Nutrient Criteria Development in Arkansas

Arkansas Water Resource Center
Fayetteville, AR
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Lake Criteria Development Milestones

2006-2008

Beaver Lake Stakeholder Group

2008-2014

Ecoregion reference lake studies

2013

Beaver Lake translators adopted APCE&C

Regulation 2.509

(B) Site Specific Nutrient Criteria

Lake	Chl a (ug/L)**	Secchi(m)***
Beaver Lake*	8	1.1

* These criteria are for measurement at the Hickory Creek site over the old thalweg, below the confluence of War Eagle Creek and the White River in Beaver Lake.

** Growing season geometric mean (May – October)

*** Annual Average

Lake Criteria Development Milestones

2006-2008

Beaver Lake Stakeholder Group

2008-2014

Ecoregion reference lake studies

2013

Beaver Lake translators adopted APCE&C

2014

Assessment Methodology

2015

HAB workgroup created

Stream/River Criteria Development Milestones

1998 EPA published the National Strategy for the Development of Regional Nutrient Criteria (National Strategy)

2001 EPA published recommended, regional numeric nutrient criteria for rivers and streams

2001 EPA requested a Nutrient Criteria Development Plan

2004 ADEQ updated Reg. 2.509 Nutrients

2005 ADEQ submitted the State of Arkansas Draft Nutrient Criteria Development Plan (NCDP) to EPA Region VI

2008 Arkansas's plan was mutual agreed upon

2008 USRPP initiated

2011 USRPP Completed

2011 NCDP Updated

2013 Ozark Highland ERW initiated

2013 EPA Guiding Principles on an Optional Approach for Developing and Implementing a Numeric Nutrient Criterion

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Stream/River Criteria Development Milestones

2014

First Edition Wadeable Stream Nutrient AM

2015

Act 335-Nutrient Trading Bill

2016 Milestones

NSTEPS Projects Completed

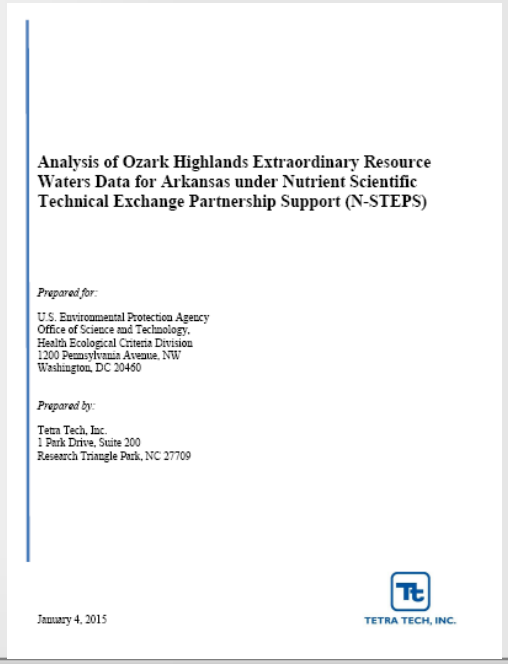
Extraordinary Resource Waterbody

Ecoregion Based

Ozark Highlands	2012-2014
Boston Mountain	2013-2015
Ouachita Mountains	2016-2018

NSTEPs

Ozark ERW	2015-2016
Red River	2015-2016



Analysis of Ozark Highlands Extraordinary Resource Waters Data for Arkansas under Nutrient Scientific Technical Exchange Partnership Support (N-STEPS)

Prepared for:

U.S. Environmental Protection Agency
Office of Science and Technology,
Health Ecological Criteria Division
1200 Pennsylvania Avenue, NW
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Prepared by:

