

Preliminary analysis of water chemistry for select Northwest Arkansas caves

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Background

NWA predicted to in top 100 MSA

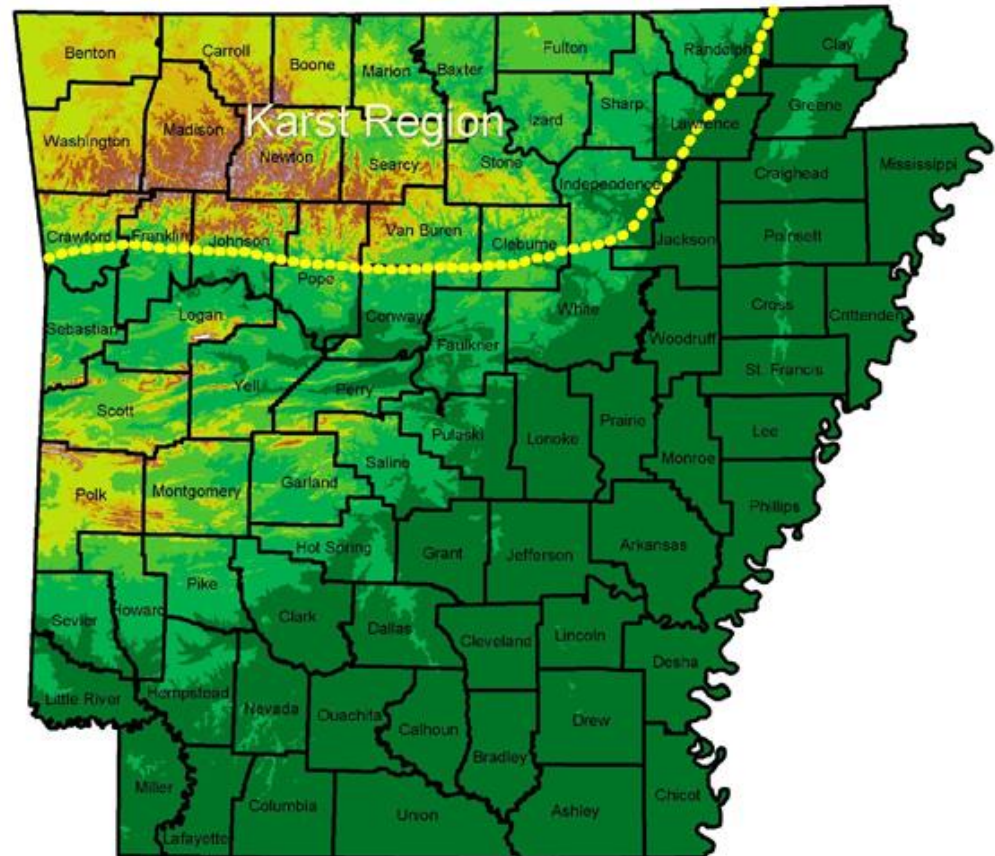
~60 endemic species

NE OK, SW MO,

NW AR

Limited historic

water quality data



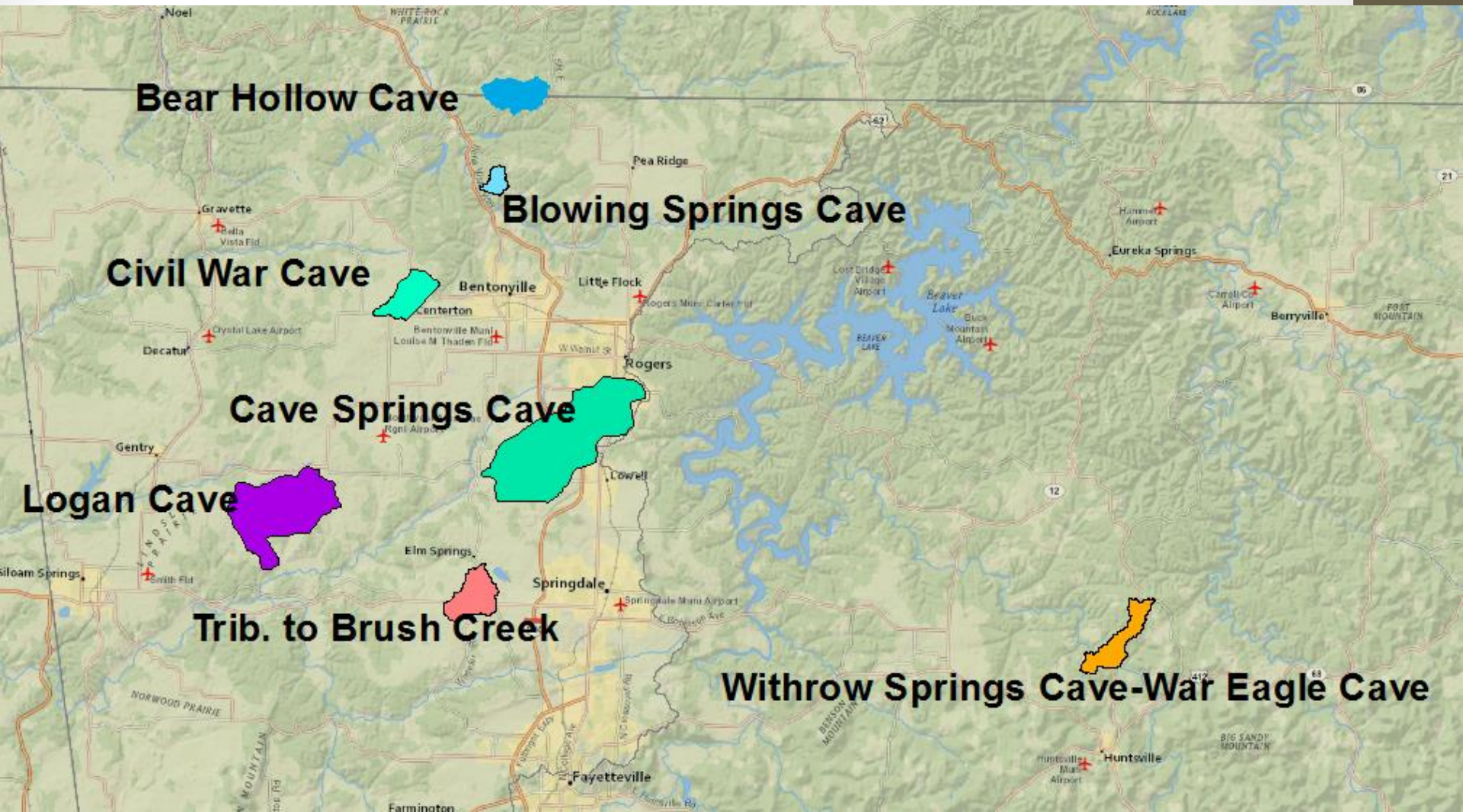
Objective

- Develop baseline water quality
- Compare available historical data
- Evaluation of non-endangered aquatic species

Methods

Site Selection

- Reviewed ~30 cave systems in Benton, Madison, and Washington counties
