

NJ Fish Index of Biotic Integrity



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Bureau of Freshwater and Biological Monitoring



Bureau of Freshwater and Biological Monitoring



Physical/Chemical Monitoring

- Since 1973
- 215 Stream Network
- 200 Lake Network

Biological Monitoring

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



<http://www.nj.gov/dep/wms/bfbm/>



NJDEP Water Monitoring and Standards

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
- The NJ Fish IBI is a true Index of Biotic Integrity



Healthy Fish Community



Impaired Fish Community



Mummichog



Banded Killifish



Green Sunfish



White Sucker



Common Carp



Methods

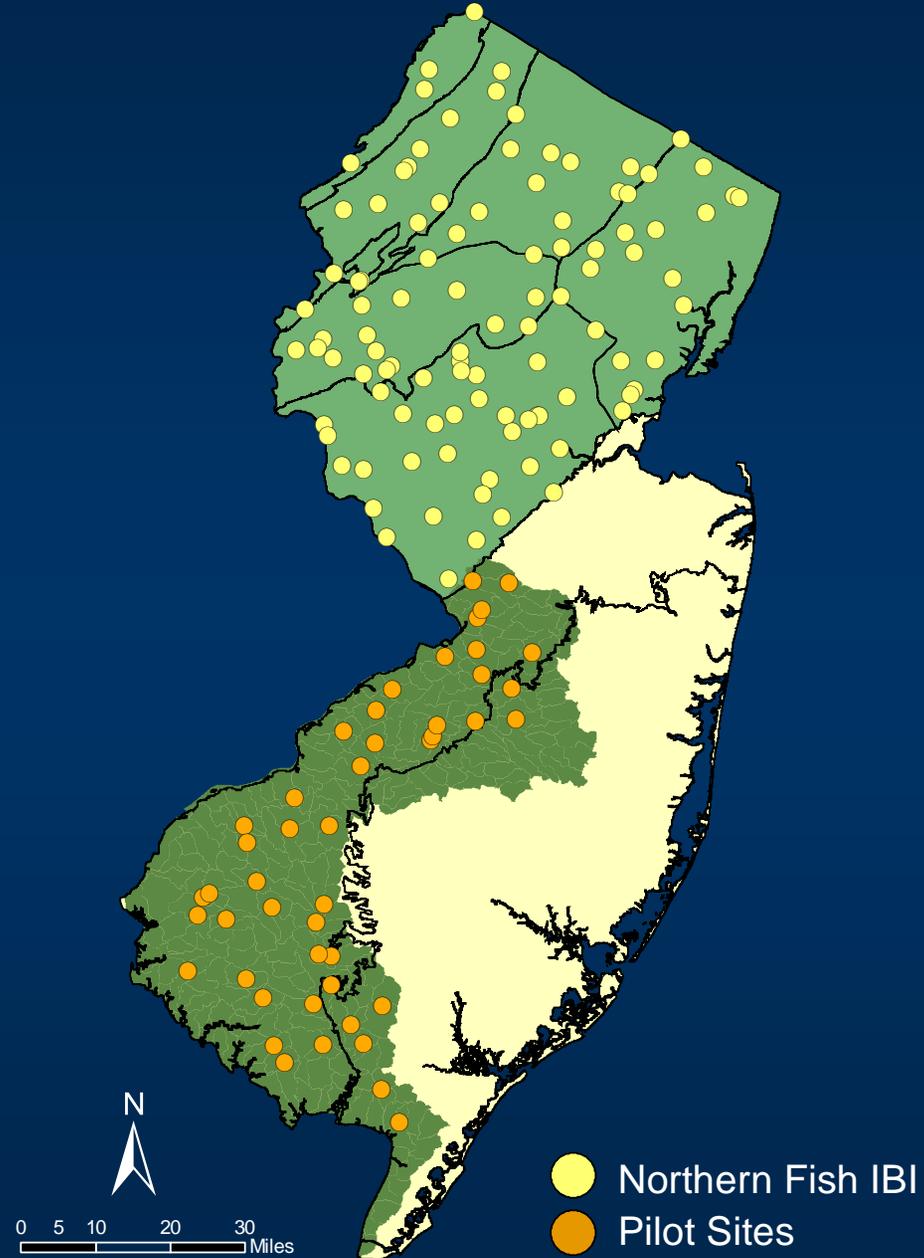
Backpack Electrofishing



Barge Electrofishing



Fish IBI Network



Northern IBI

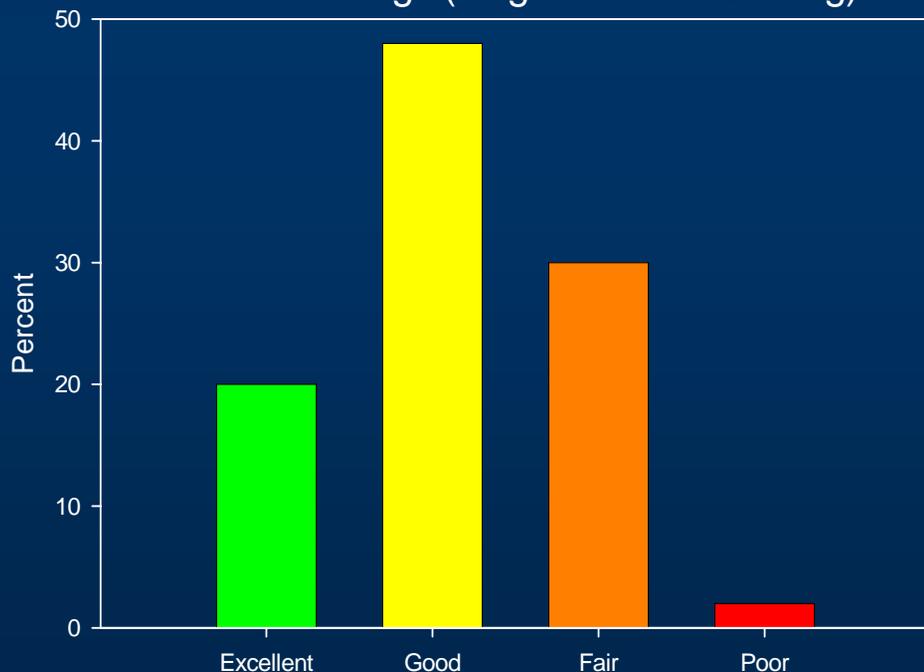
- Program Implemented in 2000
- 100 Fixed Site Network
- 20 Sites per Year, 5 Year Rotation
- Index Period – June through Mid-October
- Round 2 Sampling Initiated in 2005