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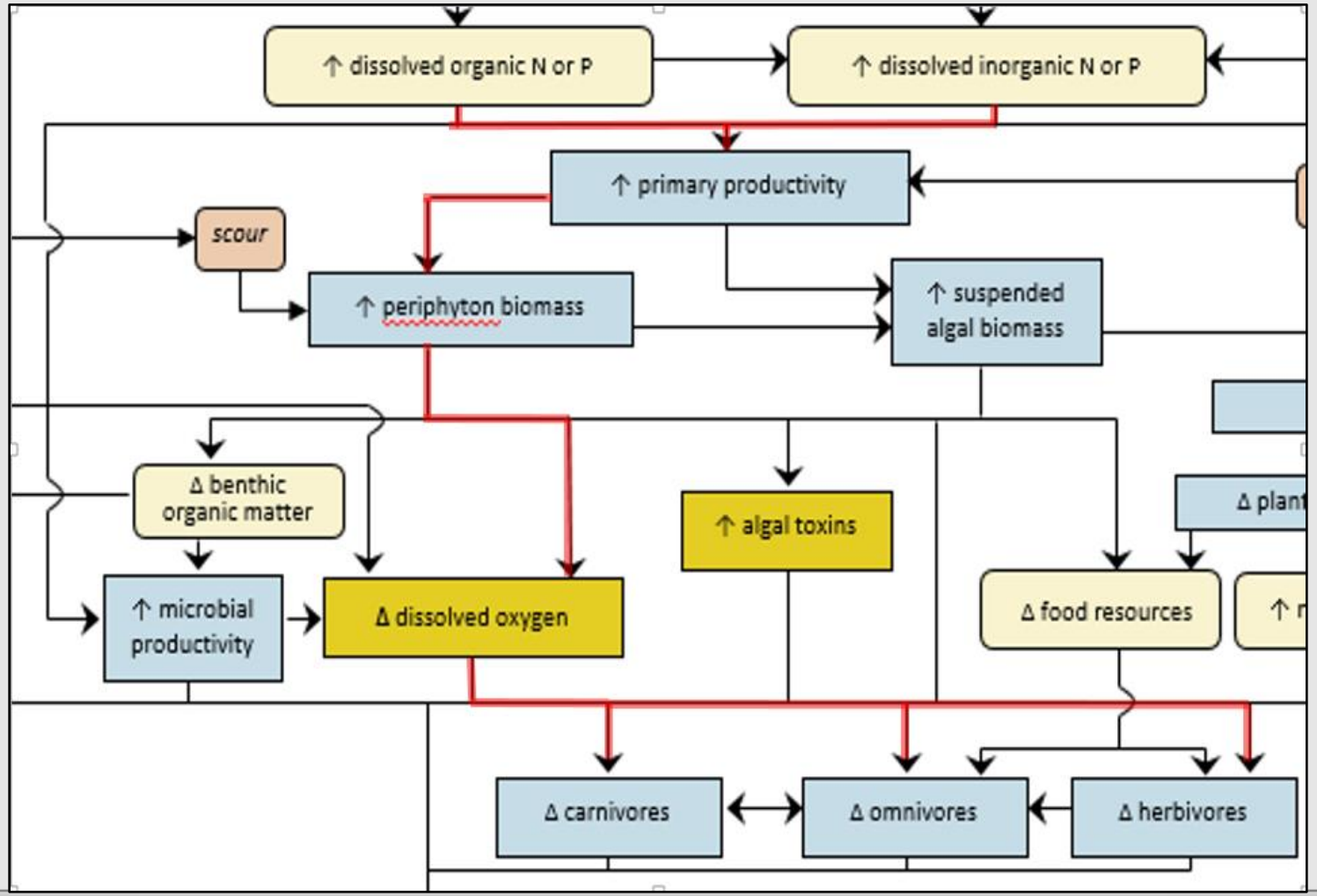
