

National Biological Assessment  
and Criteria Workshop

Advancing State and Tribal Programs



Coeur d'Alene, Idaho  
31 March – 4 April, 2003

**RFC 202**

# *Challenges for Urban and Agricultural Landscapes:*

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## *Maryland & Mississippi*

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# Heavily-Altered Systems

- **Maryland**
  - Urbanization
  - Physiographic Regions
  - Technical Issues
  - Socioeconomic Issues
- **Mississippi**
  - Agriculture
  - Subcoregions (Level 4 Ecoregions)
  - Technical Issues
  - Socioeconomic Issues

# BIOASSESSMENTS IN ALTERED SYSTEMS: URBAN WATERSHEDS



# Considerations for Urban Streams: A Basis for Judging Impairment

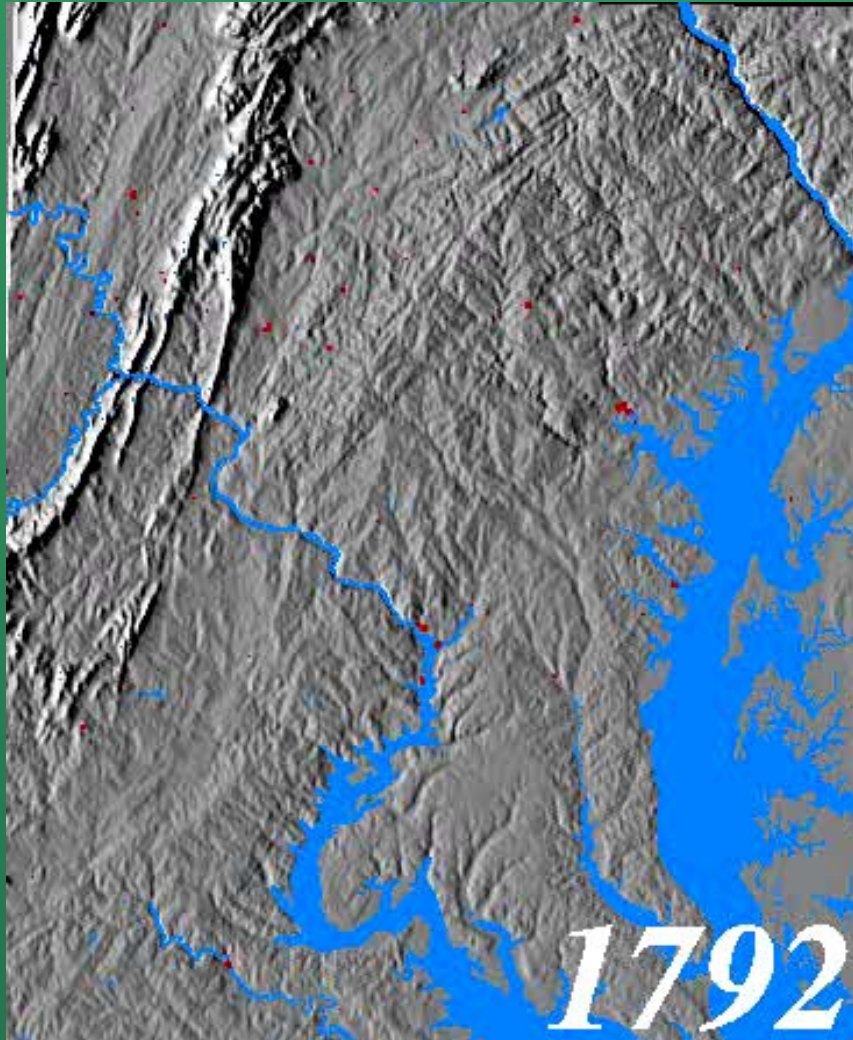
- **Reference conditions should not be compromised when establishing expectations for urban streams**
- **Tiered aquatic life uses may be established for significantly altered systems**
- **Use attainability analysis may be necessary to ascertain appropriate restoration goals**
- **Restoration of urban streams may require thorough stressor identification evaluation**

# Maryland Case Study

## Geographic Setting

- **Baltimore, MD –Washington, DC Region**
- **Chesapeake Bay Drainage**
- **Ecoregions (Level 4)**
  - Northern Piedmont (64)
- **Physiographic Region**
  - Coastal Plain
  - Piedmont

# Baltimore-Washington Area



200 years of urban  
development  
(video from Natural  
Resource Conservation  
Service)



