

# Wetland Mitigation Planning In The Watershed Context: New Tools from the National Wetlands Inventory Program

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# National Wetlands Mitigation Action Plan (MAP)

- Use of mitigation within watershed context
- Identify criteria for making mitigation decisions
- By 2005



# Present Mitigation Decisions

From the MAP:

- “Case-by-case basis”
- “Do not consider
  - the proper placement...within the landscape context”
  - “the ecological needs of the watershed”
  - “the cumulative effects of past impacts”



# The MAP Charge

Agencies to:

- Analyze issues related to using mitigation within watershed context
- Develop guidance to have mitigation achieve “the greatest benefit and probability of long-term sustainability”
- Help decision-makers use “watershed-based planning tools”



# MAP Workgroup Steps to Mitigation Decision-making in Watershed Context

1. Landscape Assessment
2. Historical Assessment
3. Assessment of Remaining Aquatic Resources
4. Analysis of Priorities and Restoration Options
5. Determination of Specific Restoration



# New NWI Tools vs. MAP Steps

1. Landscape Assessment
2. Historical Assessment
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# National Wetlands Inventory – Standard Products

- U.S. Fish & Wildlife Service
- Producing wetland data since 1970s
- Maps and Geospatial Data
- Status Reports (acreage-based)
- Trend Reports (acreage-based)



# NWI – New Tools

## Special Products

- Watershed Characterization Reports
- Watershed-based Wetland Functional Assessments
- Historical Assessments of Trends in Wetland Functions
- Inventory of Potential Restoration Sites

Demonstration projects done in Northeast





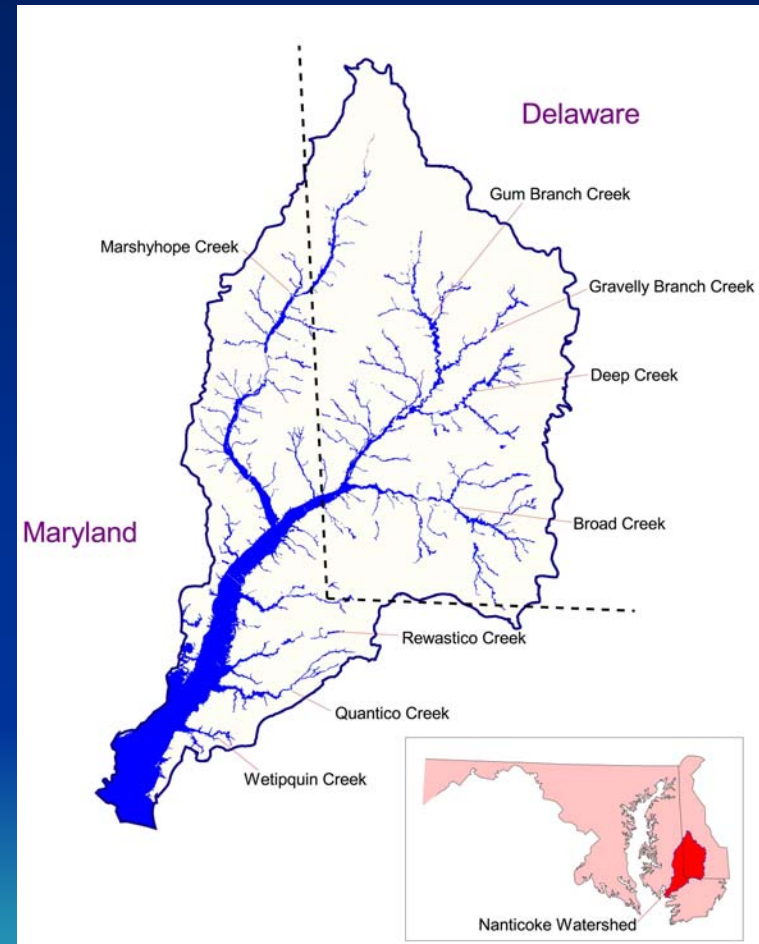
# Watershed Characterization Report: Potential Contents

- Current Status of Wetlands
- Preliminary Assessment of Wetland Functions
- Inventory of Potential Wetland Restoration Sites
- Assessment of Extent and General Condition of “Natural Habitat”
- Historical Perspective



# Nanticoke Watershed

- Example watershed assessment report
- 800 square miles
- 1/4 of Delaware
- Posted on web at: <http://wetlands.fws.gov>



# Nanticoke Assessment

- **Landscape Assessment of**
  - Wetland Types
  - Wetland Functions
  - Condition of Wetland Buffers
  - Condition of Stream Buffers
  - Potential Restoration Sites
  - Overall Condition of “Natural Habitat”
- **Historical Assessment of**
  - Wetlands and Their Functions
  - Overall “Natural Habitat”



