



# Aquatic Plants in Springs at Buffalo National River

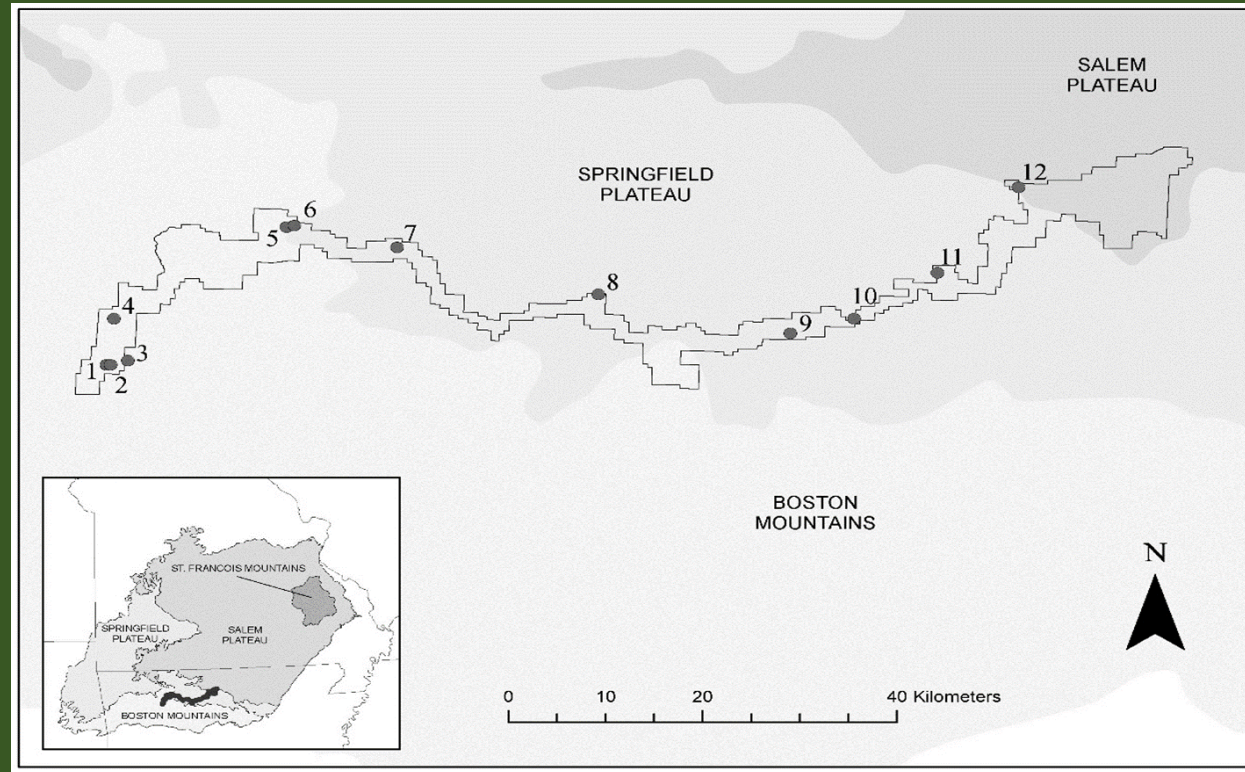
• David E. Bowles

# A poorly studied topic at BUFF

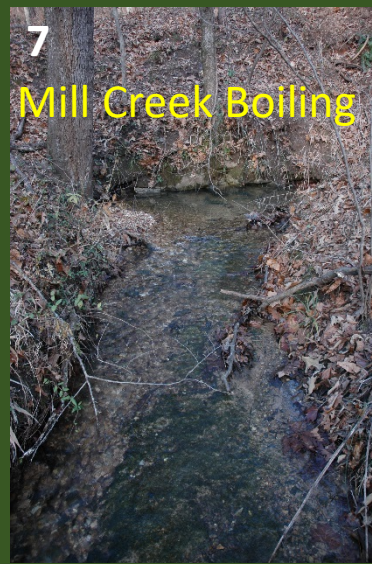
- Limited observational data at points along river-2005-present
- A recent wetland delineation at the Boxley Valley Millpond-2018
- HTLN survey of Millpond-2018
- HTLN survey of selected springs at BUFF-2018
- Cameron Cheri's Master's thesis research-2018