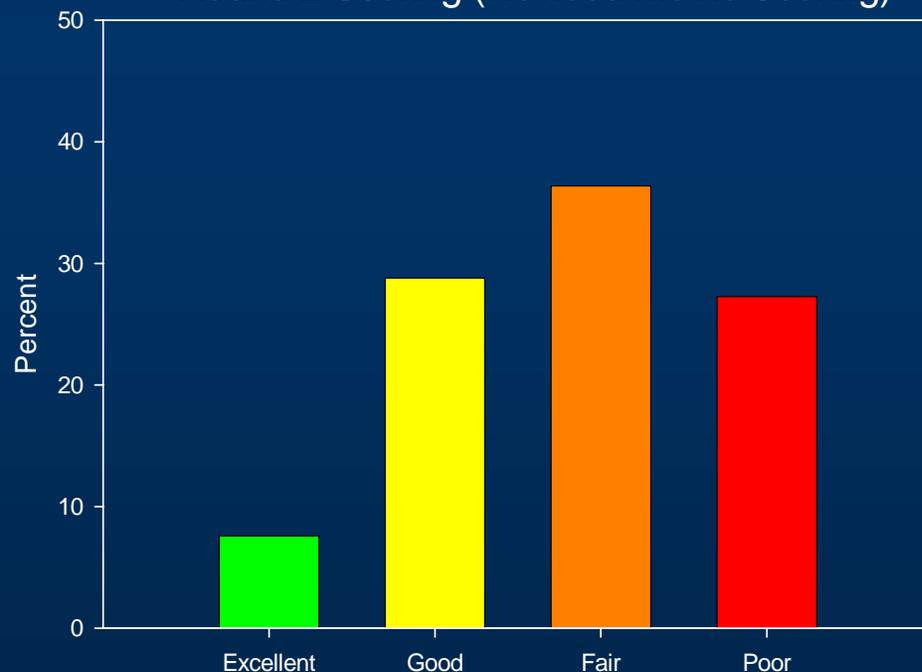
Metric Recalibration

- Round 1 sampling completed in 2004
- Metrics recalibrated in 2005 by BFBM
- Analysis and modifications reviewed by Fish IBI Workgroup (USEPA, USGS, NJDEP-BFF, NJDEP-BWQS&A)
