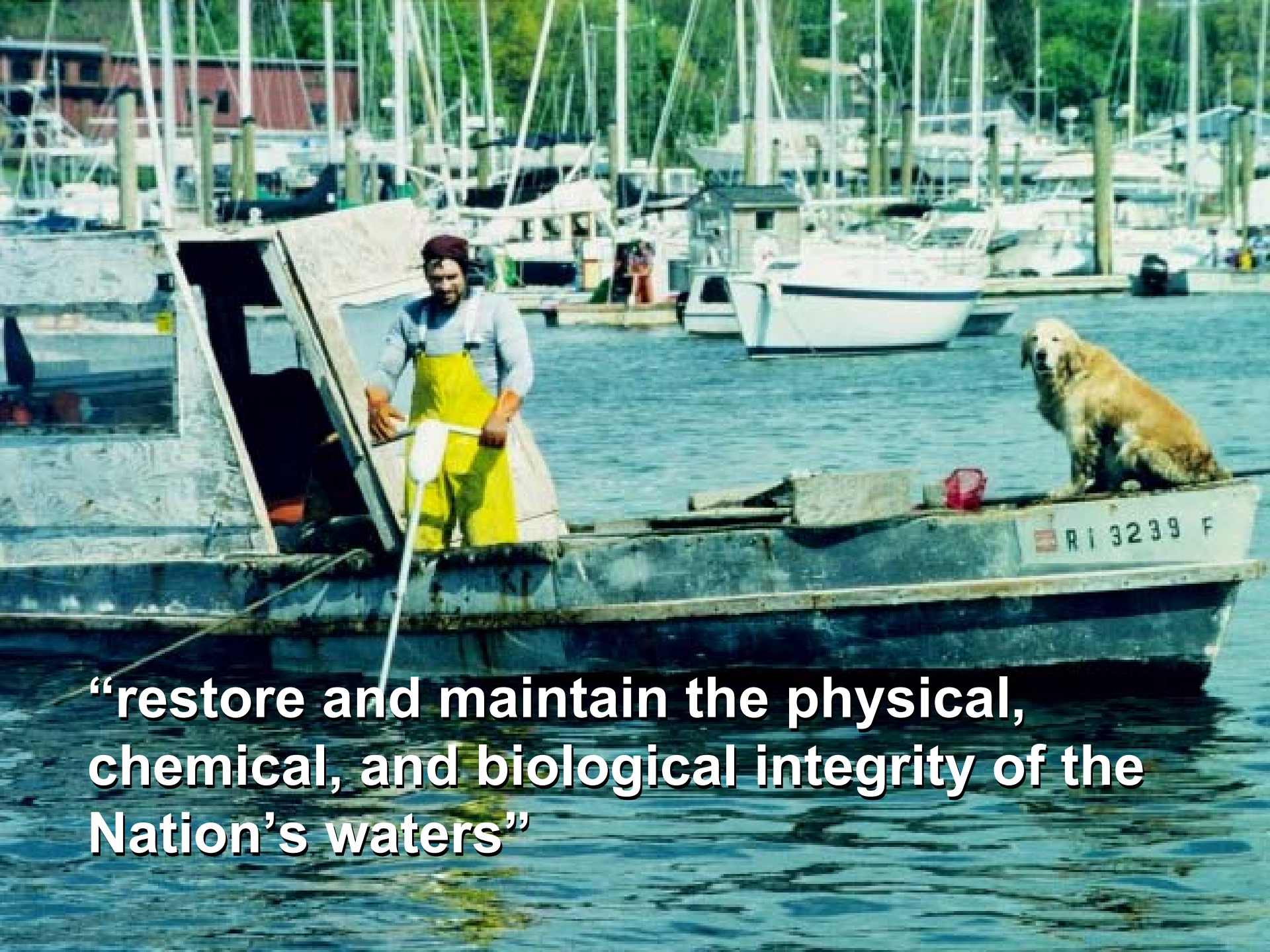


US EPA ARCHIVE DOCUMENT

**Methods to Integrate
Monitoring and Assessment
for Clean Water Act Reporting
Landscape Characterization
and Model-based Approaches
for Estimating Conditions or
Impairment of Waterbodies**





“restore and maintain the physical, chemical, and biological integrity of the Nation’s waters”

303(d) Background

- Assessment of ALL waters – Report 2 Year Cycle
- Each State Creates: Listing Policy, Designated Uses, WQ Standards and Assessment Units (AU)
- Listing Criteria: When Status = Impairment
- Need to Identify Pollutant Caused Impairment
- Evidence to Support Delisting

A satellite image showing a coastal region. A large, bright green plume of water extends from the shoreline into the deep blue ocean, indicating a significant environmental event such as a large-scale algal bloom or a massive discharge of organic matter. The land is visible in shades of yellow and green, with some darker patches. The ocean is a deep blue, contrasting sharply with the green water.

