

BIOLOGICAL - ENVIRONMENTAL CLASSIFICATION (BEC) SYSTEM AND SUPPORTING FLOW – BIOLOGY RELATIONSHIPS IN NORTH CAROLINA – PROJECT UPDATE

Conducted by: RTI and USGS

*Funded by: Environmental Defense
Fund, NC DENR, and NC WRC*



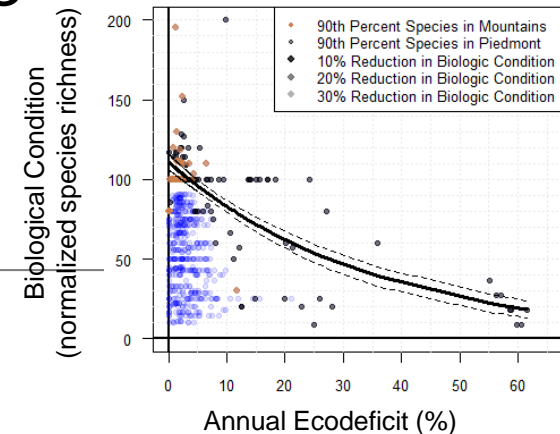
LAST MEETING.....

BEC stream classification system:

- Do multifactor response models offer better predictions of biological response?
- Do *a priori* regional classifications improve strength of flow-biology relationships?

RTI IR&D flow-biology relationships:

- Riffle-run fish guild (normalized by basin)
- Wadeable streams in NC



BEC STREAM CLASSIFICATION

- Multifactor response models?
 - NC fish (species richness of riffle-run guild)
 - Flow metrics:
 - Summer Ecodeficit
 - decreases in Annual 30-day Minimum Flow
 - Best model fit:
 - Flow metric
 - Ecological Drainage Unit (EDU) regions
 - Slope
 - % Forest Cover (correlated with flow metric)
 - Average Temperature

NOTE: Results are similar for invertebrates

BEC STREAM CLASSIFICATION

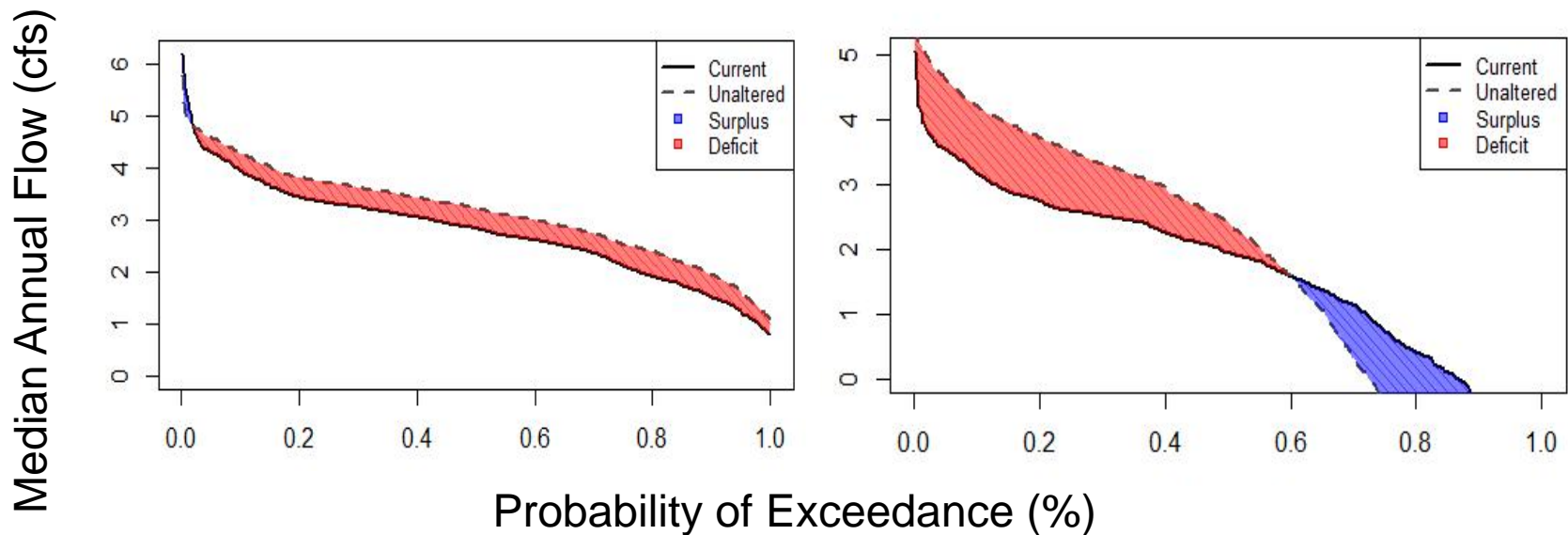
- *A priori* regional classification improve strength of flow-biology relationship?
 - NC fish (species richness of riffle-run guild; RTI flow-biology methodology – normalized by basin; response of 90th percentile data)
 - Flow-biology relationships by EDU
 - Results:
 - Flow-biology relationships were not consistently strengthened by splitting up by EDU
 - only 4 of 10 EDUs had significant flow-biology relationships
 - only 1 EDU had a better model fit than the state-wide model (Albemarle Pamlico Piedmont EDU)