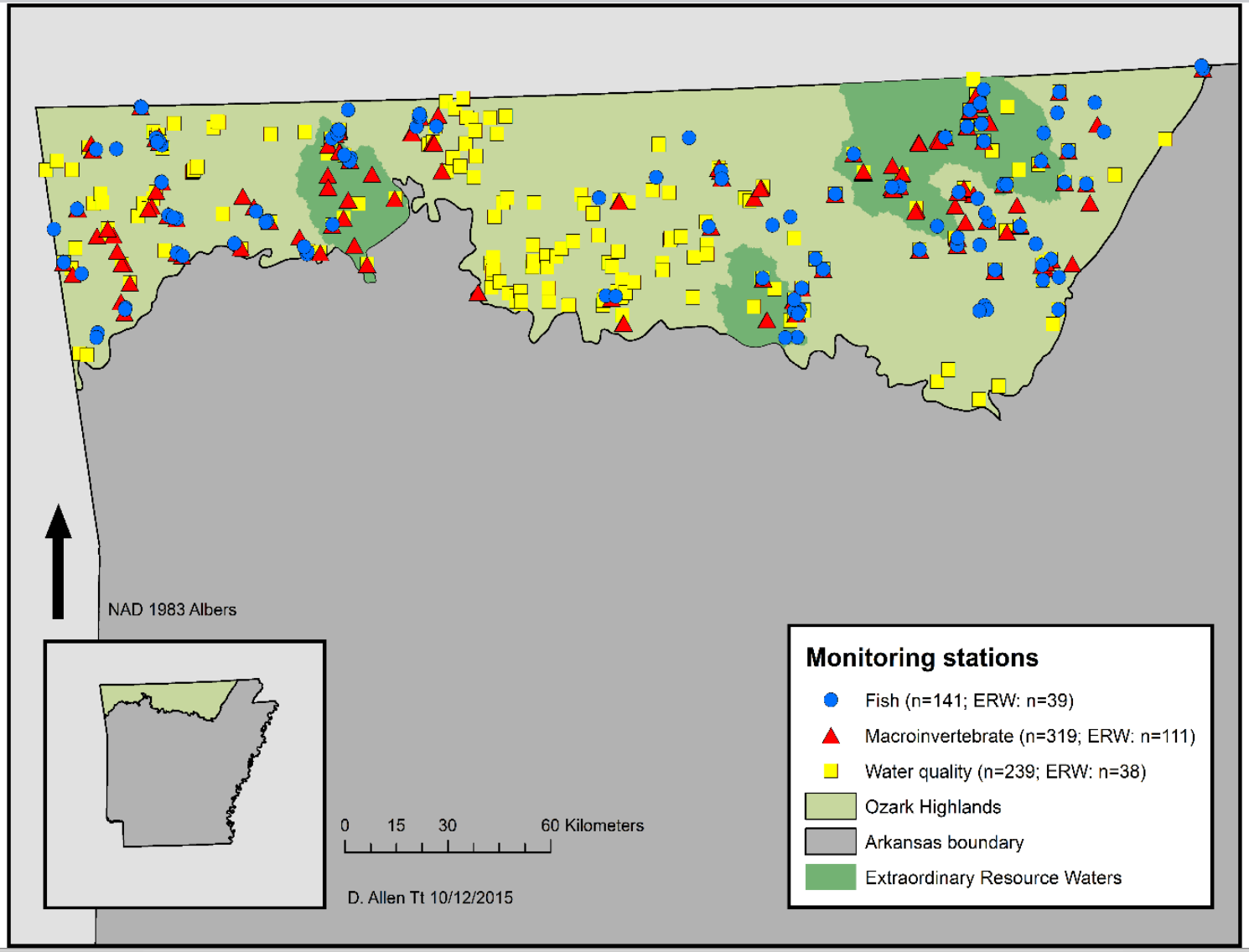
January 4, 2015