**Gather Data
to Confirm
Impairment**



United States
Environmental Protection
Agency

Office of Water
Washington, DC 20460

EPA841-S-97-001
April 1998

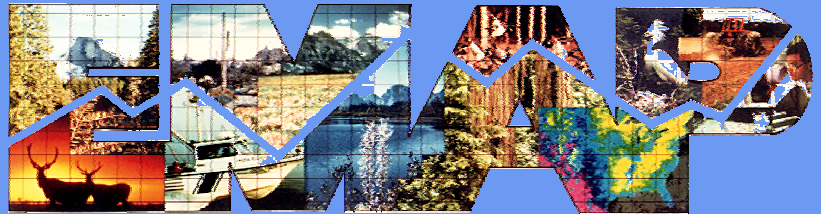
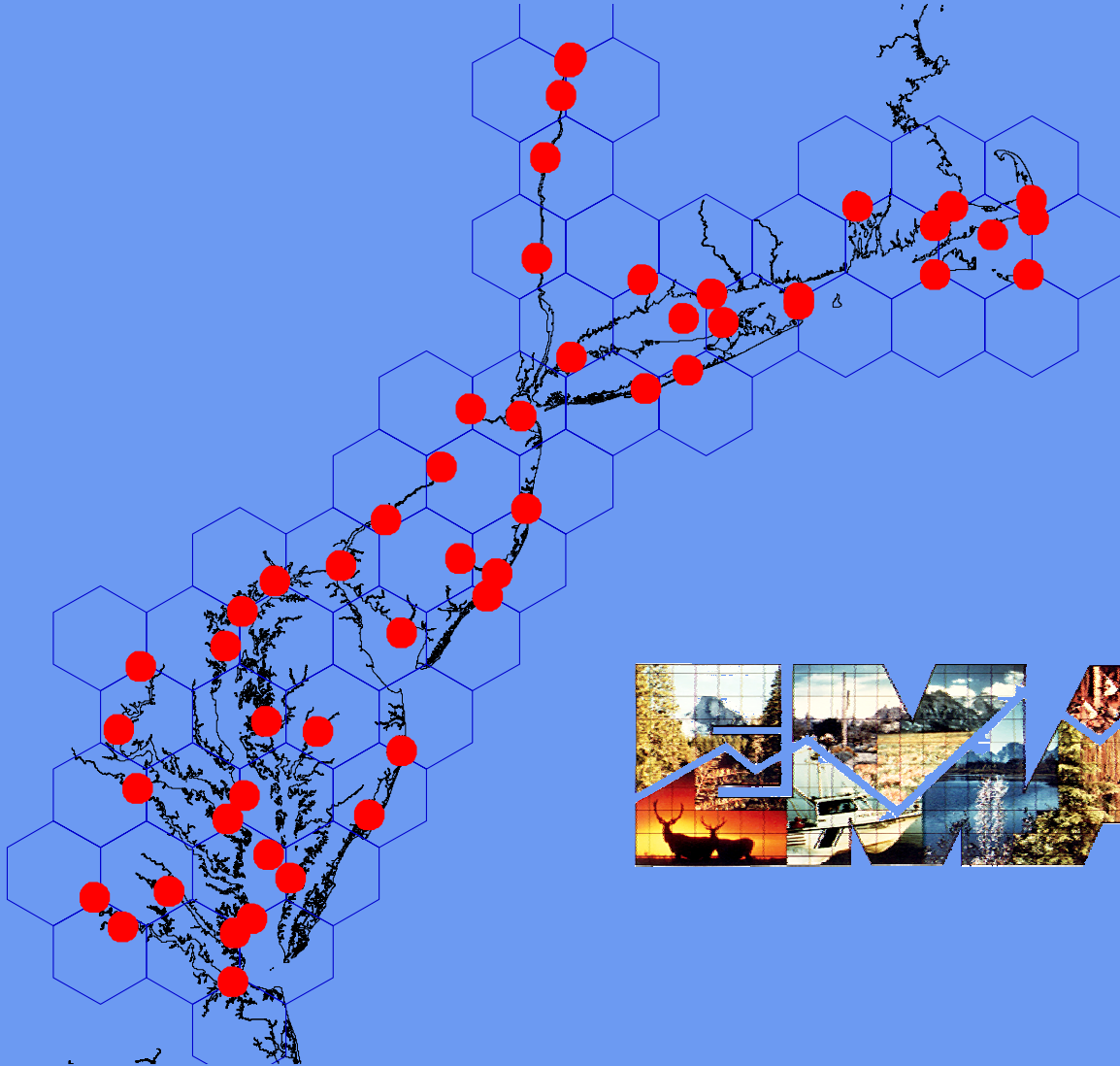


The Quality of Our Nation's Water: 1996



Executive Summary of the National Water Quality
Inventory: 1996 Report to Congress