**33-004, UT to Lower Potomac River**

**Spring 2000 37% Forest catchment (242 acres),**

**10% Impervious Surface**

**RBP Low Gradient Habitat Score – 142**

**Coastal Plain, 1<sup>st</sup> Order stream, SW corner of PG Co, MD**

**28-002, UT to Broad Creek  
West PG Co, below DC  
Spring 2000**

**176 acres (80.7% forested, 18.8%  
Urban)**

**7.8% Impervious Surface**

**RBP Low Gradient Habitat Score – 129**

**1<sup>st</sup> Order**



# Crow Branch



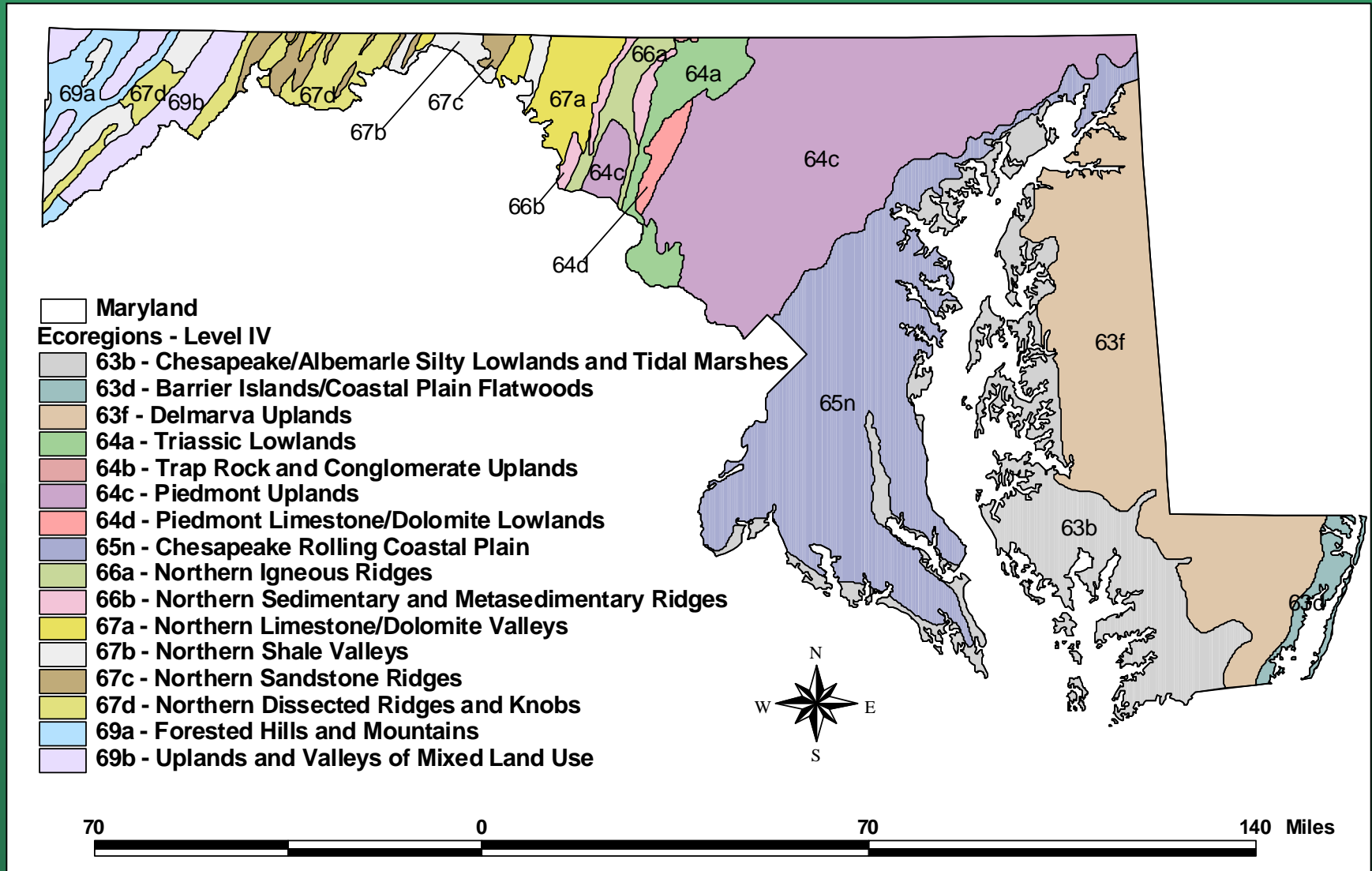
*heavily urban stream  
pervasive stormwater stressors  
35.5% imperviousness*



