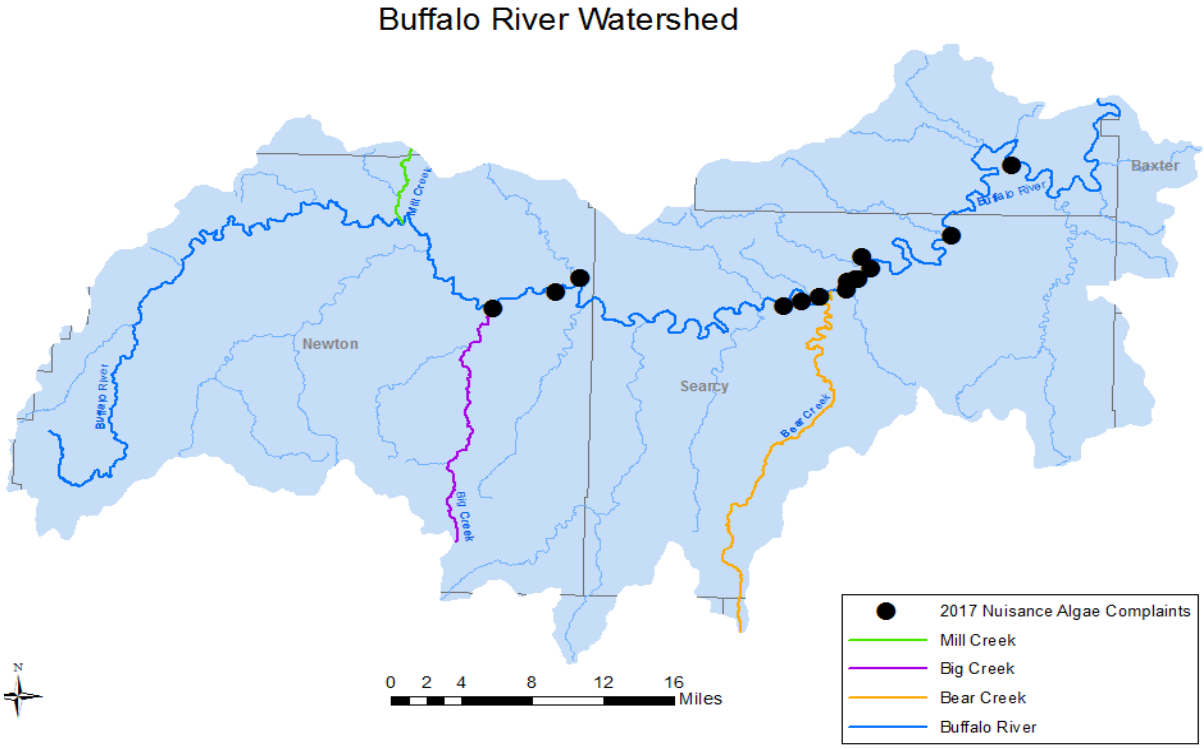
	T01	T02	T03	T04	T05	T06	T07	T08	T09	T10	T11	T12	T13	T14	T15	T16	T17	T18	T23	T24
Mean	0.009	0.009	0.008	0.011	0.013	0.016	0.009	0.011	0.009	0.032	0.011	0.016	0.039	0.008	0.007	0.007	0.007	0.014	0.007	0.007
# of Samples	19	35	41	38	38	34	34	33	32	26	32	31	20	36	42	40	43	28	37	35

Figure 4.4.3 Mean PO_4-P concentrations for Buffalo River tributary sites sampled between 1998 and 2011 during base-flow conditions.

	T01	T02	T03	T04	T05	T06	T07	T08	T09	T10	T11	T12	T13	T14	T15	T16	T17	T18	T23	T24
Mean	0.05	0.15	0.05	0.66	0.11	0.16	0.42	0.11	0.05	0.38	0.30	0.25	0.62	0.40	0.23	0.24	0.18	0.17	0.03	0.03
# of Samples	28	60	59	65	59	58	62	55	46	57	60	56	46	58	59	64	62	54	51	52

Figure 4.3.5 Mean NO_3-N concentrations for Buffalo River tributary sites between 1995 and 2011 during base-flow conditions.