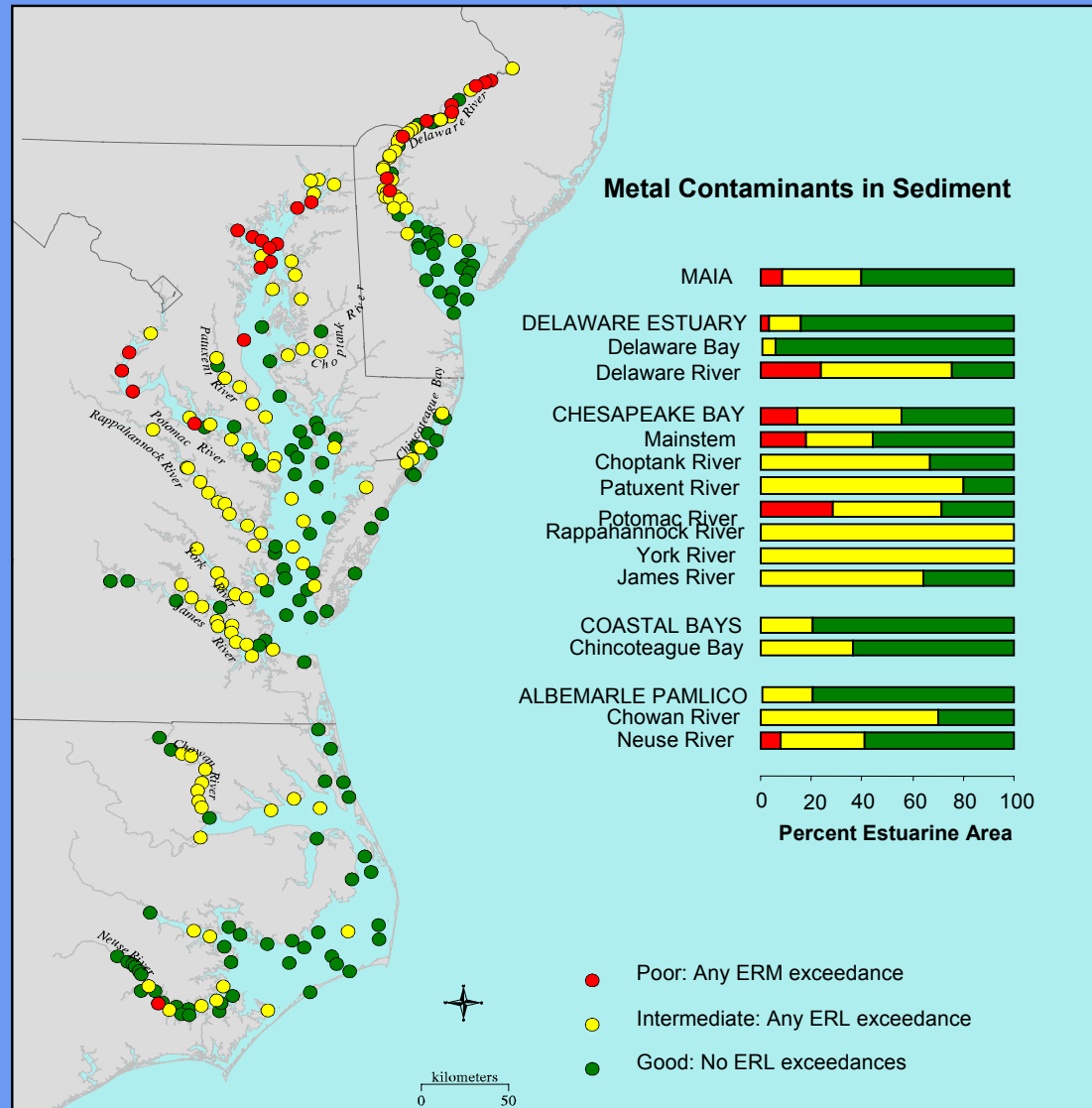
Assessing Overall Condition



305(b) Guidance

- Probabilistic monitoring design - large areas
- Excellent approach to producing, with known confidence, statistical representation
- Extent of waters that may or may not be impaired
- Assist a State or territory in determining monitoring priorities and in targeting monitoring activities

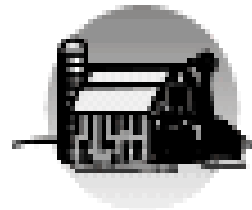
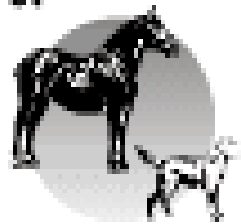
Assessing Overall Condition





**“Models that can fill gaps in data
have the potential to generate
information that will increase the
efficiency of monitoring”
National Research Council 2001**