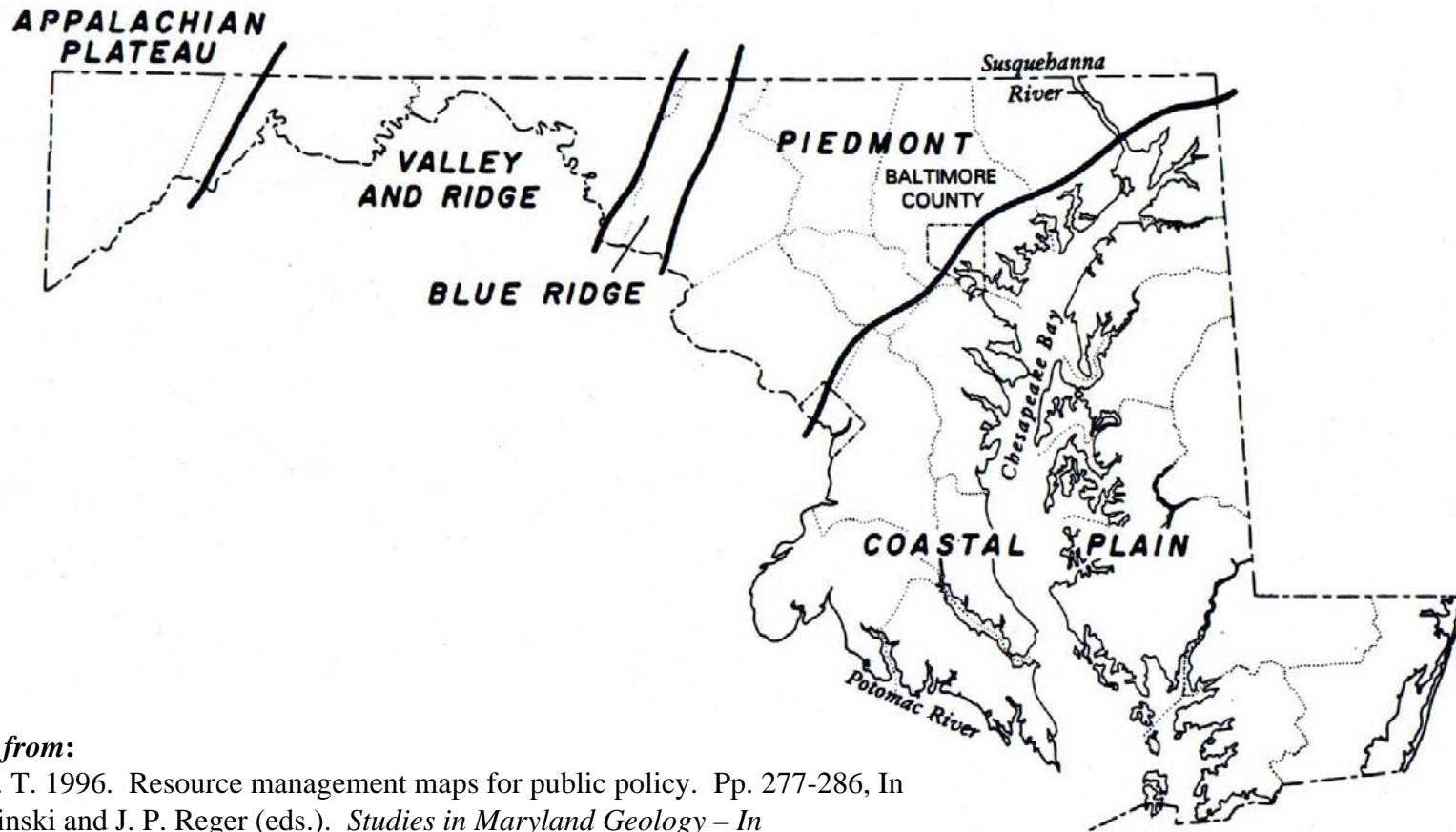


# Ecoregions (Level 4)

## -Northern Piedmont (64)



# Maryland Physiographic Regions

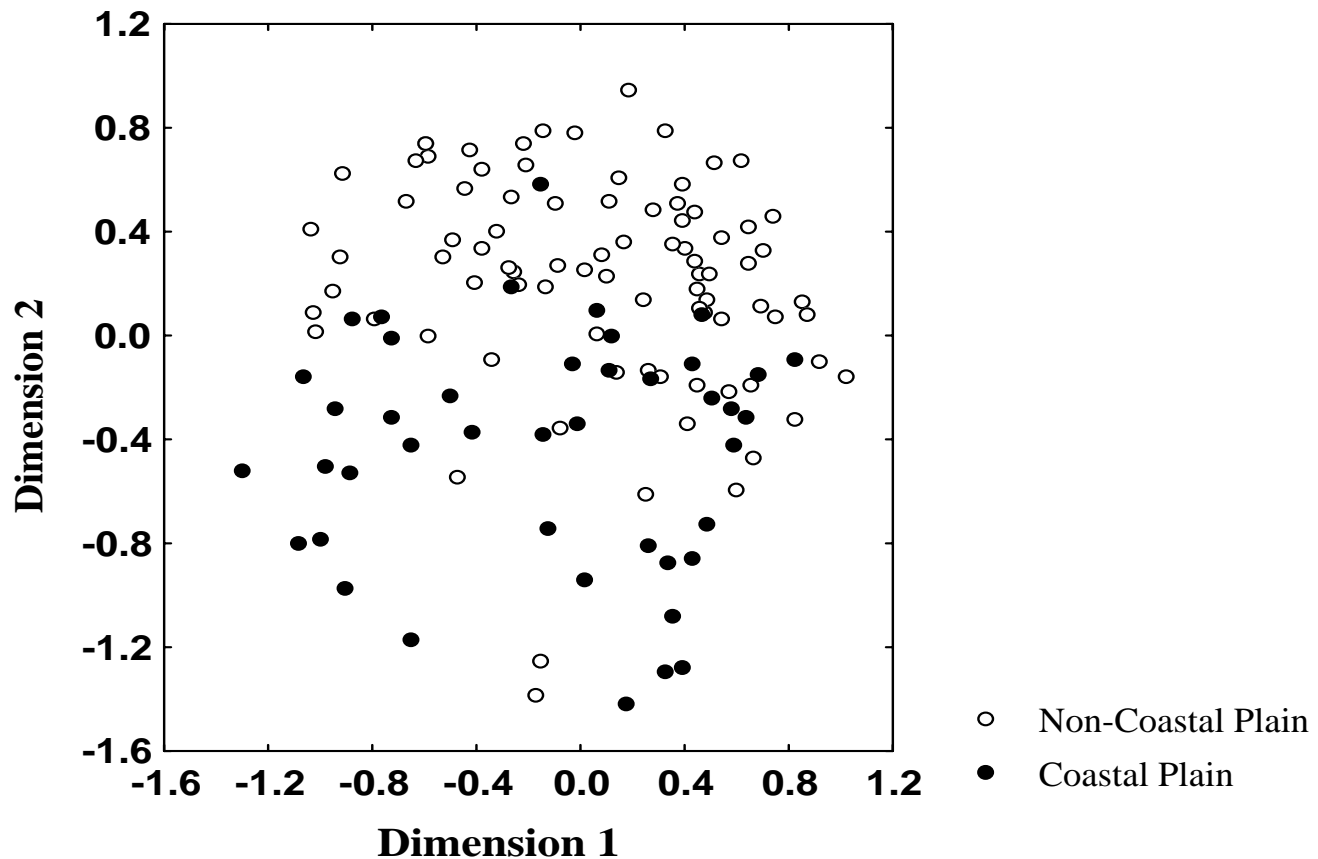


*map taken from:*

Cleaves, E. T. 1996. Resource management maps for public policy. Pp. 277-286, In D. K. Brezinski and J. P. Reger (eds.). *Studies in Maryland Geology – In Commemoration of the Centennial of the Maryland Geological Survey*. Department of Natural Resource, Maryland Geological Survey. Baltimore, Maryland.

# Maryland Site Classification

Non-metric multidimensional scaling (NMDS)



# Two Site Classes

1<sup>st</sup> - 3<sup>rd</sup> Strahler Stream Orders

1. Coastal Plain
2. Non Coastal Plain (4 physiographic regions)
  - Piedmont
  - Blue Ridge
  - Valley and Ridge
  - Appalachian Plateau

