




Progress on Trend Assessment in ECBP and HELP Ecoregions: Applications to Fish Creek and the St. Joseph River Systems

Midwest Biodiversity Institute

Broad Study Objectives

- Explore trends in biological response variables such as IBI and ICI, their metrics and certain key fish and macroinvertebrate taxa in Eastern Corn Belt Plains (ECBP) and Huron Erie Lake Plain (HELP) ecoregions
- Relate, where possible, changes in biology to the predominant stressors in these watersheds
- Assess trends in Fish Creek and the Saint Josephs River watersheds in relation to changes elsewhere in these ecoregions to determine whether the patterns of change in these watersheds are stable, likely to improve, or at risk of decline.

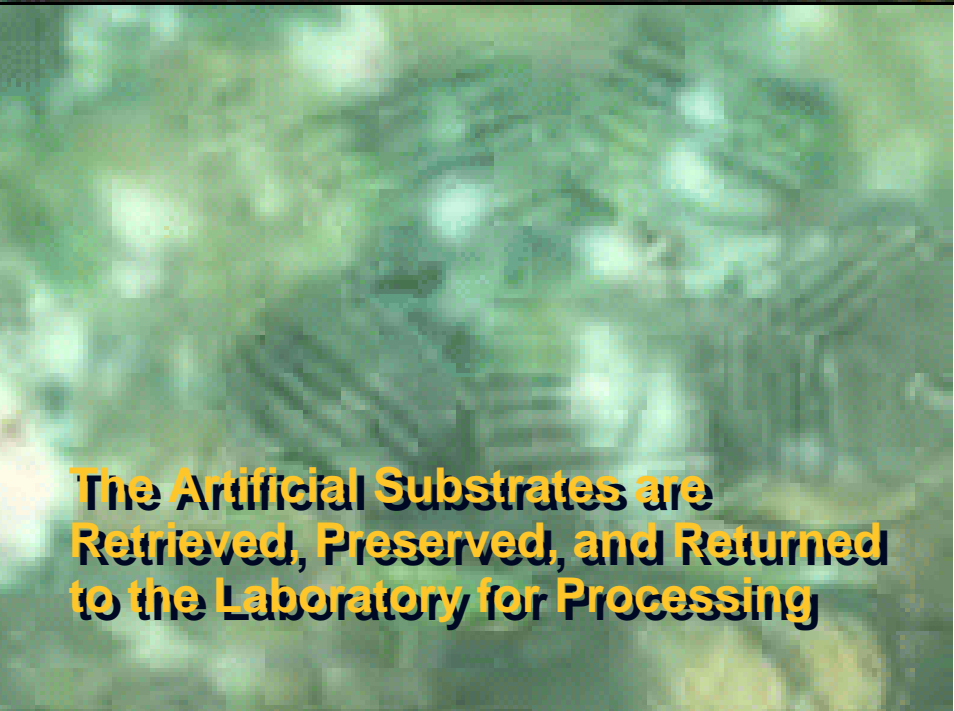
Ohio EPA Macroinvertebrate Methods: Field Procedures

A photograph showing several artificial substrates, which are rectangular frames with mesh, placed inside a large, light-colored container. The substrates are arranged in rows, and some have small, dark objects (possibly macroinvertebrates) on them.

Artificial Substrates are Set for a Six-Week Exposure (July - September Index Period)

A photograph of a person wearing a white t-shirt and dark pants, bending over a stream. They are holding a rectangular artificial substrate and placing it into the water. The stream bed is rocky and the water is flowing.

Artificial Substrates are Placed in Run Habitat With Constant Current

A photograph showing several artificial substrates placed in a stream. The water is flowing over the substrates, which are partially submerged. The background shows green foliage and trees.

The Artificial Substrates are Retrieved, Preserved, and Returned to the Laboratory for Processing

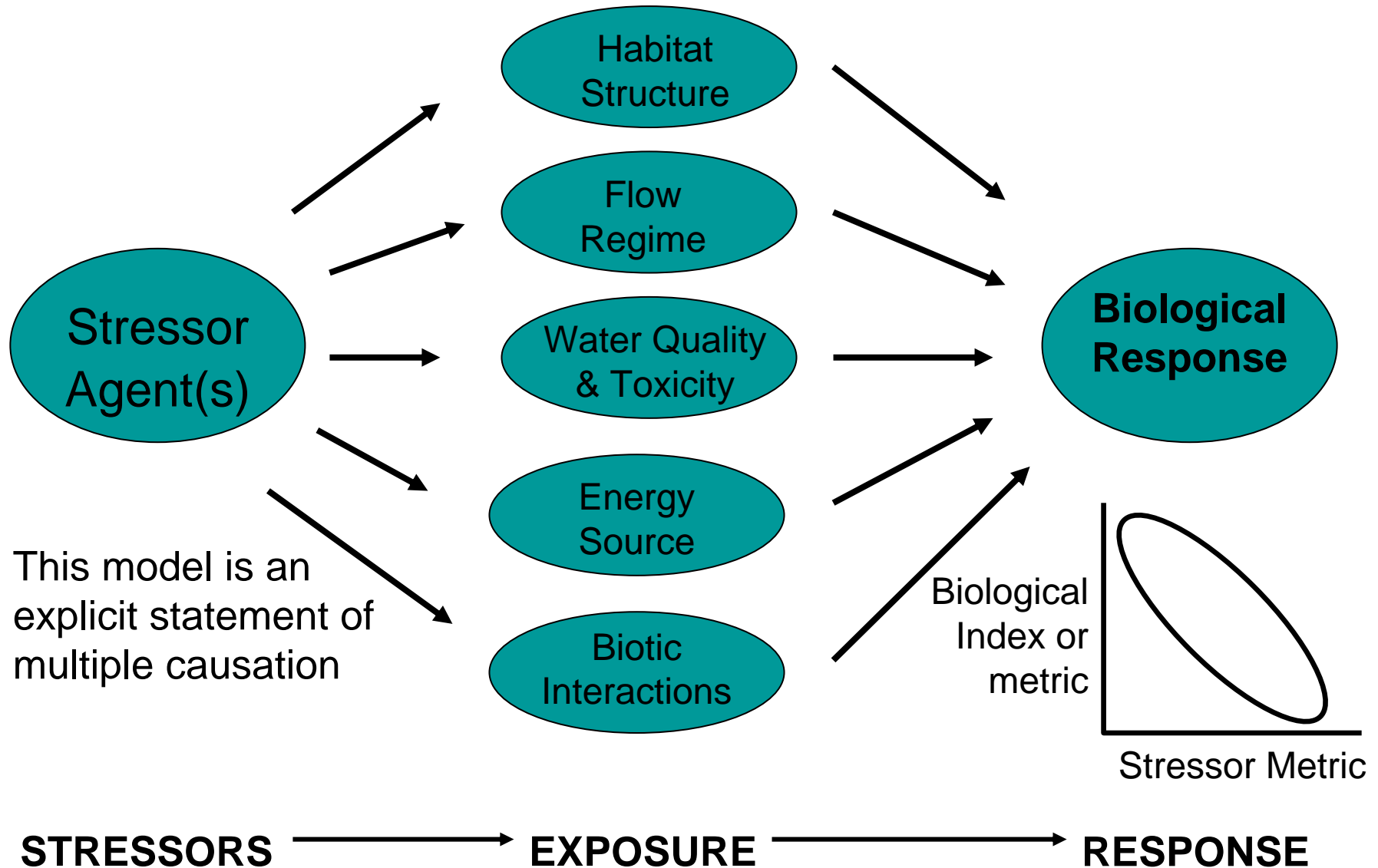
A photograph of a person wearing a white t-shirt and dark pants, standing in a stream. They are using a dip net to collect macroinvertebrates from the stream bed. The stream bed is rocky and the water is flowing.

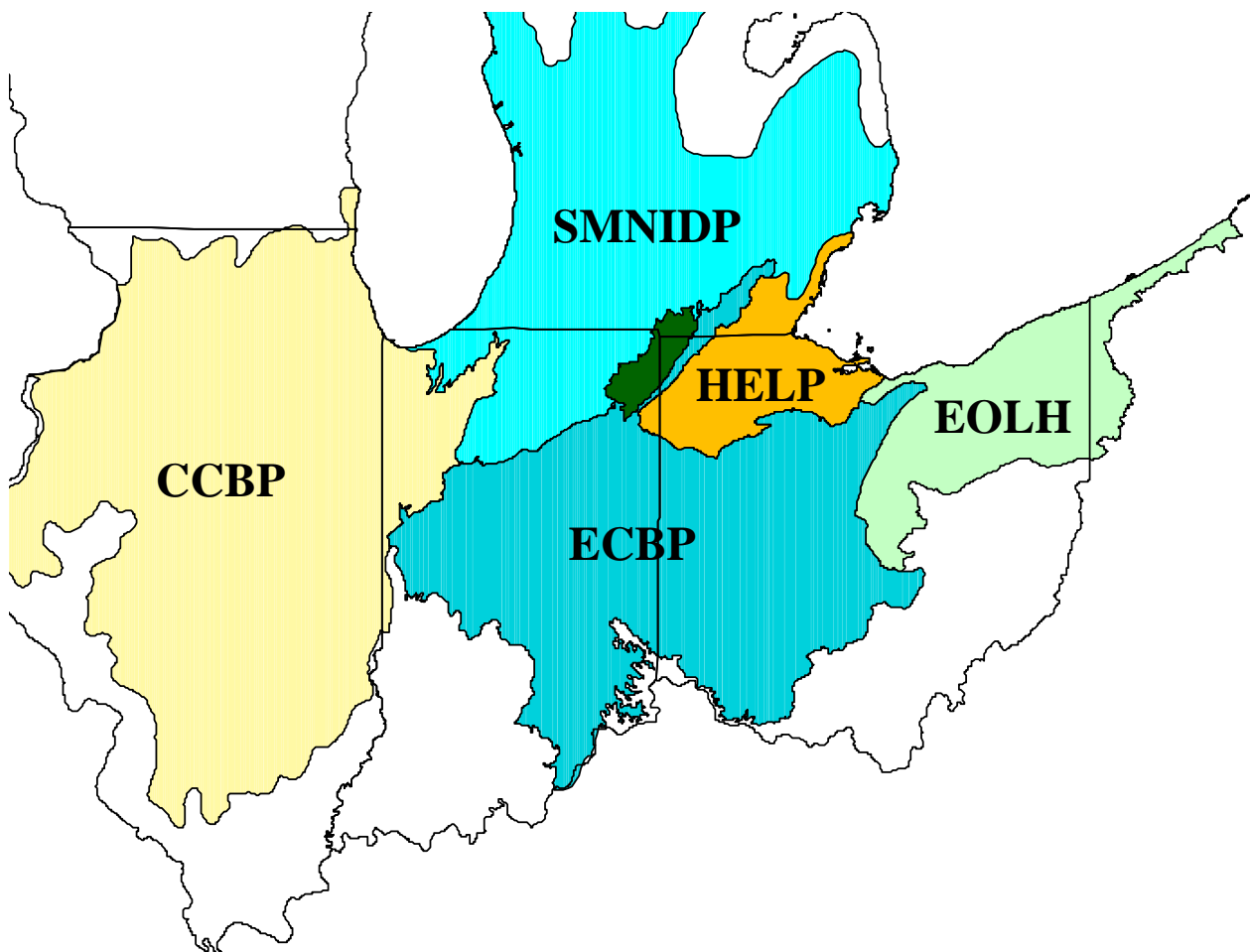
A Qualitative Dip Net/Hand Pick Method is Used to Supplement the Artificial Substrates or as a Stand Alone Evaluation

Fish are a widely identifiable component of aquatic systems and are valued for their recreational uses. Most species, however, are more obscure, and comprise the second most endangered group.



The Linkage From Stressor Effects to Ecosystem Response

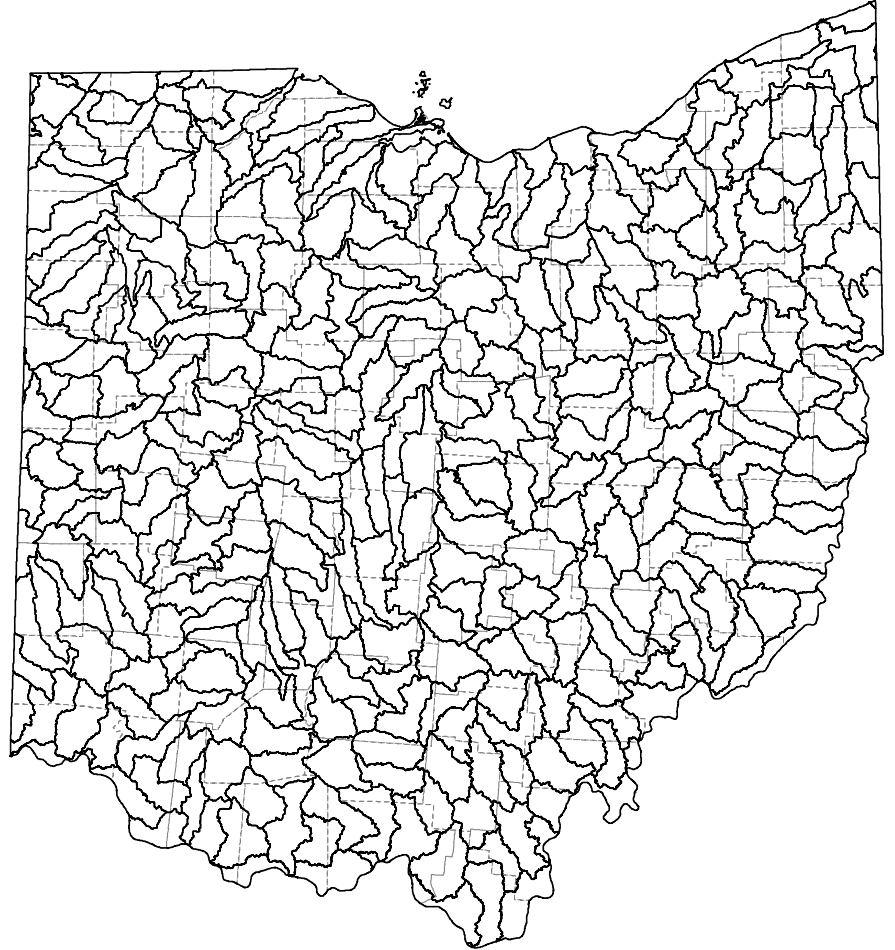




Watershed Scales:



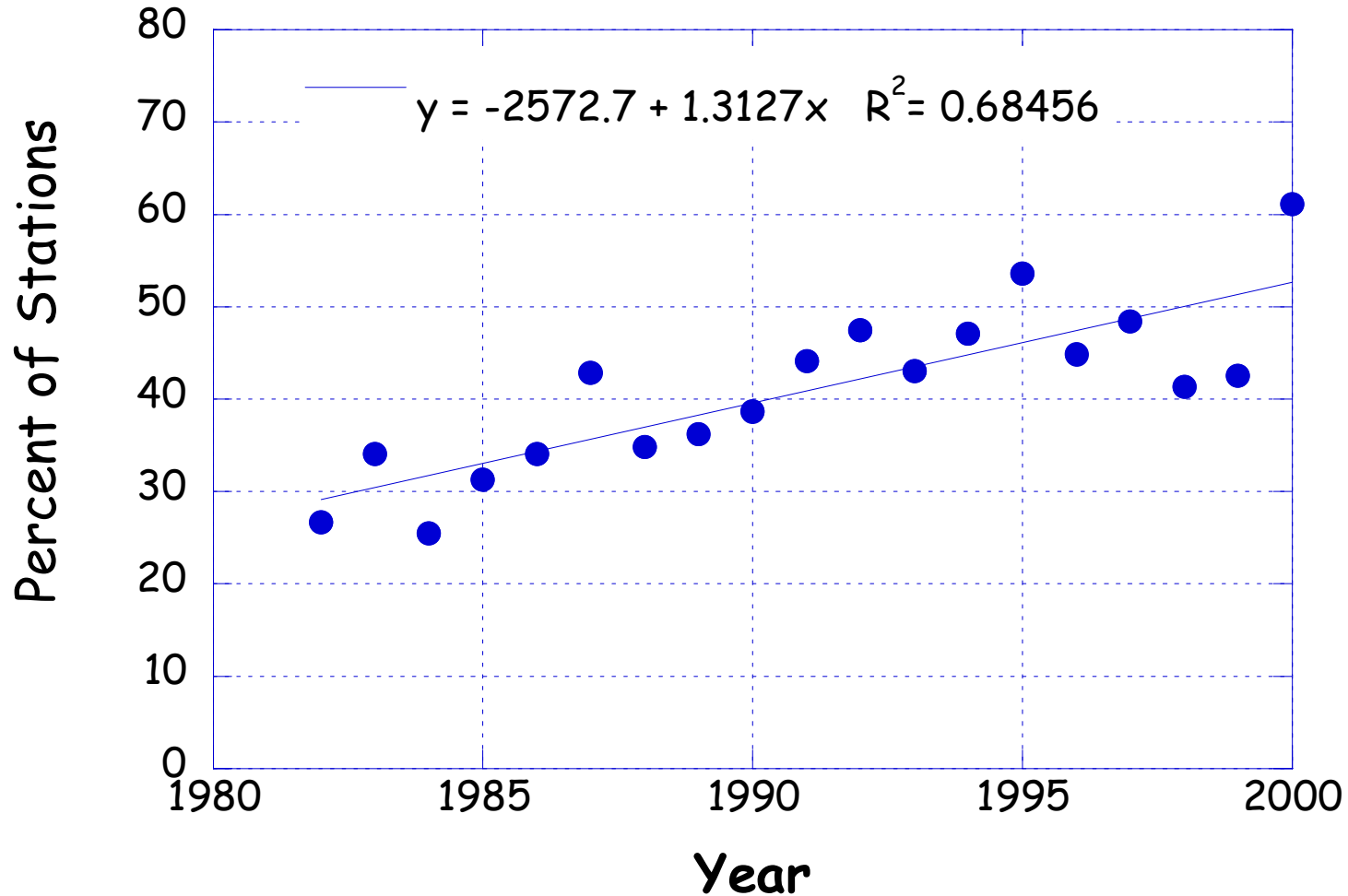
Subbasin: 93 in Ohio



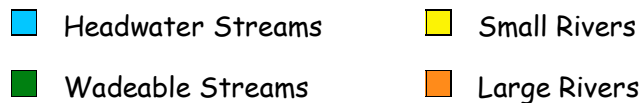
Huc Watershed: 330 in Ohio

Trends in Water Quality

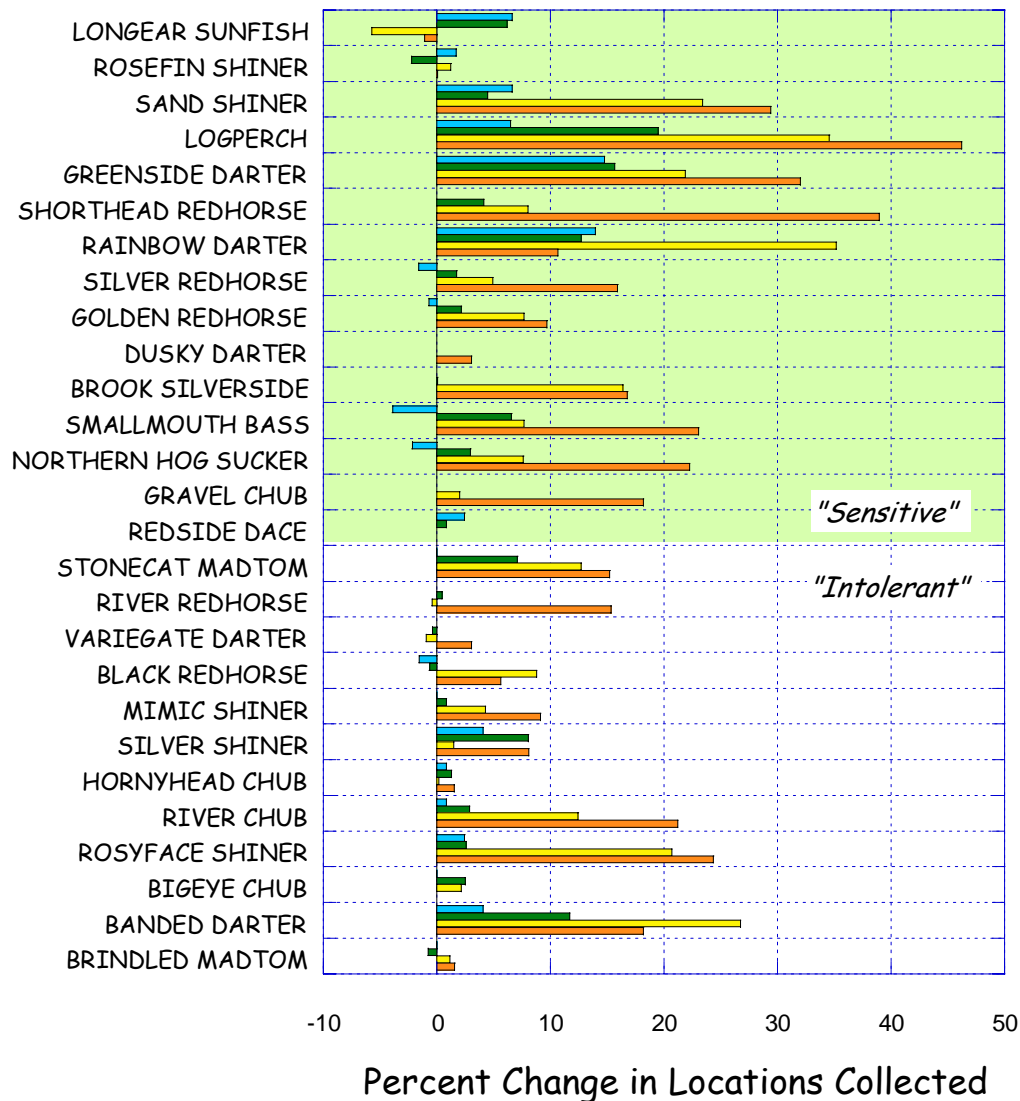
Aquatic Life Use Attainment in Ohio Streams
(Based on Biocriteria)



ECBP and HELP Ecoregions

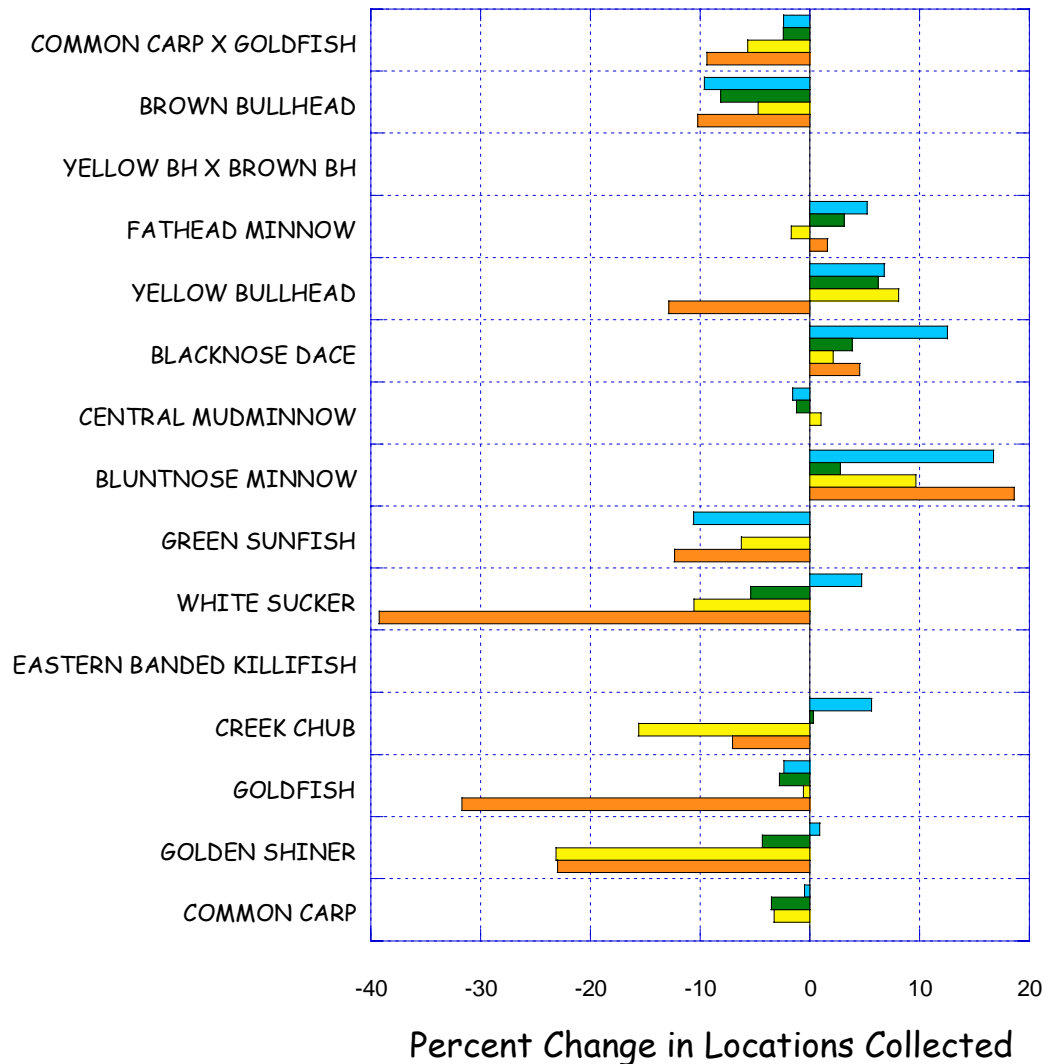


Change in Sensitive & Intolerant Fish Species Distributions
Matched Sites, pre-1988 and post-1993

