Anthropogenic Impacts to Fish Assemblages in Northern New Jersey Streams

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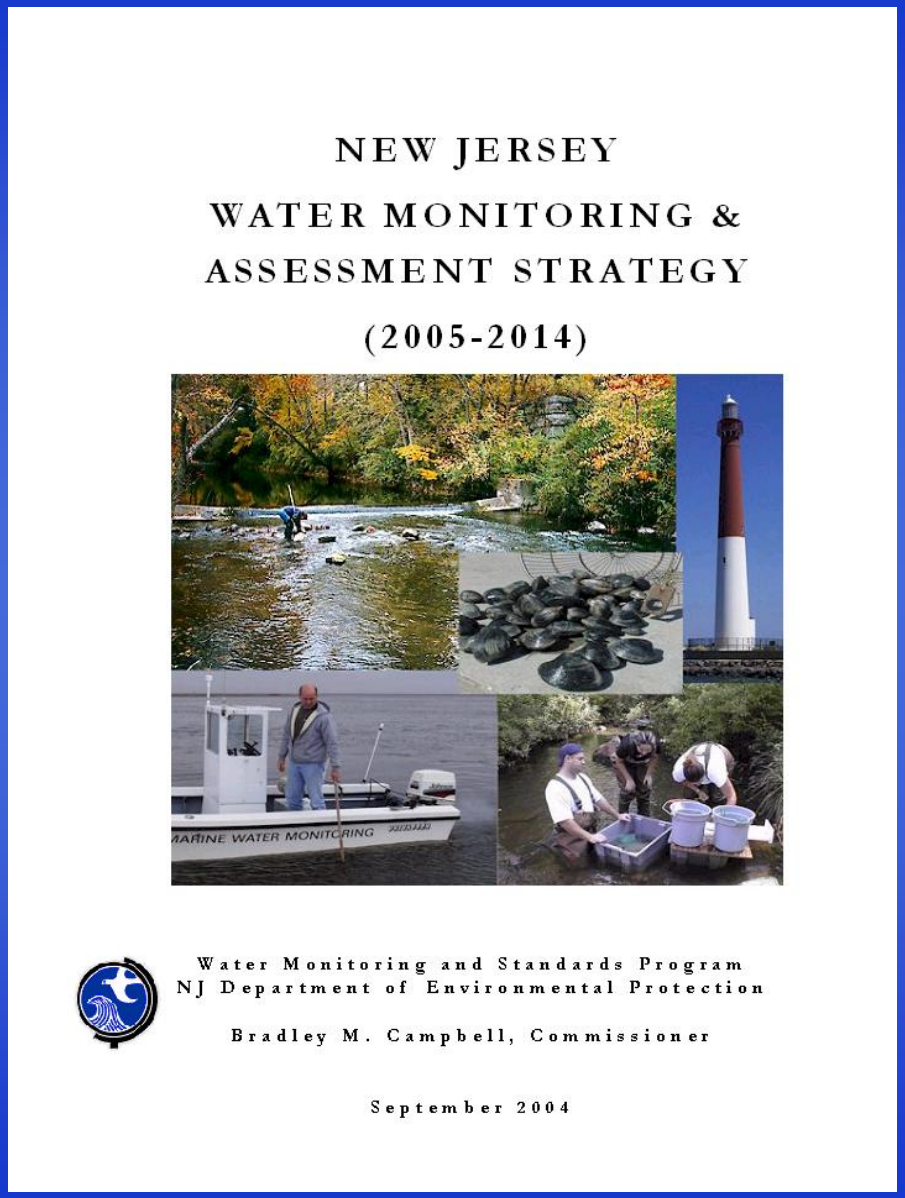
Water Monitoring & Standards
Bureau of Freshwater and Biological Monitoring

NJ Water Monitoring Program


NEW JERSEY

WATER MONITORING &

ASSESSMENT STRATEGY

(2005-2014)

Water Monitoring and Standards Program
NJ Department of Environmental Protection

Bradley M. Campbell, Commissioner

September 2004

Physical/Chemical Monitoring

- Since 1973
- 215 Site Network (2005)

Biological Monitoring

- **Benthic Macroinvertebrate**
  Since 1992
  822 Site Network
- **Fish**
  Since 2000
  100 Site Network
- **Diatoms**
  In Development

www.nj.gov/dep/wmm/longtermstrategyreport.pdf

Why Use Fish as Biological Monitors?

- Fish are long-lived and are therefore good indicators of long-term disturbances
- Fish assemblages generally consist of a number of trophic levels
- Fish are at the top of the food chain in aquatic environments
- Fish are easy to collect and identify

What is an Index of Biotic Integrity?