- Final metric revisions greatly increased sensitivity to anthropogenic stressors

Round 1 Ratings (Original Metric Scoring)



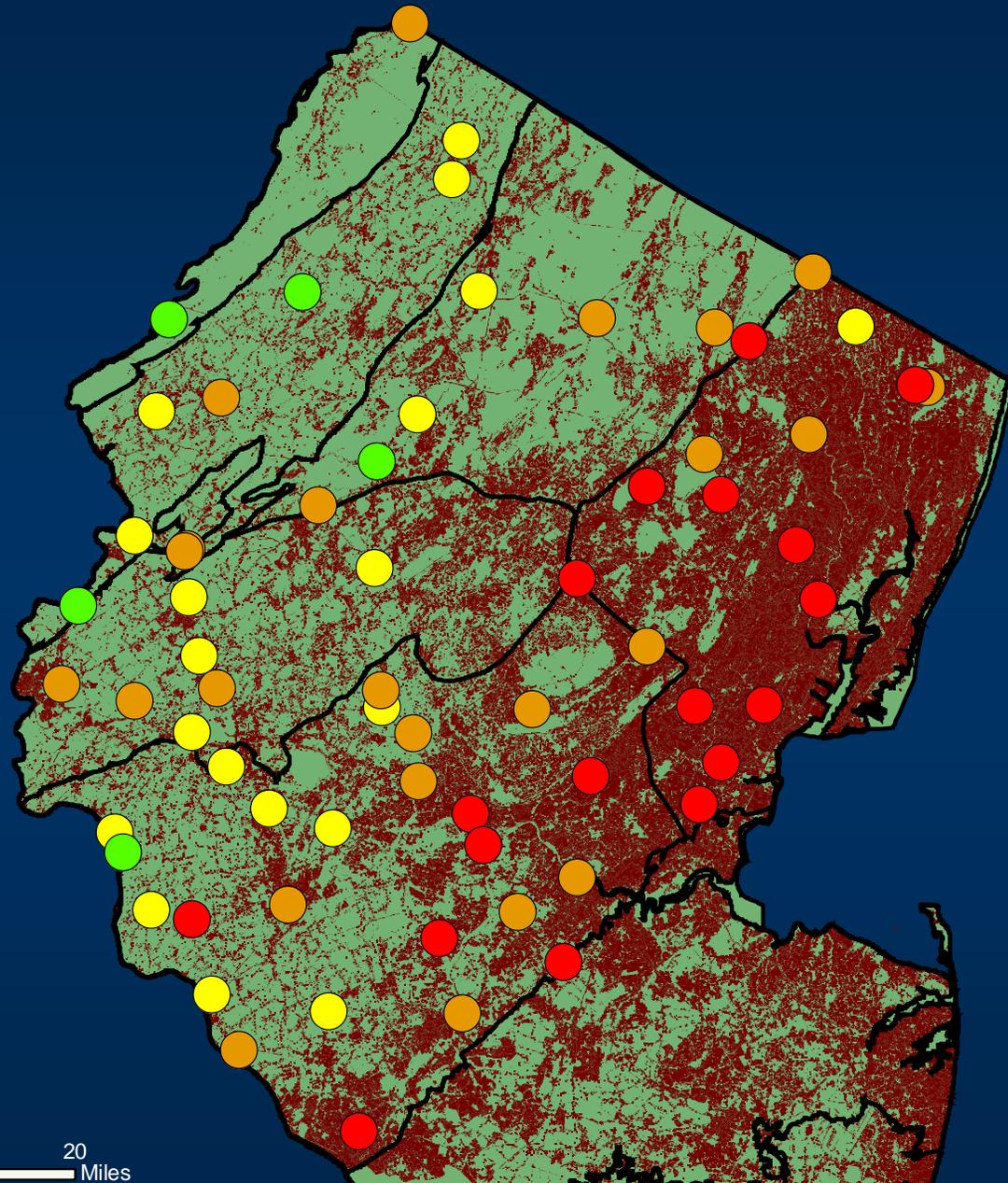
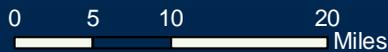
Round 2 Scoring (Revised Metric Scoring)



