Effects of Stressors on Stream Ecosystems

Landscape

Nutrients (N,P)

Streamflow Alt.

Contaminants

Sediment

Stream Ecosystems

Policy and Management Needs

- Ecological effects of stressors
- Indicators of water quality and biological condition
- Predictive models for management and decision making
- Setting priorities and expectations under limited budgets

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Science vs Current Funding

Science Funding

- 10 regional studies
- Extensive temporal
- Multi-scale management (BMPs)
- Extensive ecological process

Current Funding

- 6 regional studies
- Limited temporal
- Large-scale management
- Limited ecological process

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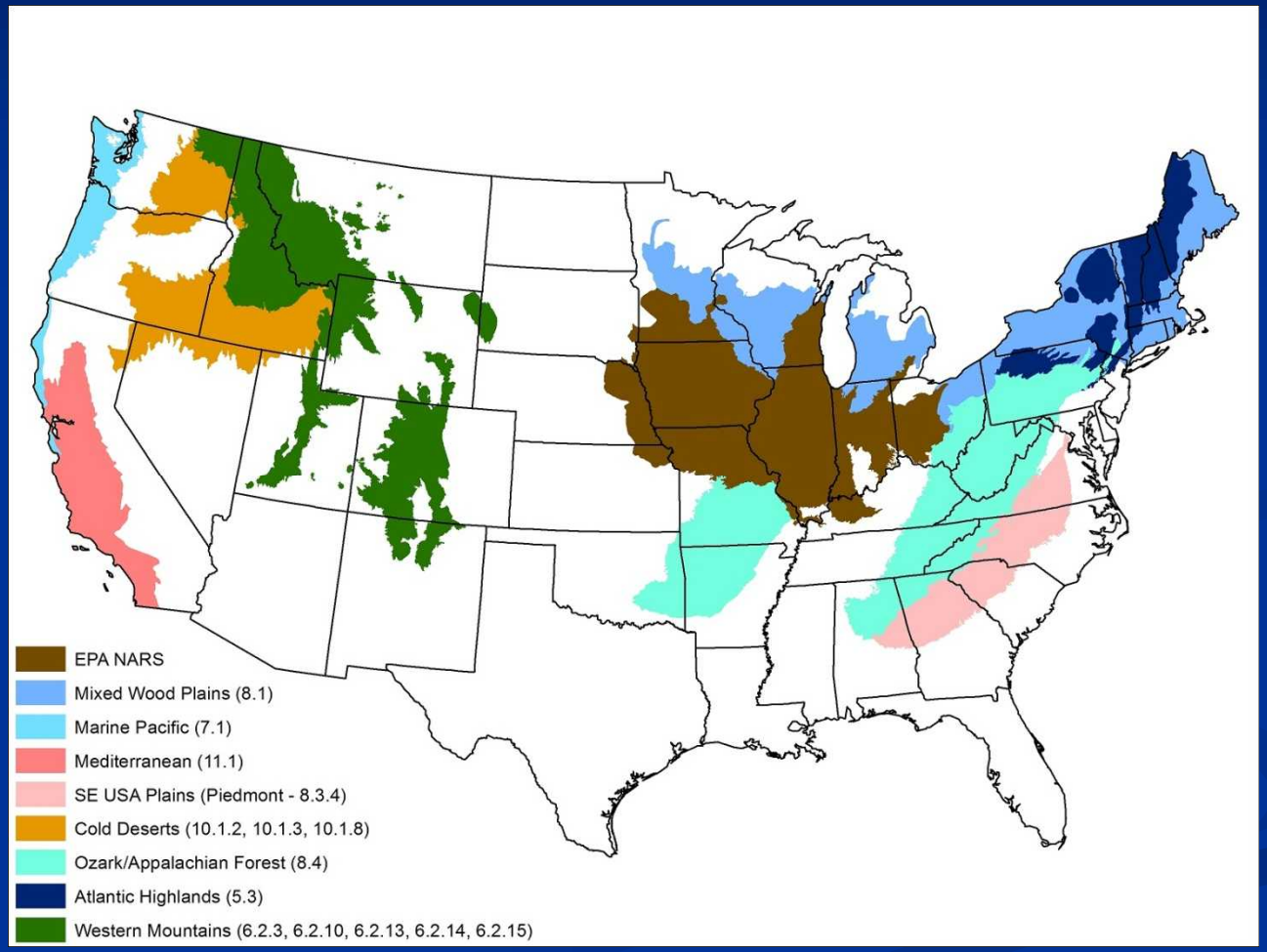
Locations of Candidate Stressor-Effects Studies

1. Ecological Reference Sites
2. Range in stressors (gradient)



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Cycle 3 Regional Synoptic Studies