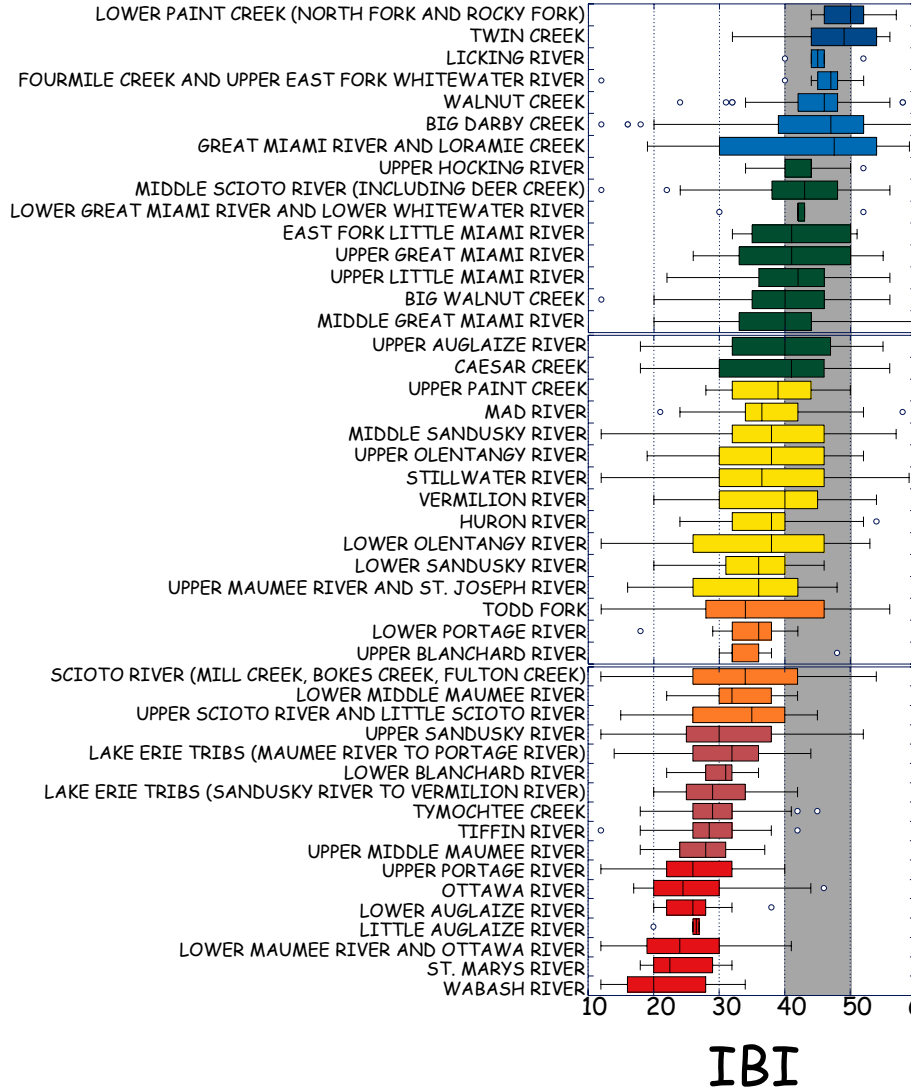


ECBP and HELP Ecoregions

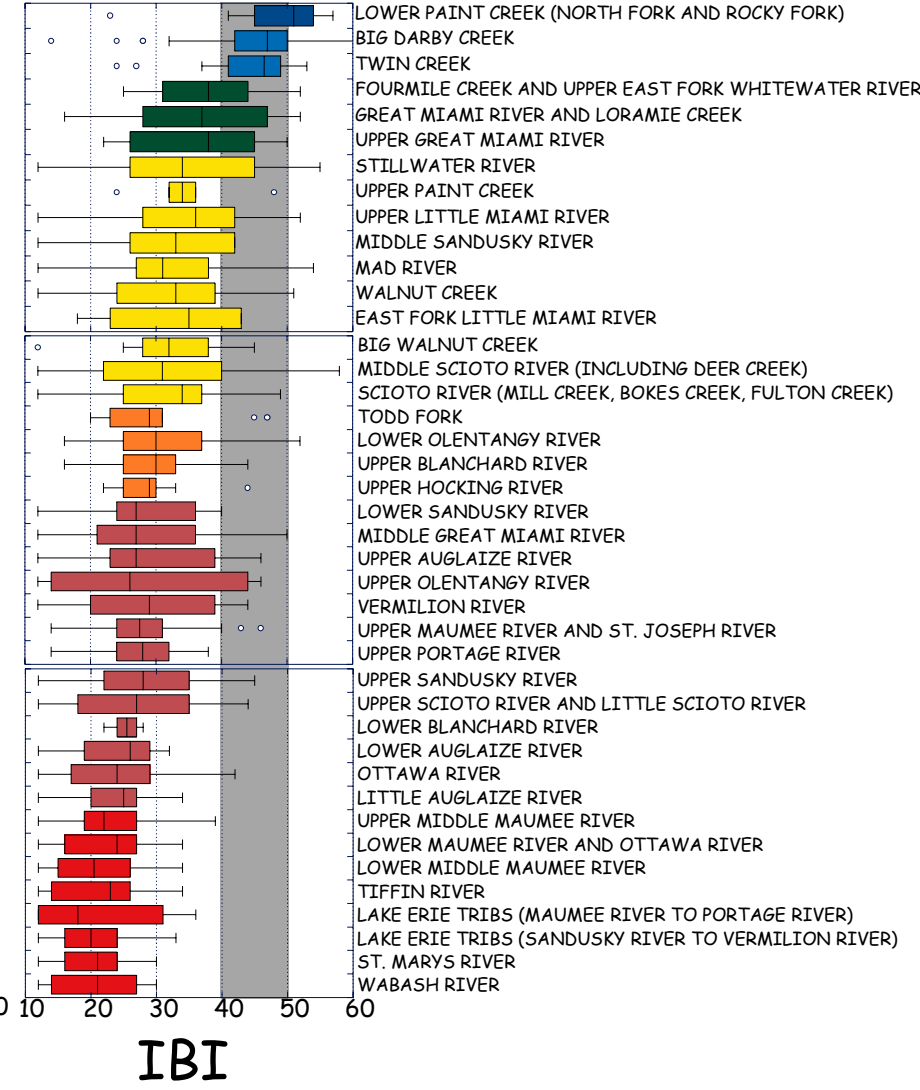
Change in Tolerant Fish Species Distribution
Matched Sites, pre-1988 and post-1993