- A scoring system based on multiple attributes (metrics) of a fish assemblage
- Individual metrics are summed and overall score used to determine health of a water body
- Metrics selected based on how well they indicate anthropogenic stressors

New Jersey Fish IBI Metrics

I. Species richness and composition metrics

- No. Fish Species
- No. Benthic Insectivores
- No. Trout & Centrarchid Species
- No. Intolerant Species
- Proportion of White Suckers

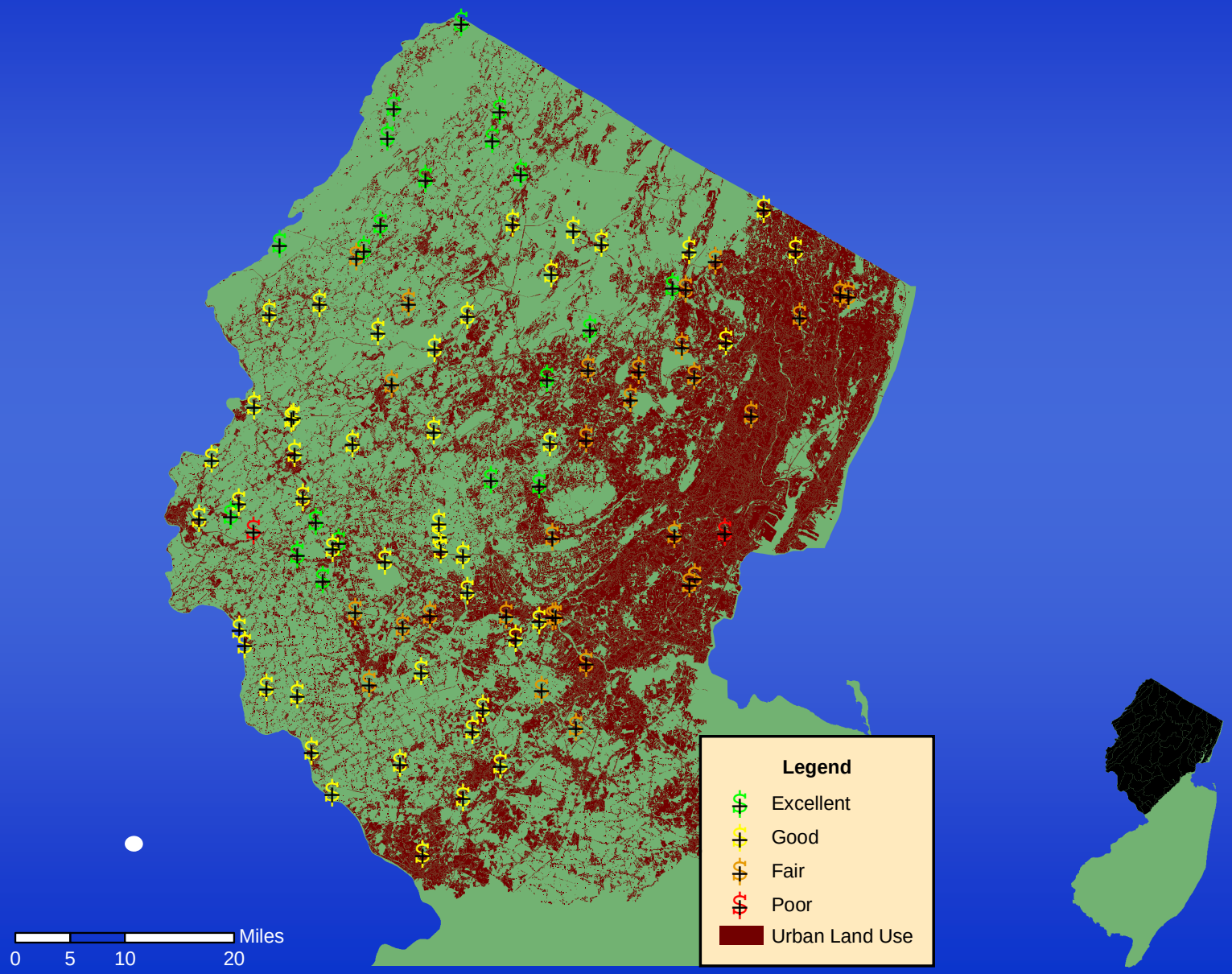
II. Trophic composition metrics

- Proportion of Generalists
- Proportion of Insectivorous Cyprinids
- Proportion of Trout or Piscivores