**Animal/Pet
Waste**

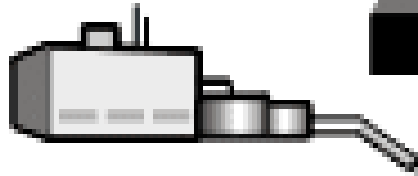


**Agricultural
Runoff**



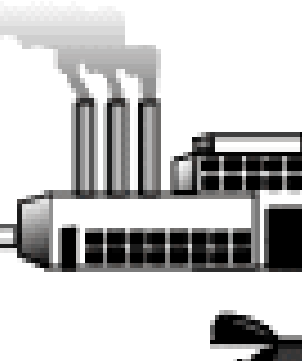
Forestry

**Wastewater
Treatment
Plant**



Air Deposition

Urban Runoff

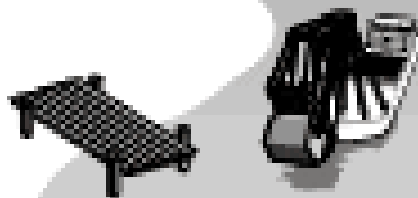


**Industrial
Facilities**

**Waste
Facilities**



Marinas



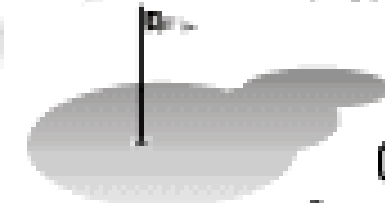
**Septic
Systems**