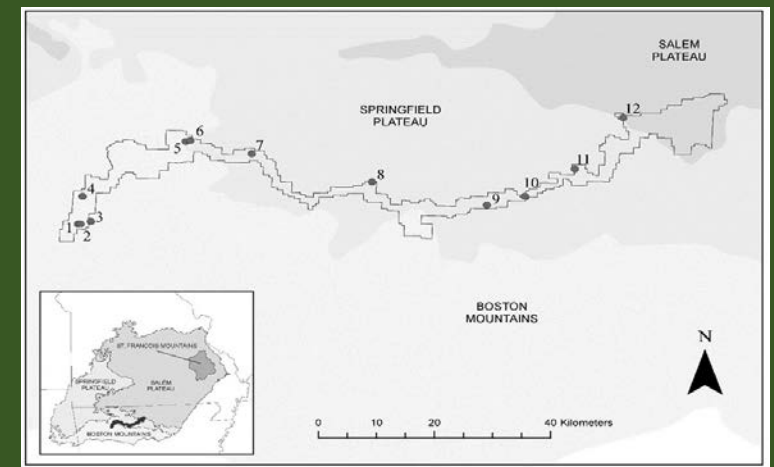
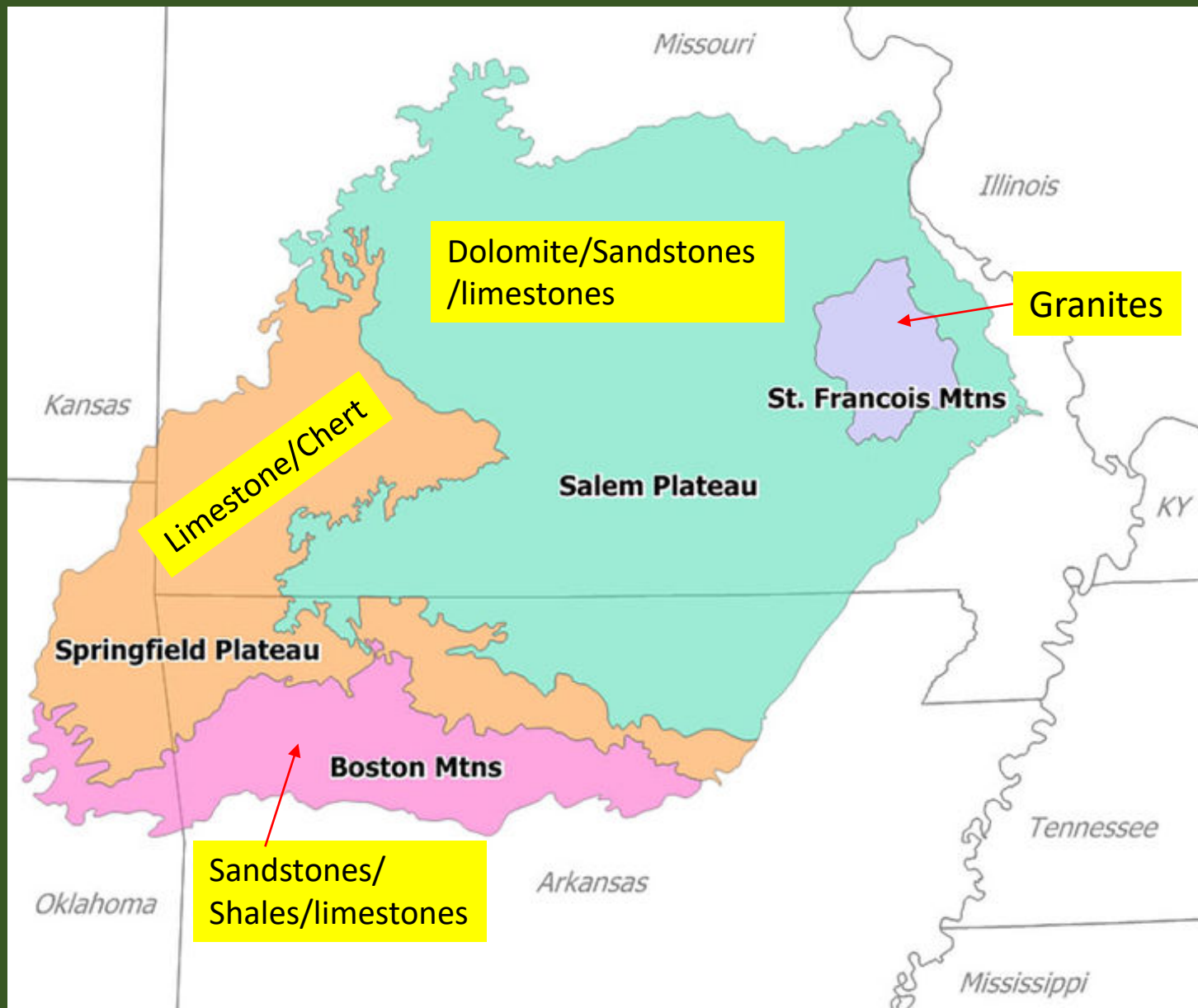
# Springs survey