III. Fish abundance and condition metrics

- No. Specimens
- Proportion with Anomalies

Current IBI Network



Methods

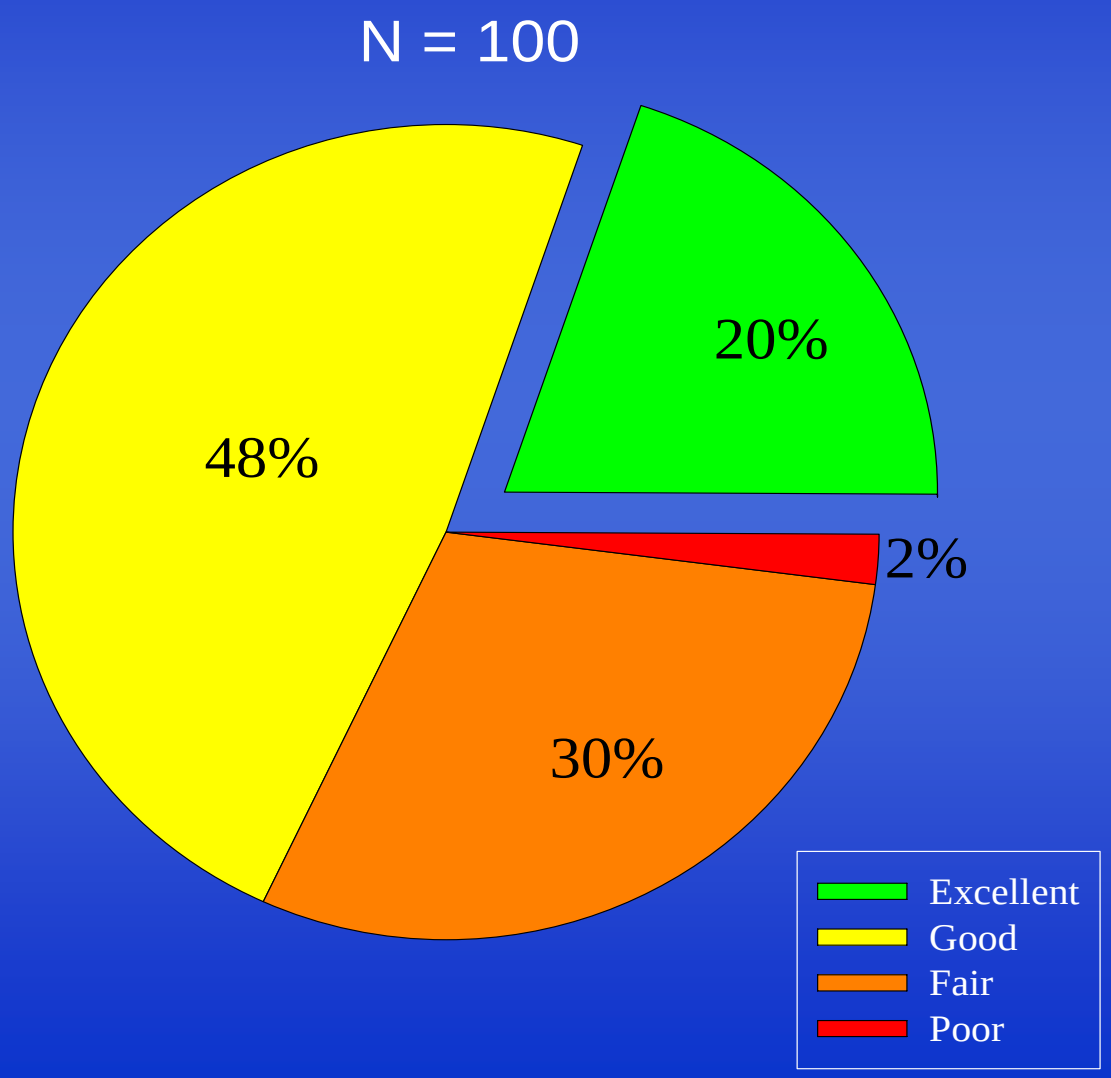
Backpack Electrofishing

Barge Electrofishing

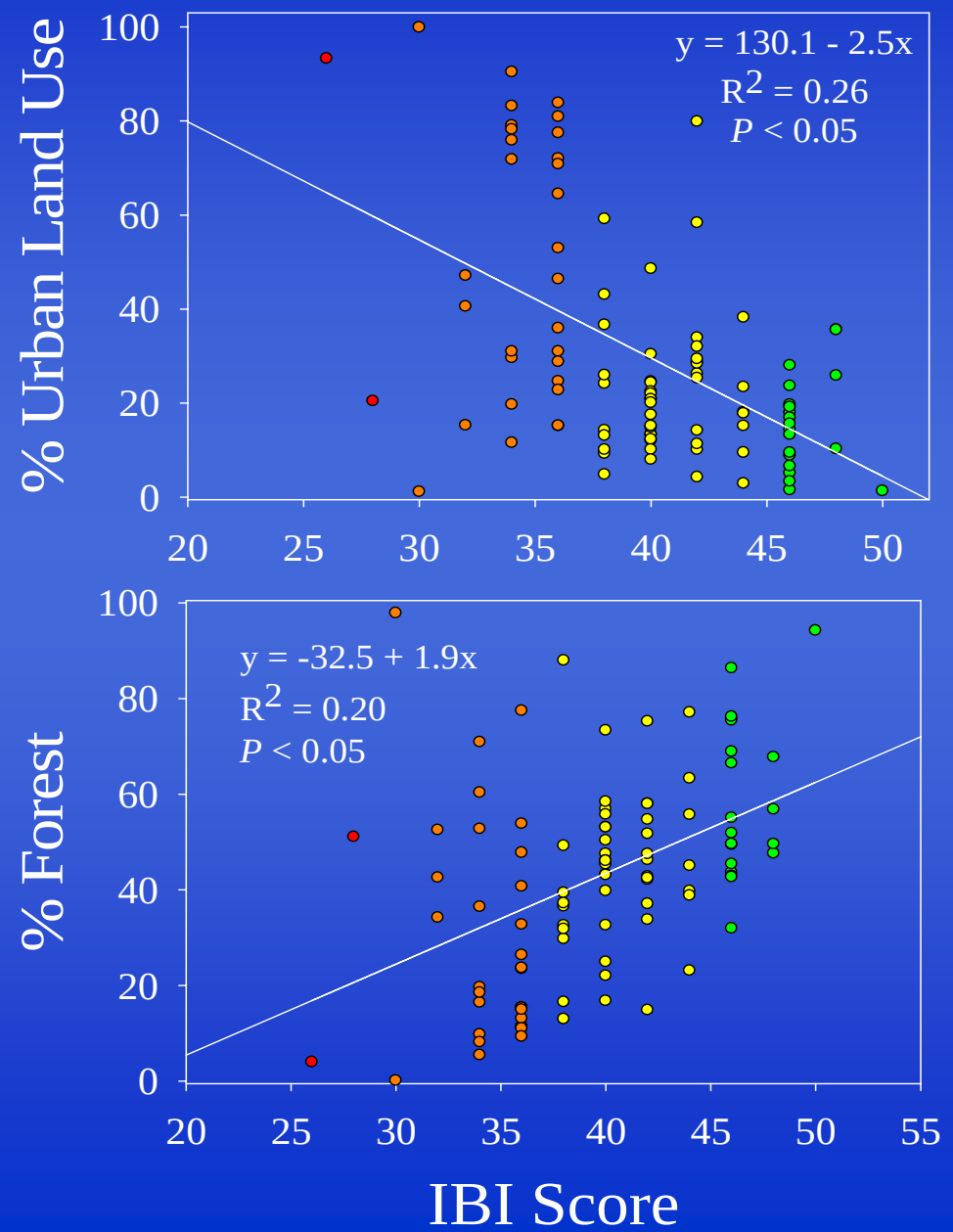
Sampling Criteria

- Sites must be wadeable
- The drainage must be greater than 5 square miles
- Sites must have some combination of riffle/run/pool habitat
- The 150-m sample stretch should be representative of the habitat of the reach
- Barriers (i.e. natural or block net) are necessary to prevent upstream escape