# Assessment Procedures

- **Photointerpretation**
  - Update NWI Data
  - Interpret Landuse/cover
- **Map Interpretation**
  - Enhance NWI Data
- **GIS Analysis**
  - Create digital resource data base
  - Enhance NWI Data
  - Maps/stats for analysis and presentation



# Baseline Geospatial Data

- **Primary Data Sources**
  - NWI
  - USGS hydro data
  - USGS digital topographic maps
  - Land use/cover data
  - USDA soils data (for historic analysis)
- **Collateral Sources**
  - USDA soils data (for presentday wetlands)
  - State wetland data



# Assessment of Existing Aquatic Resources

- **NWI Data**
  - Update
    - Wetlands and Deepwater Habitats by FWS Types
  - Enhance
    - Wetlands by landscape position, landform, water flow path
    - Waterbody types – ponds, lakes, estuaries, etc.
  - Types, Acreage, and Maps
- **Based on photointerpretation not satellite image analysis**



# Enhanced NWI

- Identify additional properties important for wetland functional assessment
  - **Landscape Position** - relation to a waterbody
  - **Landform** - physical form or shape
  - **Water Flow Path** - directional flow of water
  - **Waterbody Type** (natural, artificial, specific types)
- Reveals more discrete wetland and deepwater habitat types
- LLWW descriptors vital for functional assessments



# Example of Wetland Types/Acreage for the Nanticoke

## Standard NWI

- 142,005 acres
- Estuarine Wetlands = 16,918 a
  - EM = 91%
  - SS + FO = 2%
  - US = 3%
- Palustrine Wetlands = 124,708
  - FO = 80%
  - SS = 12%
  - EM = 5%
  - Farmed = 2%
  - UB = 1%
- Riverine Wetlands = 379 a
- Water Regimes
  - E, C, A, B, R, N, P

## Enhanced NWI

- 4,920 wetlands
- Lotic Wetlands = 12% area
- Lentic Wetlands = 0.2%
- Terrene Wetlands = 72%
- Landform
  - FP = 11% of area
  - FR = 17%
  - IF = 71%
- Water Flow Path
  - OU = 68% of area
  - IS = 4%
  - TH = 10%
  - BT = 18%







# Wetland Functional Assessment

- Correlate characteristics with functions
- Report for the Northeast
  - Collaborative process involving several states
    - Maine, New York, Delaware, and Maryland
- Apply correlations to Enhanced NWI data
- Generate maps and stats through GIS
- Preliminary assessment based on existing information (level of field effort = variable)



# Predicted Functions

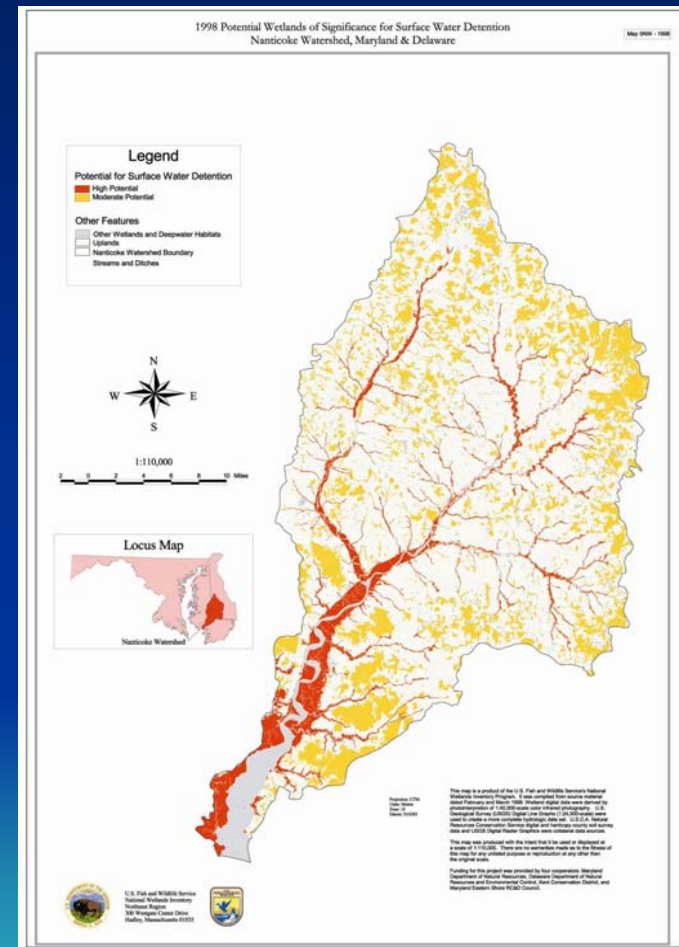
- Surface Water Detention
- Streamflow Maintenance
- Nutrient Transformation
- Sediment and Other Particulate Retention
- Shoreline Stabilization
- Coastal Storm Surge Detention
- Provision of Fish and Shellfish Habitat
- Provision of Waterfowl and Waterbird Habitat
- Provision of Other Wildlife Habitat
- Biodiversity