Lawn Fertilizing

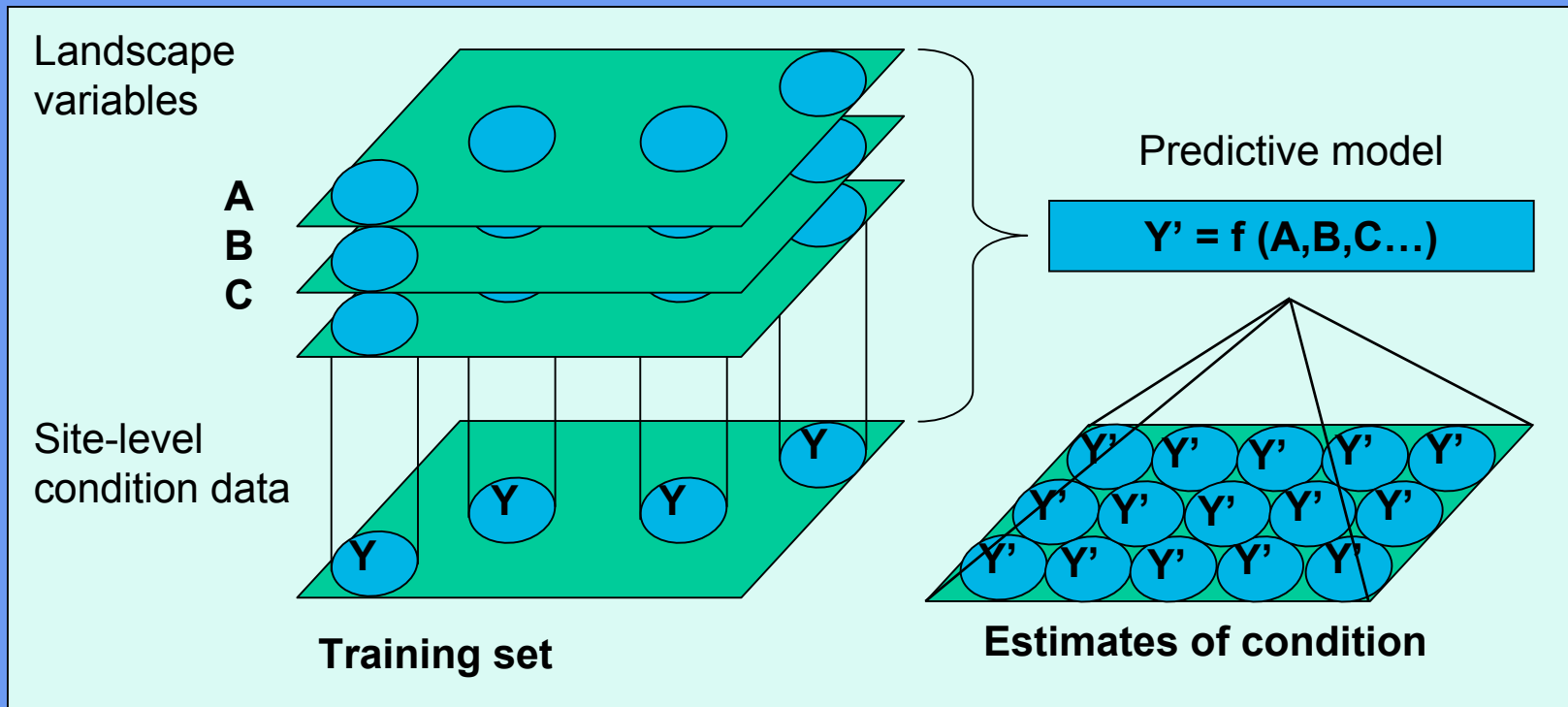


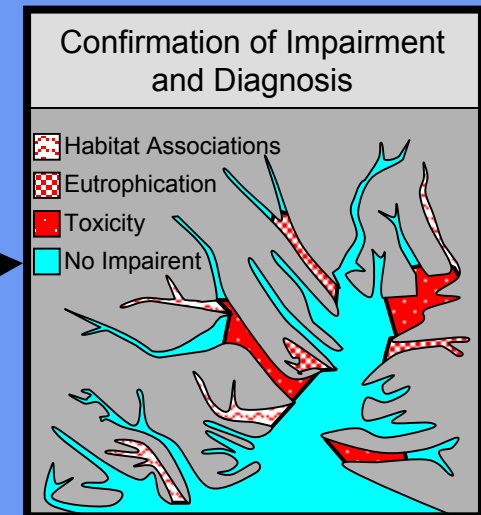
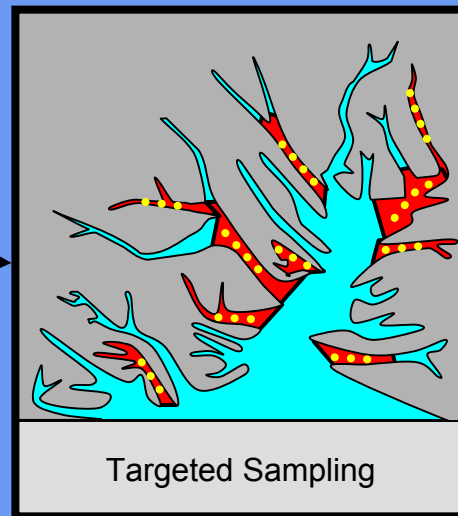
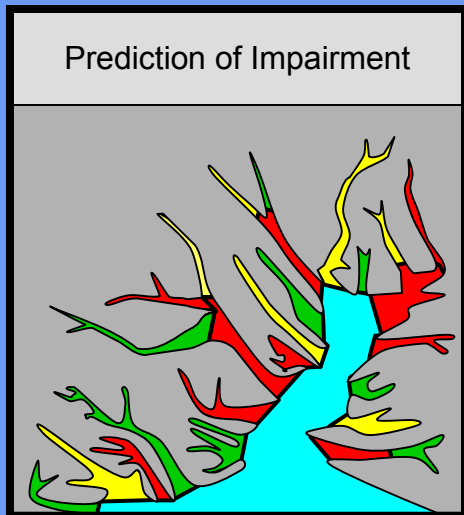
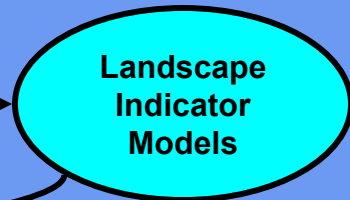
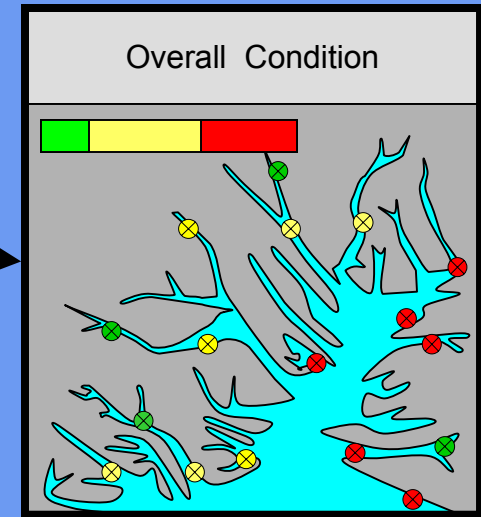
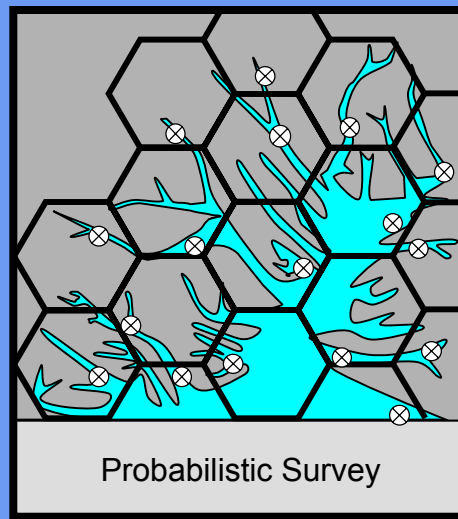
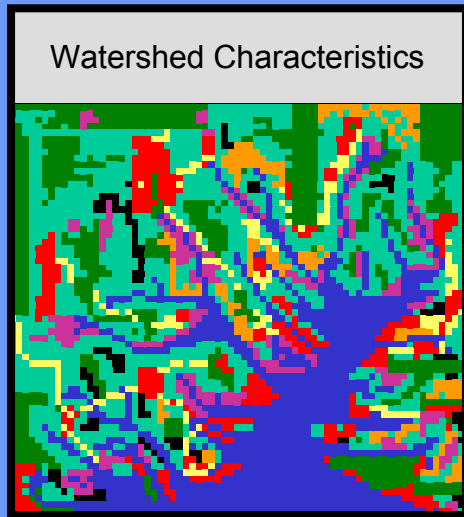
Ground Water