	Stressor Distribution Regional Synoptics	Stressor Effects Regional Synoptics	
Year	**Contaminants**	**Multiple Stressor and Ecological Effects Studies Combined**	**MS-Streamflow Alteration**
2013		Temperate Plains: NAWQA/NARS	Streamflow
2014	Drinking Water Synoptic	Urban Streams	Streamflow
2015		Agricultural Streams	
2016			
2017		Urban Streams	
2018			
2019			Streamflow
2020			
2021			

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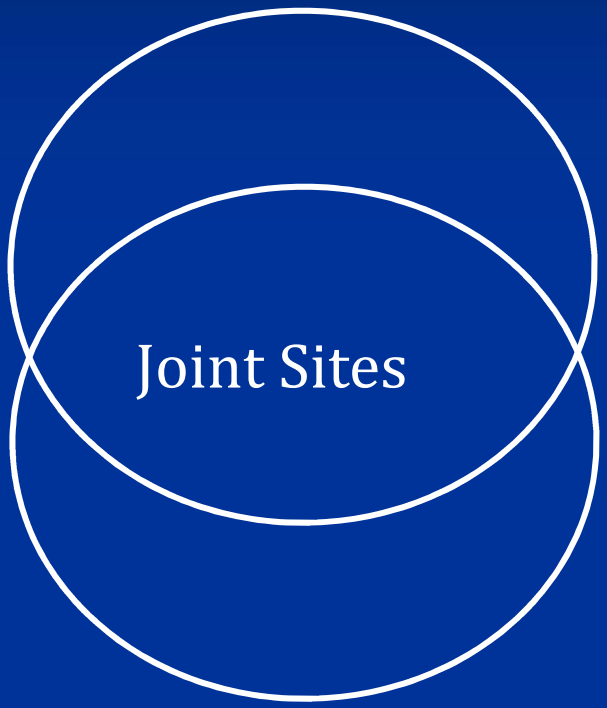
Stressor Distribution and Stressor Effects Synoptics



Stressor Distribution

- Multiple land use cont. survey
- Intensive sampling over time
- Water and Sediment Toxicity
- Cont/Tox Model development

Stressor Effects

- Land use more controlled
- MS (sediment, cont., flow, nutrients)
- Ecological endpoints
- Ecological model development

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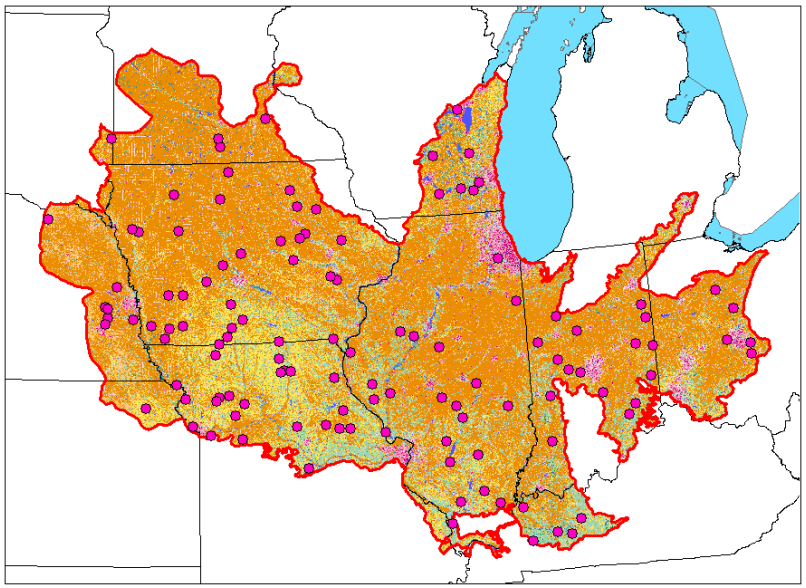
Regional Studies

- Large scale
- 100+ sites, synoptic
- Gradient design (reference to highly altered)
- Regional predictive models



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Products

- Web based reports
- Models
  - Understanding models
  - Management models
  - Stressor specific models. Feeds interactive models, e.g. CADDIS.
  - Interactive web based scenario simulation model.
- Tools
  - Response indicators for specific stressor (e.g. nutrient indicators)
  - Contaminant/toxicity tools, improved PTI