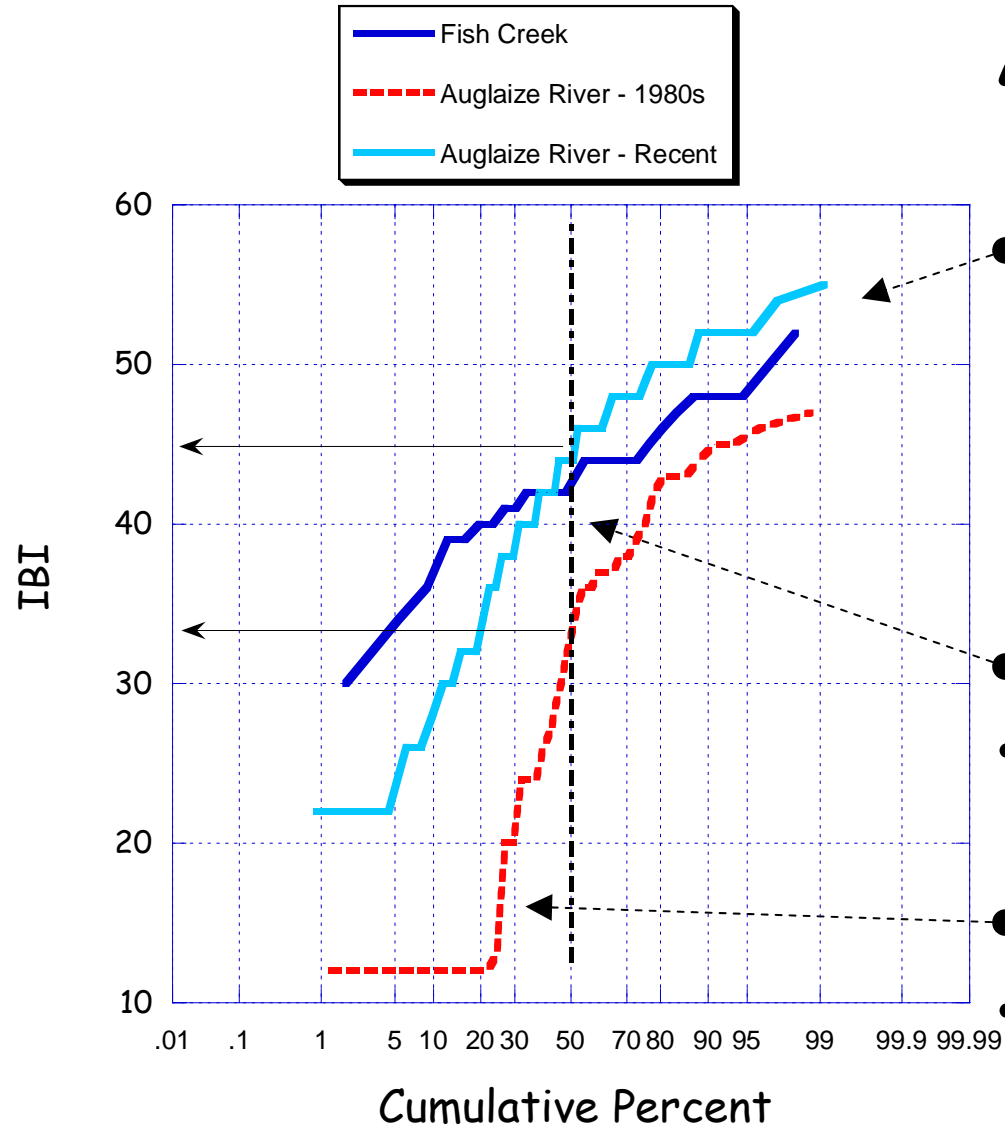
1994-2001



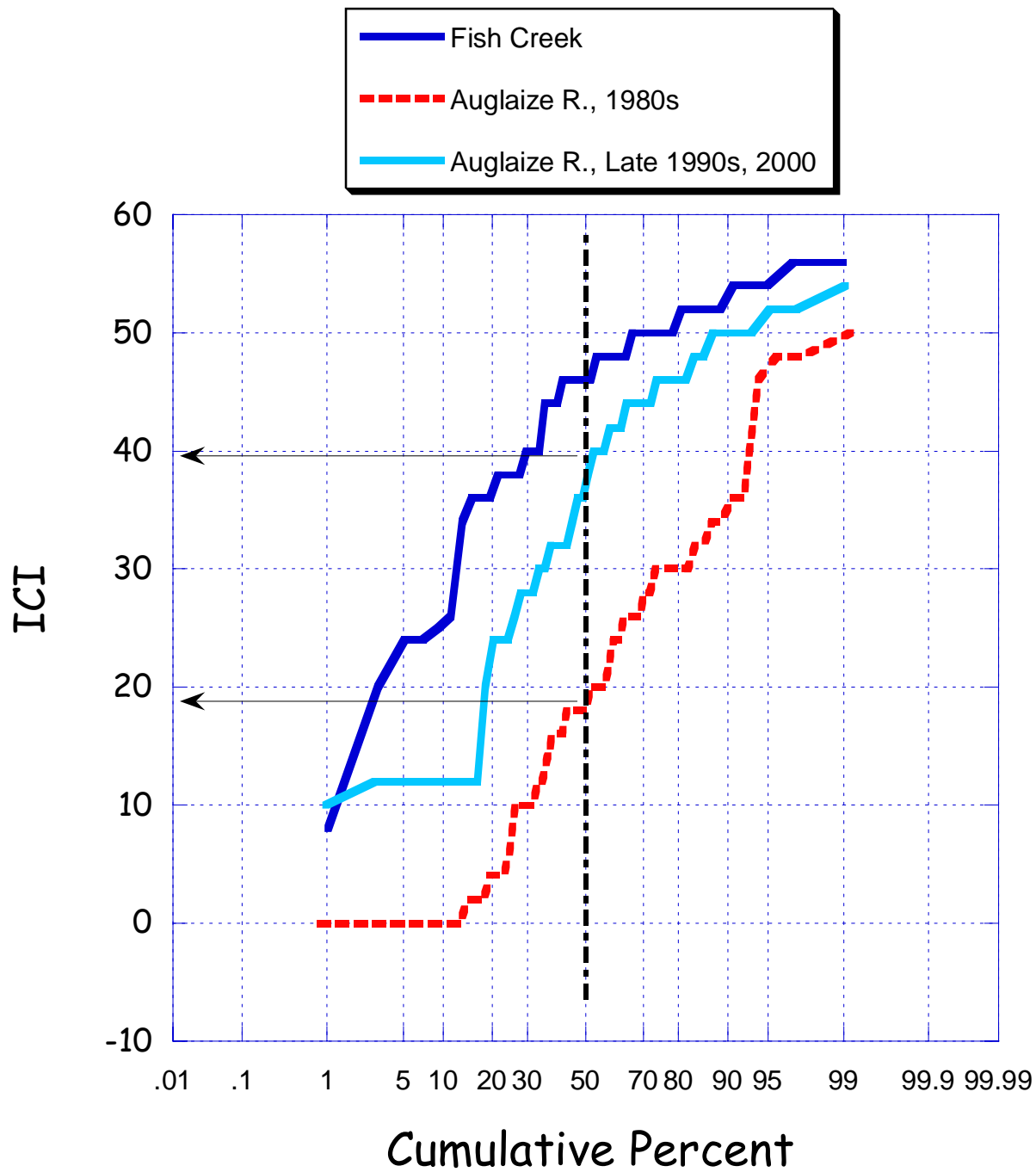
1979-1987



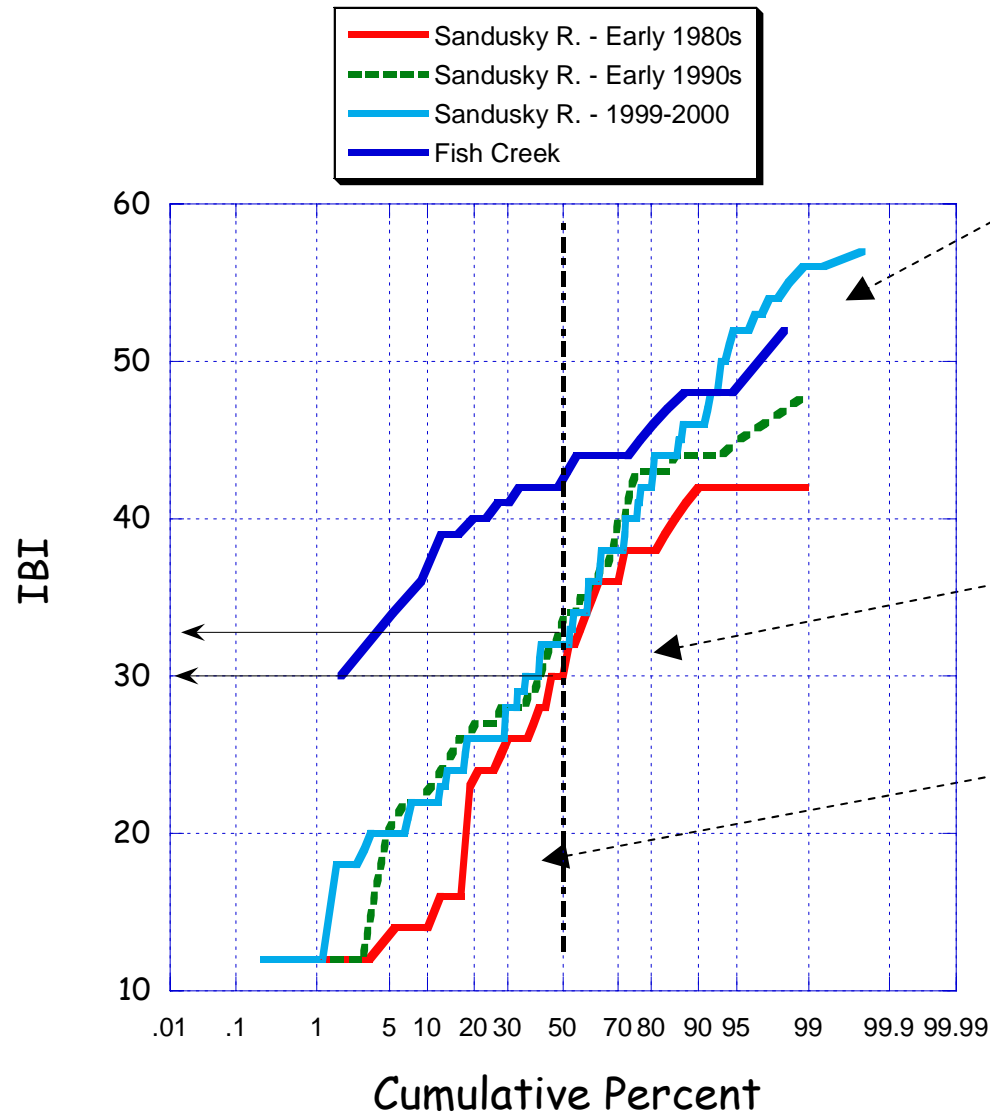
Auglaize River



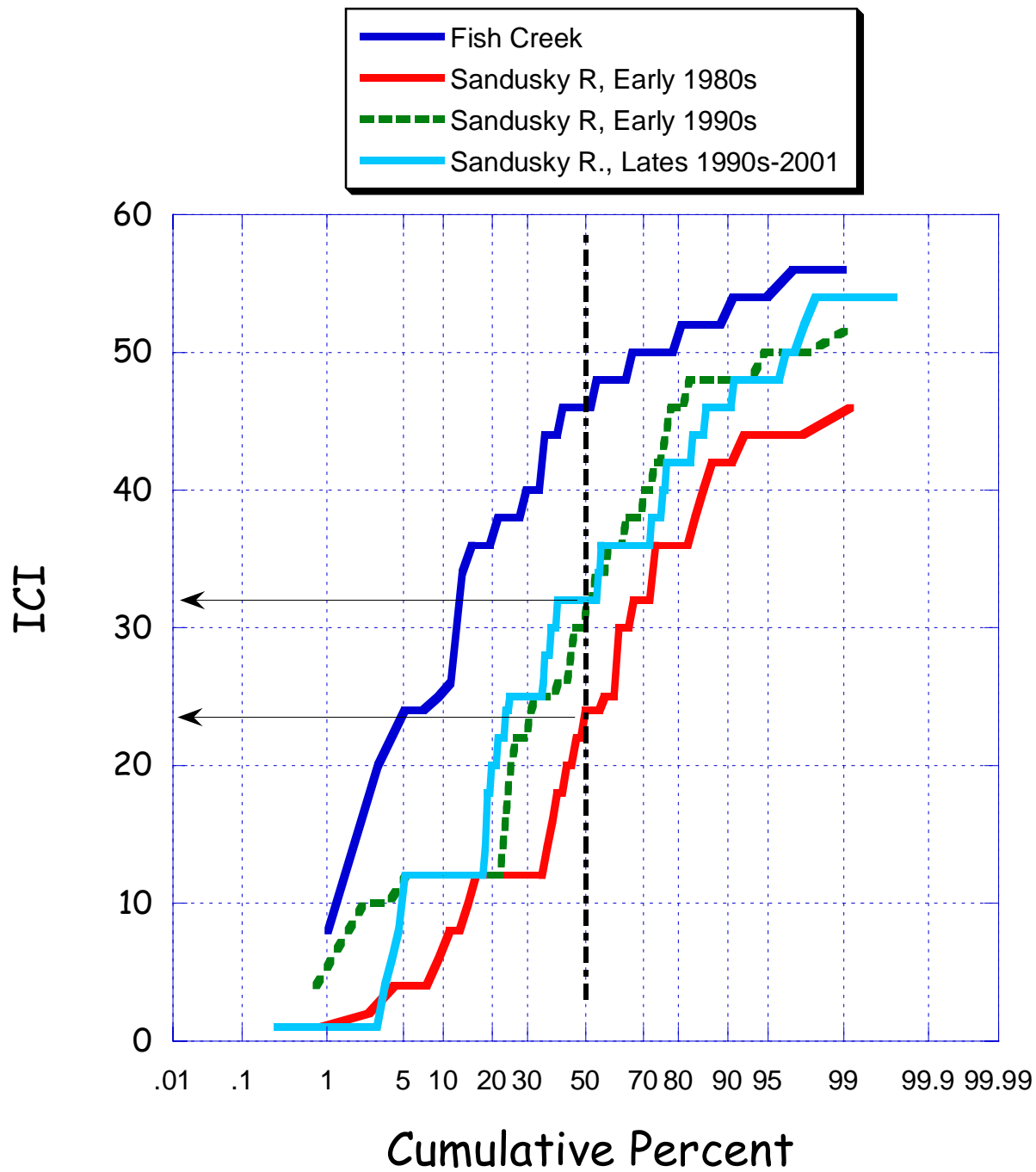
- Substantial improvement in Auglaize basin associated with point and nonpoint sources
- Exceptional biological scores surpass Fish Creek
- Many fewer poor and very poor sites



Sandusky River



- Sandusky River - Recovery from point sources, especially in mainstem segments
- Little change in mean condition
- Reduction in very poor sites

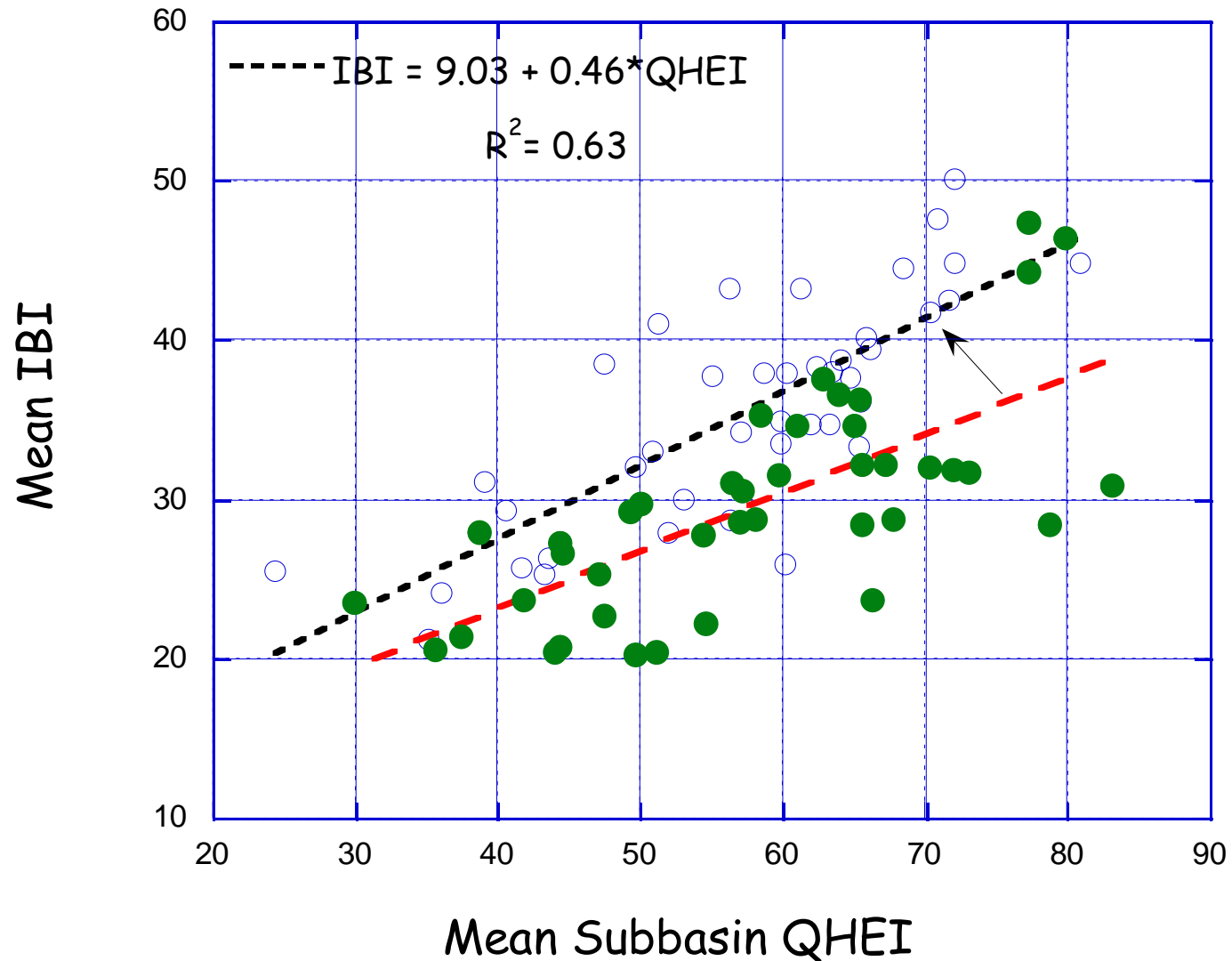


Linking Changes or Spatial Variation in Biological Condition to Stressors

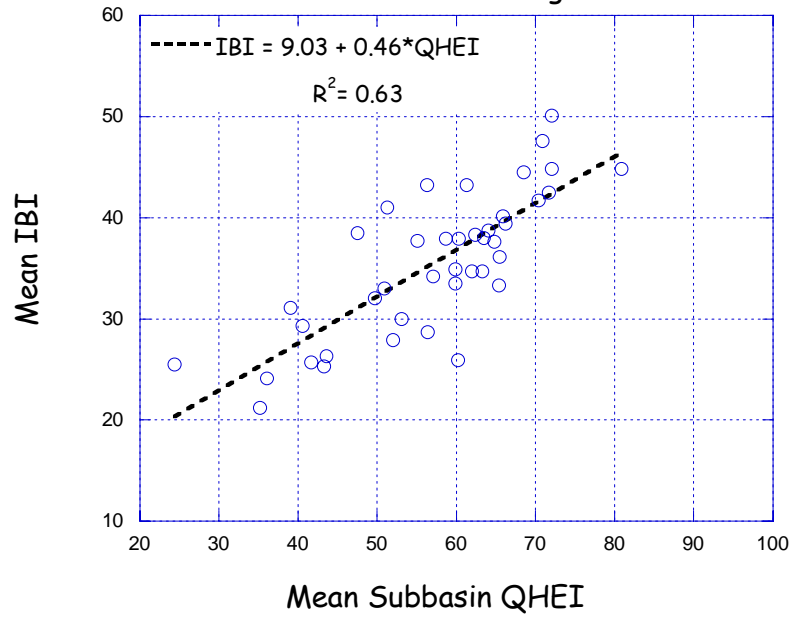
Data by Subbasin - 1994-2001

Overlay: 1979-1987 data

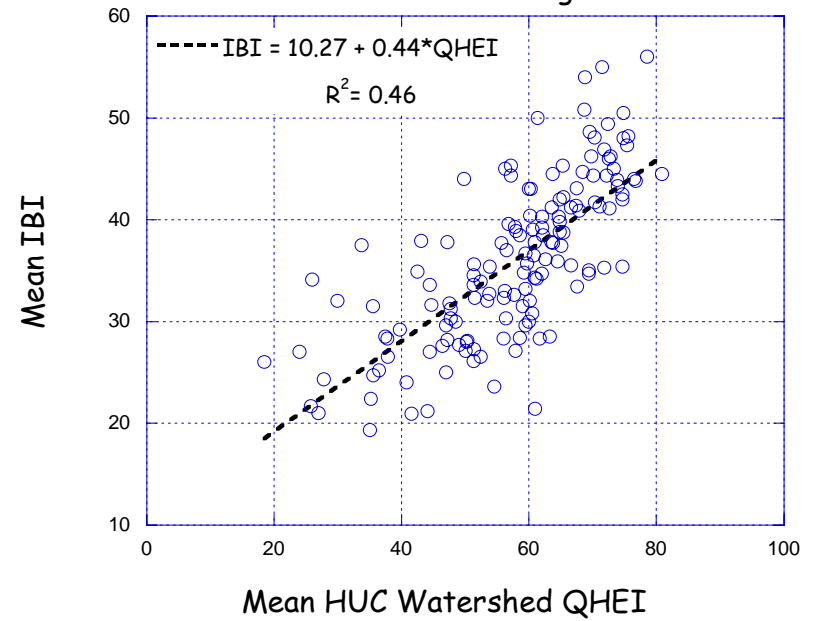
ECBP & HELP Ecoregions



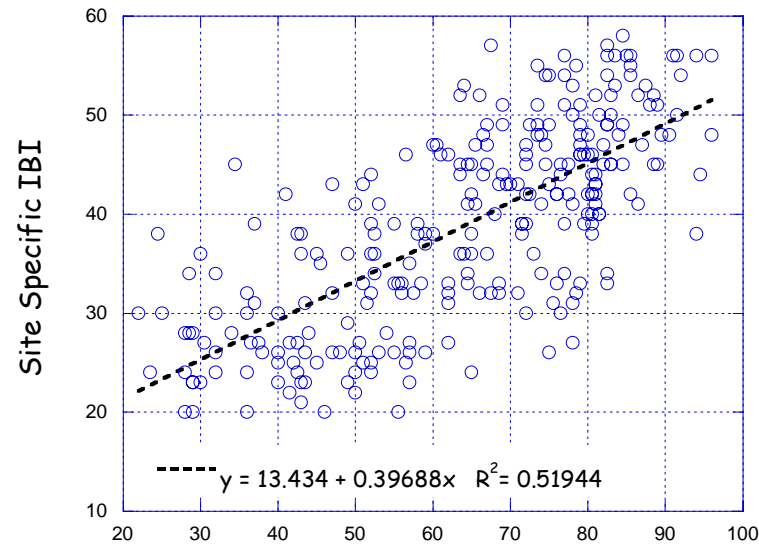
Data by Subbasin - 1994-2001
ECBP & HELP Ecoregions



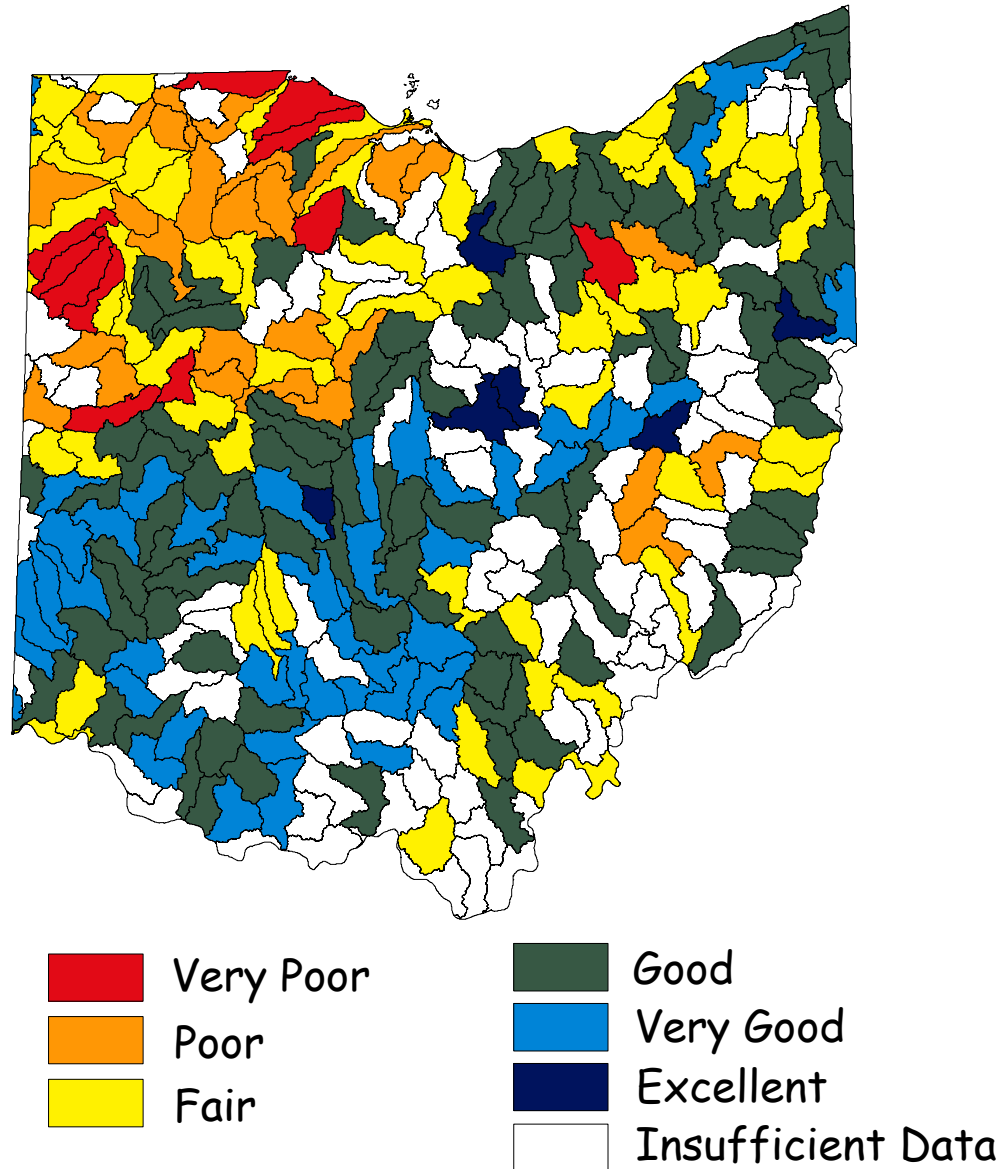
Data by Subbasin - 1994-2001
ECBP & HELP Ecoregions