- Ranked by Species of Greatest Conservation Need
 - *Caecidotea ancyla*, *C. steevesi*, *Cambarus aculabrum*, *Stygobromus ozarkensis*, *S. clantoni*, *Eurycea spelaea*
 - All ranked S1, S2, or unranked
- State, NGO, or federal protection
- Accessibility
- Eight selected



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Methods

Water quality

Anions (bromide, chloride, fluoride, sulfate)

Nutrients (NH₃,TKN, NO₂-NO₃, ortho-P, TP)

Turbidity

TSS/TDS

Metals (Al-V)



ADEQ

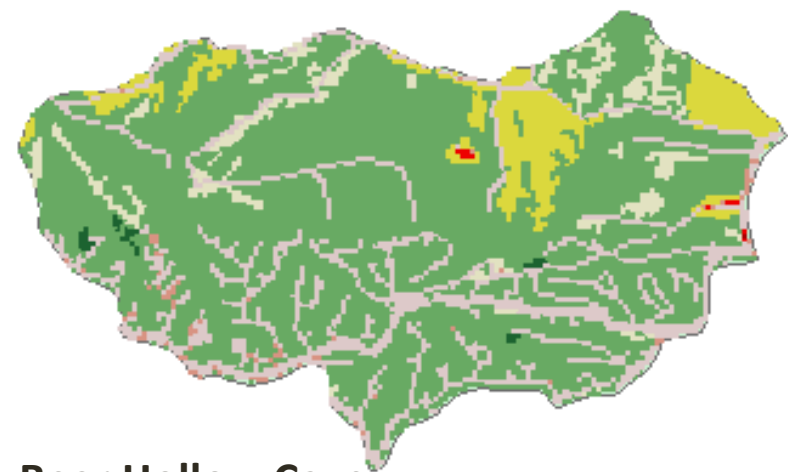
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Preliminary Results