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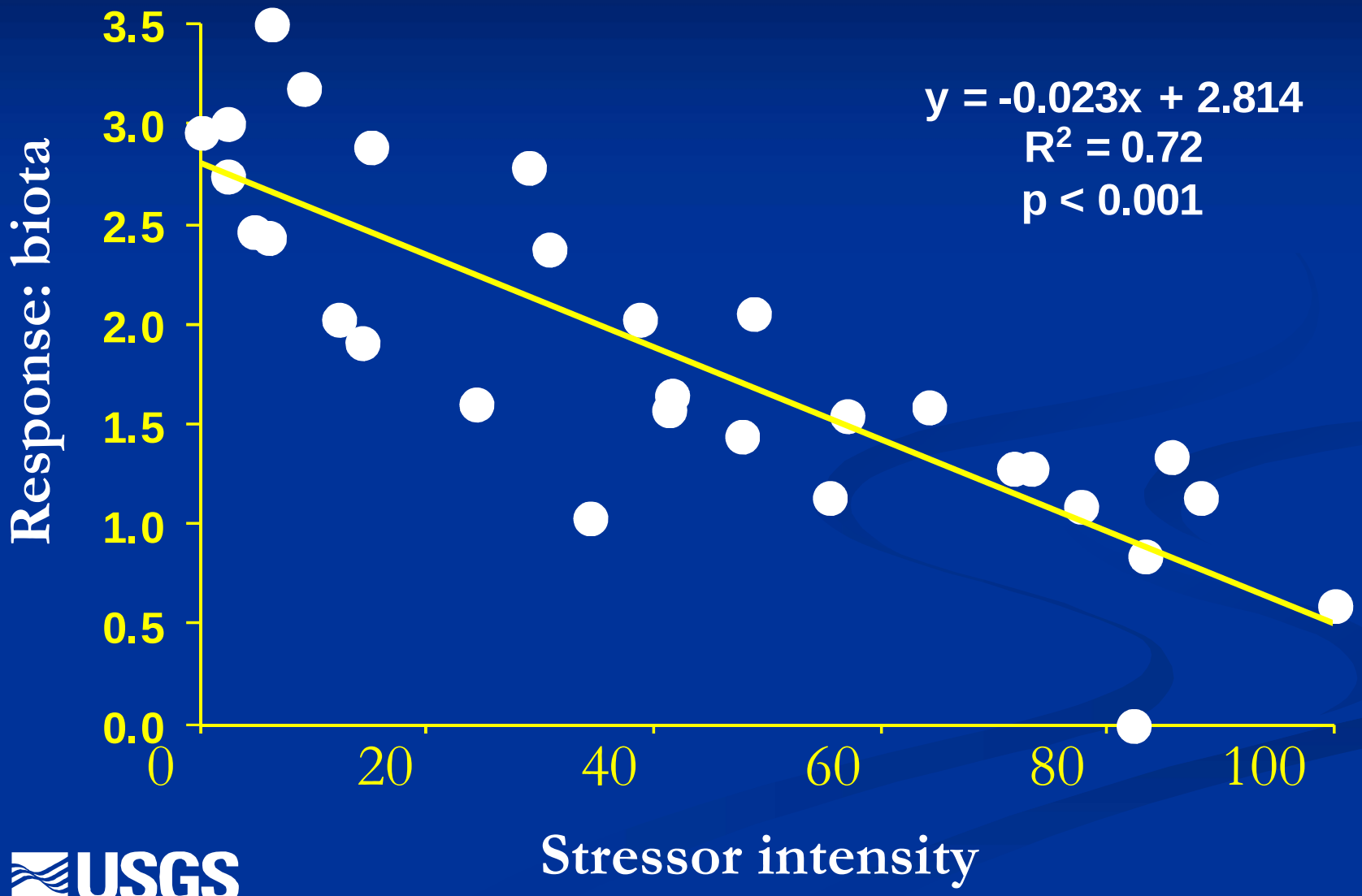
Simple regression