Round 2 Scores

Legend

- Excellent
- Good
- Fair
- Poor
- Urban Land Use

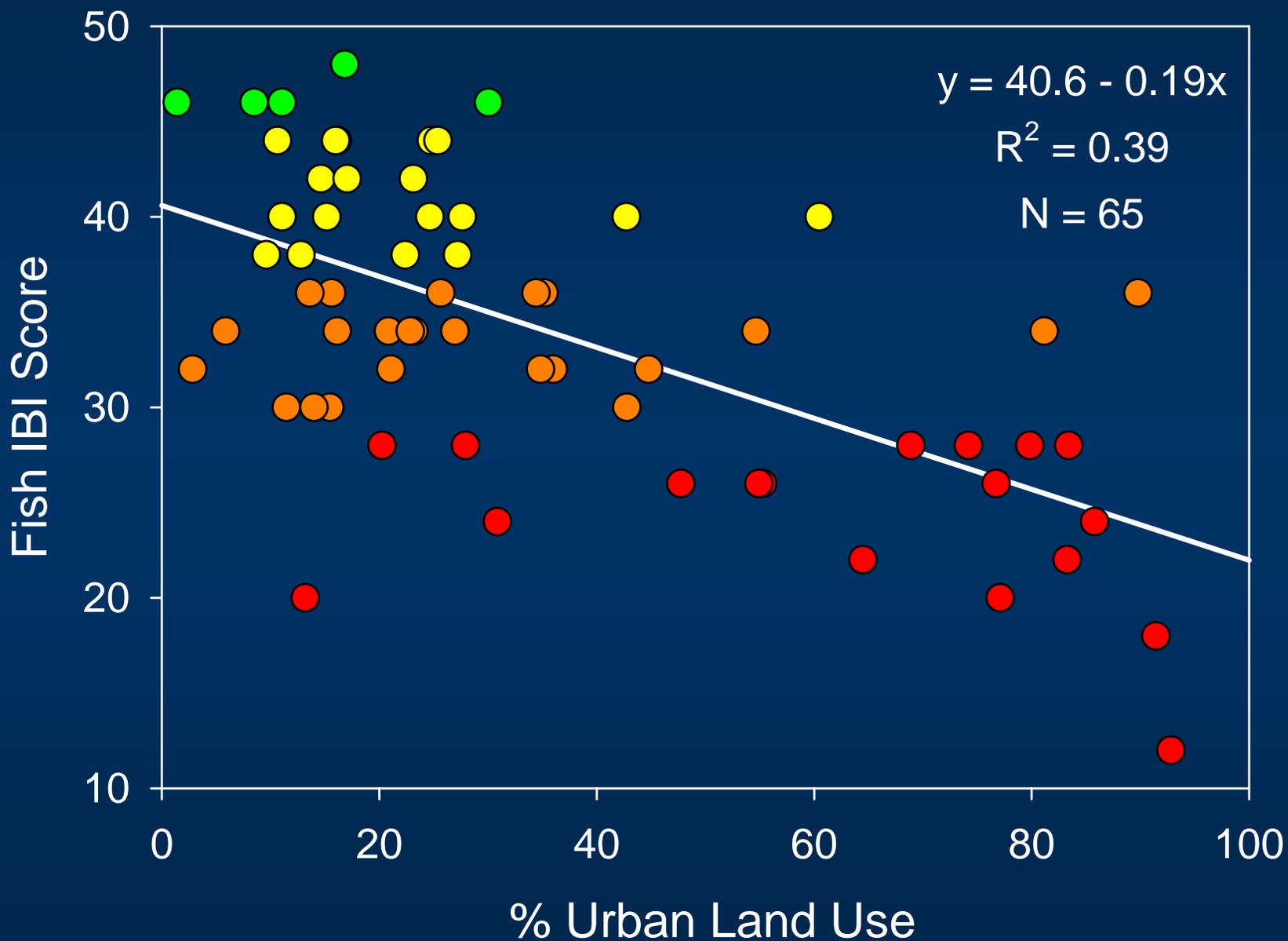


Impacts from Urbanization