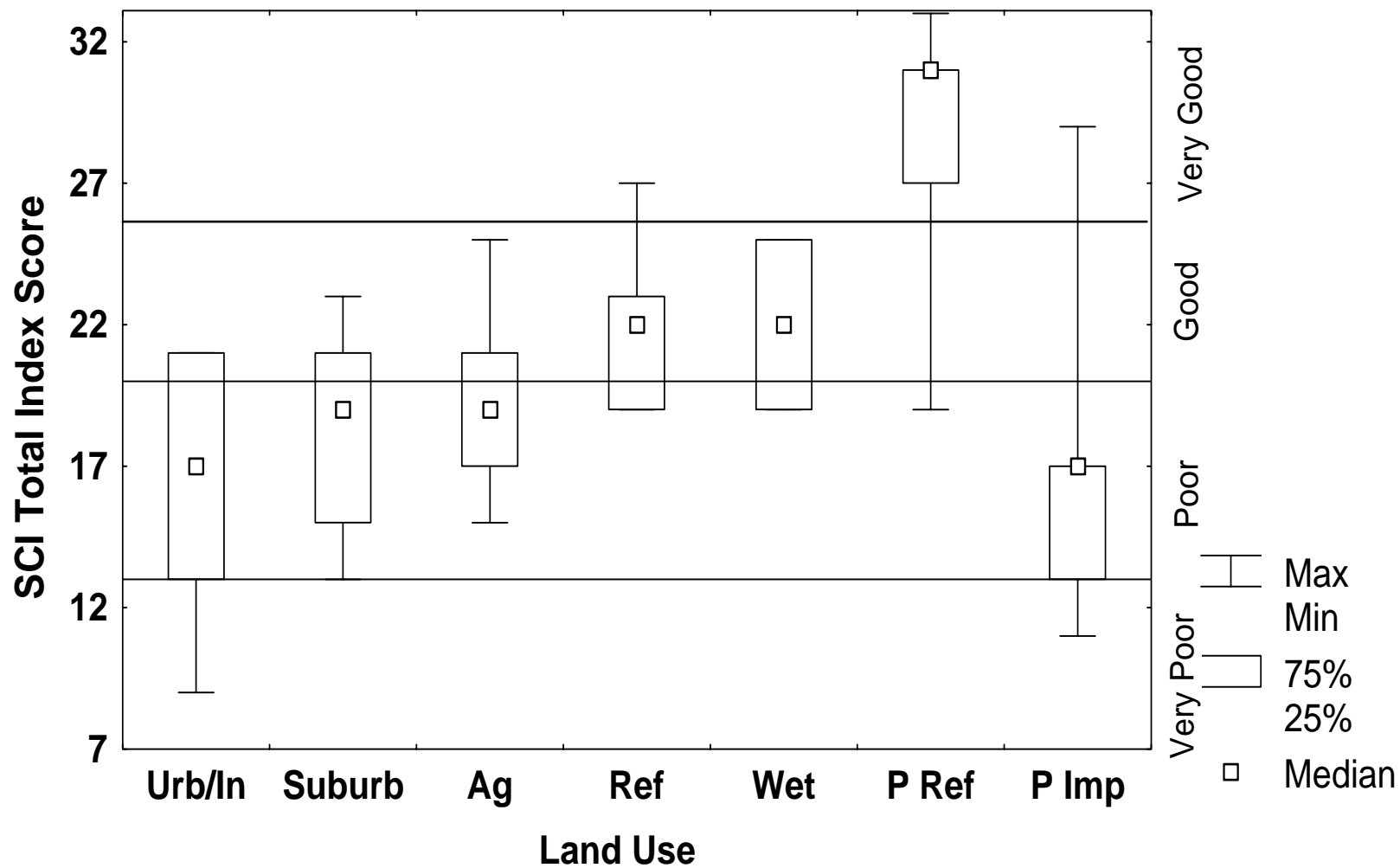
# MBSS Reference Site Criteria

## - 37 Reference Sites

- pH  $\geq$  6.0
- ANC  $\geq$  50 Feq/l
- dissolved oxygen  $\geq$  4.0 ppm
- Nitrate-N  $\leq$  4.2 mg/l
- Urban land use  $\leq$  20% of catchment
- Forested land cover  $\geq$  25% of catchment
- Remoteness rating “optimal” or suboptimal”
- Aesthetics rating “optimal” or “suboptimal”
- Instream habitat rating “optimal” or “suboptimal”
- Riparian buffer width  $\geq$  15m
- No channelization
- No point source discharges



## SCI Total Index Score by Land Use



# Technical Issues

- **Technical definition of objectives**
  - monitoring
  - assessment
  - management
- **Urban streams/watersheds as a separate site class? (depends on objectives)**
- **Targeted vs. random site selection (depends on objectives)**
- **Depauperate biota, i. e., insufficient sample for index calculation**
- **Others?**



# Socioeconomic Issues

- **What's it worth to the community to have their surroundings be, ecologically, of higher quality?**
- **Ecological goods and services**
- **Community buy-in to clean up efforts**
- **Stream stewardship**
- **Need for actually “seeing” improvement**
- **Communication of watershed activities**
- **Demonstrating effectiveness of management programs**

# Mississippi Case Study

## Geographic Setting

- **Southeastern US**
- **Gulf Coastal Plain and Mississippi River Drainages**
- **Ecoregions (Level 4)**
  - Flatwoods/Blackland Prairie Margins (65b)
  - Northern Hilly Coastal Gulf Plain (65e)
  - Bluff Hills (74a)
  - Loess Plains (74b)
- **Bioregion**
  - Northwest

# Mississippi Northwest Bioregion

- **Intensive agriculture (>200 years)**
- **Extensive physical alteration of watersheds and streams**
  - land cover conditions
  - hydrology
  - fluvial geomorphology
  - physical habitat quality

# Mississippi Northwest Bioregion

- **Stream habitat and physical conditions**
  - severe entrenchment (= no floodplain connectivity)
  - very erodible soils
  - ongoing channel adjustments
    - widespread bank instability
    - mass-wasting
    - migrating headcuts
- **Few truly high quality reference sites available**

Little Spring Creek [34]



Turkey Creek [115]



Camp Creek [010]