- David Bowles and Cameron Cheri, summer/fall 2018
- 12 springs surveyed, 2 others examined were dry (Leatherwood & Limekiln)



1=Monster's Lair, 2=LuAllen, 3= Sherfield, 4= Mill Pond, 5= Van Dyke, 6=Huchingson, 7=Mill Creek Boiling, 8=Mitch Hill, 9=Calf Creek, 10=Gilbert, 11=Maumee, 12=Rush Boiling





Site Name	Source Type	Impounded (yes or no)	Dominant substrate type	Habitat type	Canopy %
Calf Creek Spring	Fracture/Conduit	No	Sand/silt	Run	50
Huchingson Spring	Fracture/Conduit	No	Cobble/gravel	Run	100
Gilbert Spring	Fracture/Conduit	Yes	Cobble/gravel	Run	100
LuAllen (upper) Spring	Seep	No	Cobble/gravel	Run	50
Maumee Spring	Fracture/Conduit	No	Silt	Run/Pool	100
Mill Creek Boiling Spring	Fracture/Conduit	No	Gravel/sand	Run	100
Mill Pond	Seep	Yes	Silt	Pond	0
Mitch Hill Spring	Fracture/Conduit	Yes	Cobble/Gravel	Run	50
Monster's Lair	Seep	No	Silt/gravel	Pool	75
Rush Boiling Spring	Fracture/Conduit	No	Cobble/Gravel	Run	75
Sherfield Spring	Fracture/Conduit	No	Cobble/Gravel	Run	100
Van Dyke Spring	Fracture/Conduit	Yes	Upper: Cobble/Gravel. Lower: Sand/silt	Run/pool	25

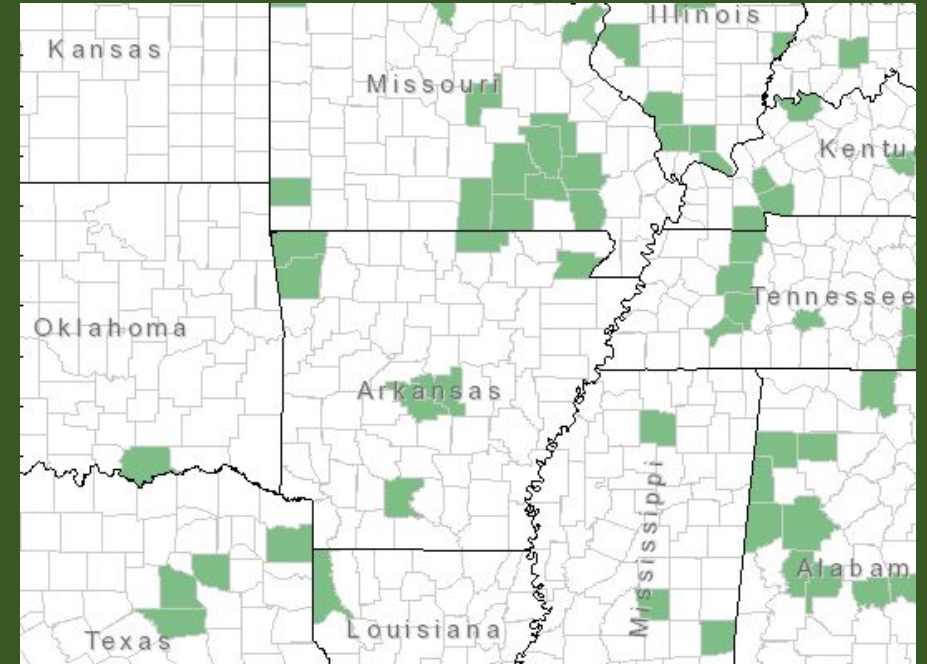
Spring	Temperature (°C)	Dissolved Oxygen (mg/l)	pH	Specific Conductance (µm/cm)	Discharge (m <sup>3</sup> /sec)
Calf Creek	12.60	10.12	7.64	293.10	0.33
Huchingson	14.00	9.82	7.59	154.43	0.03
Gilbert	12.4	10.25	7.59	428.20	0.04
LuAllen (upper)	9.80	10.72	7.69	109.00	0.07
Maumee	14.40	8.68	7.43	340.10	0.003
Mill Creek Boiling	10.80	10.45	7.76	320.40	0.02
Mill Pond	9.05	9.56	7.98	170.20	0.05
Mitch Hill	14.80	8.65	7.22	412.60	0.27
Monster's Lair	13.5	7.03	7.27	124.50	0.01
Rush Boiling	13.00	8.45	7.32	378.00	0.03
Sherfield	9.50	11.29	8.15	103.7	0.36
Van Dyke	13.15	7.05	7.40	210.50	0.04