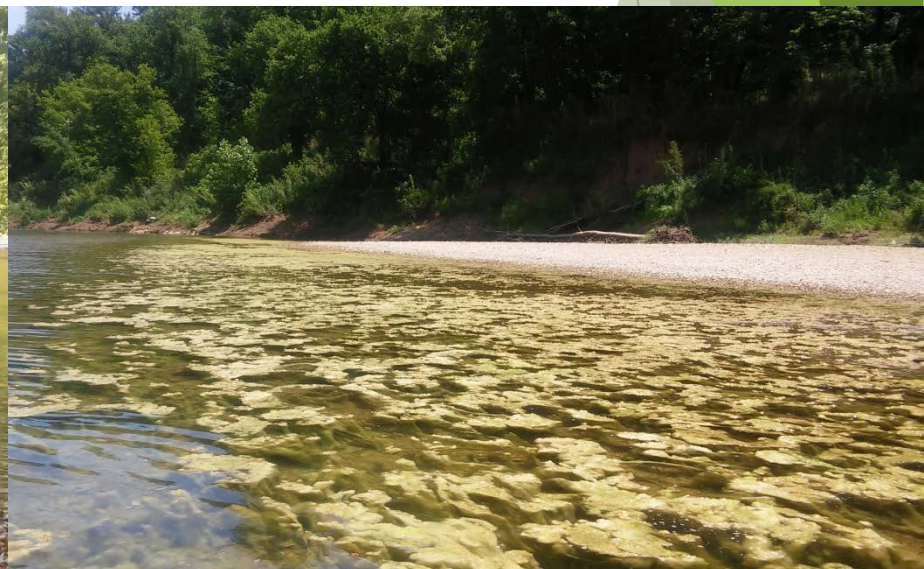
WCRC, 2017



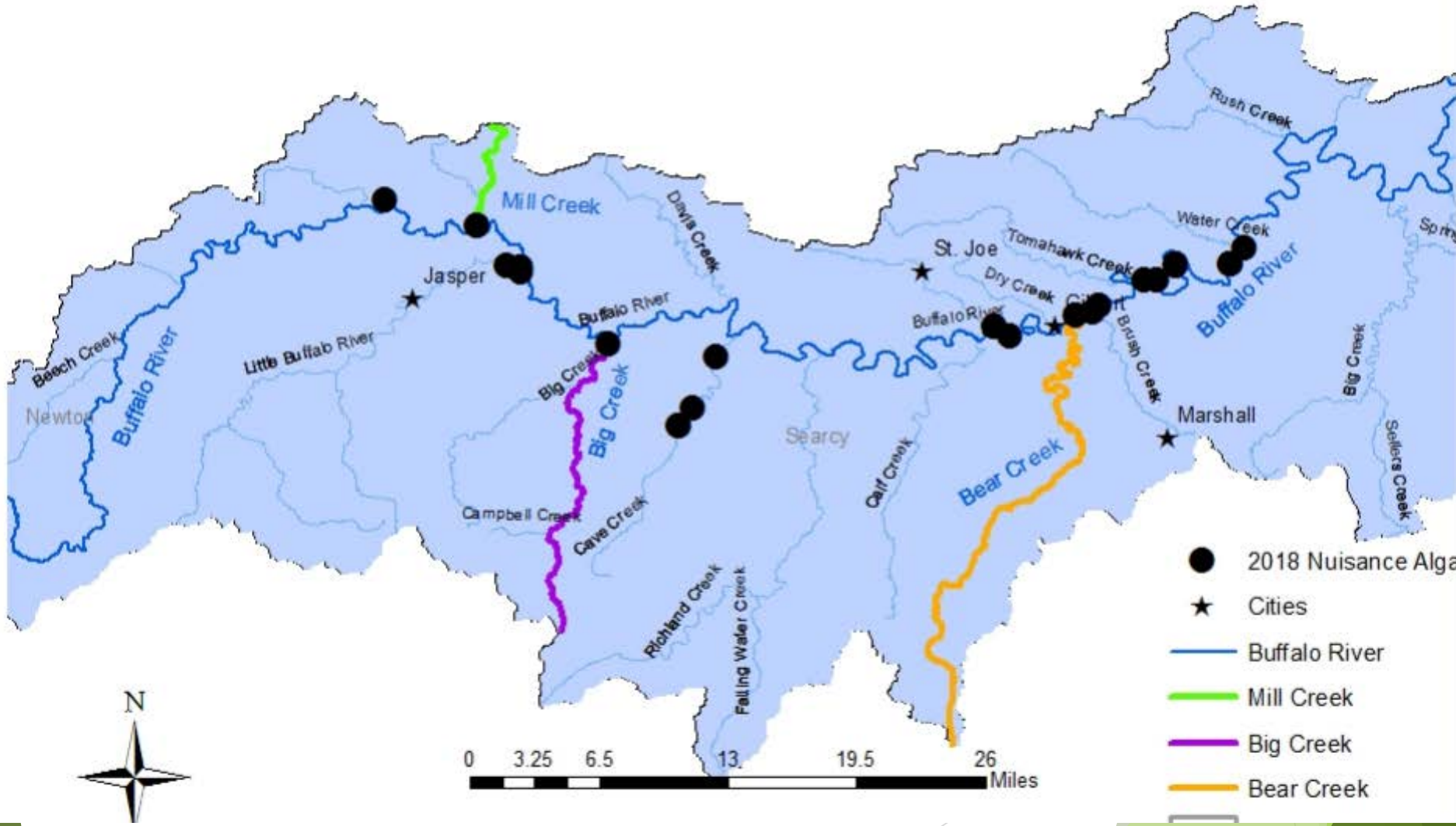
2018

First reported May 15, 2018

36 tracking submissions



Buffalo River Watershed



Current Work

- AGFC/USGS/ADEQ/NPS Joint Algae Study
  - Summer 2018-Present
  - 27 sites
- Citizen Science

QUESTIONS?

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