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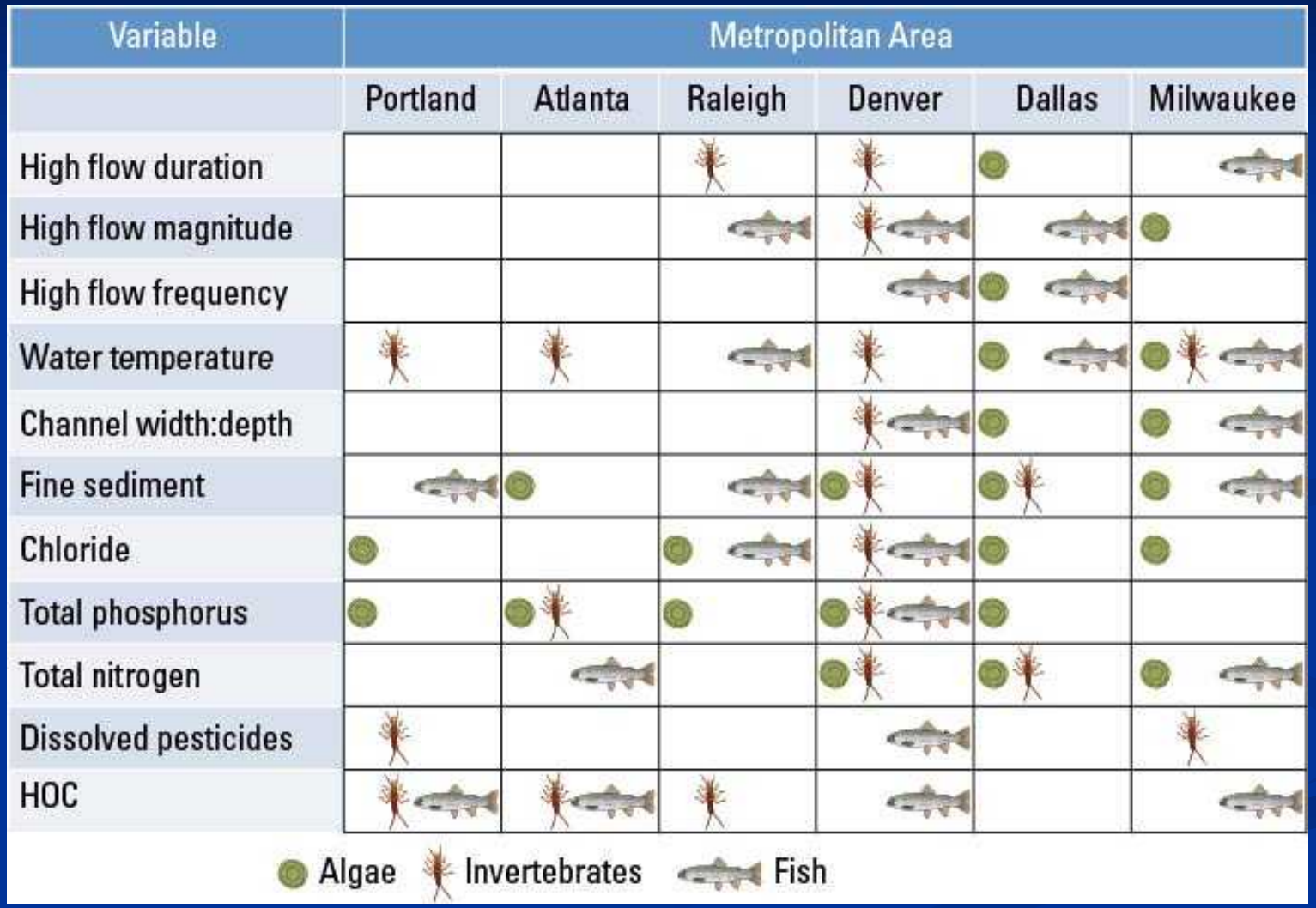
Development of Stressor Indicators



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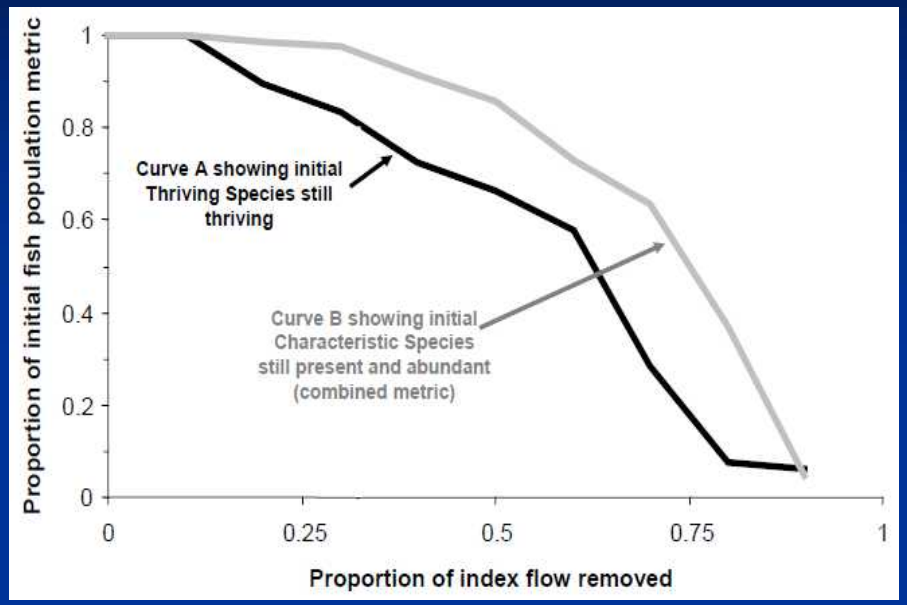
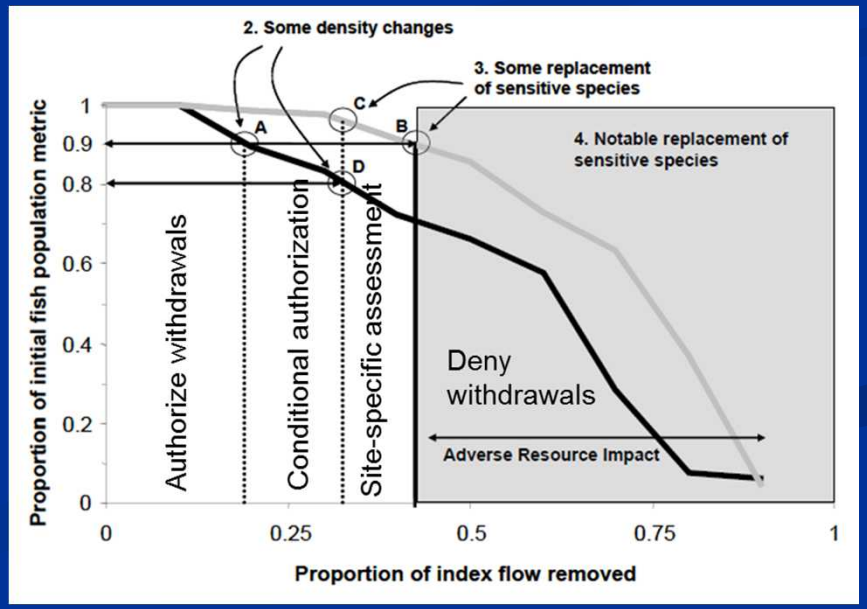
Streamflow alteration models