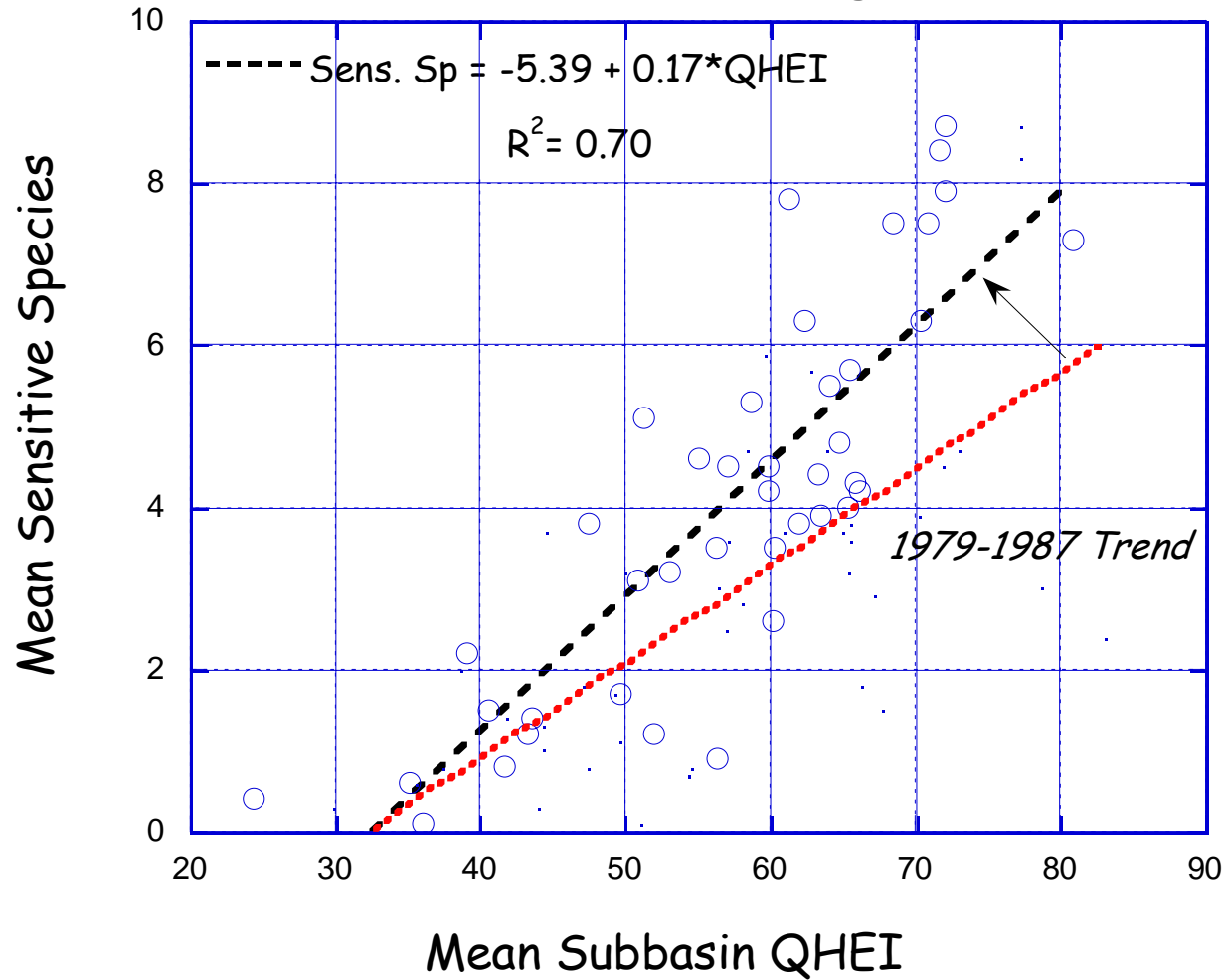
Data by Site All Years
ECBP & HELP Ecoregions
Reference Sites ONLY

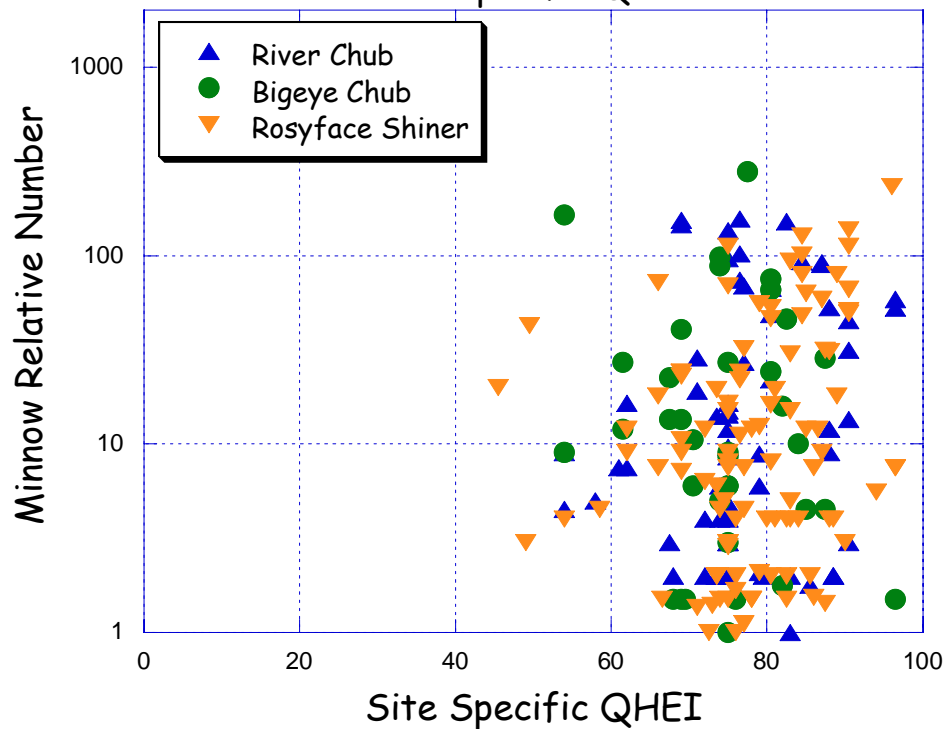
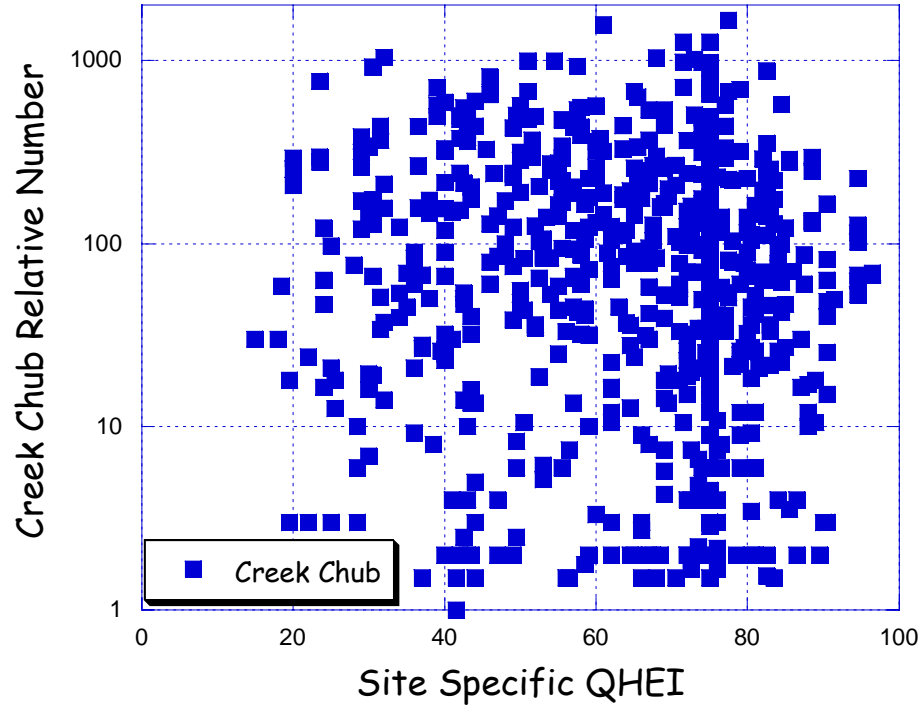


Average Habitat Quality by Watershed

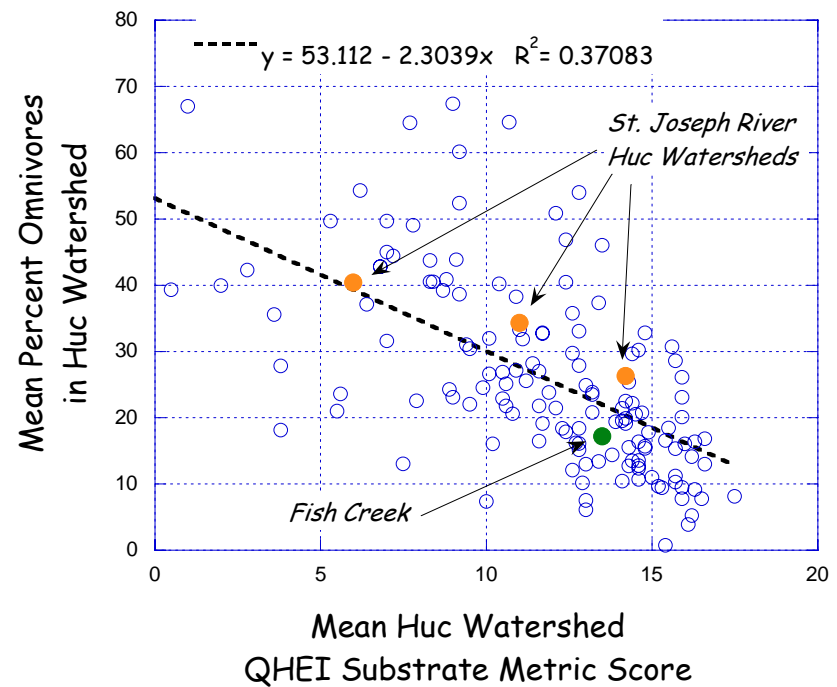
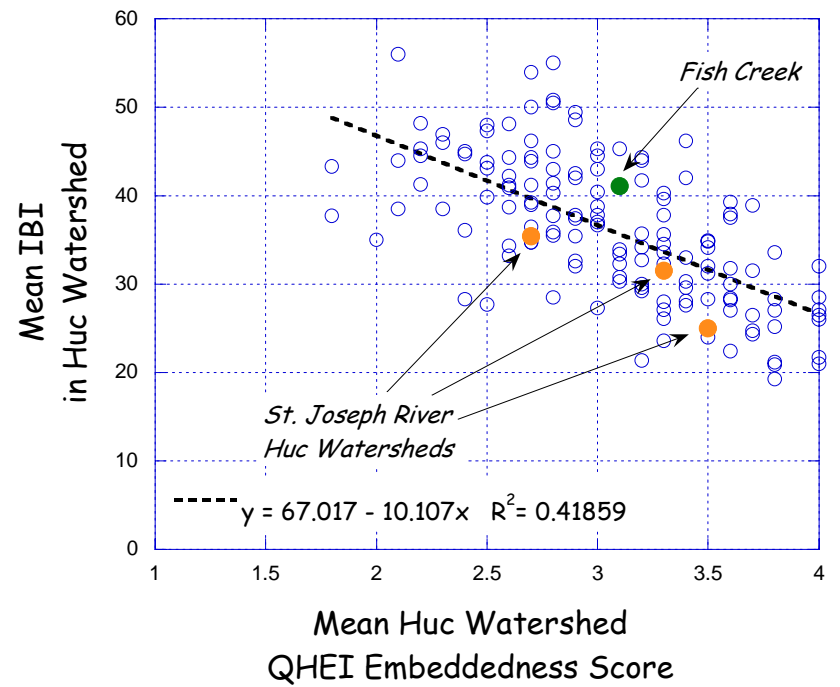
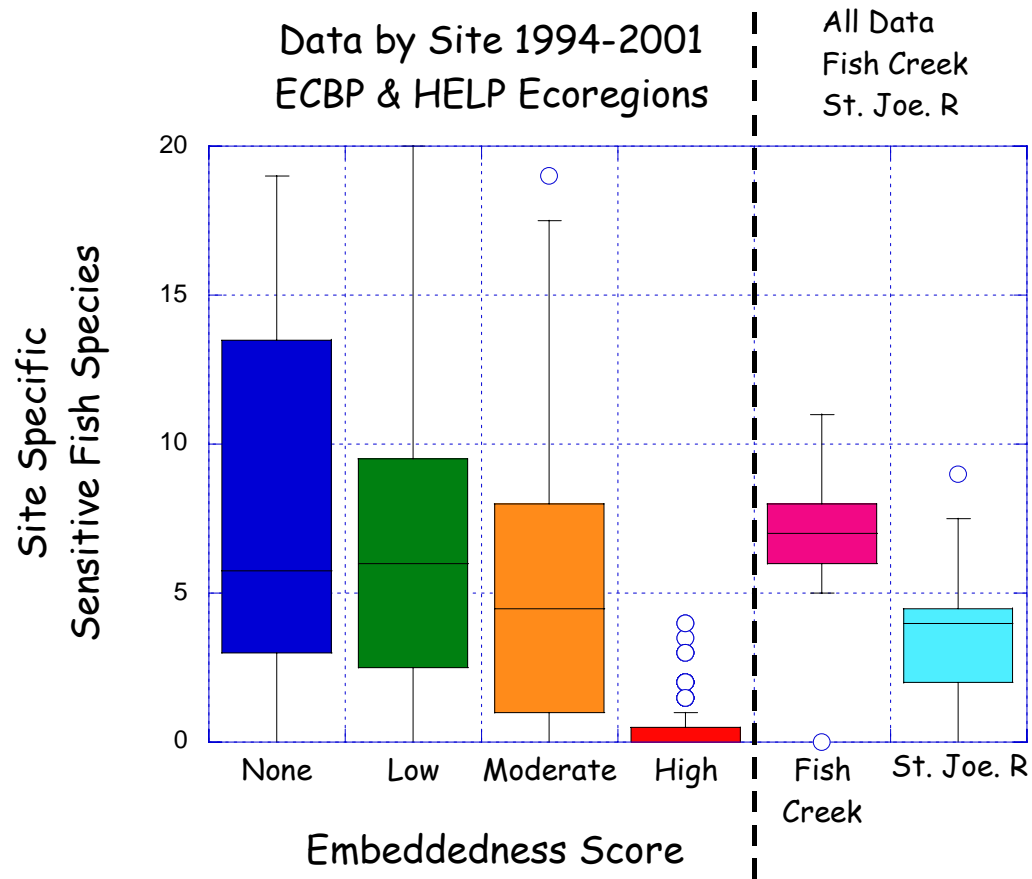