TETRA TECH, INC.

Ozark ERW NSTEPs





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Ozark ERW NSTEPs

Potentially Least-Disturbed (Reference)

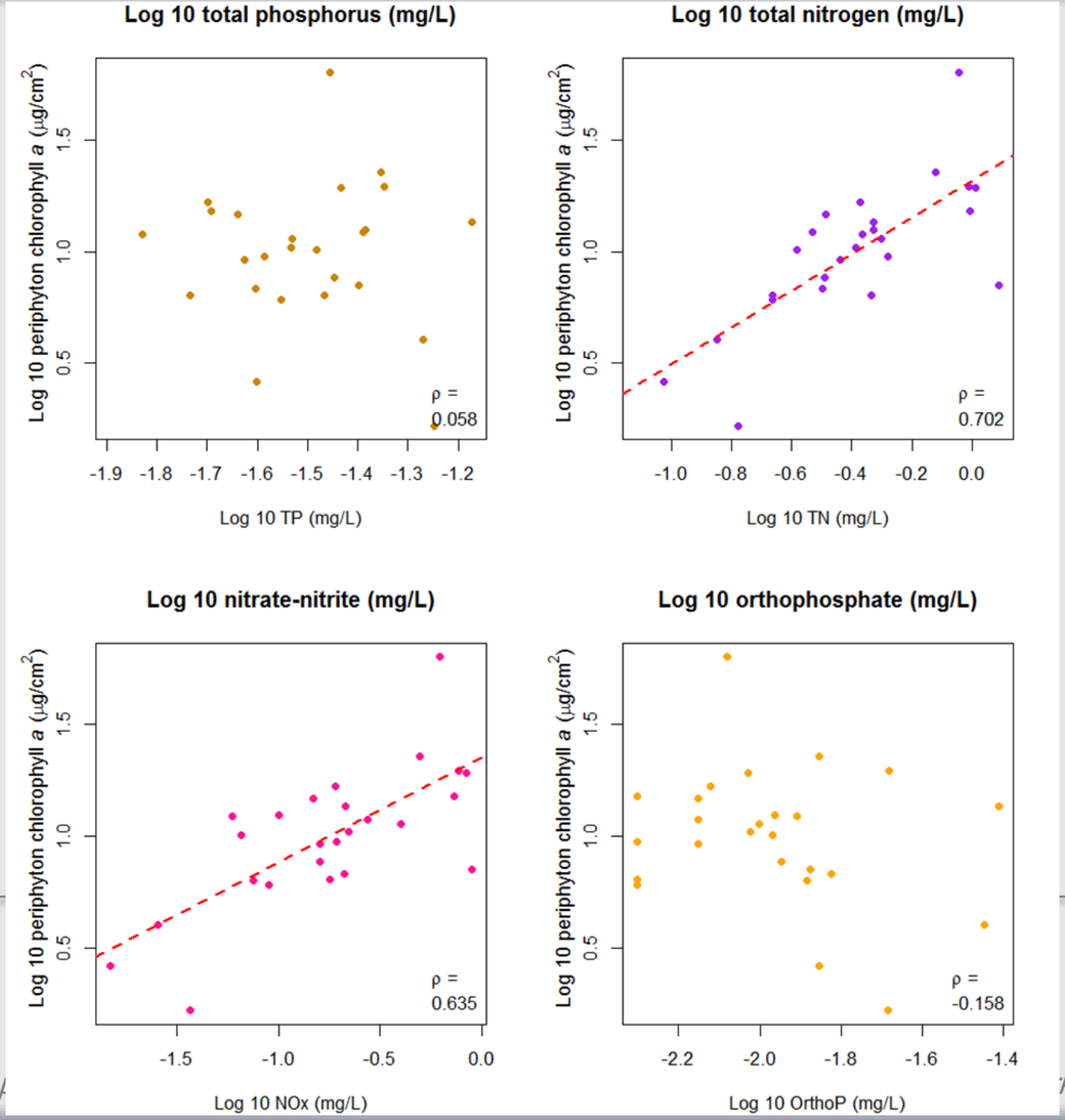
Parameter	N	Geo Mean	10th percentile	25th percentile	Median	75th percentile	90th percentile
TN (mg/L)	89	0.198	0.087	0.108	0.159	**0.264**	0.390
TP (mg/L)	38	0.023	0.010	0.015	0.025	**0.032**	0.038