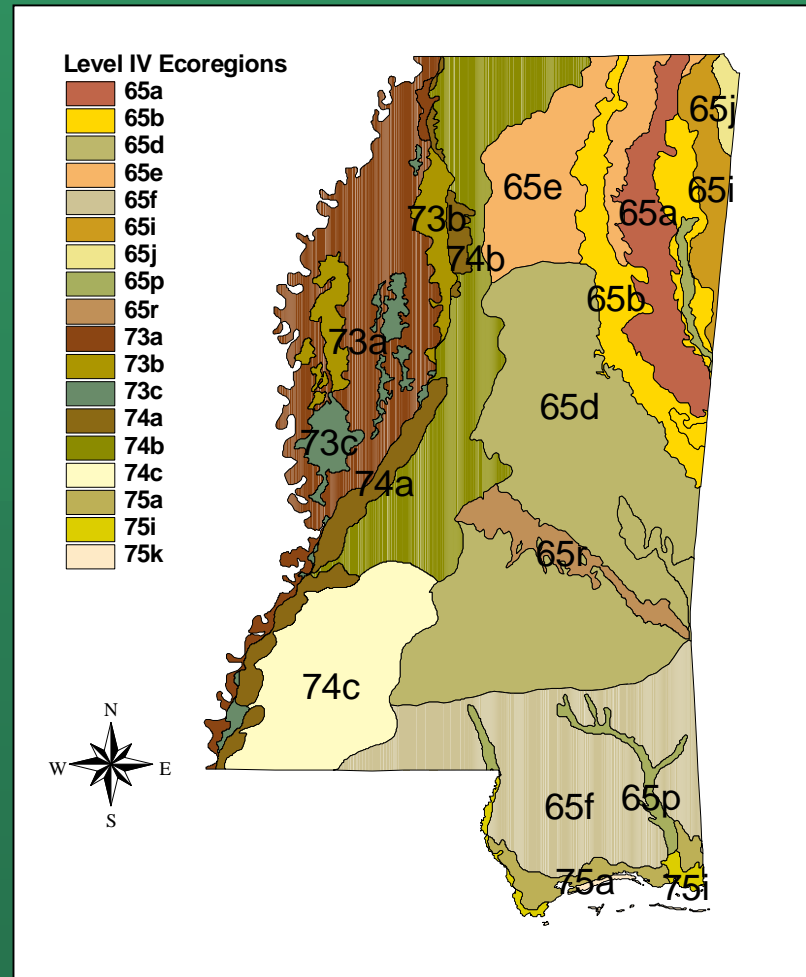


Skuna River Canal [116]

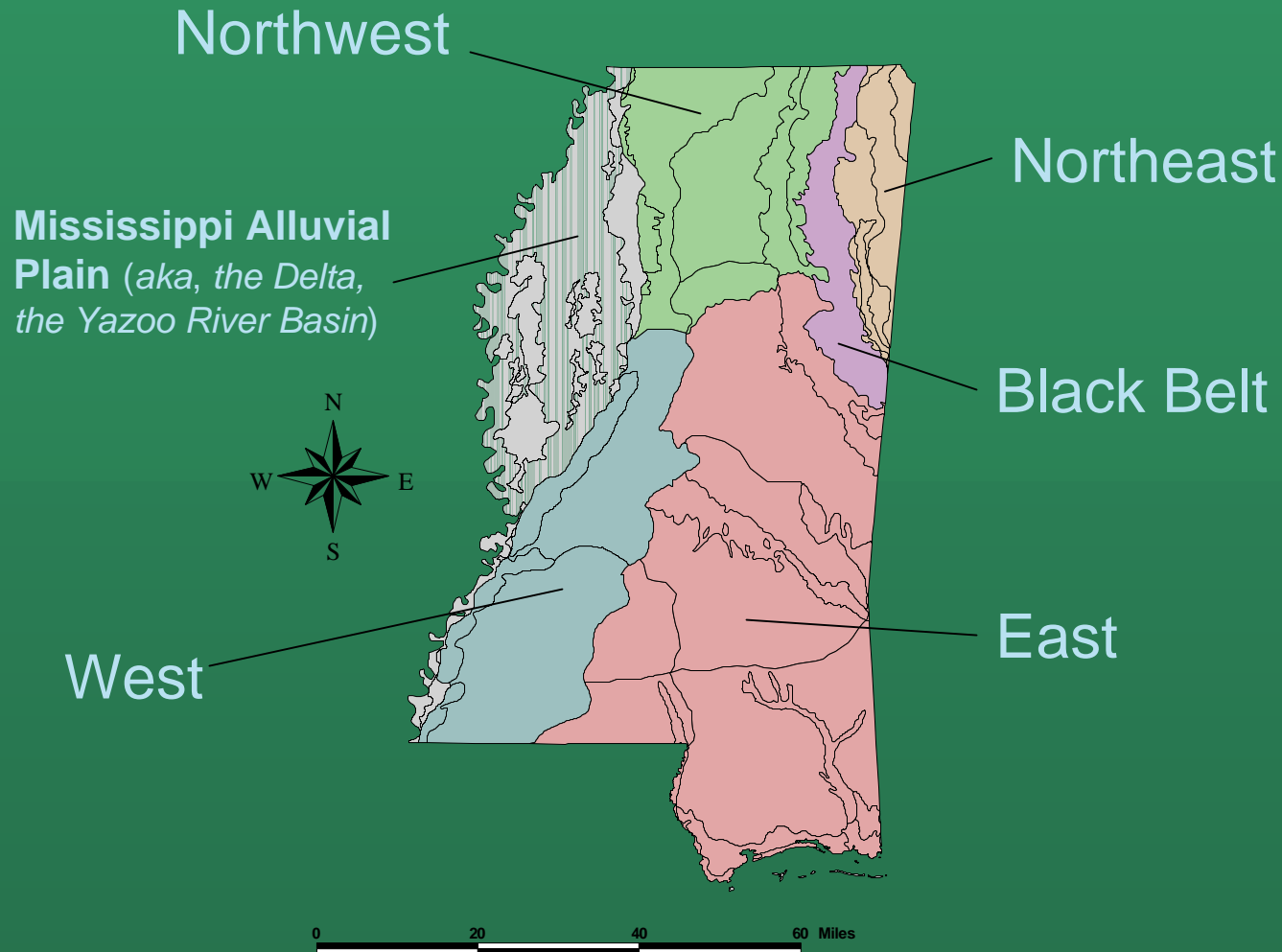


# Ecoregions (Level 4)

- Flatwoods/Blackland Prairie Margins (65b) (*in part*)
- Northern Hilly Coastal Gulf Plain (65e)
- Bluff Hills (74a) (*in part*)
- Loess Plains (74b)



