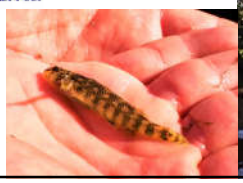
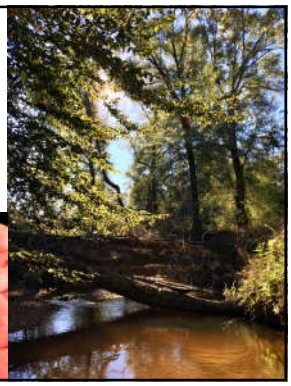
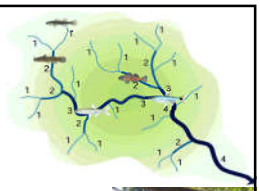
The Importance of Spatial Scale and Habitat Heterogeneity on Community Diversity





Patch Arrangement Influences Fish Assemblages

- Longitudinal arrangement of stream segments establishes hierarchical arrangement of habitats across a stream network
- Allows for predictable patterns in community diversity at both large and small spatial scales



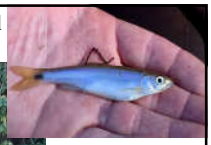
S. atromaculatus
L. megalotis

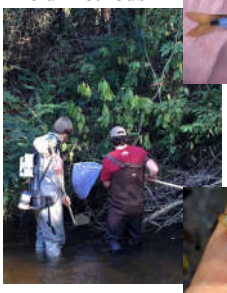
E. lynceum
P. sciera

Hypotheses

- Heterogeneous habitats at both intermediate and fine scales will consist of more diverse and distinct assemblages
- Mesohabitats will be represented by distinct ecological guilds

Site Selection and Field Methods





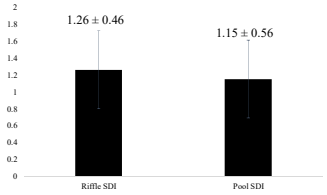
Data Analyses

- Shannon's diversity index (SDI) was used as metric of diversity for all linear models
- Non-metric multi-dimensional scaling (NMDS) was utilized to explore similarities and dissimilarities in community composition at the reach and mesohabitat scales
- We used principal components analysis (PCA) as a data reduction technique to visually explore differences in environmental variability in relation to both mesohabitats.
- Linear models and AIC_c were used to distinguish which environmental variables were most important in elucidating changes in stream fish diversity at the mesohabitat scale

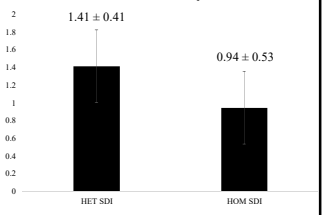
Results

- We sampled 6 riffle and 13 pool habitats
- In total we sampled 212 individuals from 23 species

$F = 3.04, p > 0.05$

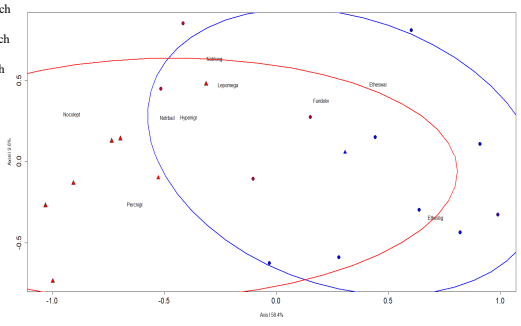


$F = 4.94, p < 0.05$



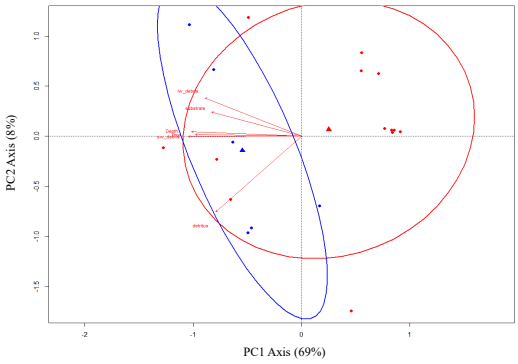
Legend

- Riffle, HET Reach
- Pool, HOM Reach
- Pool, HET Reach



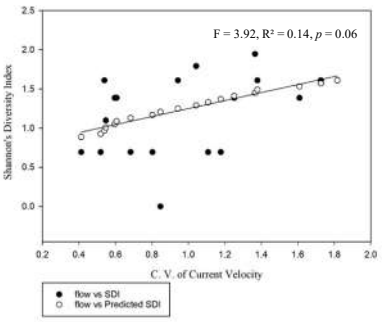
Legend

- Riffle
- Pool



Linear Models

Model	K	ΔAIC_c	*wi*
SDI ~ current velocity	2	0.0	0.31
Null (no variables)	2	1.1	0.18
SDI ~ Depth	4	1.5	0.15
SDI ~ Woody Debris	4	1.8	0.13



Conclusions

- Habitat heterogeneity at multiple spatial scales plays a pivotal role in distinguishing local scale community structure and composition
- Our results may suffer from three forms of bias: small sample sizes at the reach scale, spatial autocorrelation, and temporal bias