RECOMMENDATION

- Use state-wide flow-biology relationships for fish and benthos (based on RTI flow-biology methodology) to support determination of ecological flows
 - Biological response:
 - Fish
 - Species richness of Riffle-run guild
 - Normalized by basin
 - Benthos
 - EPT Richness
 - Normalized by Omernik Level III
 - Flow metric:
 - Ecodeficit

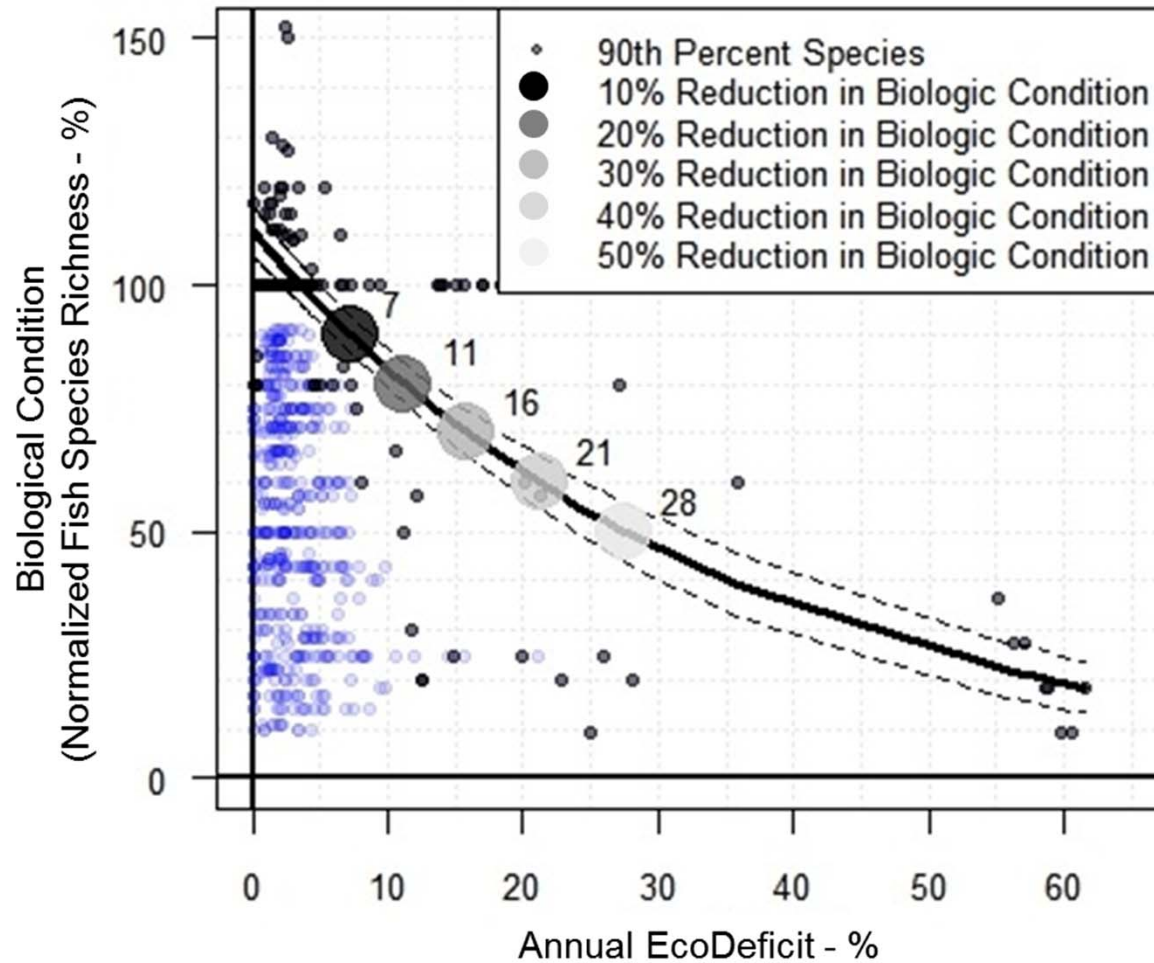
ECODEFICIT

NHD+ Catchments in Roanoke Basin

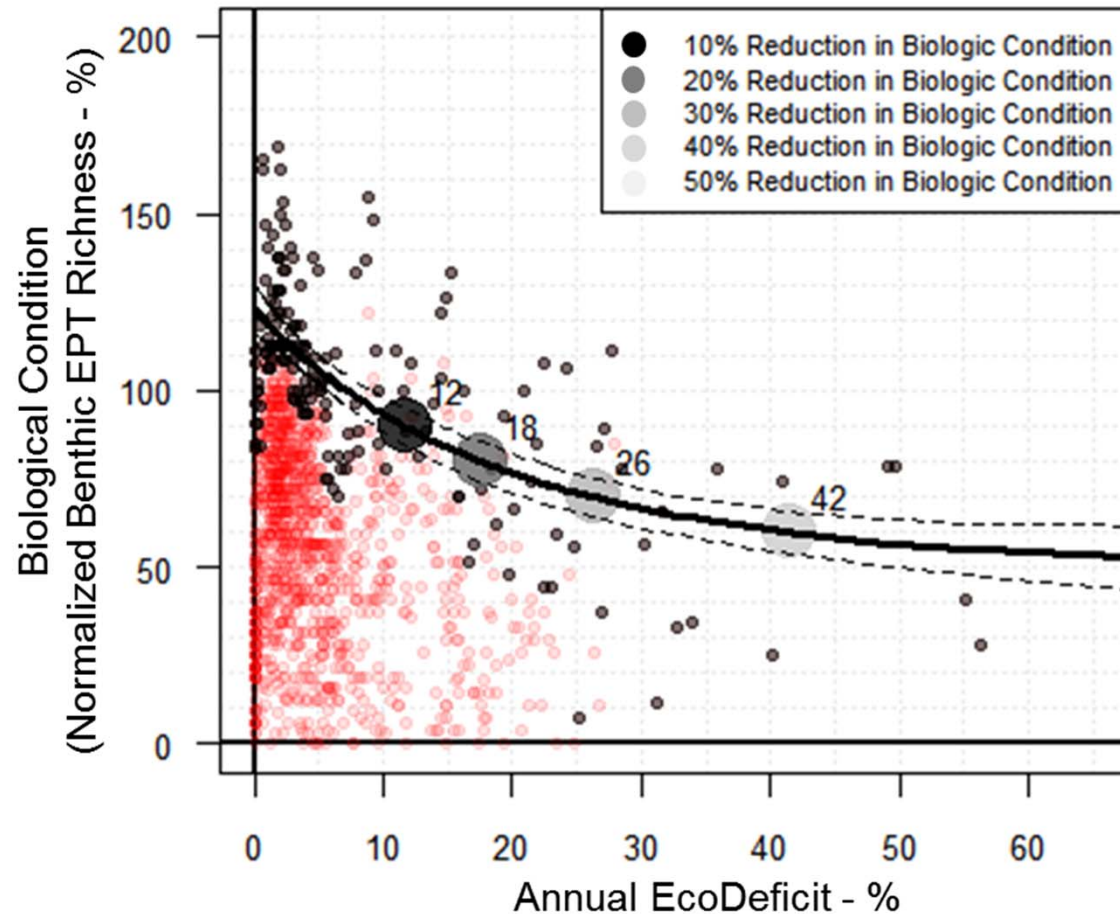


- Ecodeficit is a measure of the reduction in volumetric water availability
- 20% ecoficit = 20% reduction in volumetric water availability (over a defined period of time)