Stressor-response curve used by Michigan to permit water withdrawals. Stressor is water withdrawal expressed as a percent of August stream flow, response is fish assemblage diversity.

Science to policy



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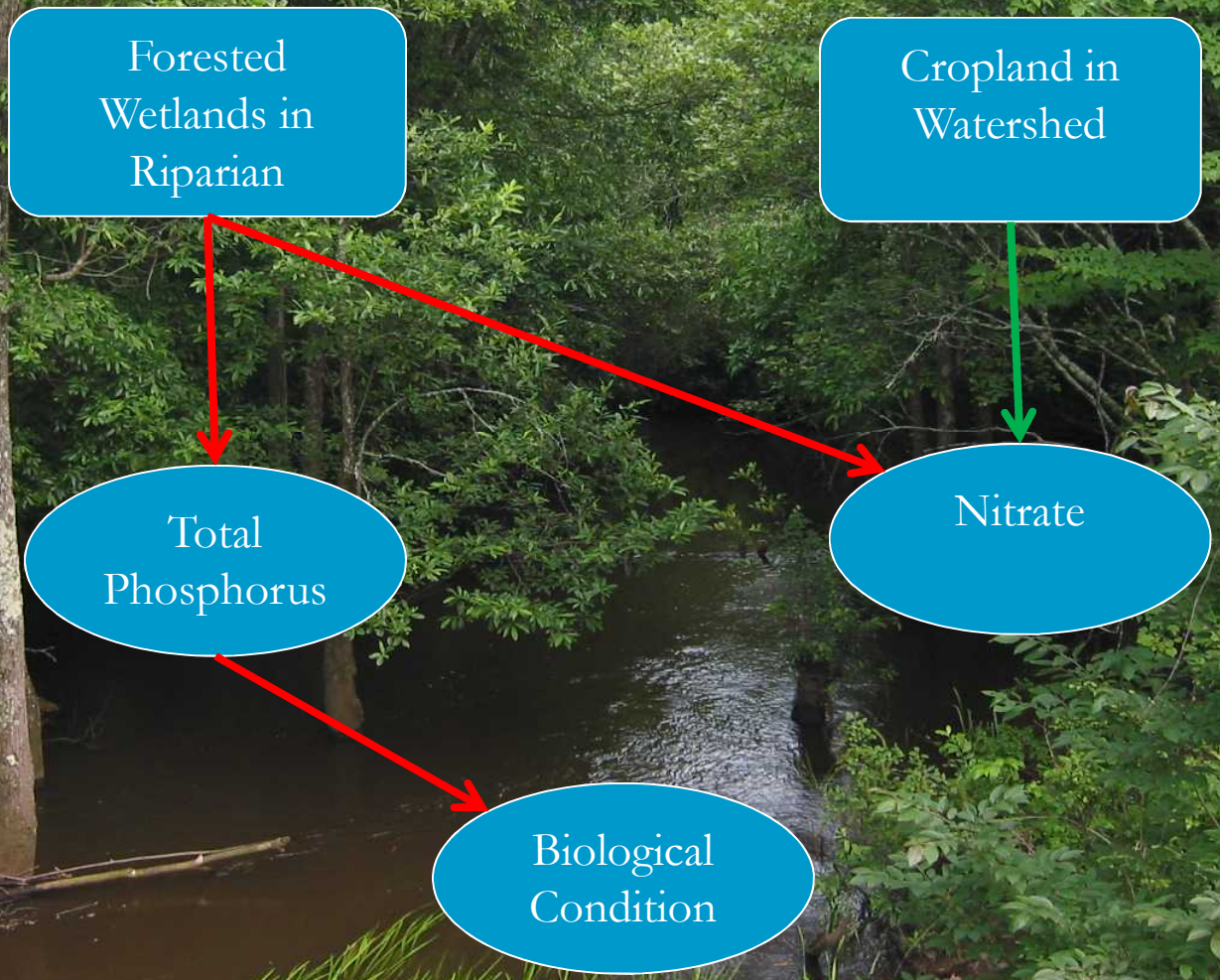
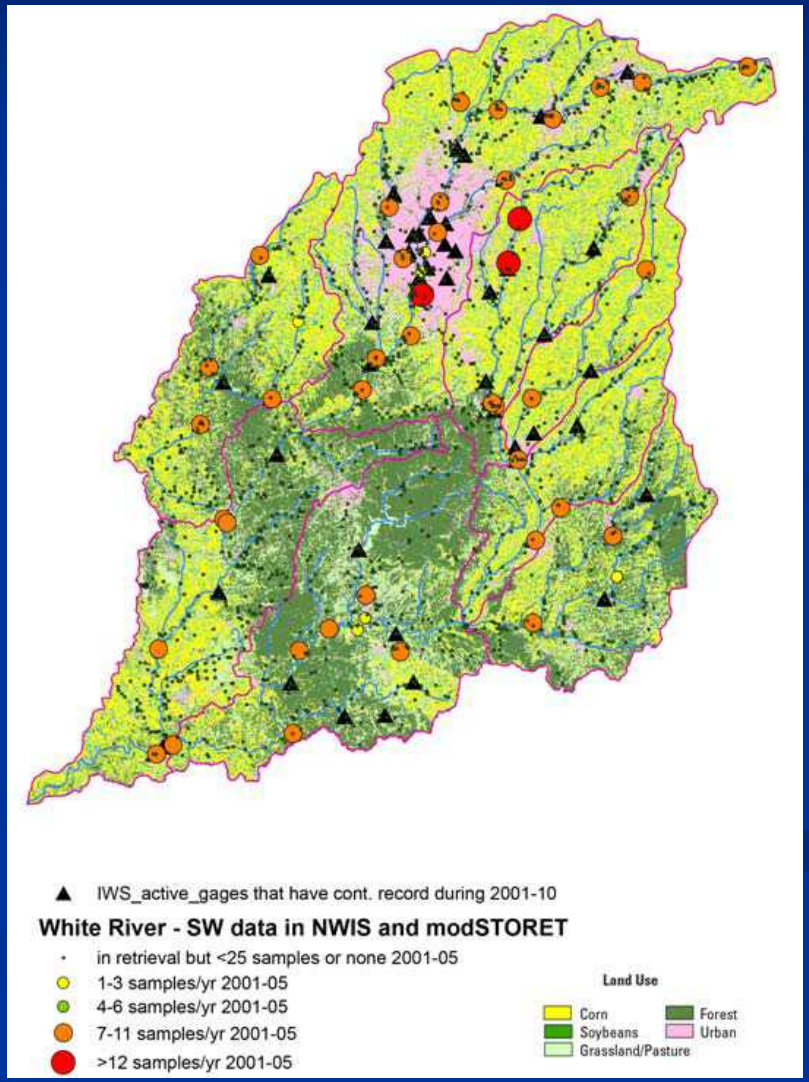
Management Scenario Models