Round 1 (2000-2004) Results
Fish IBI Ratings



Land Use/Land Cover

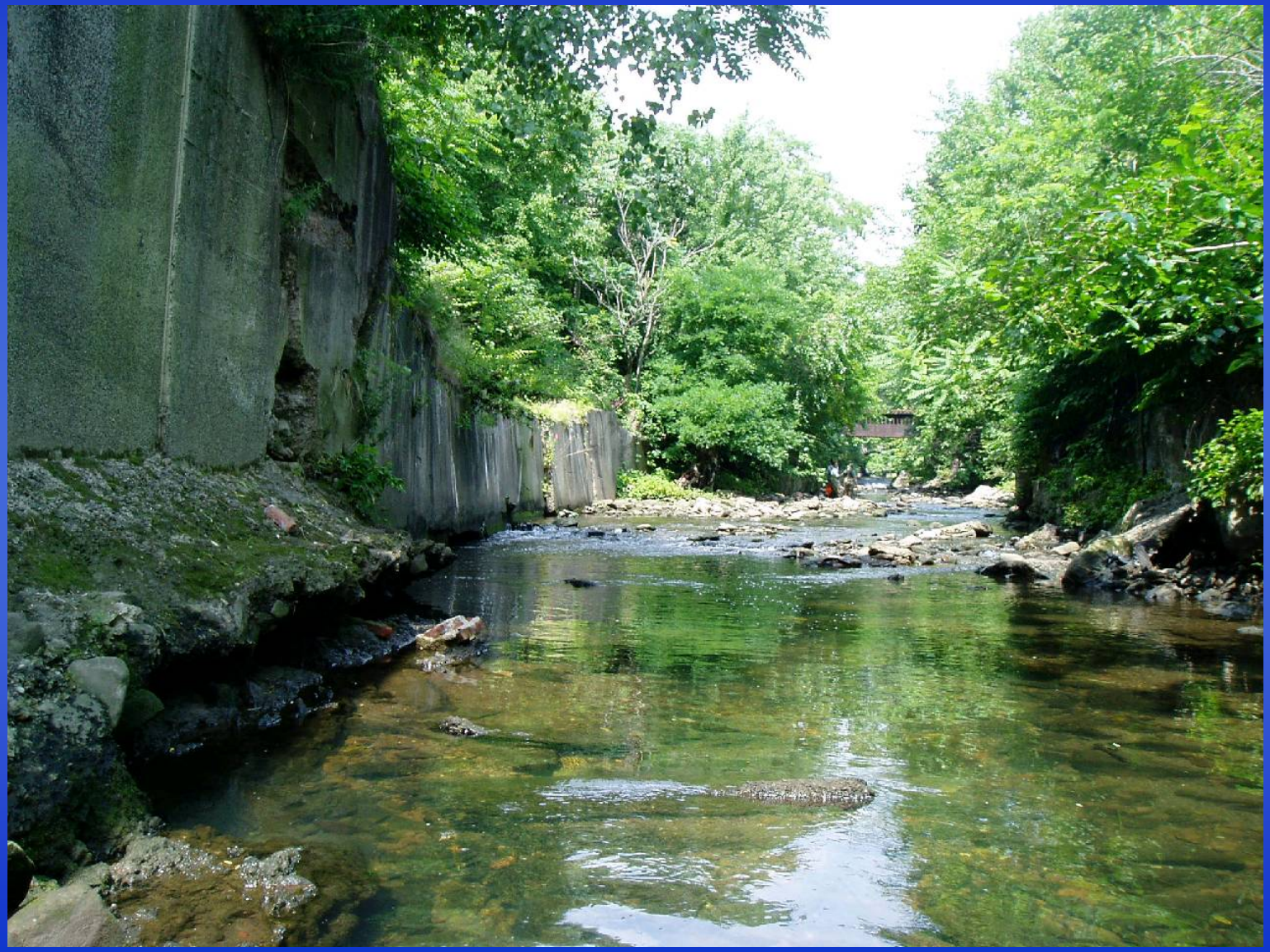


Urban Sites

- 18 of the network sites are urban (>50% LU)
- 3 new urban sites were added in 2005
- Problems associated with sampling urban streams