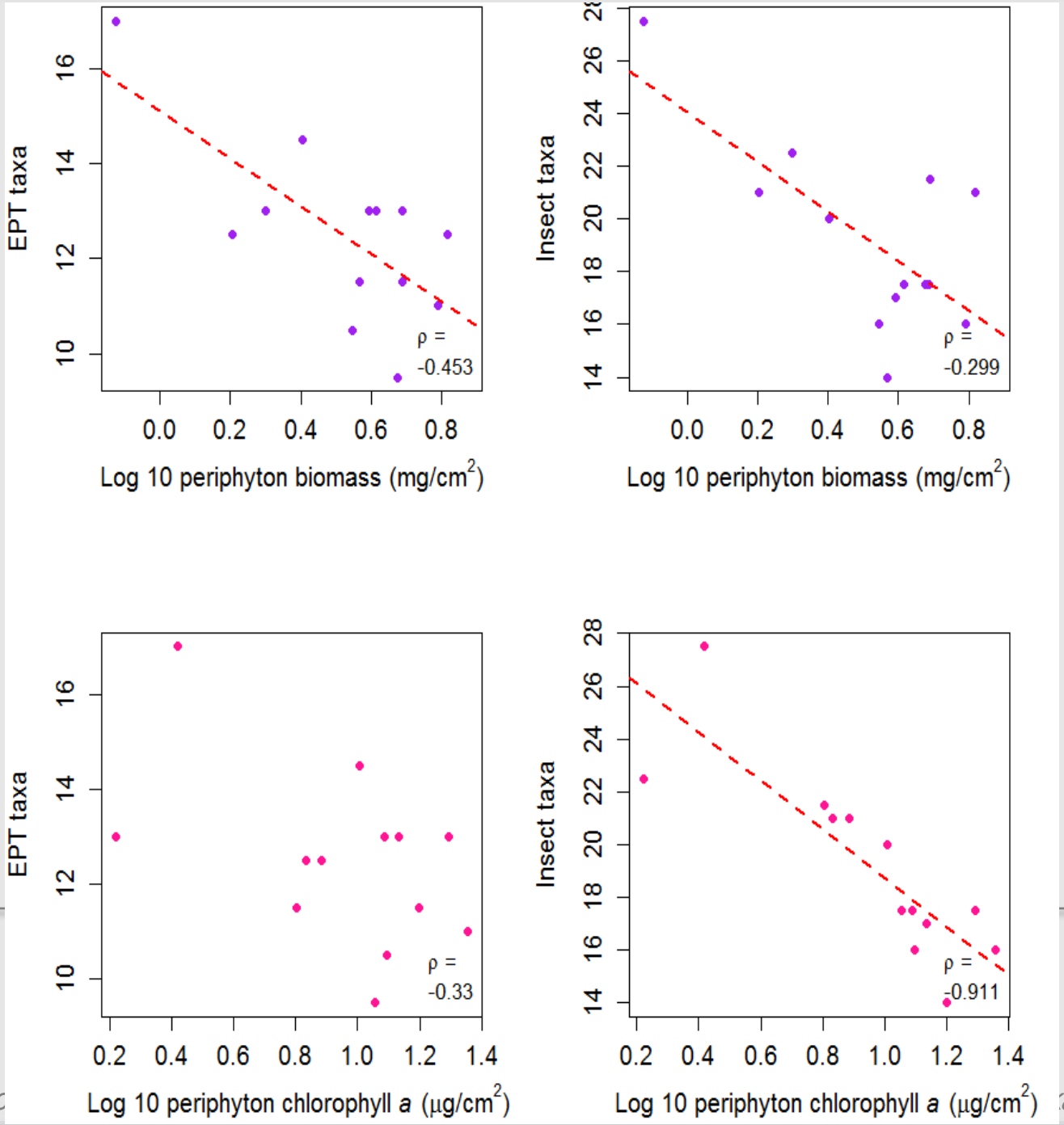
ERW

Parameter	N	Geo Mean	10th percentile	25th percentile	Median	75th percentile	90th percentile
TN (mg/L)	236	0.437	0.148	0.235	0.519	0.773	1.022
TP (mg/L)	61	0.046	0.026	0.034	0.042	0.061	0.08