Data by Subbasin - 1994-2001
ECBP & HELP Ecoregions

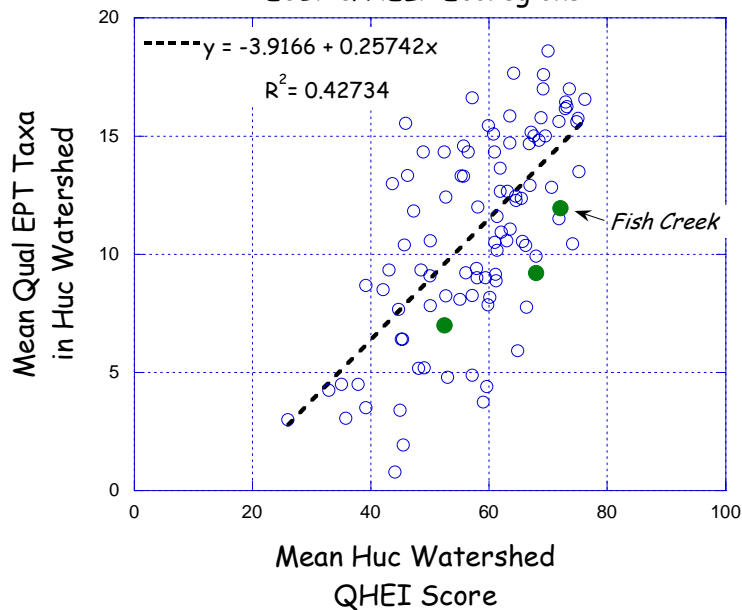




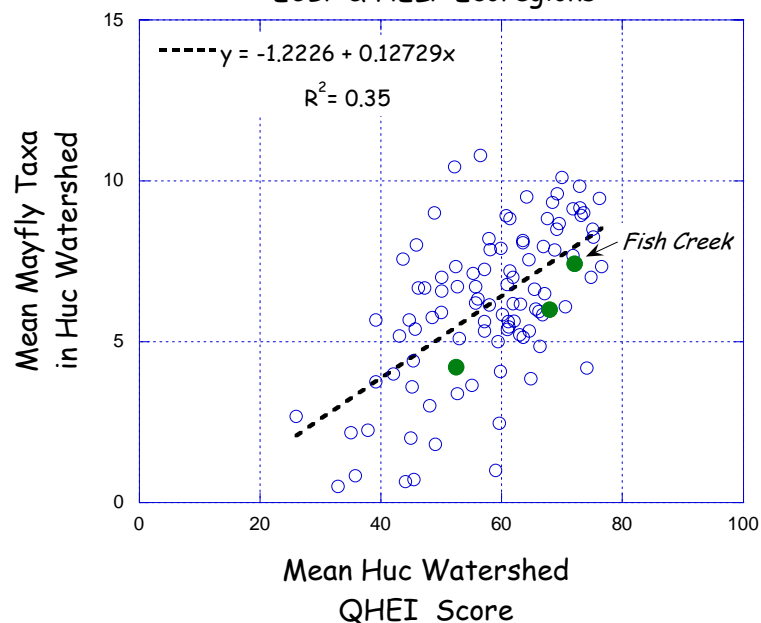
Data by Date, All Years
ECBP & HELP Ecoregions
Reference Sites ONLY



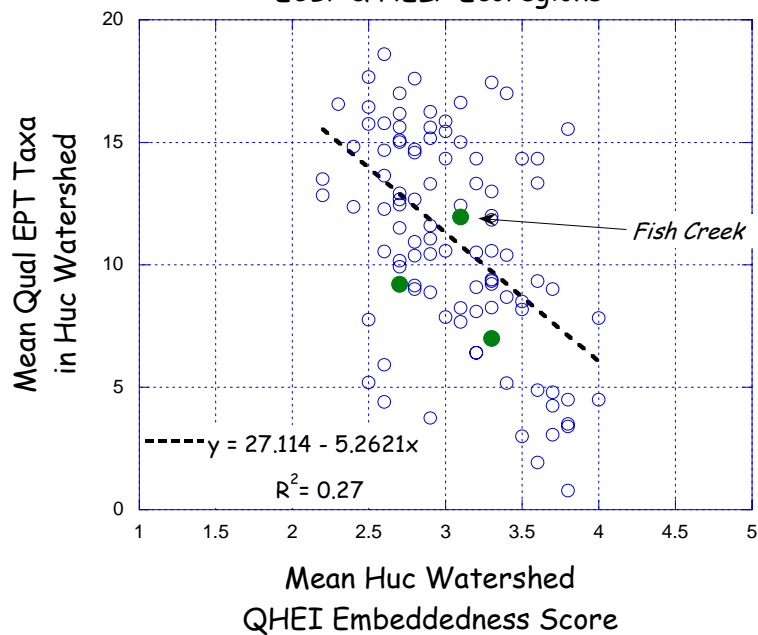
Data by Huc Watershed - 1994-2001
ECBP & HELP Ecoregions



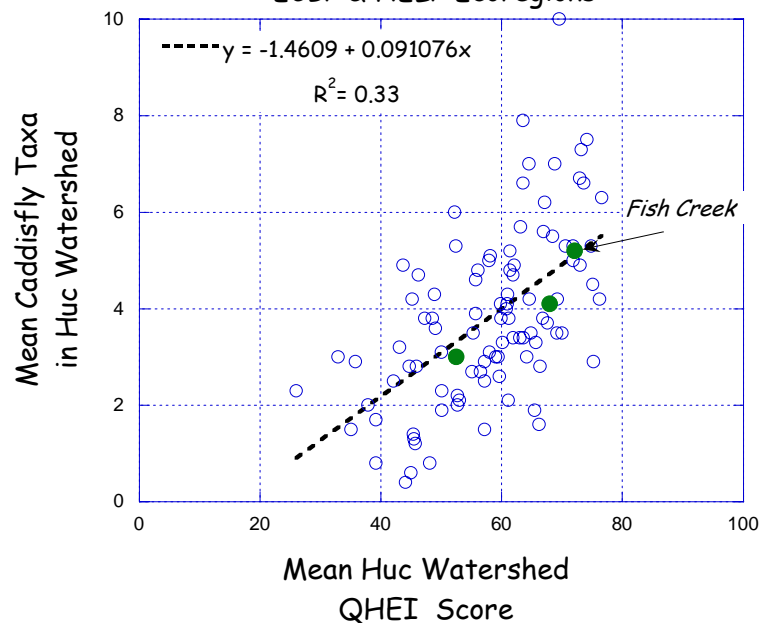
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ECBP & HELP Ecoregions



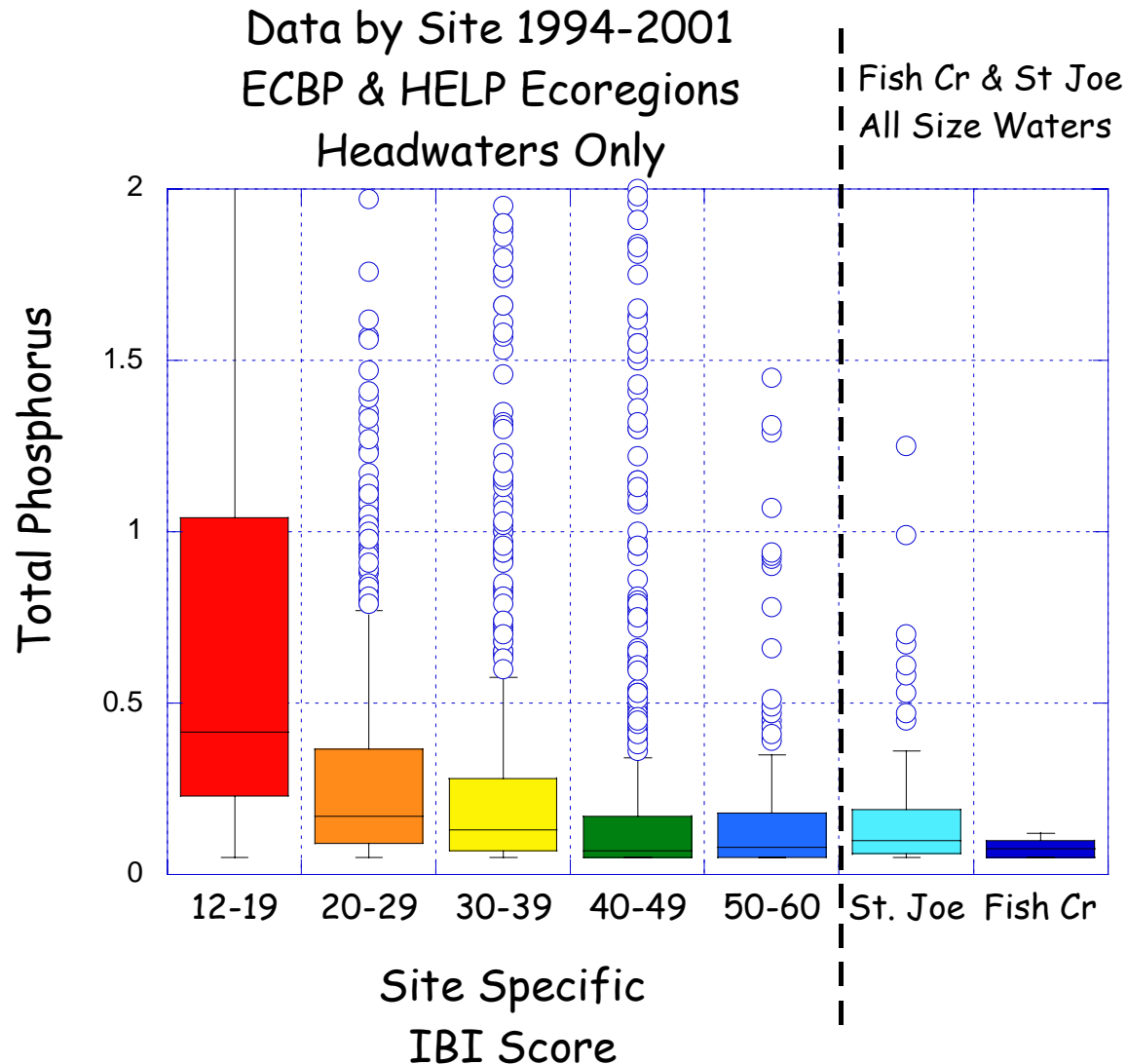
Data by Huc Watershed - 1994-2001
ECBP & HELP Ecoregions



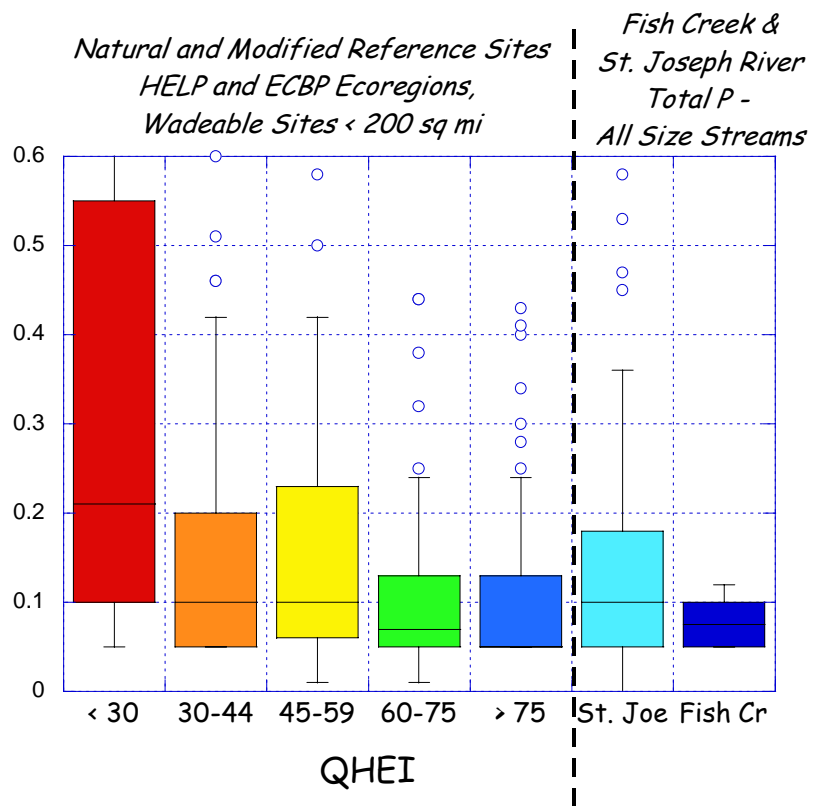
Data by Huc Watershed - 1994-2001
ECBP & HELP Ecoregions



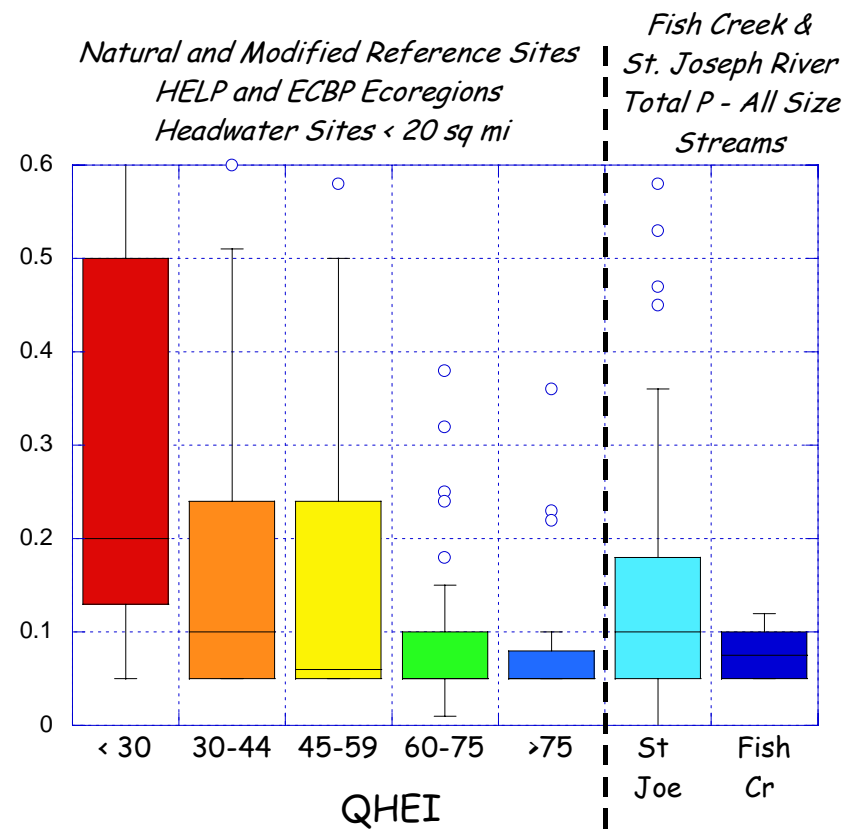
IBI and Total Phosphorus in Headwater Streams