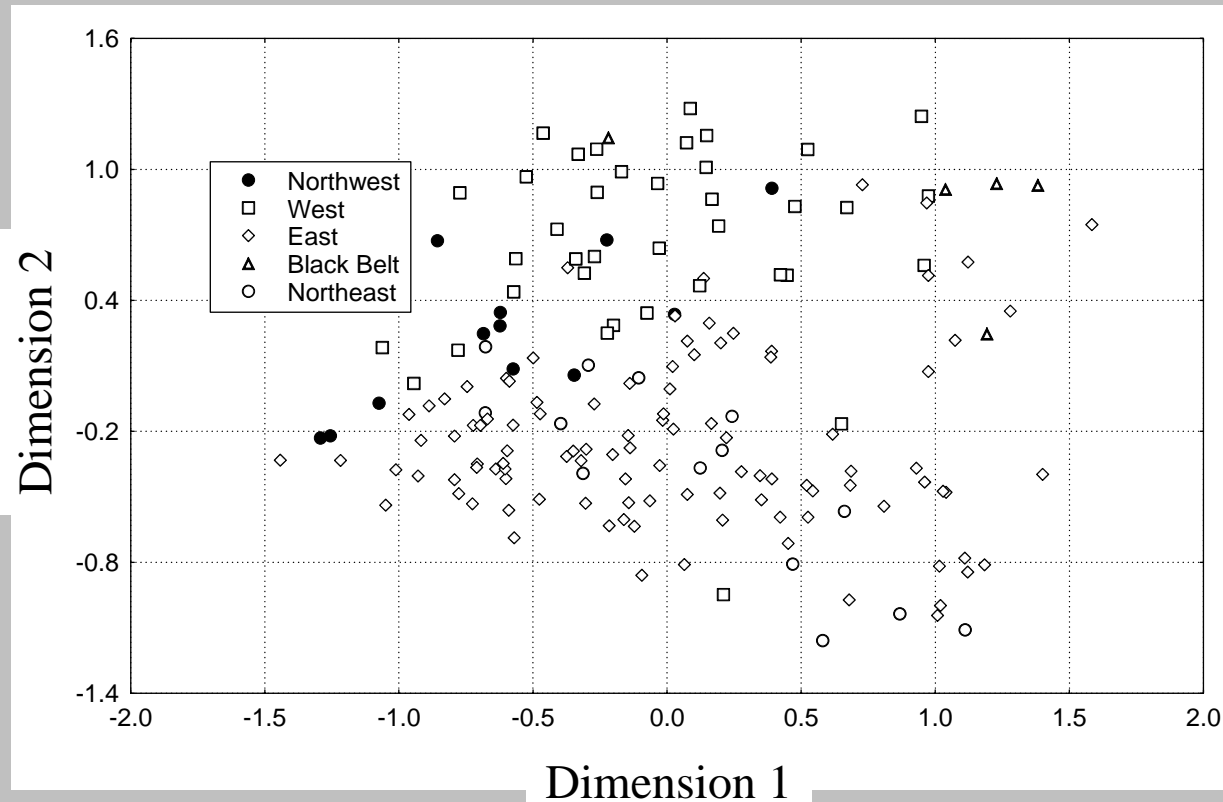
# Mississippi Bioregions





# Mississippi Site Classification

Nonmetric Multidimensional Scaling (NMDS)