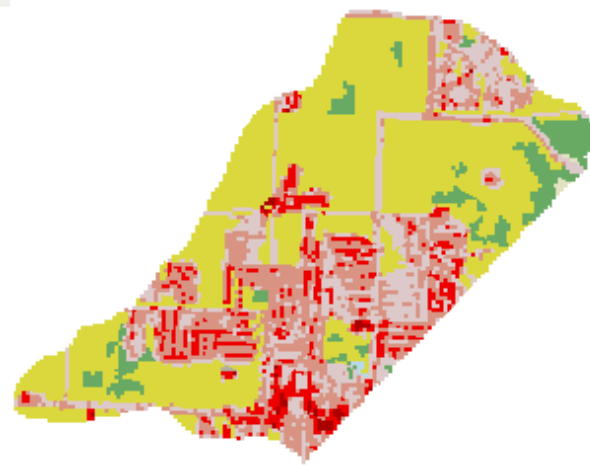
- Land use
- Water quality
- Comparison to historic data

Land Use NLCD 2011

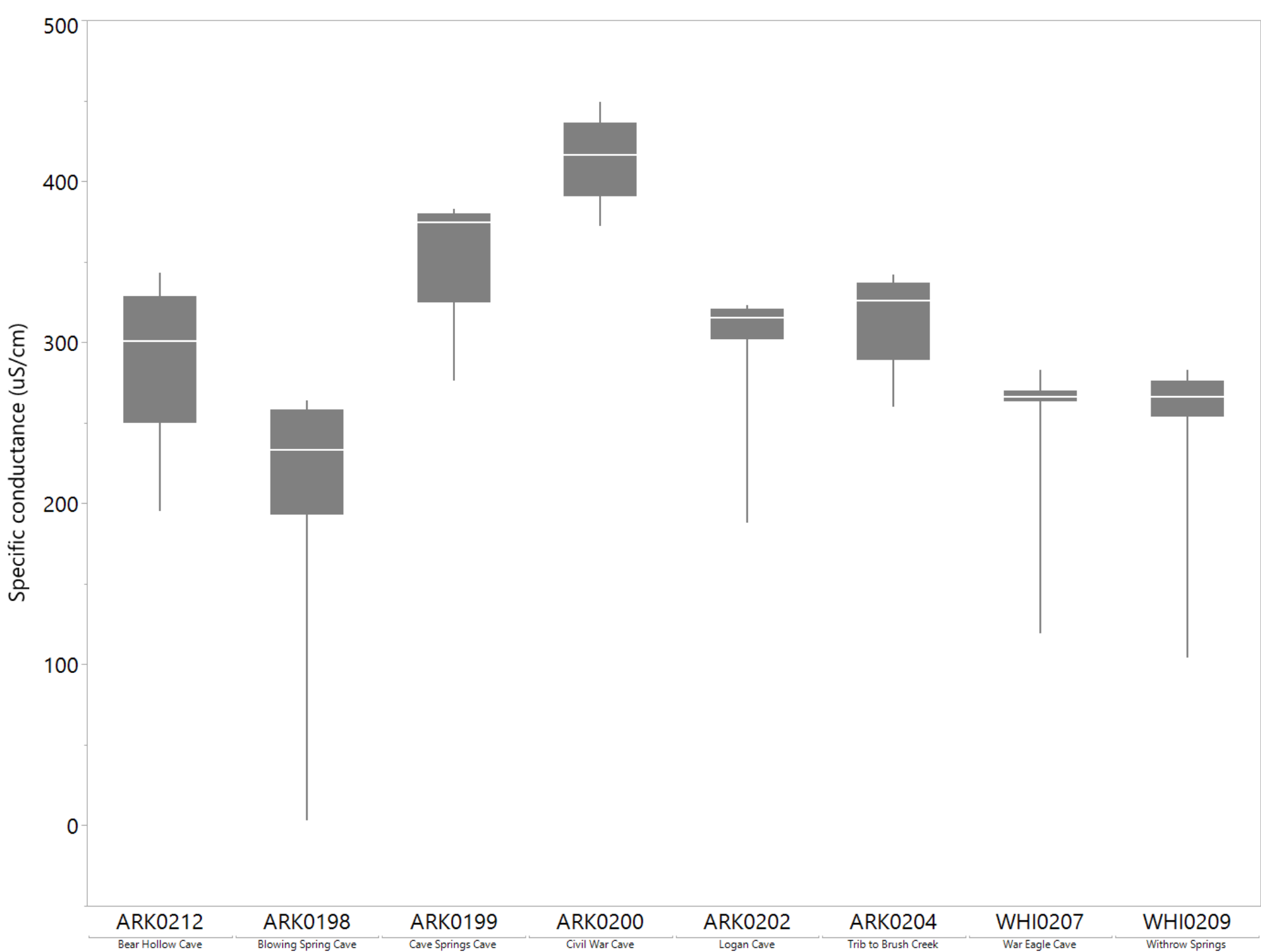
	Wshd. Size (km ²)	% Developed	% Forest	% Pasture
Cave Springs Cave	49	42	6	51
Logan Cave	30	4	44	52
Bear Hollow Cave	9	17	75	8
Blowing Springs Cave	2.5	27	71	3
Civil War Cave	8	47	6	47
Trib. Brush Creek	9	28	3	69