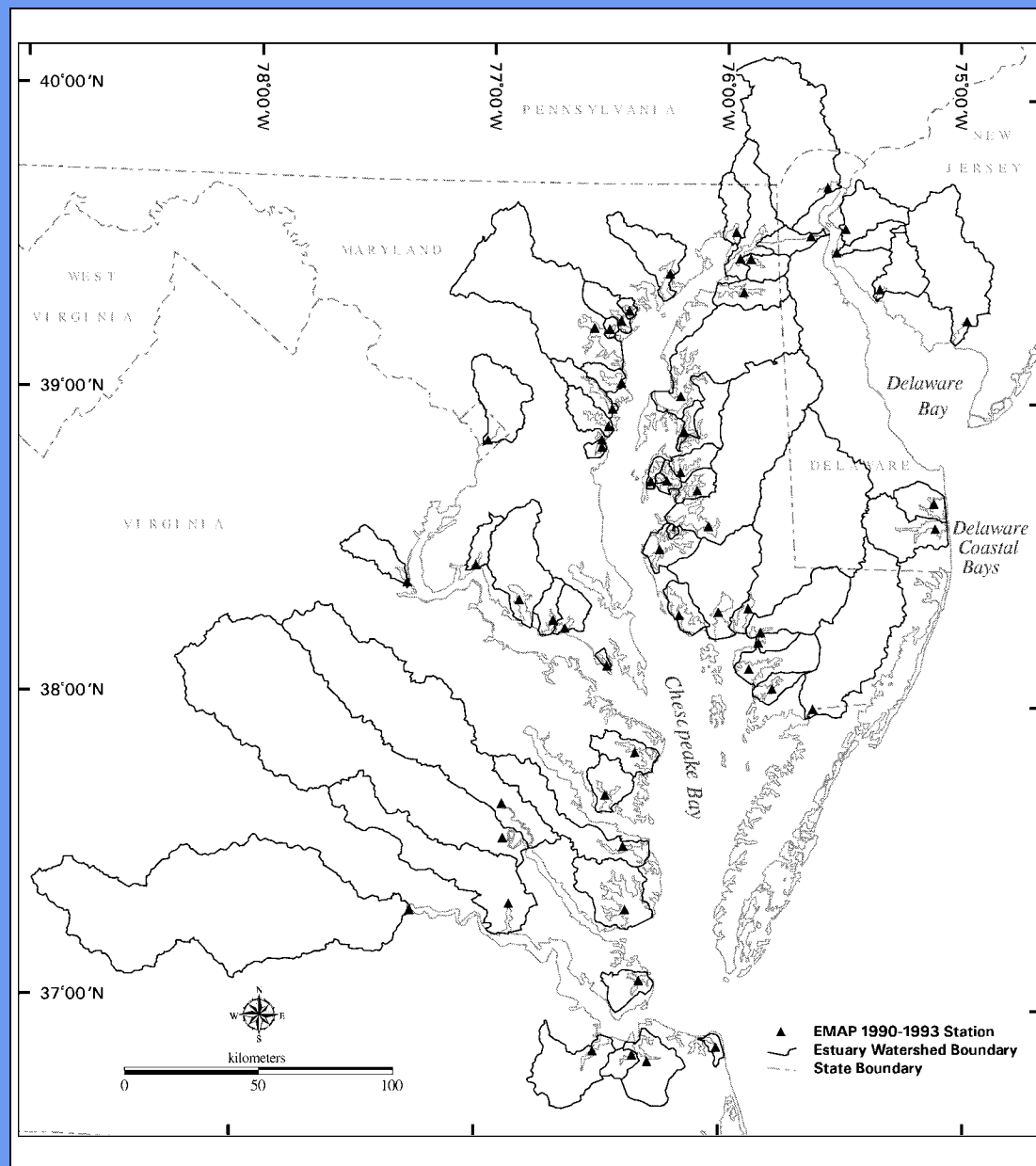


**Golf
Courses**

PREDICTING AQUATIC CONDITION





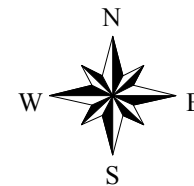
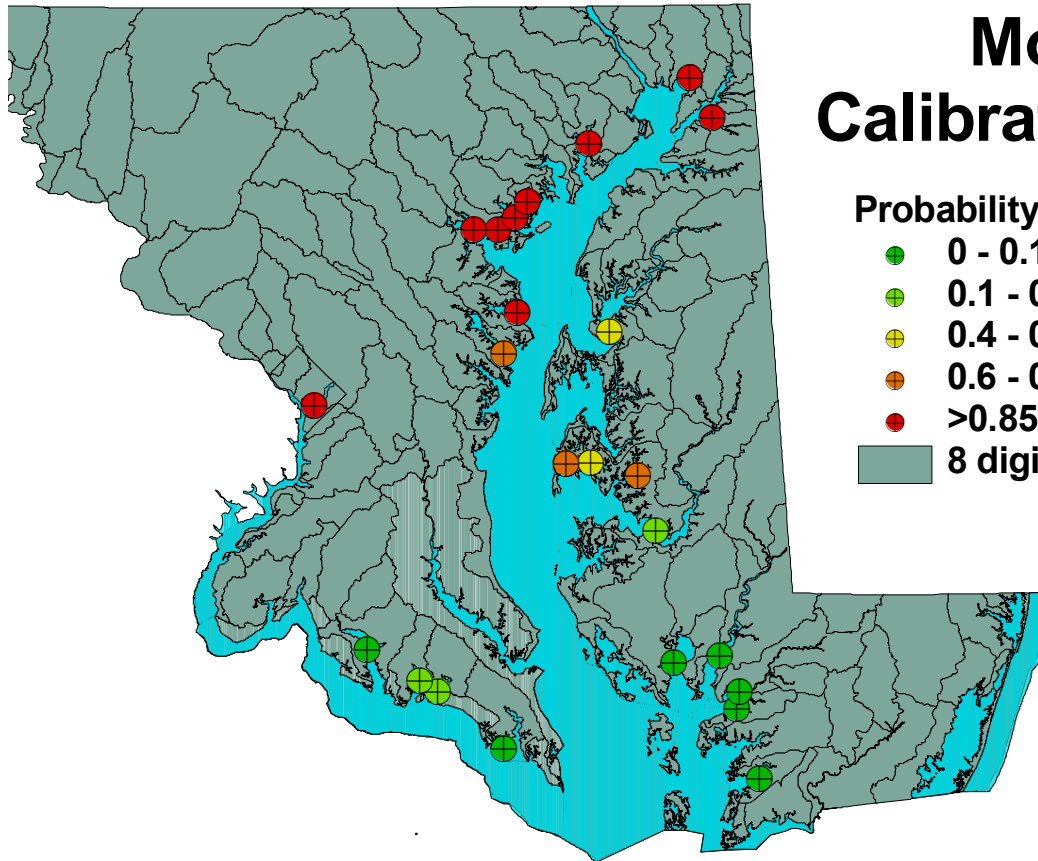