# Five Site Classes

Wadeable, Nontidal Streams

- 1. Northwest**
- 2. West**
- 3. East**
- 4. Black Belt**
- 5. Northeast**

# Northwest Bioregion/Sub-bioregion 4

## Reference Site Criteria (4 Sites)

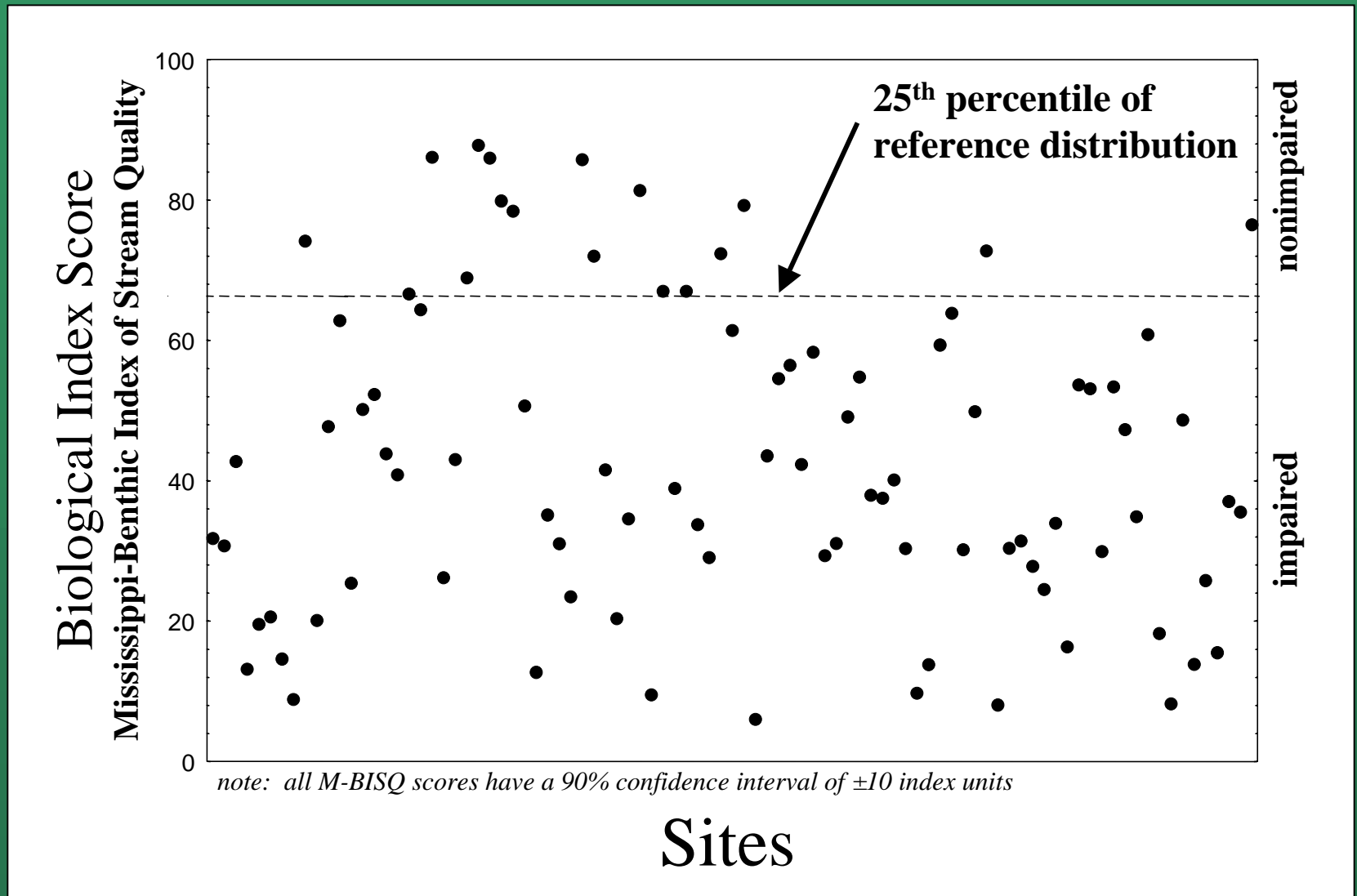
- “natural” LU/LC >17%
- high density residential <3%
- physical habitat quality \$106
- NPDES proximity >5 miles
- ammonia #0.4 mg/L
- COD #24.45 mg/L
- chlorides #9.08
- DO \$4.0 mg/L
- alkalinity #31.2 mg/L
- TKN #1.76 mg/L
- TOC #6.3 mg/L
- TP #0.34 mg/L
- N-N #1.96 mg/L
- pH \$6.2, #6.9
- Sp. conductance #102 $\mu$ S/cm

# Northwest Bioregion/Sub-bioregion 10

## Reference Site Criteria (5 Sites)

- “natural” LU/LC >46%
- high density residential <3%
- physical habitat quality \$119
- NPDES proximity >5 miles
- ammonia #0.3 mg/L
- COD #20.45 mg/L
- chlorides #5.48 mg/L
- DO \$4.0 mg/L
- alkalinity #24.9 mg/L
- TKN #0.80 mg/L
- TOC #5.3 mg/L
- TP #0.15 mg/L
- N-N #0.36 mg/L
- pH \$7.3, #5.8
- Sp. conductance #145 $\mu$ S/cm

# Mississippi Northwest Bioregion M-BISQ



# Technical Issues

- **Technical definition of objectives**
  - monitoring
  - assessment
  - management
- **Agricultural watersheds as a separate site class? (depends on objectives)**
- **“Best attainable” vs. *no biological goal* as reference concept**
- **relaxed criteria to ensure SOME reference sites**
- **Others?**

# Socioeconomic Issues

- **What's it worth to the agricultural community to have their surroundings accurately assessed?**
- **Ecological goods and services**
- **Magnitude of costs for “restoration”**
- **Stream stewardship**
- **Need for actually “seeing” improvement**
- **Communication of watershed activities**

**“It isn’t pollution that’s harming the environment, it’s the impurities in our air and water that are doing it.”**

**- former U.S. Vice-President Dan Quayle**