Riseng, et al. 2011, Impacts of agricultural land use on biological integrity: a causal analysis: Ecological Applications 21(8) pp. 3128-3146.

Intensive Temporal Sites

- Watershed scale
- 3-5 sites, 1-3 years
- Region specific objectives
  - Seasonal interactions
  - In-situ contaminant effects
  - Internal and external collaboration opportunities



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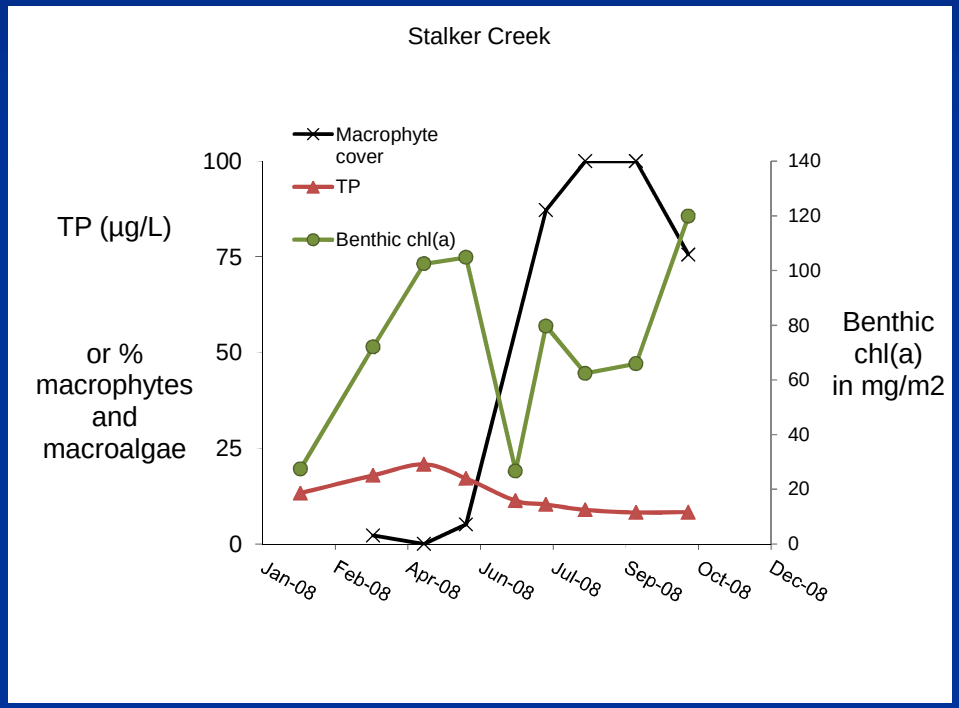
Stalker Creek, Idaho
Upper Snake River basin