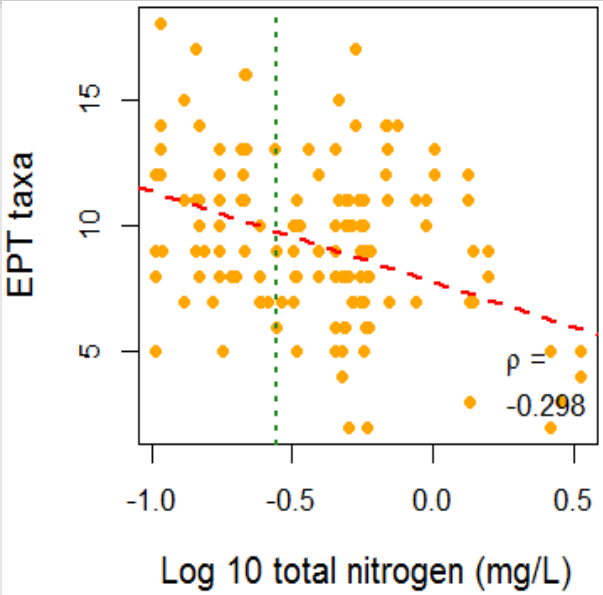
Ozark Highlands

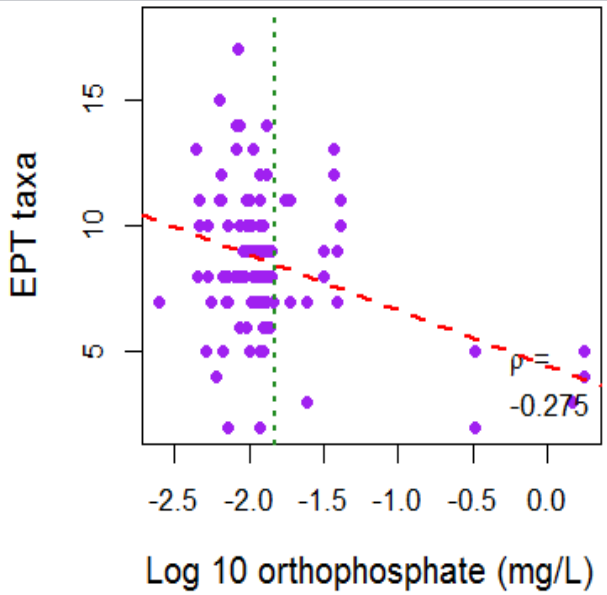
Parameter	N	Geo Mean	10th percentile	25th percentile	Median	75th percentile	90th percentile
TN (mg/L)	1160	0.516	0.141	**0.221**	0.447	1.111	2.739
TP (mg/L)	305	0.037	0.009	**0.024**	0.041	0.066	0.10