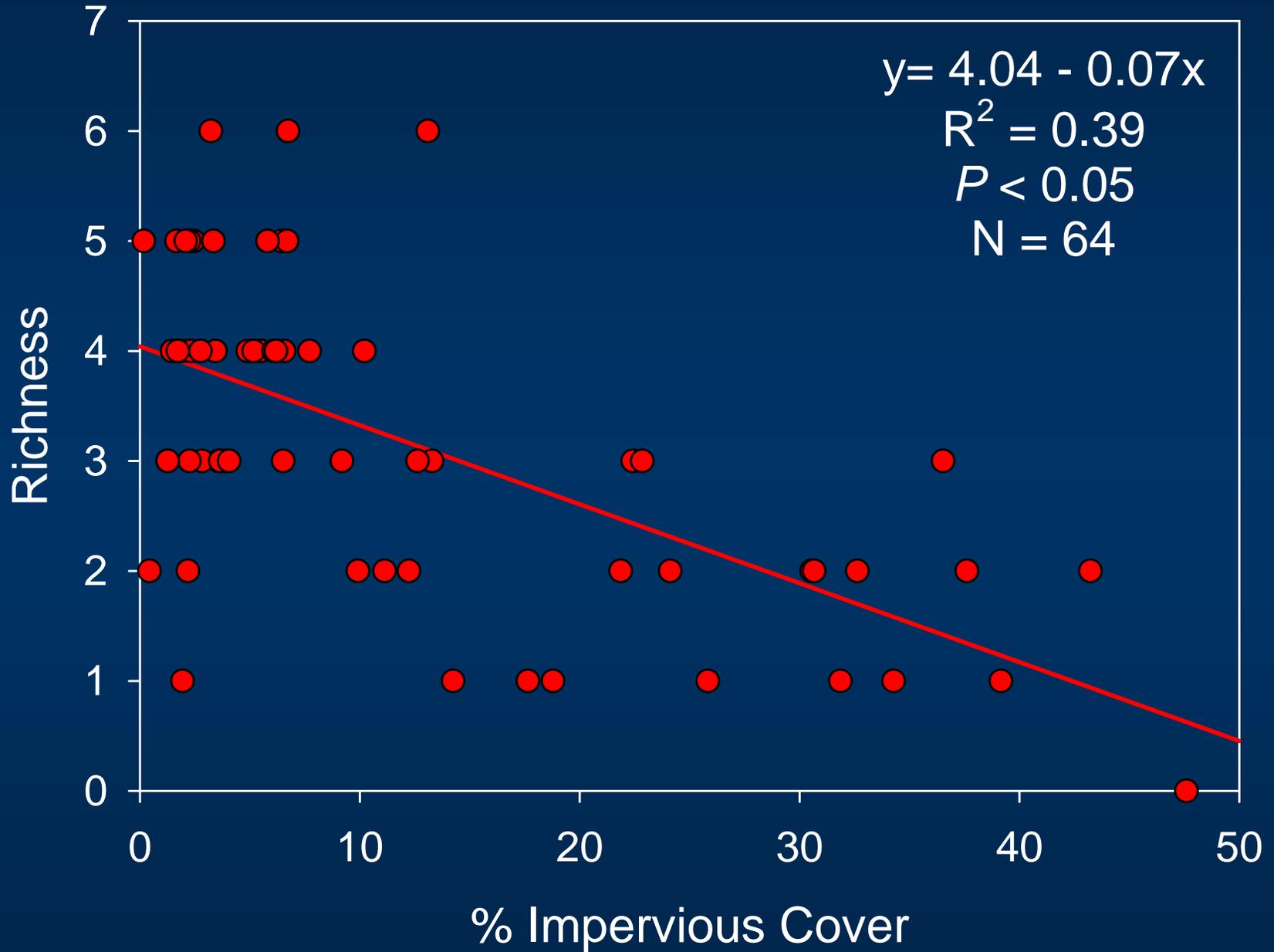
- Siltation
- Habitat Loss
- Bank Erosion
- Water Quality Impairments
- Storm Water Outfalls
- Flash Flooding