Total Phosphorus

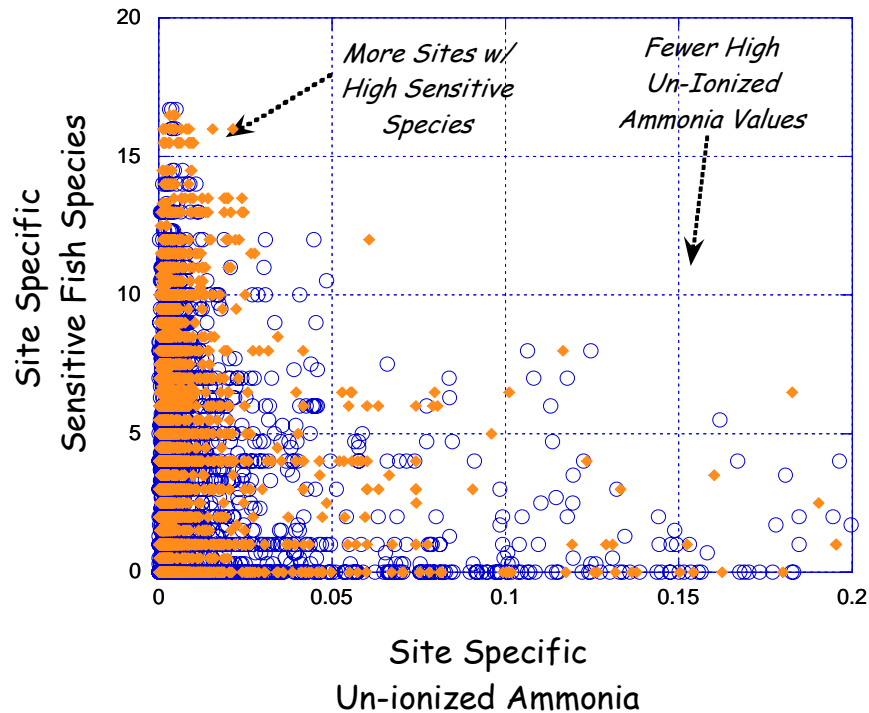


Total Phosphorus

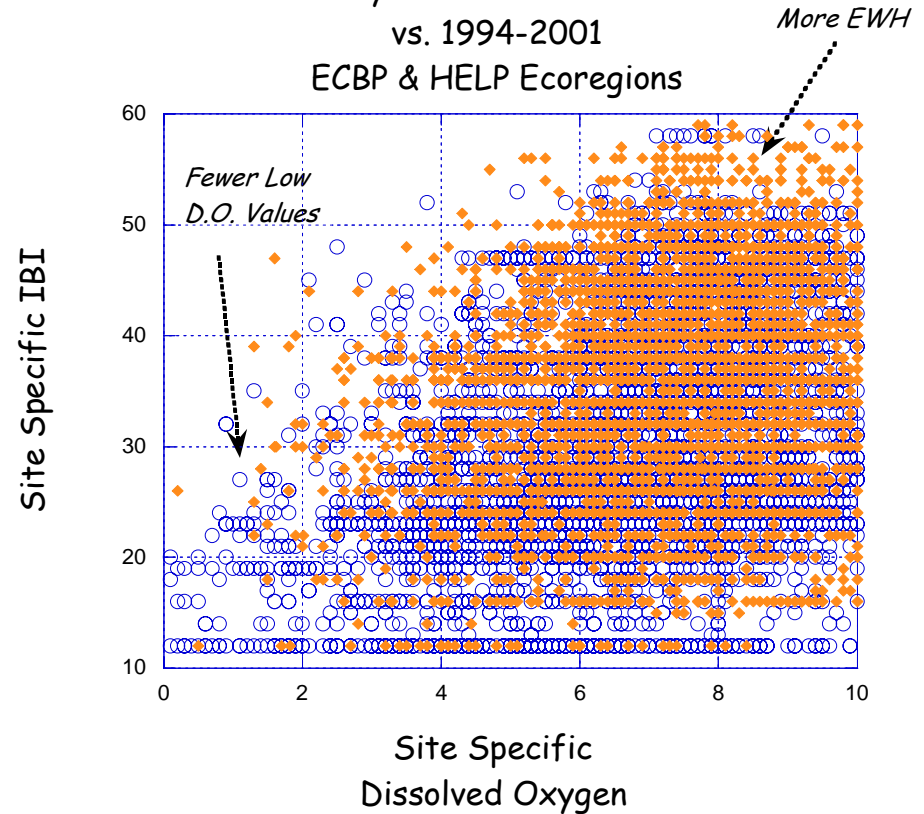


Other Stressors: D.O. and Ammonia

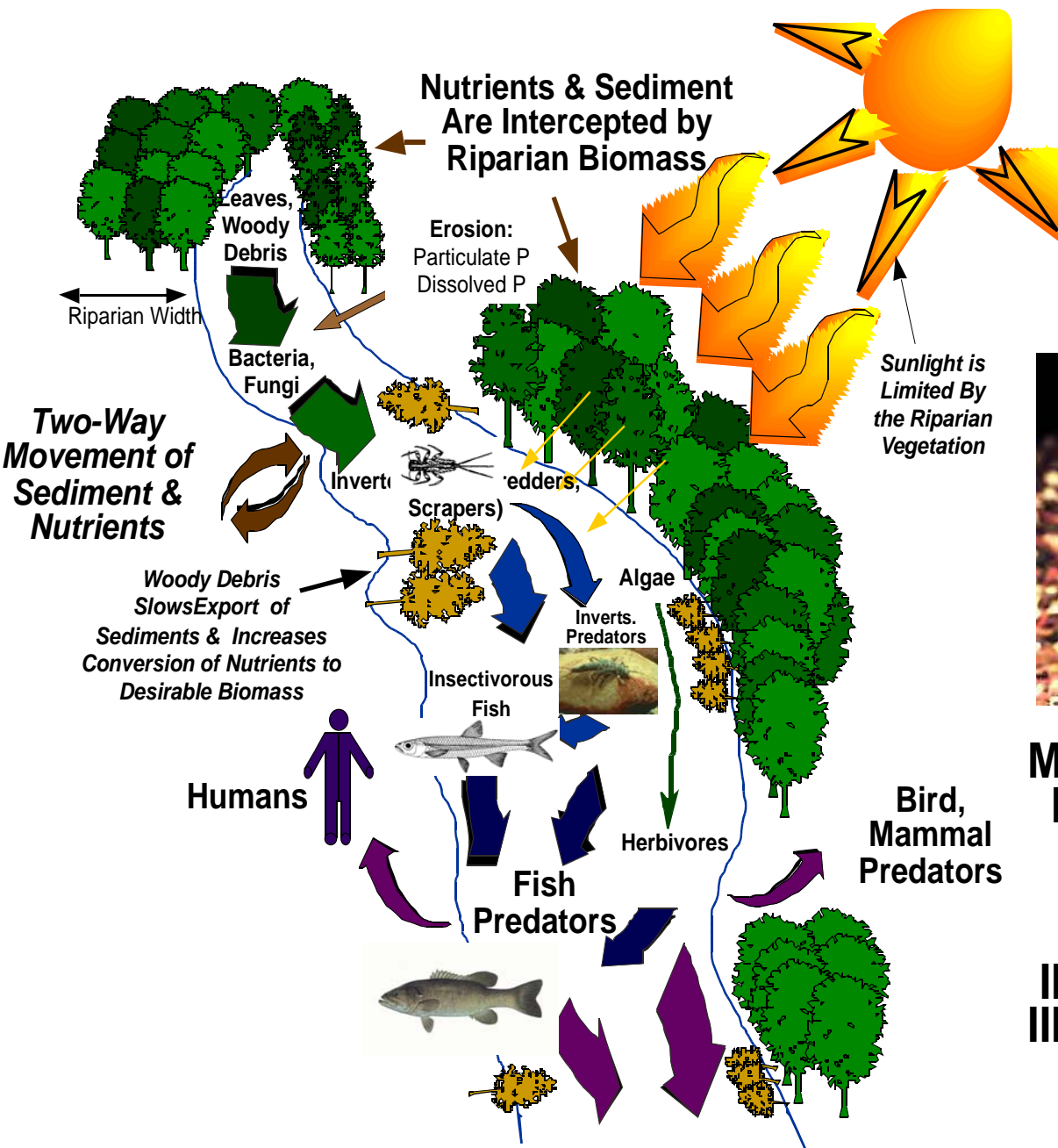
Data by Site - 1981-1987
vs. 1994-2001
ECBP & HELP Ecoregions



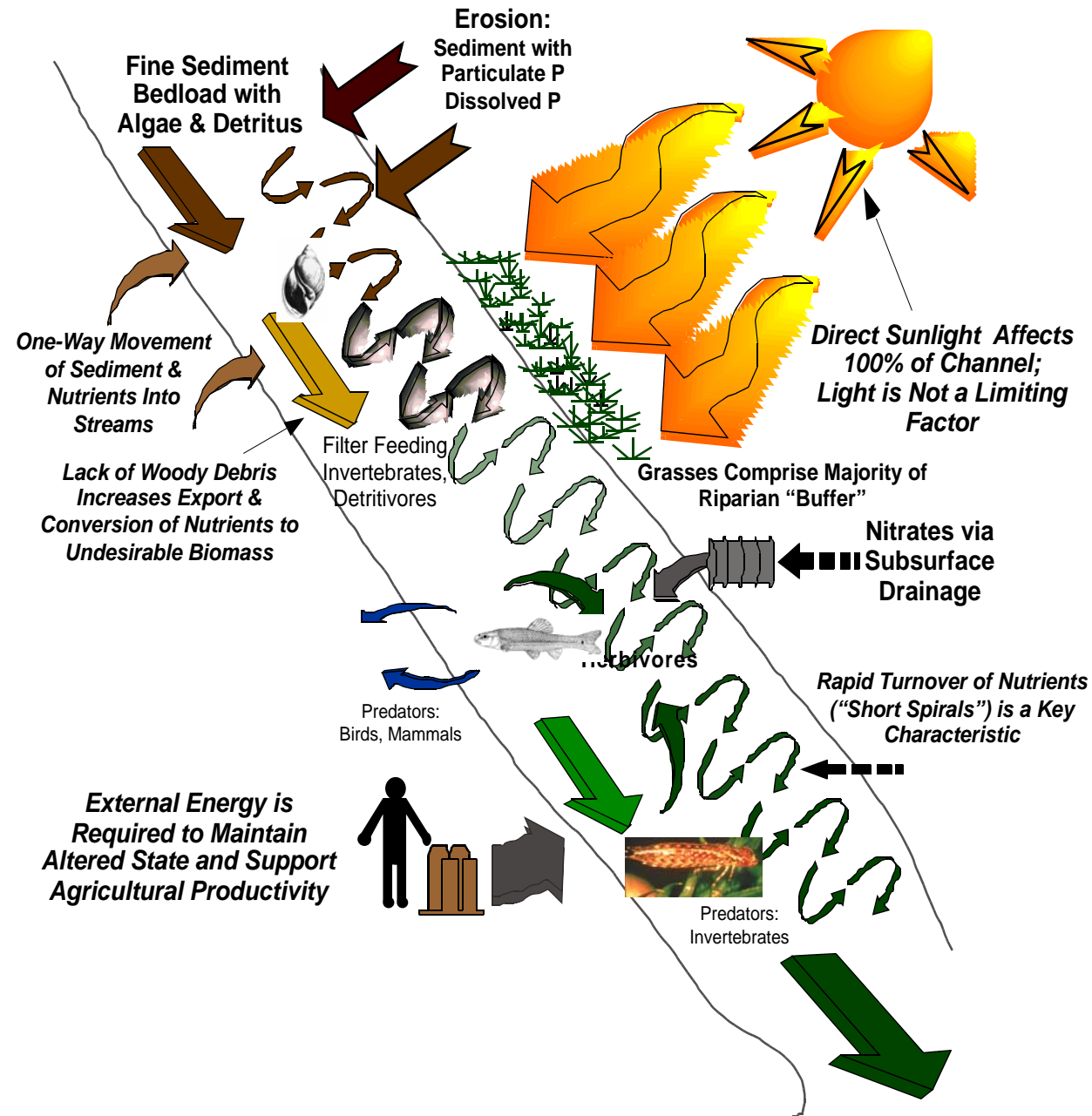
Data by Subbasin - 1981-1987
vs. 1994-2001
ECBP & HELP Ecoregions