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Partners

- USGS
  - Water: Coop, WaterSmart
  - Climate: Landuse change
  - Ecosystems: FORT ecosystem services, WaterSmart
  - Energy, Minerals, and Environmental Health: Toxics, CERC
- EPA
  - NARS, ORD (sediment), OST (Nutrient Criteria)
- BOR: streamflow alteration
- TNC: habitat and streamflow alteration

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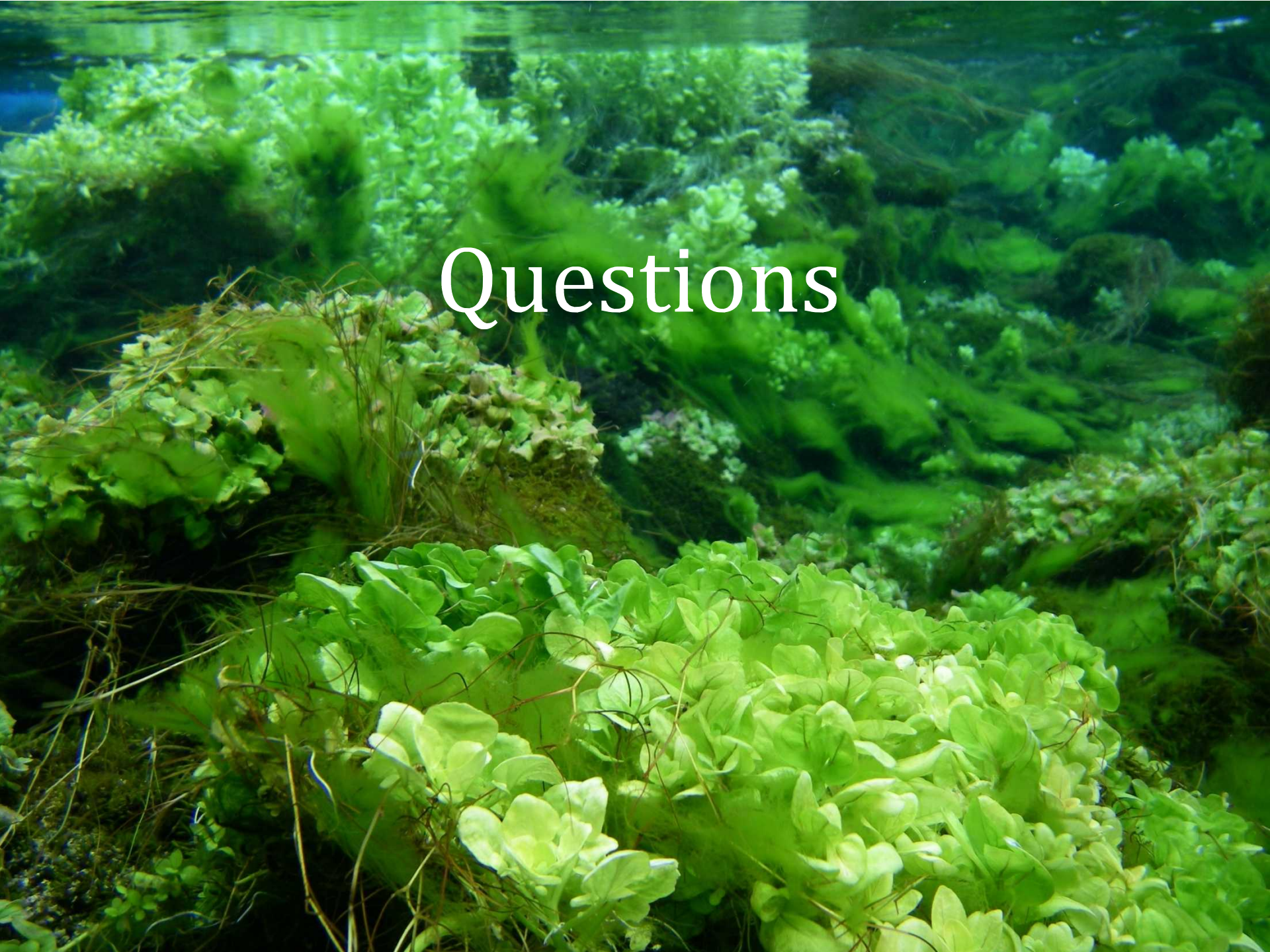
Questions