  1. Poor access
  2. Lack necessary stream habitat
  3. Non-wadeable

Common Urban Impacts

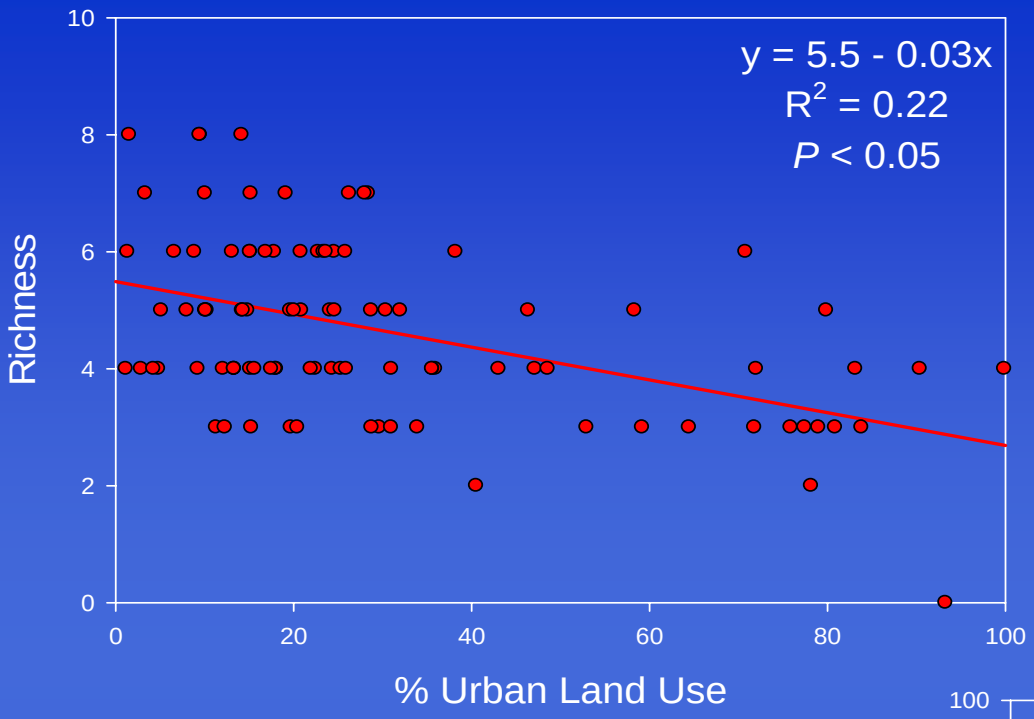


1. Outfalls

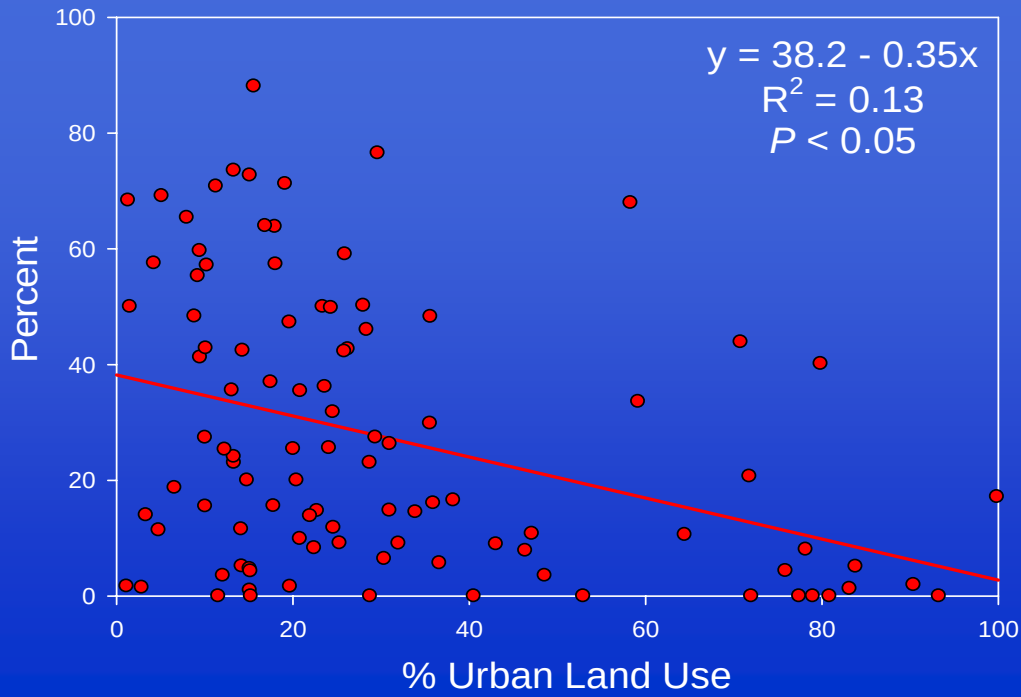
2. Bank Erosion

3. Siltation

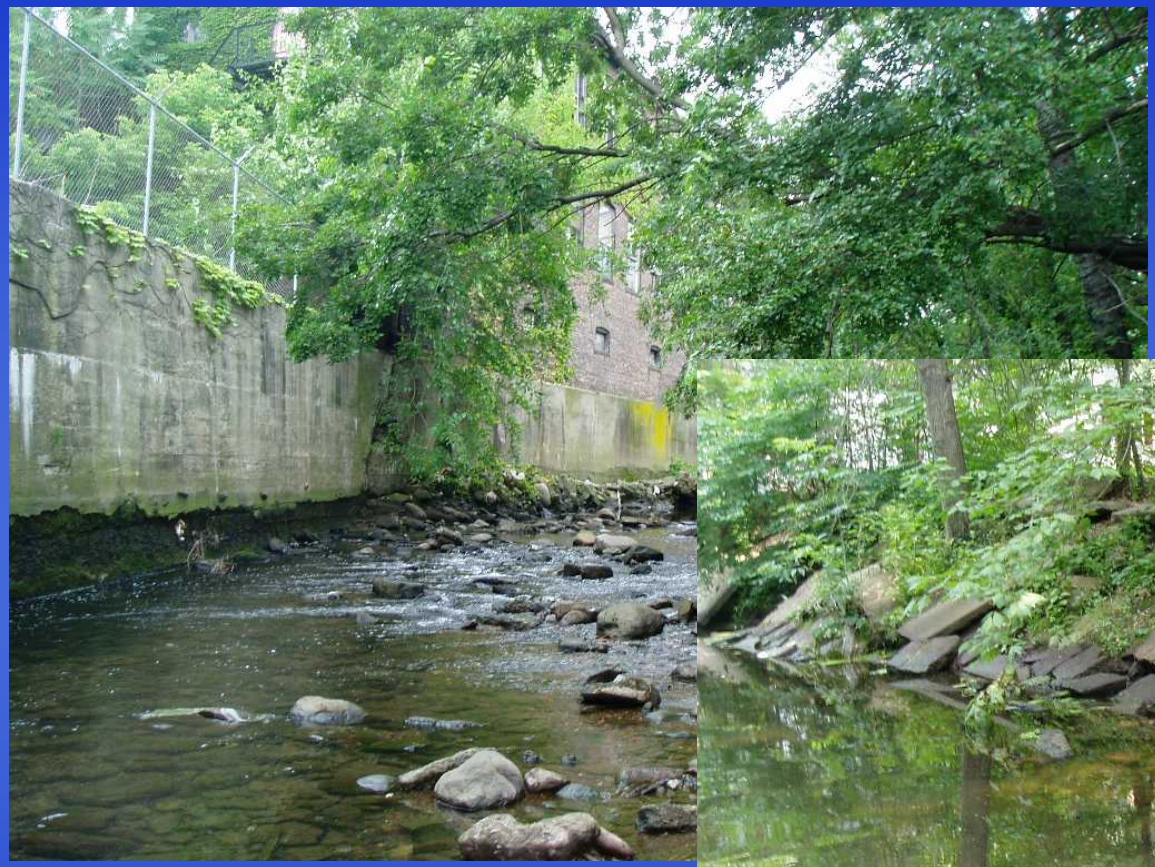
Number Benthic Insectivores