Model Calibration Sites

Probability of Impairment

- 0 - 0.1
- 0.1 - 0.4
- 0.4 - 0.6
- 0.6 - 0.85
- >0.85

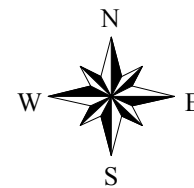
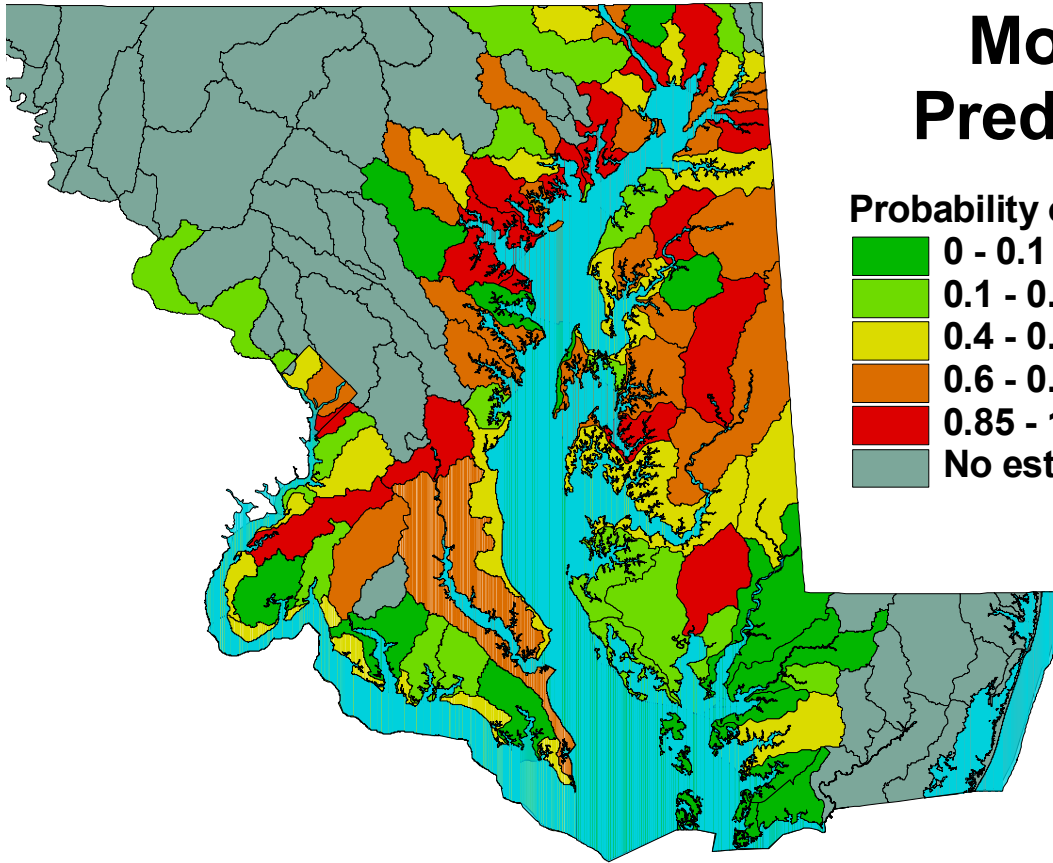
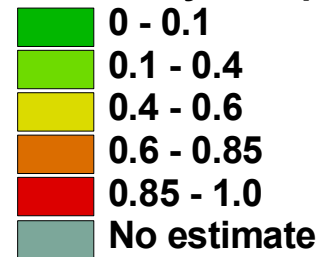
8 digit HUC