Good Stream Habitat



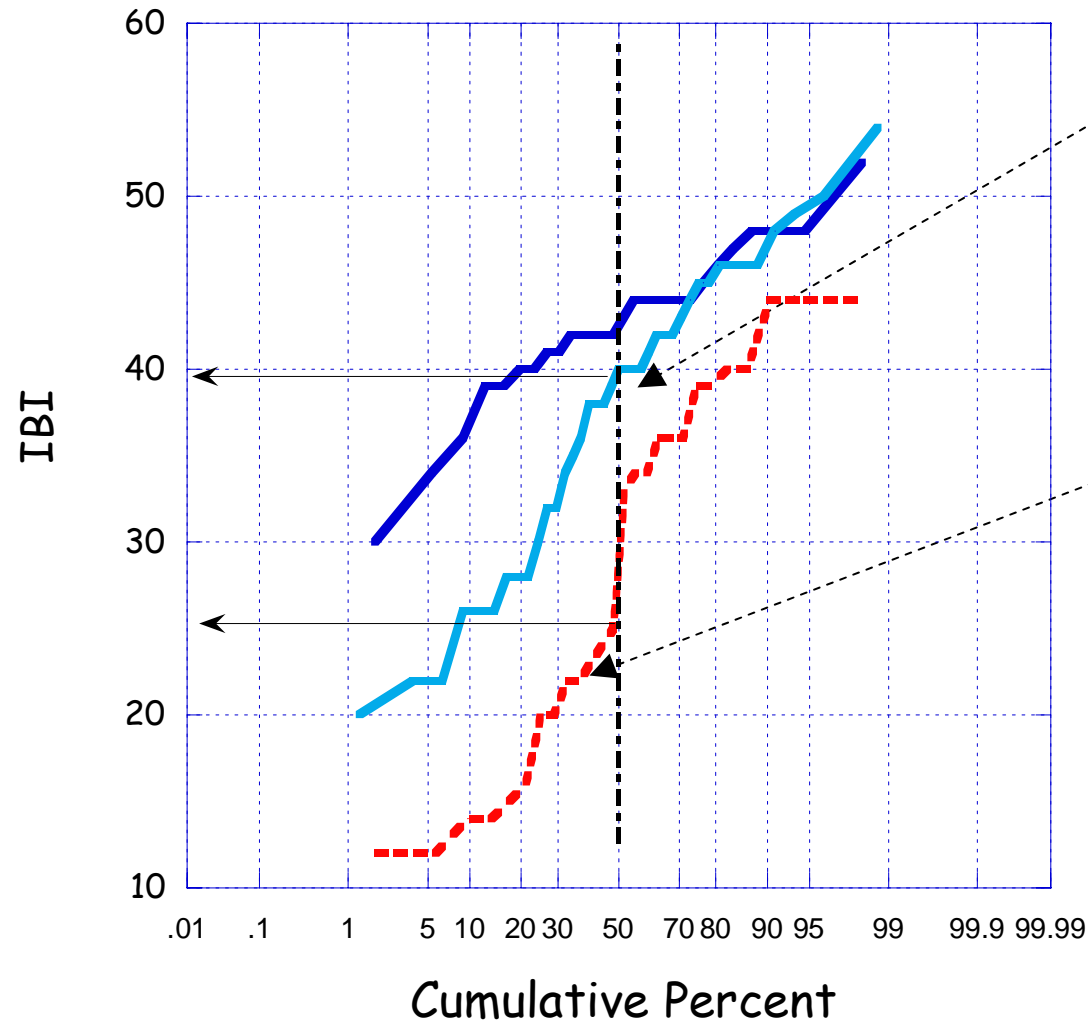
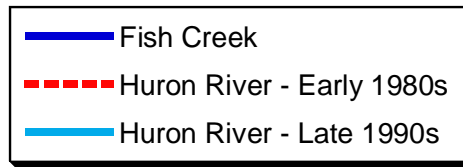
- Major Downstream Exports:**
- I. Desirable Biomass (e.g., fish, plants, birds, mammals, sensitive species)
 - II. Low Sediment Delivery
 - III. Water Quality Suitable for ALL Uses



Major Downstream Exports:

- I. Nutrients & Undesirable Biomass (e.g., algae, detritivores, tolerant species)**
- II. High Sediment Delivery**

End



● Substantial Improvement of mean biological condition

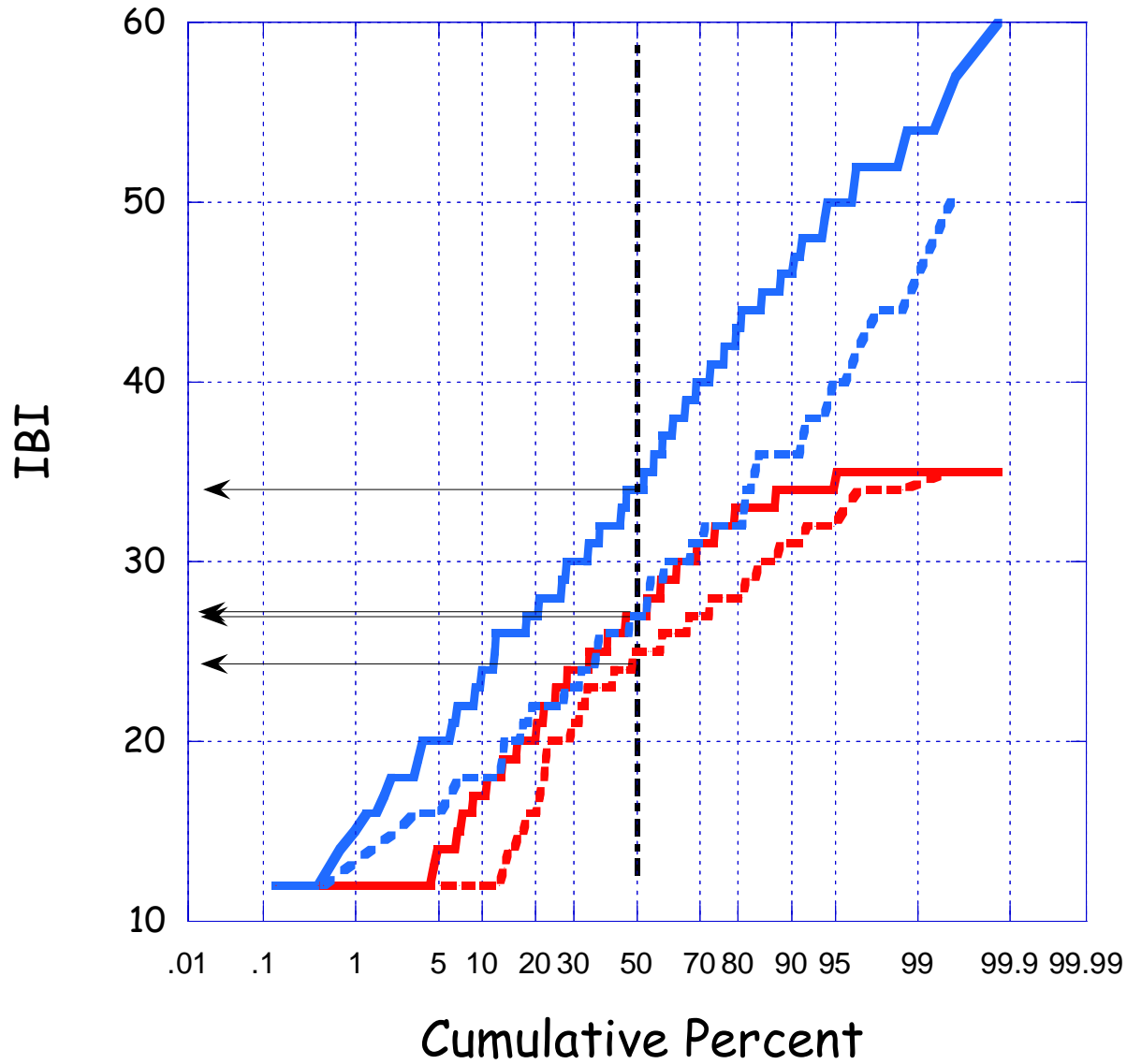
● Substantial reduction in very poor and poor sites

Earliest

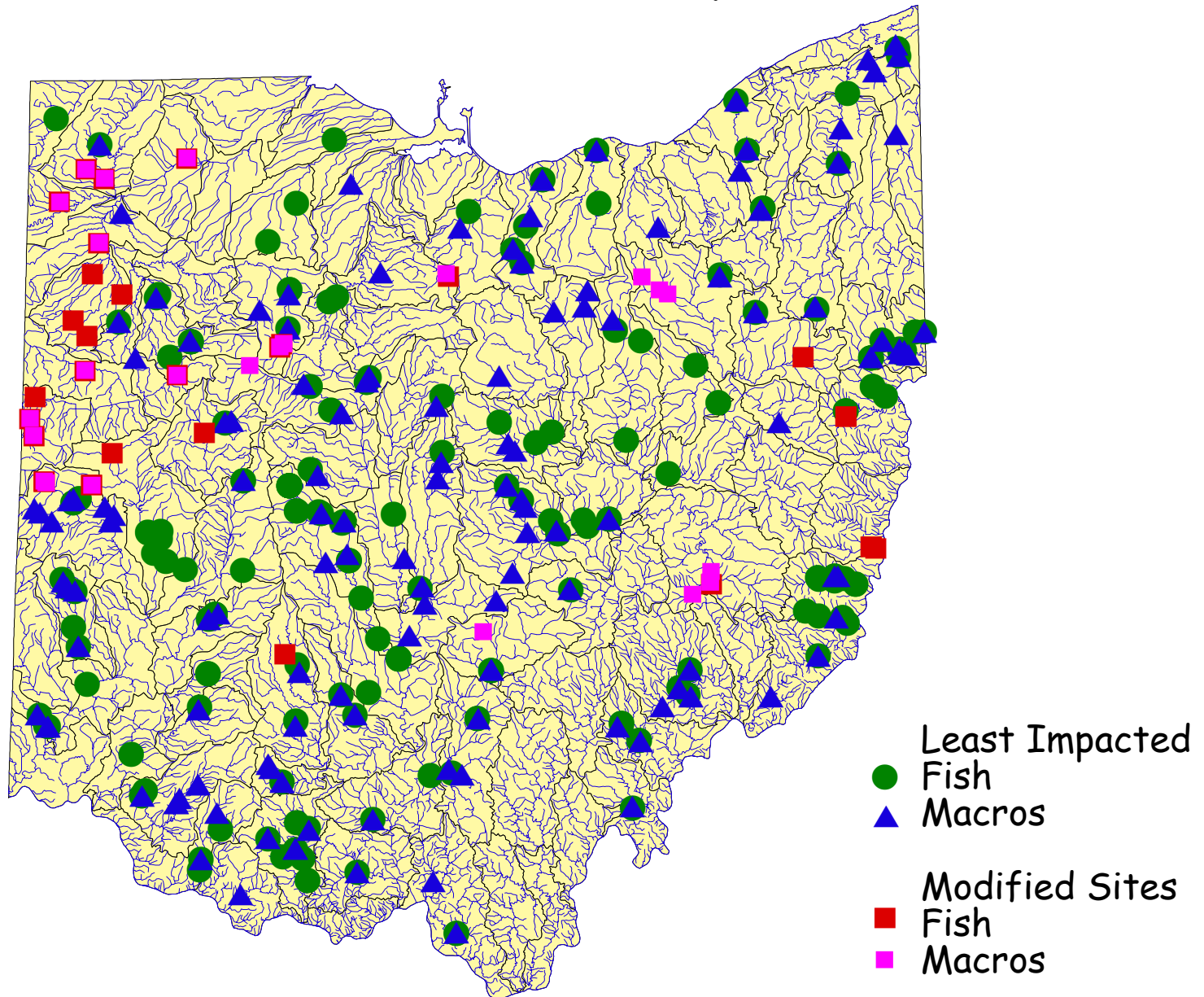
Latest

ECBP Ecoregion

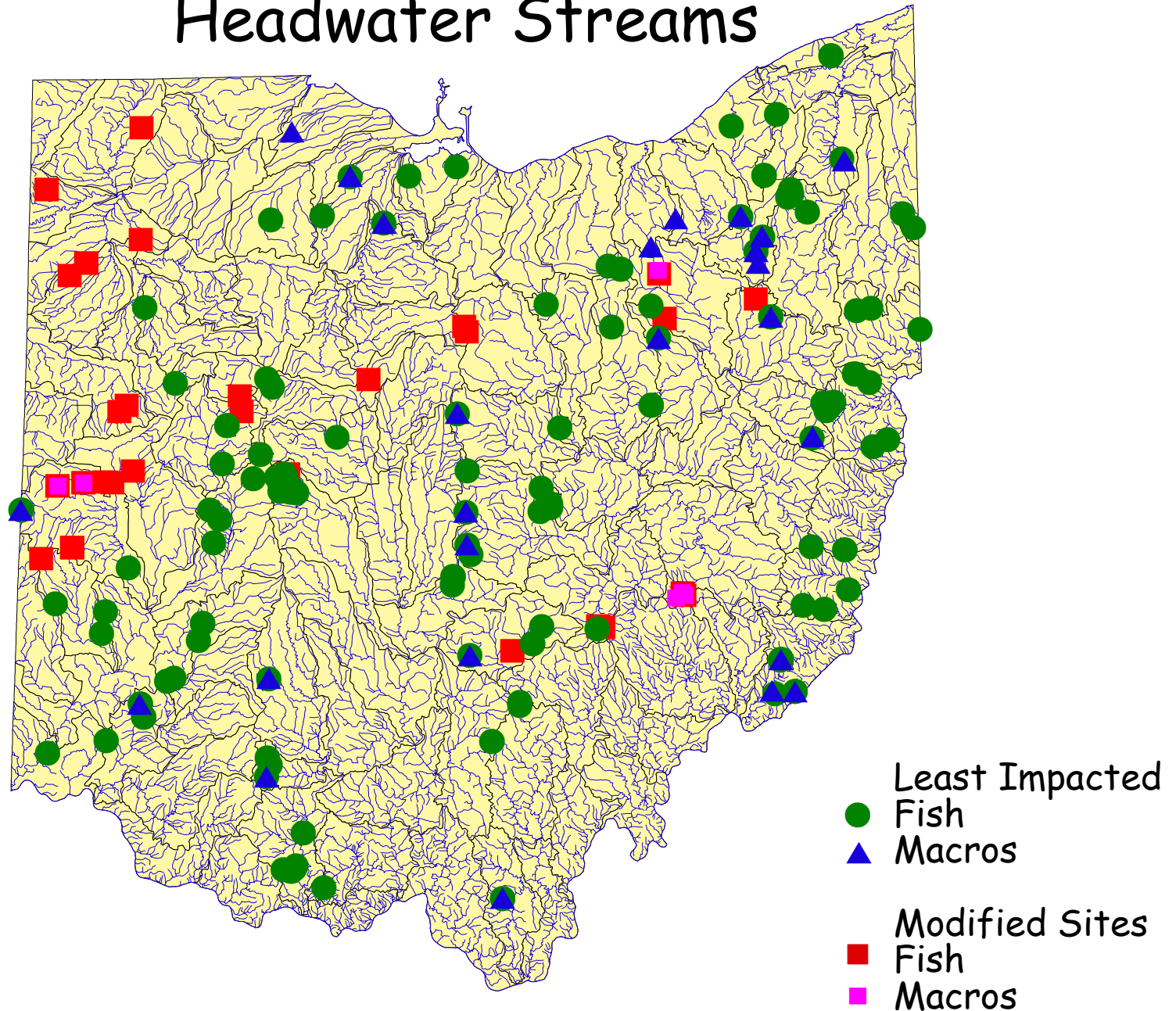
HELP Ecoregion



Ohio Biocriteria Reference Sites Wadeable Streams



Ohio Biocriteria Reference Sites Headwater Streams



Measuring and Managing Environmental Progress: Hierarchy of Indicators

Indicator Levels



The “Health” Endpoint