Candidate Regions (8)

Streamflow Alteration Design (2-3)	Contaminant Design	
	Urban (1-2)	Agricultural (NARS+1)
1. Western Mountains	1. Southeastern Plains (Piedmont)	1. Cold Desert (Irrig west, CCYK to USNK)
2. Atlantic Highlands	2. Mediterranean California (SF to SD)	2. Mediterranean California
3.Ozark/Appalachian Forest	3. Marine West Coast Forest	3. Mixed Wood Plains
4.Marine West Coast Forest	4. Mixed Wood Plains	
	5. Ozark/Appalachian Forest	

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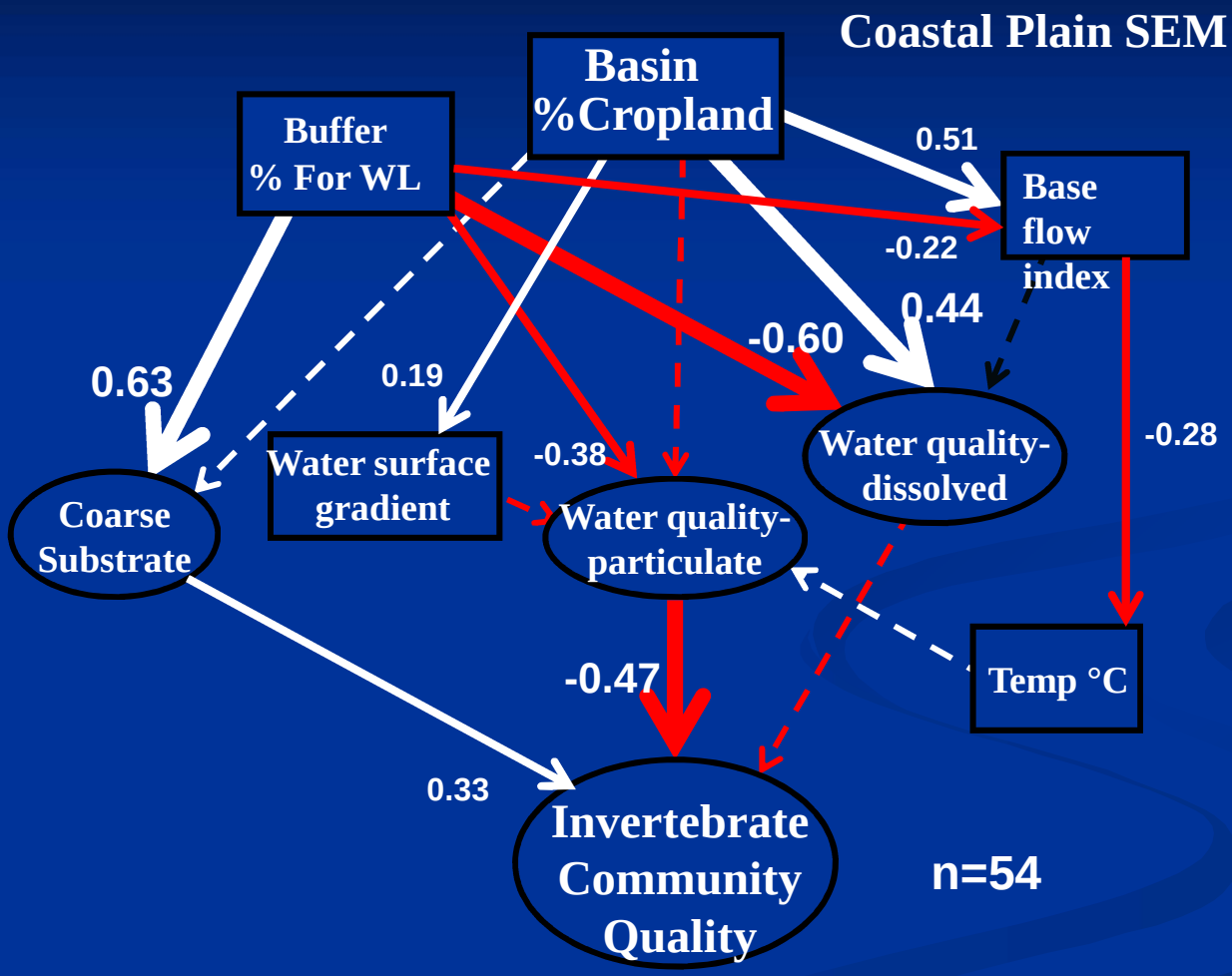
Structural Equation Models



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