50 0 50 100 Kilometers

Model Prediction

Probability of Impairment



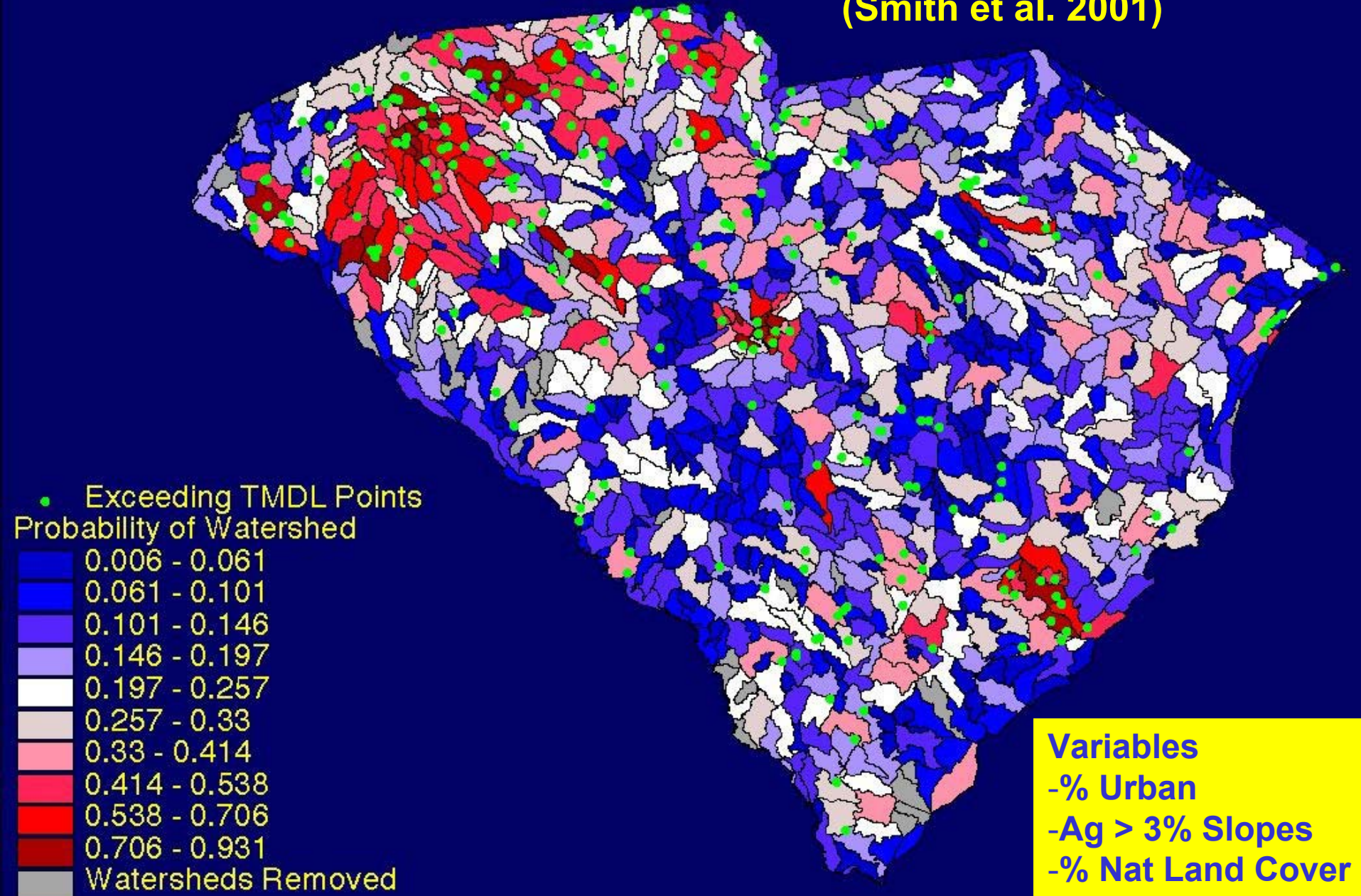
50 0 50 100 Kilometers



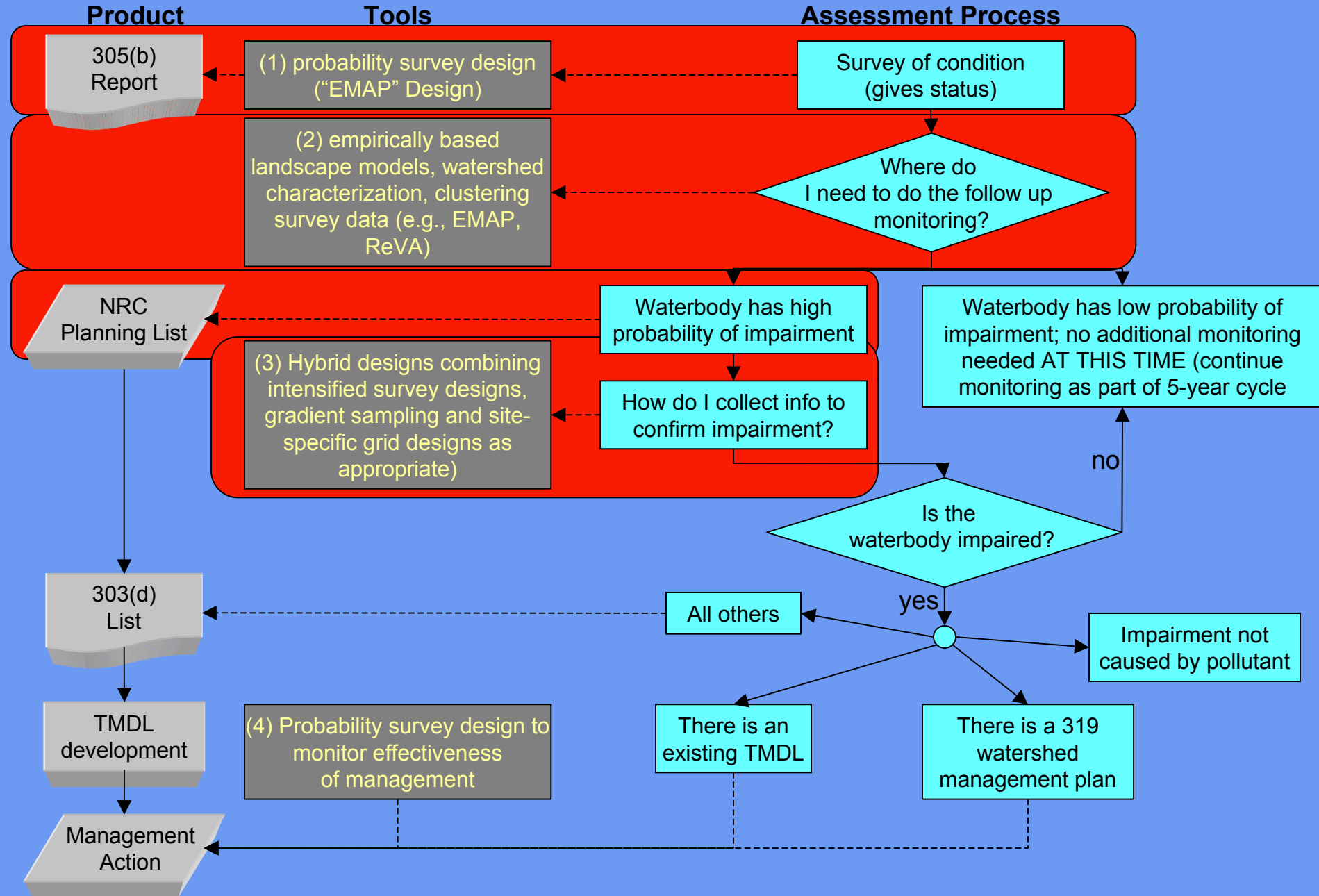
A scale bar showing distances in kilometers. The bar is marked with 50, 0, 50, and 100 Kilometers.

Logistic Regression Results with Test Points

(Smith et al. 2001)



INTEGRATED MONITORING FRAMEWORK



Anticipated Products

- Tools that can assist states in the 303(d) listing process
- Provide a rationale for targeted sampling of aquatic resources
- Help consolidate 305(b) assessment and 303(d) listing methodologies
- Provide evidence for diagnosing aquatic impairment
- Forecast the impacts of future watershed alterations

Topics

- Implementation Expectations & Experience
- Providing Information on All Waters
 - Large Scale Probability Surveys
 - Estimation Approaches for Condition, Stressors, Impairment
 - Design
 - Modeling
 - Landscape