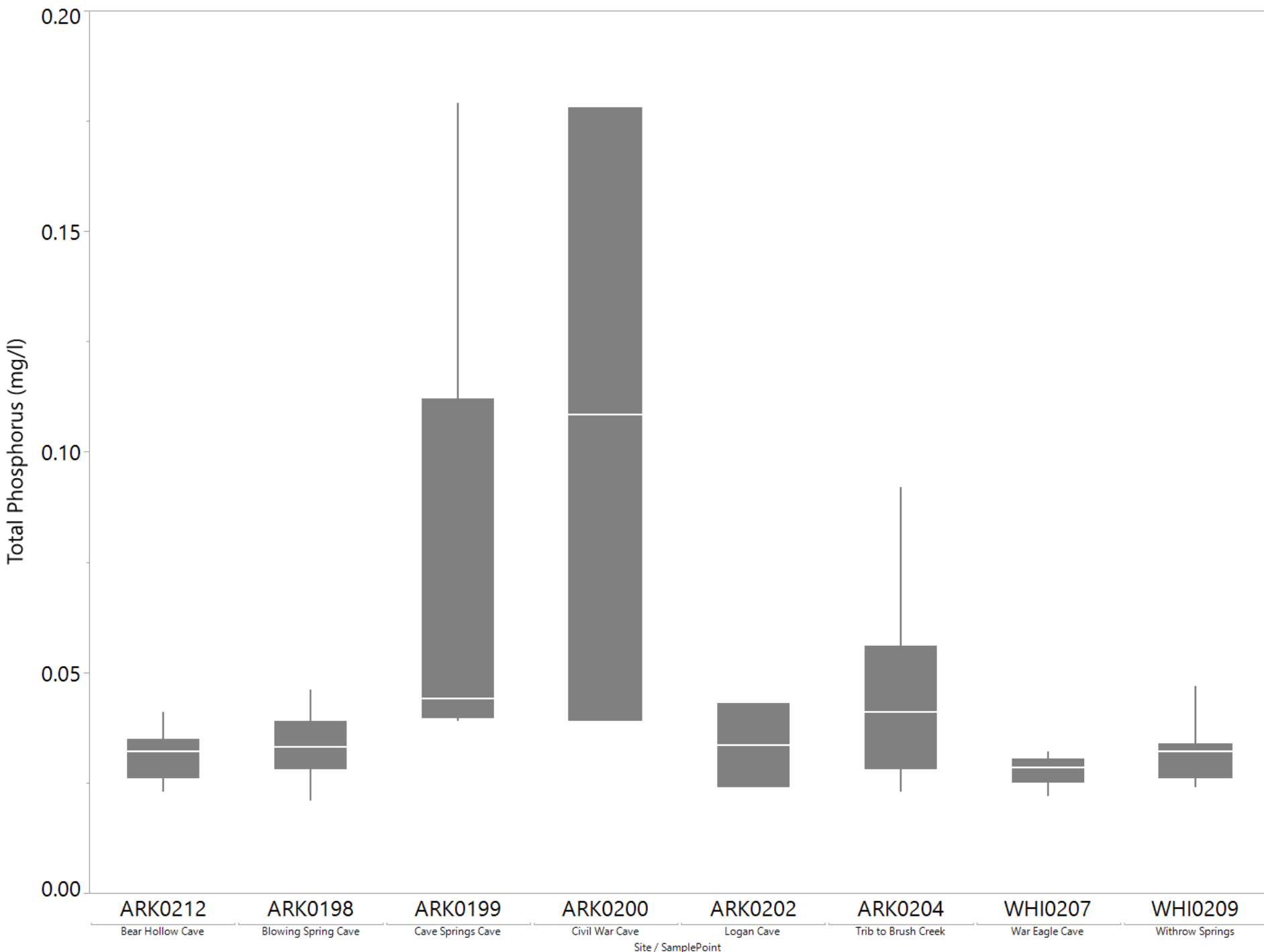


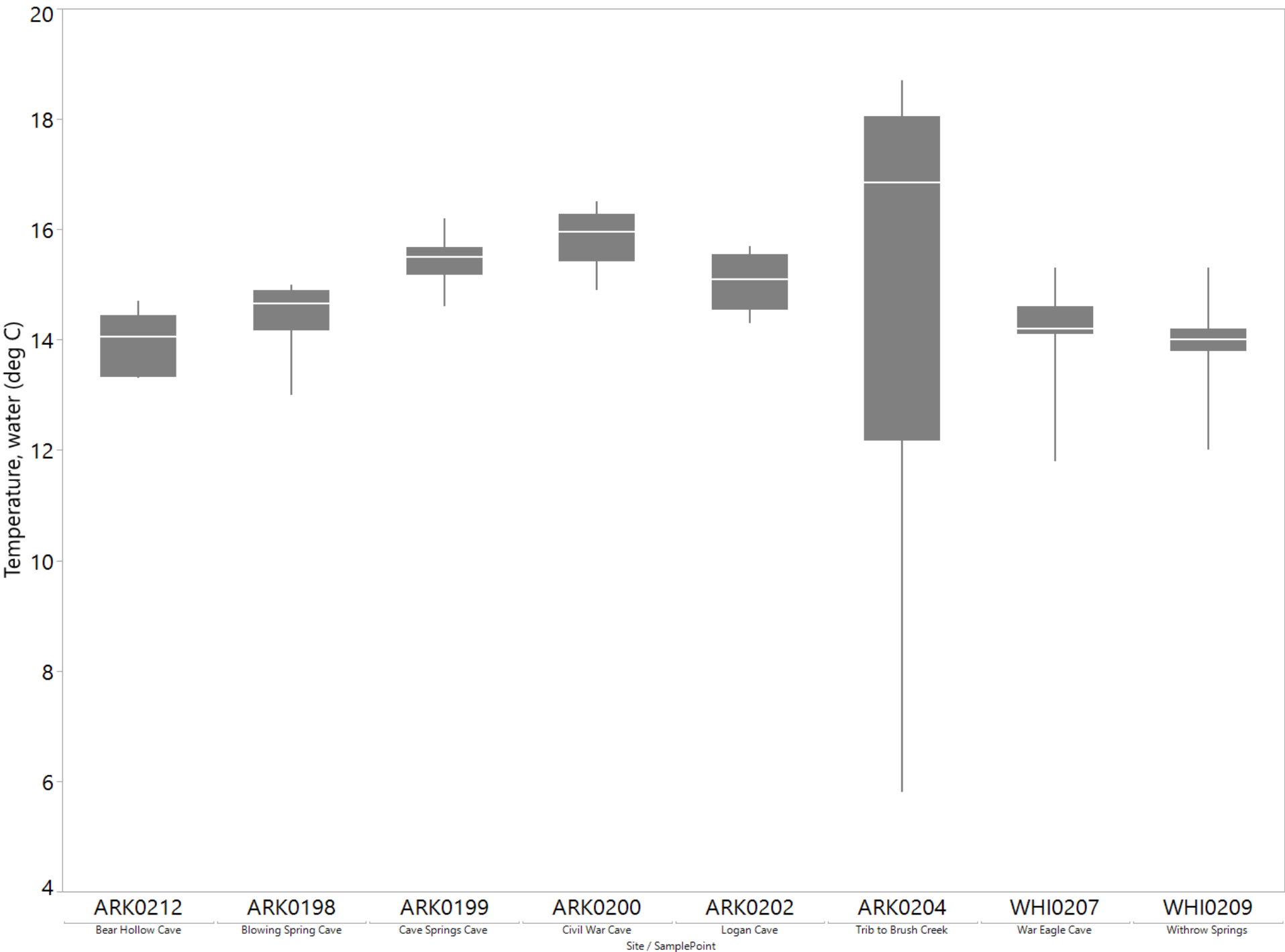
Bear Hollow Cave

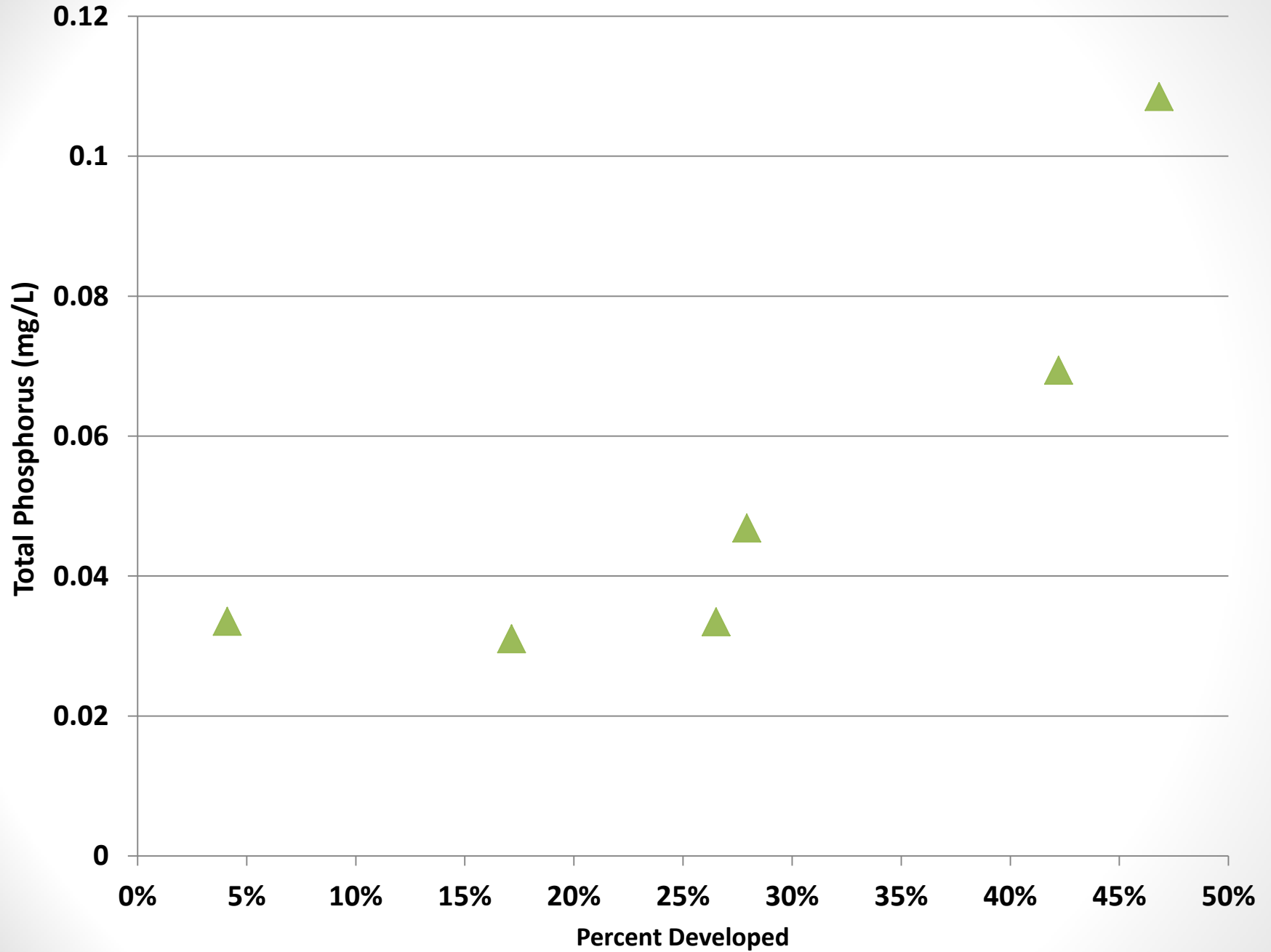


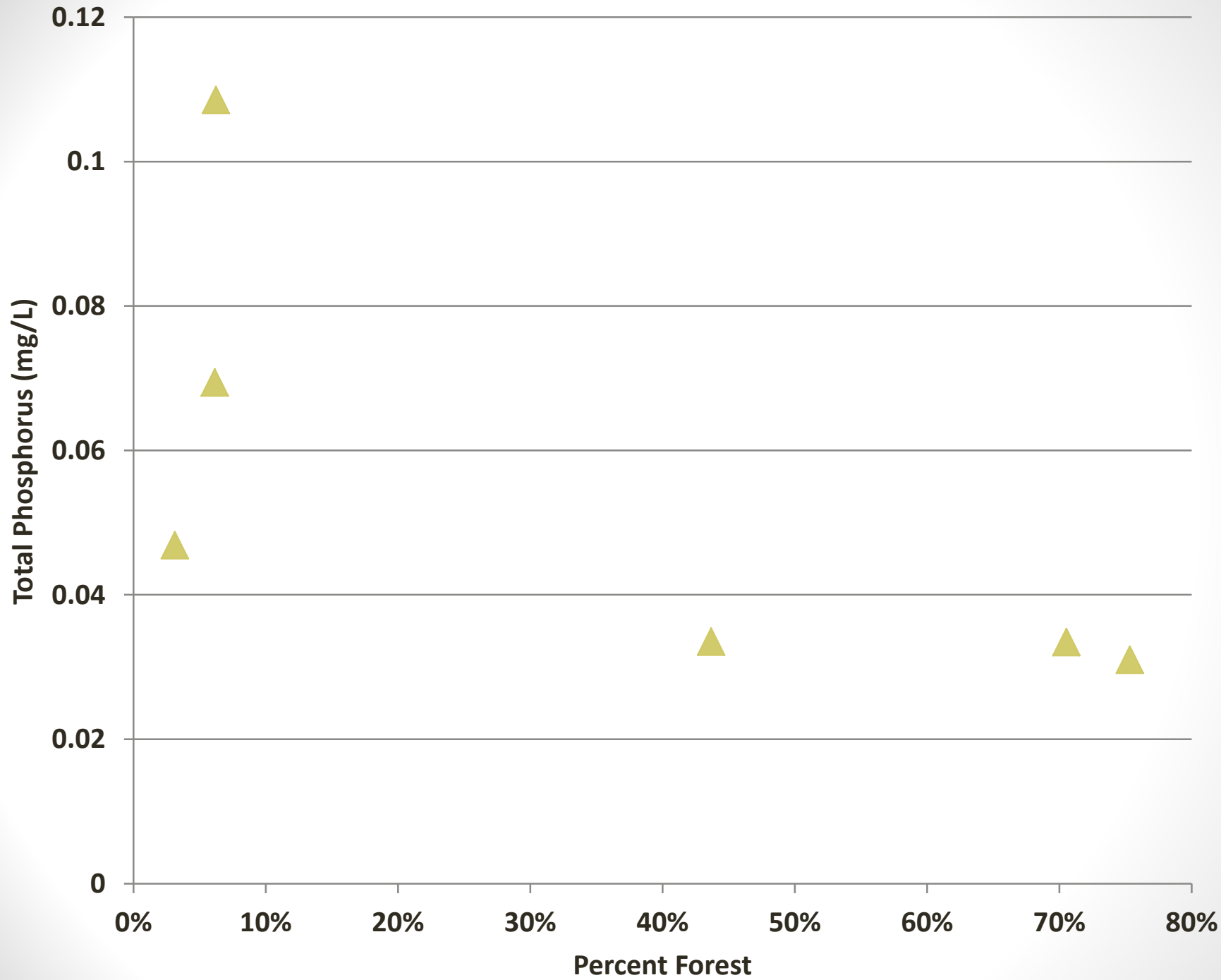
Civil War Cave