Percent Insectivorous Cyprinids



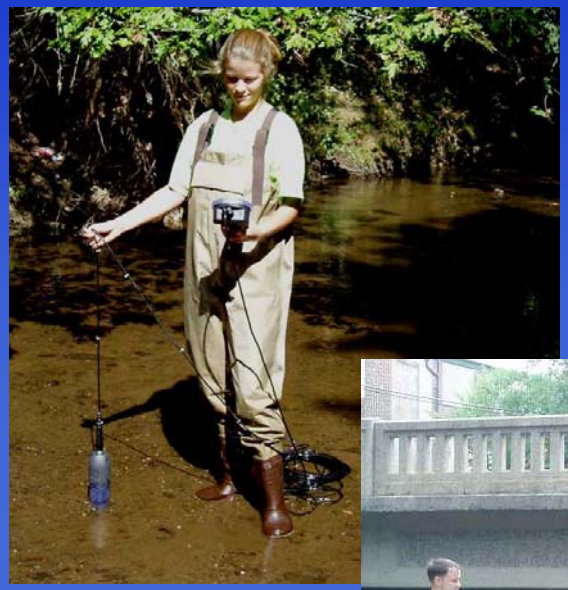
4. Habitat Degradation



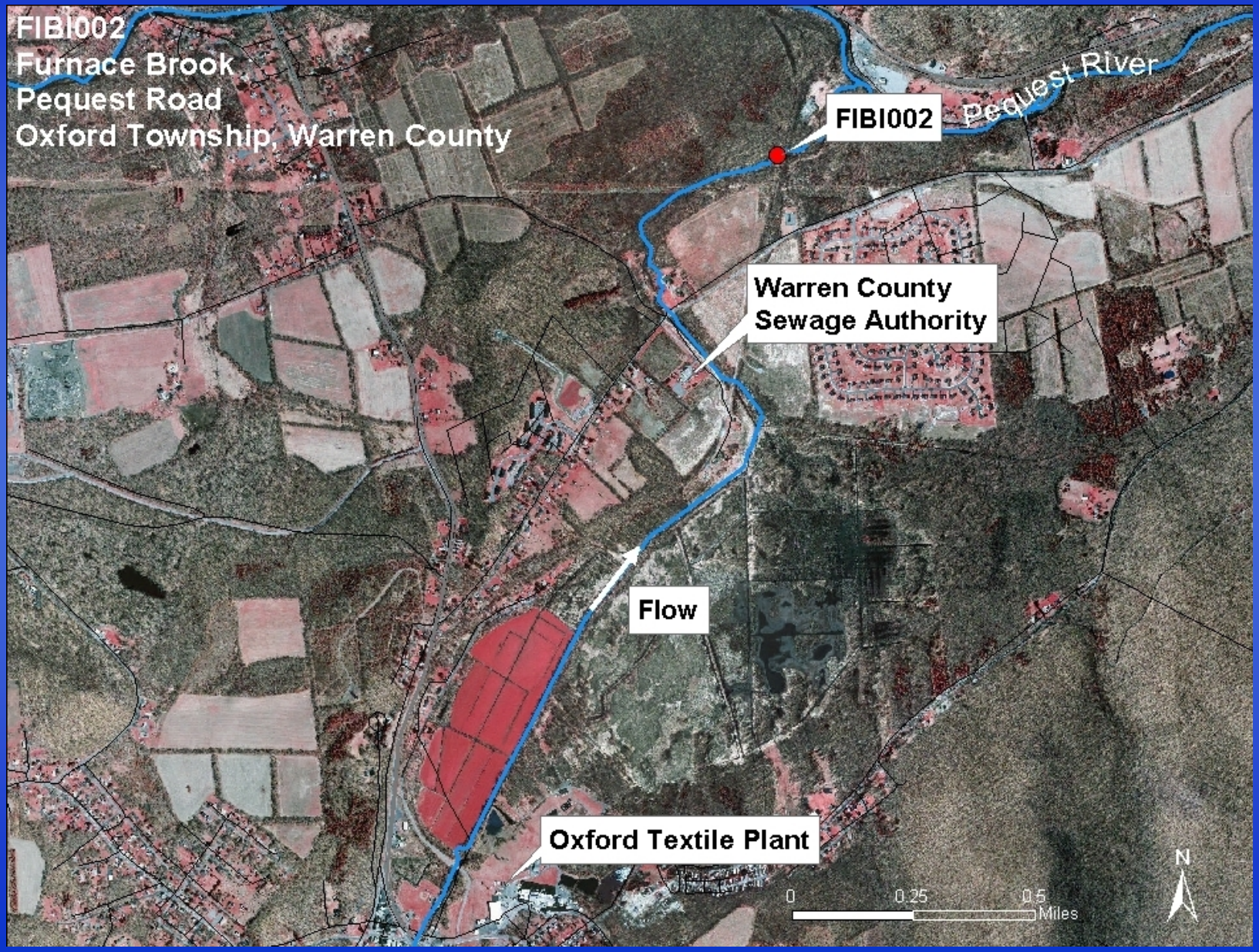
5. Poor Water Quality

Tools to Evaluate Potential Impacts

1. Comprehensive Habitat Surveys

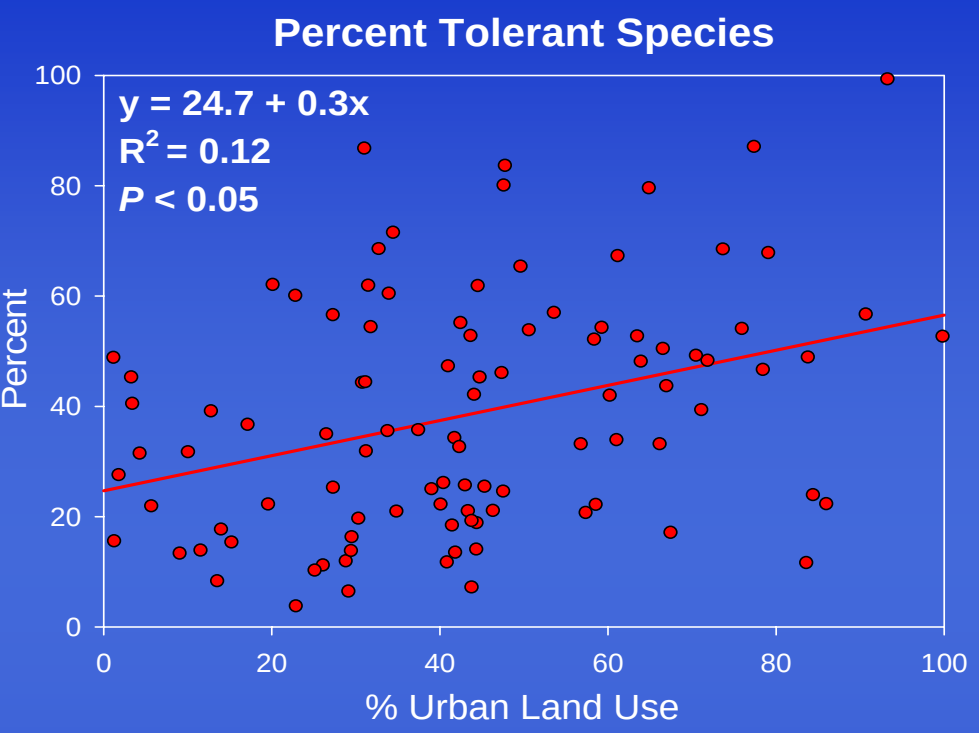


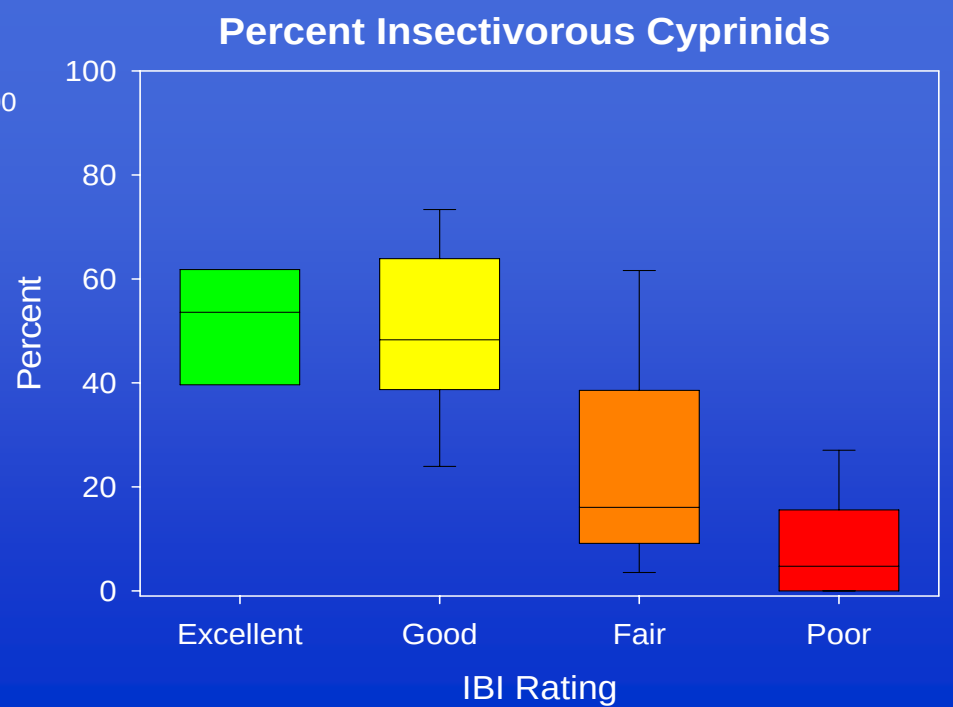
2. GIS


FIBI002
Furnace Brook
Pequest Road
Oxford Township, Warren County
FIBI002
Pequest River
Warren County
Sewage Authority
Flow
Oxford Textile Plant
0
0.25
0.5
Miles
N

3. Integration of GIS & Field Observations

4. Data Analysis





The Future of the NJ Fish IBI

- Recalibrate metrics
- Evaluate channelized streams
- Monitor trends at individual sites over time
- Bio-criteria development?
- Continued use in evaluating aquatic life use & special protection waters

Contact Information

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http://www.nj.gov/dep/wmm/bfbm/