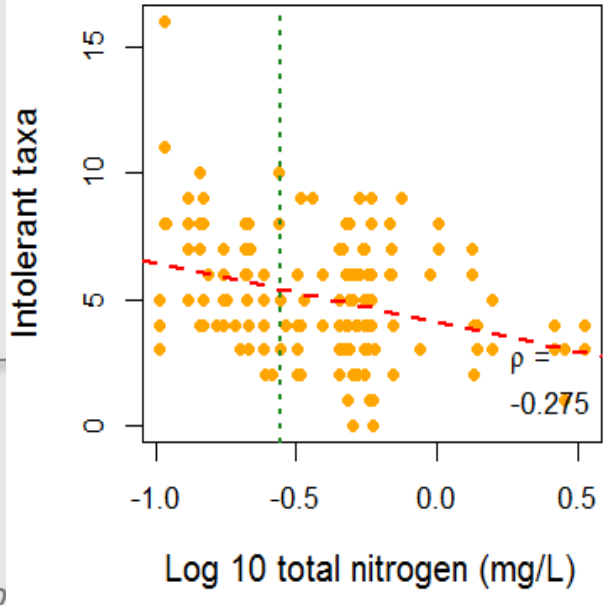

Log 10 total phosphorus (mg/L)
Log 10 periphyton chlorophyll a (µg/cm2)
0.5
1.0
1.5
-1.9 -1.8 -1.7 -1.6 -1.5 -1.4 -1.3 -1.2
Log 10 TP (mg/L)
ρ =
0.058
Log 10 total nitrogen (mg/L)
Log 10 periphyton chlorophyll a (µg/cm2)
0.5
1.0
1.5
-1.0 -0.8 -0.6 -0.4 -0.2 0.0
Log 10 TN (mg/L)
ρ =
0.702
Log 10 nitrate-nitrite (mg/L)
Log 10 periphyton chlorophyll a (µg/cm2)
0.5
1.0
1.5
-1.5 -1.0 -0.5 0.0
Log 10 NOx (mg/L)
ρ =
0.635
Log 10 orthophosphate (mg/L)
Log 10 periphyton chlorophyll a (µg/cm2)
0.5
1.0
1.5
-2.2 -2.0 -1.8 -1.6 -1.4
Log 10 OrthoP (mg/L)
ρ =
-0.158

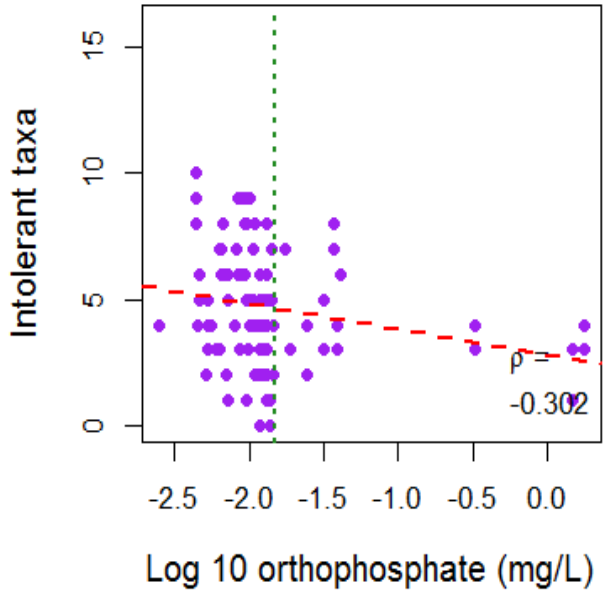


"To pro ansans."


EPT taxa
15
10
5
ρ =
-0.298
-1.0
-0.5
0.0
0.5
Log 10 total nitrogen (mg/L)


EPT taxa
15
10
5
ρ =
-0.275
-2.5
-2.0
-1.5
-1.0
-0.5
0.0
Log 10 orthophosphate (mg/L)


Intolerant taxa
15
10
5
0
ρ =
-0.275
-1.0
-0.5
0.0
0.5
Log 10 total nitrogen (mg/L)


Intolerant taxa
15
10
5
0
ρ =
-0.302
-2.5
-2.0
-1.5
-1.0
-0.5
0.0
Log 10 orthophosphate (mg/L)

"To pro *nsans."*

Ozark ERW NSTEPs

- Nutrients in the Ozark Highlands ERWs are generally low;
- The streams appear to be relatively N limited;
- Elevated periphyton does correlate with declines in some macroinvertebrate responses;
- Existing condition approach for the ERW region should be considered