ANNUAL ECODEFICIT - FISH

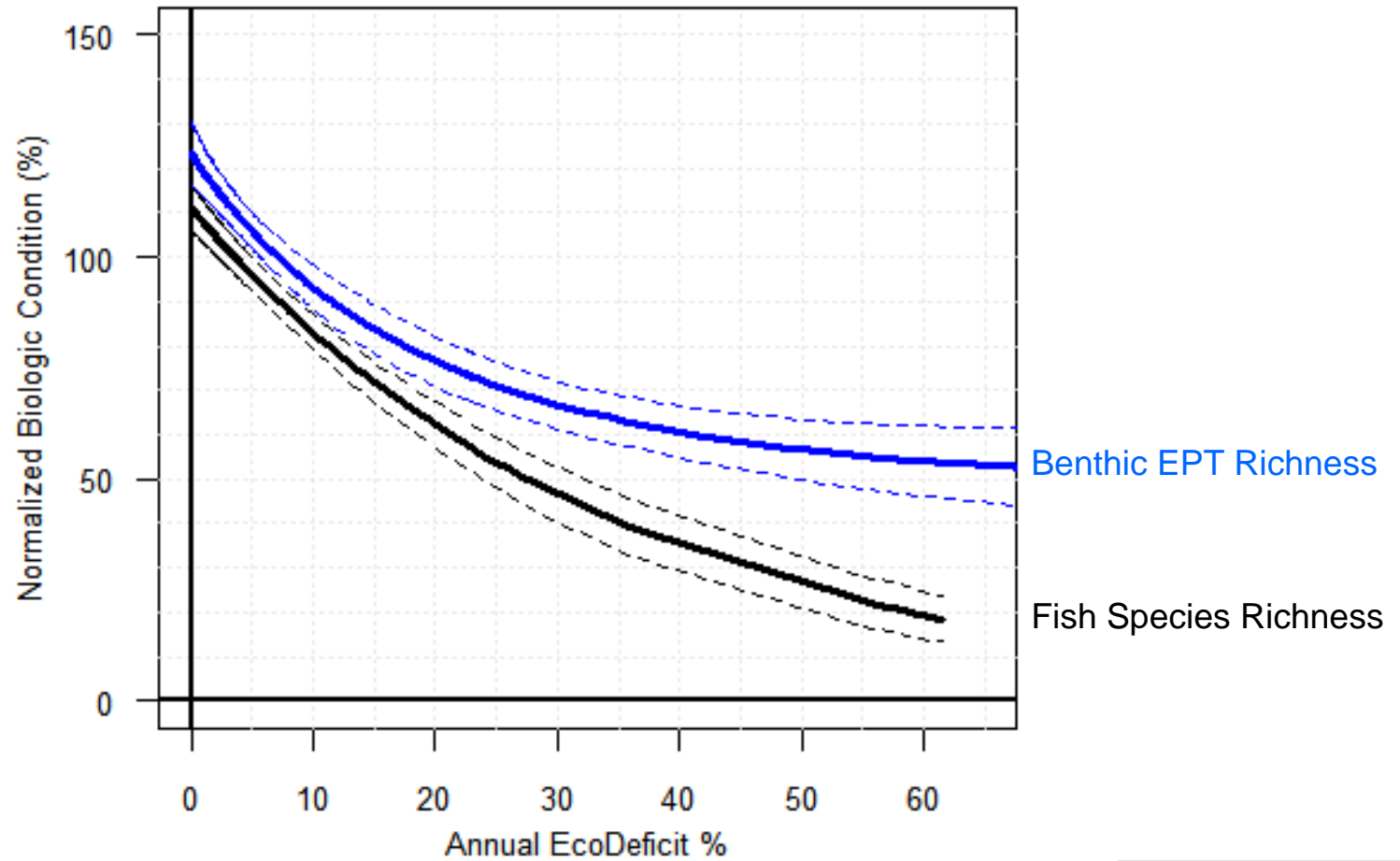


ANNUAL ECODEFICIT - BENTHOS



Note: 50% reduction in biological condition is beyond the range of the data

ANNUAL ECODEFICIT - COMBINED



ANNUAL ECODEFICIT - COMBINED

- Annual versus seasonal ecodeficit – biological responses relationships and associated “biological condition” thresholds

Metric	Fish: Species Richness			Benthos: EPTR		
	10%	20%	30%	10%	20%	30%
Annual EcoDeficit	7	11	16	12	18	26
Winter Deficit	7	11	16	11	16	24
Spring Deficit	7	11	15	11	17	25
Summer Deficit	9	13	18	13	20	31
Fall Deficit	10	15	20	14	21	30
Average	8	12	17	12	18	27
Standard Deviation	1	2	2	1	2	3

WHAT'S NEXT?

- Depending on the current condition of a stream, how much degradation in the biological condition is EF-SAB (NCDENR) willing to tolerate?