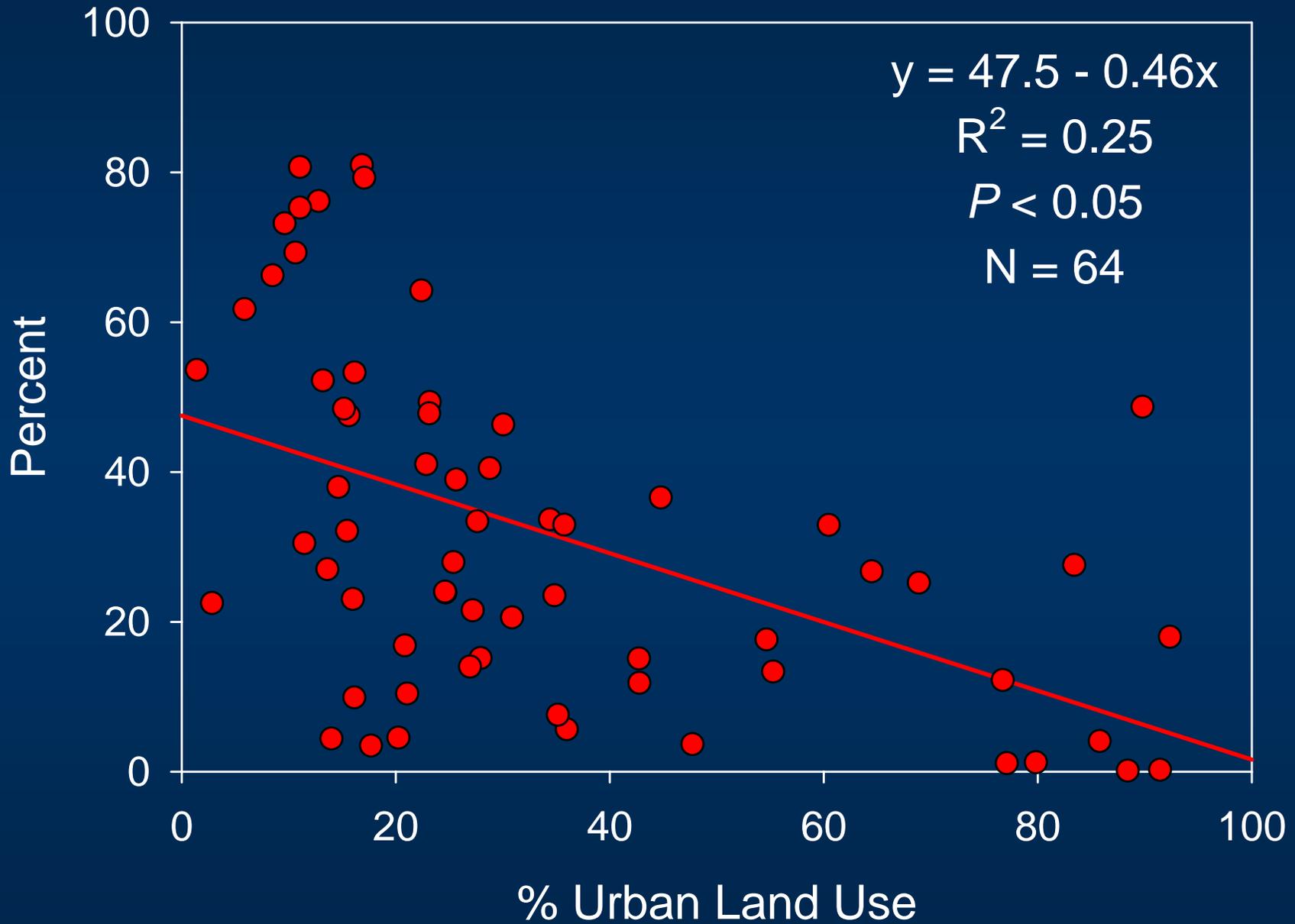
Impairments to Fish Communities



Benthic Insectivore Richness



Percent Abundance Insectivorous Cyprinidae



Case Studies

Whippany River – FIBI009

FW2-NTC2

Sampled in 2000 & 2005

FIBI Score – Poor (26)

Habitat Score – Sub-optimal



- Numerous habitat impairments
- No riparian buffer
- Numerous outfalls
- Urbanization (48%)
- 14% impervious cover
- Run-off from roads & parking lots
- High conductivity
- Numerous abnormalities
- No insectivorous cyprinids



Case Studies

Royce Brook – FIBI014

FW2-NTC2

Sampled in 2005

FIBI Score – Poor (26)

Habitat Score – Sub-optimal



- No riparian buffer
- Heavy run-off
- Urbanization (55%)
- 17% impervious cover
- Low D.O.
- % green sunfish increasing
- % native sunfish sp. decreasing
- Numerous anomalies



Case Studies

Green Brook – FIBI097a
FW2-NTC2
Sampled in 2005
FIBI Score – Poor (22)
Habitat Score – Marginal



- No riparian buffer
- Severe bank erosion
- Heavy siltation
- Urbanization (65%)
- 22% impervious cover
- Run-off from township park
- High conductivity/low D.O.
- Low benthic insectivore abundance



Case Studies

Ireland Brook – FIBI051

FW2-NTC2

Sampled in 2003 & 2007

R2 FIBI Score – Poor (26)

R2 Habitat Score – Optimal



- No obvious habitat or water quality impairments
- Good riparian buffer/bank vegetation
- Headwaters mainly urbanized (55%)
- 19% impervious cover
- Severe storm water run-off in headwaters
- No cyprinids were collected
- 73% generalist species



A person wearing a bright yellow raincoat and a dark green vest is holding a large, vibrant orange fish. The fish is held gently in both hands, and its mouth is slightly open. Above the fish's head, there is a large, light blue thought bubble with a black outline. Inside the thought bubble, the text "Any Questions?" is written in a bold, black, sans-serif font. Three smaller, light blue circles of varying sizes are arranged in a vertical line between the fish's mouth and the main thought bubble, suggesting a trail of thought or a sequence of bubbles.

**Any
Questions?**