Ozarks: Next Steps

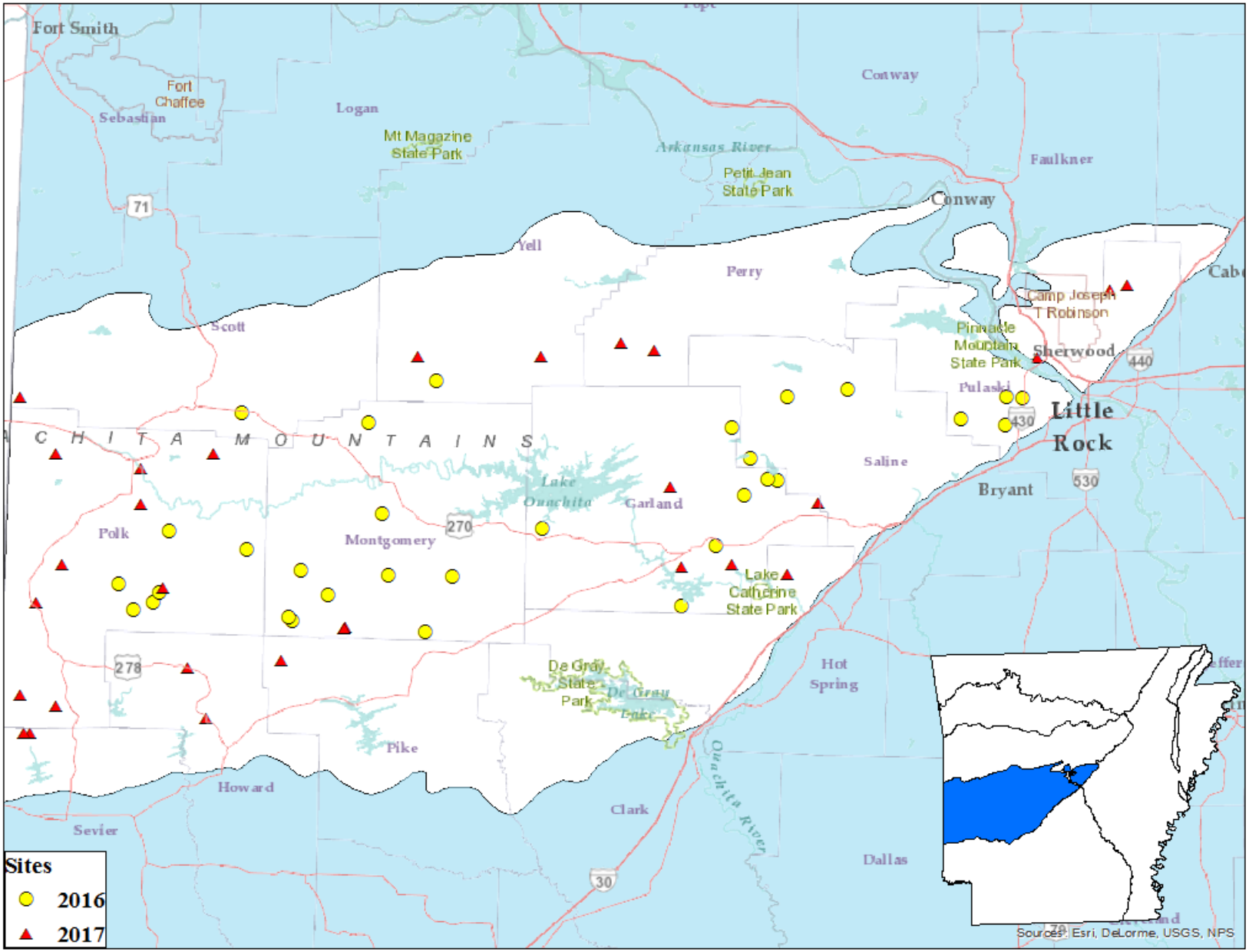
- Finalize proposed criteria with frequency and duration components
- Finalize Assessment Methodology
- Initiate public participation and stakeholder workgroup
- Adoption into Triennial Review

Ouachita ERW

Least-disturbed approach

~ 60 sites over two years

Ouachita ERW

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