# Results

- 59 taxa from among all springs
- 7 genera of algae
- 1 species of scouring rush (*Equisetum hymale*)
- 4 bryophytes taxa
- Moss was not identified to species
- 21 species of monocots and 24 species of eudicots
- 6 non-native species were observed
  - Water-cress (*Nasturtium officinale*), Creeping bentgrass (*Agrostis stolonifera*), Annual bluegrass (*Poa annua*), Watermint (*Mentha aquatica* L. (*Mentha x piperita*)), Oriental lady's thumb (*Persicaria longiseta*), and Bitter doc (*Rumex obtusifolius*)
- No taxa unexpected except for *Dulichium arundinaceum* (L.) Britton (Three-way sedge)



*Dulichium arundinaceum* (L.) Britton  
Three-way sedge



# Diversity

Spring	No. Species
Mill Pond	32
Monster's Lair	23
Van Dyke	17
Mitch Hill	16
LuAllen	13
Calf Creek	11
Sherfield	11
Gilbert	3
Huchingson	3
Rush Boiling	3
Maumee	2
Mill Creek Boiling	2



*Cyperus strigosus*



*Mentha aquatica* (*M. x piperita*)



*Lycopus virginiana*



*Ludwigia palustris*



*Nasturtium officinale*



*Callitriche heterophylla*



*Sparganium androcladum*



*Batrachospermum*



*Myriophyllum heterophyllum*



*Hydrocotyle verticillata*



*Helenium autumnale*



*Lobelia cardinalis*