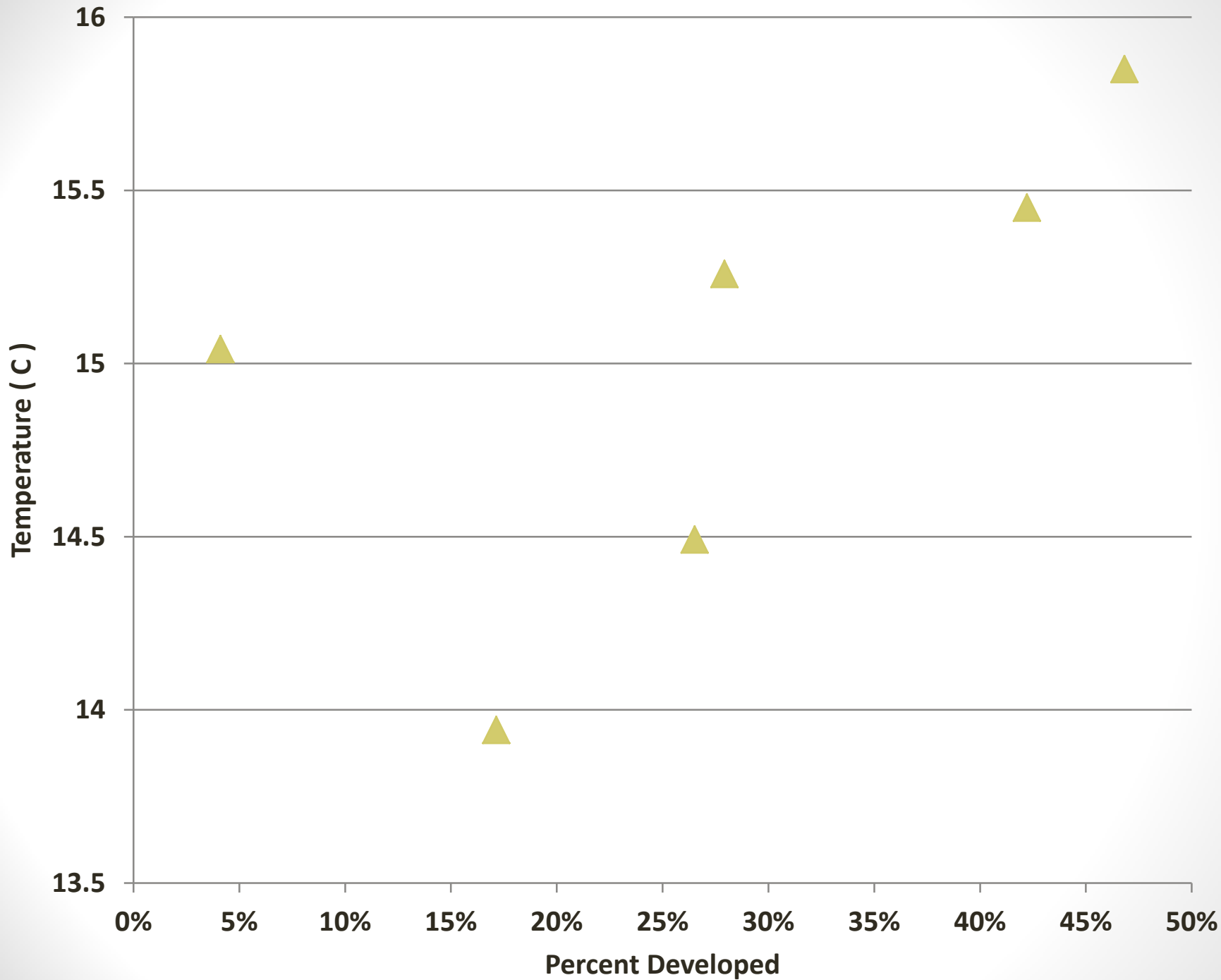












Cave Springs Cave

	40 month (1997-1999)*	12 month (2016-2017)	Change
Temperature (C)	14.5	15.5	↑
pH	6.9	6.85	≡
Nitrate-Nitrite Nitrogen (mg/L)	5.62	4.77	↓
Chloride (mg/L)	7.9	7.37	↓
Sulfate (mg/L)	3.54	4.03	↑
Ortho-phosphate (mg/L)	0.03	0.04	↑
Spec. Conductance (uS/cm)	330	353.5	↑

*Graening, G.O. and A.V. Brown. 2003. Ecosystem dynamics and pollution effects in an Ozark cave system. Journal of the American Water Resources Association. December 2003. pp. 1497-1507.

Future work

- Identify biological collections and evaluate relationships of organism density to water quality
- Delineate three remaining recharge zones
- Collect water chemistry for additional 12 months
- Evaluate seasonality and flow conditions
- Evaluate land use changes through time



Acknowledgments



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