*Bidens cernua*





*Schoenoplectus  
tabernaemontani*



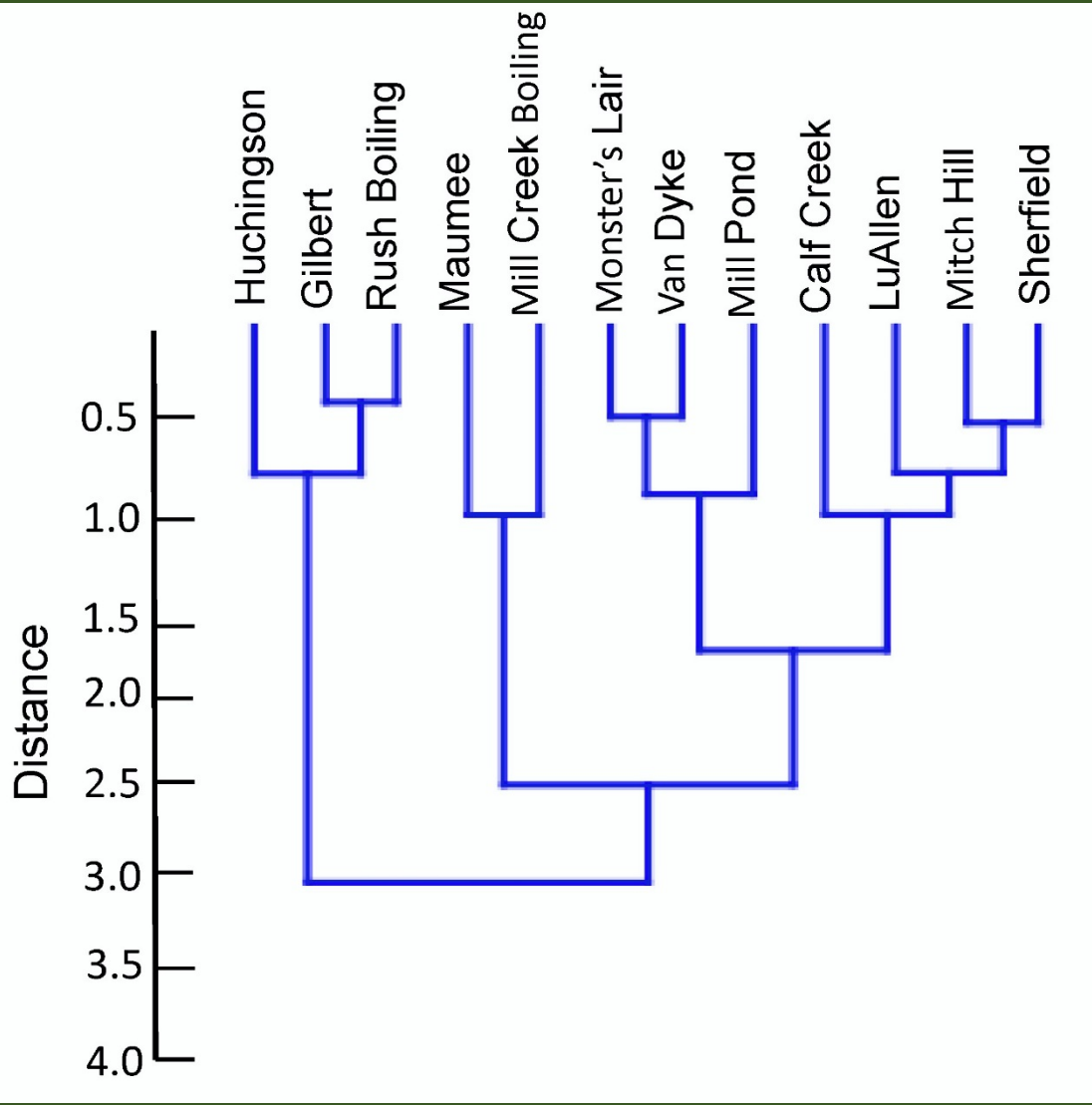
*Rumex obtusifolius*



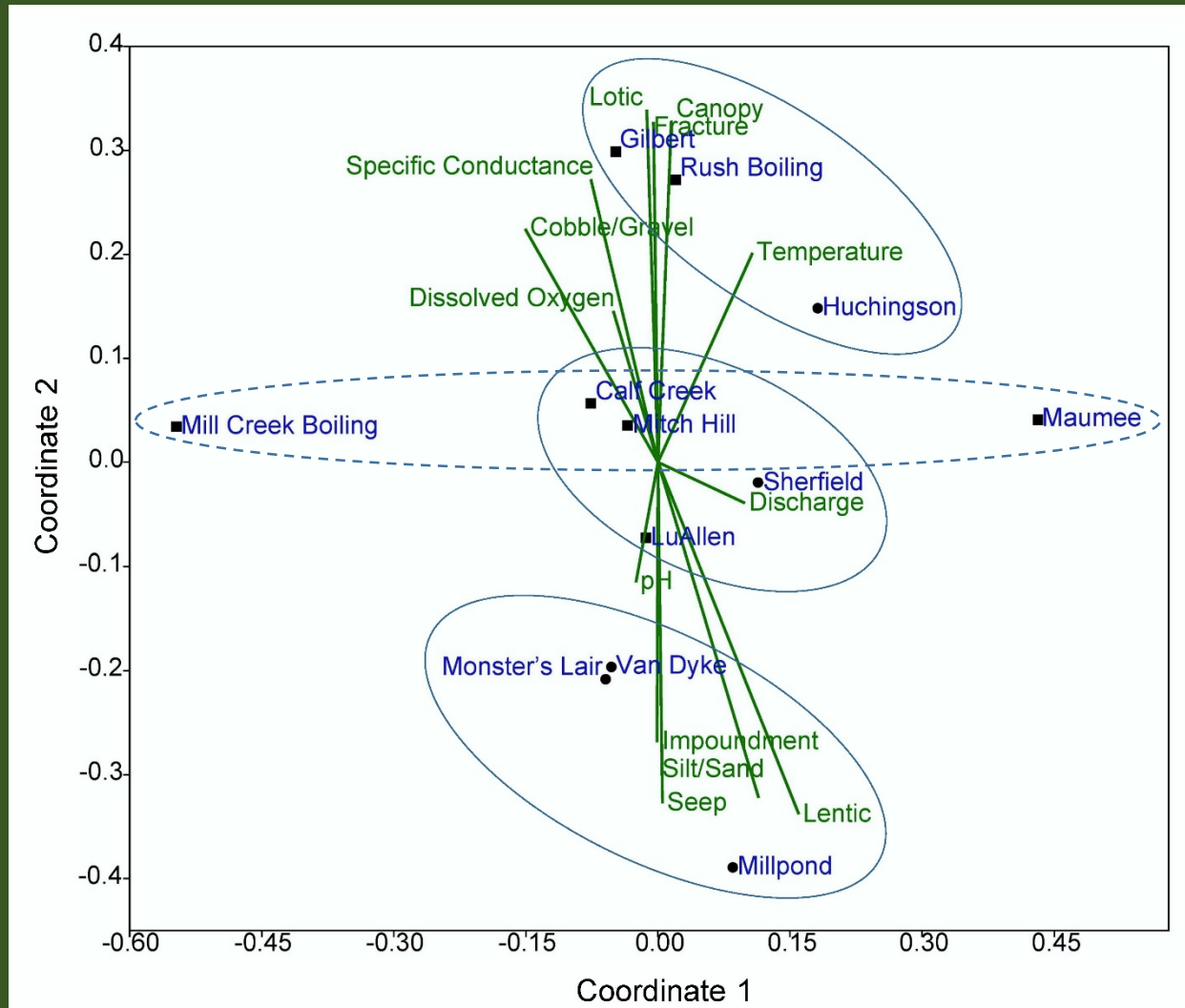
*Scirpus atrovirens*



*Potamogeton foliosus*



# NMDS



Shepard plot stress value=0.17;  
Axis 1=0.40, Axis 2=0.18;  
two dimensional model)



# Conclusions

- Geography is less important than habitat type or condition
- Springs that had a lentic component as part of their physical structure had higher taxa diversity compared to those that only had a spring-run
- Among the springs primarily consisting of a spring-run with a lotic geomorphology, Mitch Hill, LuAllen and Sherfield springs had the most species
- Some of the springs had high similarities simply because there were very few plant species in those springs.
- Although few non-native aquatic plants presently occur in springs at BUFF, potential future introductions of invasive species, particularly plants, pose very real threats to the springs.

# Conclusions

- The 3<sup>rd</sup> magnitude or smaller springs at BUFF have considerably fewer species of aquatic plants, on average, compared to the higher 1<sup>st</sup> and 2<sup>nd</sup> magnitude springs of southern Missouri.
- Community composition among individual dolomitic springs in Missouri is more diverse, particularly for hydrophytes.
  - This study included several taxa that grew along the wetted banks of the springs and are best characterized as wetland plants or helophytes and not true hydrophytes.

# Conclusions

- Associated geologies and geomorphology may play an underlying role in describing aquatic vegetation communities due to physical habitat and water chemistry differences.
- The high magnesium content of dolomite (calcium magnesium carbonate), largely absent from limestone (calcium carbonate) and sandstone (quartz/feldspar), may be responsible for this increased diversity.
  - Dissolved magnesium in the large dolomitic springs can approach 22 mg/liter, while those of the limestone springs at Buffalo National River seldom exceed 1.5 mg/liter.
  - Magnesium is crucial to photosynthesis, and the absence or low concentrations of this nutrient can retard plant growth and deter establishment of vegetation.

# Needs

- Inventory and delineate the aquatic vegetation occurring on the tributaries, mainstem river, and backwaters.
- Seasonality data
- Ecological/habitat data



# Questions?