# Products – Stats & Maps

## Surface Water Detention

- 28% High Potential
- 69% Moderate Potential
- 97% of acreage



# Nanticoke Wetland Functions: 1998

- Surface Water Detention 97%
- Streamflow Maintenance 75%
- Nutrient Transformation 96%
- Sediment and Other Particulate Retention 31%
- Shoreline Stabilization 28%
- Coastal Storm Surge Detention 18%
- Provision of Fish and Shellfish Habitat 23%
- Provision of Waterfowl and Waterbird Habitat 23%
- Provision of Other Wildlife Habitat 96%
- Biodiversity 25%



# Historical Assessment

- Pre-settlement Wetlands vs. Current Wetlands
- Types (generalized for pre-settlement)
- Acreage
- Functions
- Trends (general)

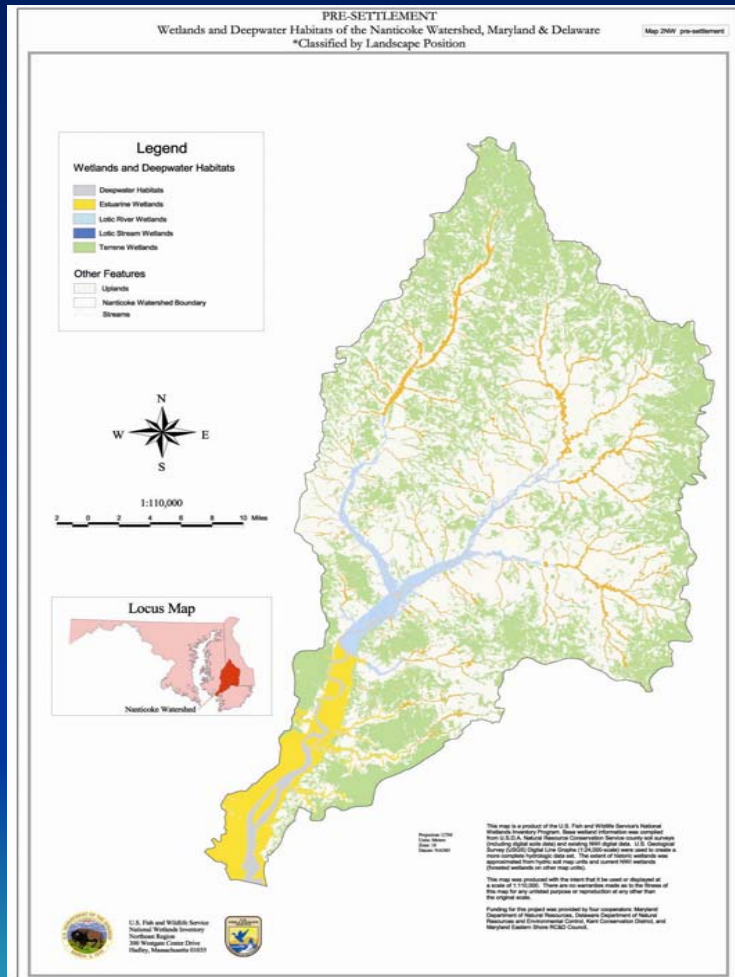


# Pre-settlement Wetlands

- Sources
  - USDA Soils Data
  - USGS Topographic Maps
  - NWI Data
  - Other Maps
- Classify wetlands by general NWI types
- Enhance wetland classification with LLWW descriptors
- Predict wetland functions



# Pre-settlement Maps and Stats



- 230,000 acres
- 89% Forested
- 10% Estuarine
- 2,809 wetlands
- 75% Terrene
- 77% Interfluve
- 10% Floodplain
- 73% Outflow
- 7% Throughflow
- 5% Isolated



# Pre-settlement Wetland Functions

- Surface Water Detention 98%
- Streamflow Maintenance 79%
- Nutrient Transformation 100%
- Sediment and Other Particulate Retention 44%
- Shoreline Stabilization 22%
- Coastal Storm Surge Detention 15%
- Provision of Fish and Shellfish Habitat 19%
- Provision of Waterfowl and Waterbird Habitat 20%
- Provision of Other Wildlife Habitat 100%



# Comparison of Functions: Pre-settlement vs. 1998

- Surface Water Detention -36%
- Streamflow Maintenance -64%
- Nutrient Transformation -47%
- Sediment Retention -46%
- Shoreline Stabilization -23%
- Coastal Storm Surge Detention -23%
- Fish and Shellfish Habitat -28%
- Waterfowl and Waterbird Habitat -30%
- Other Wildlife Habitat -41%



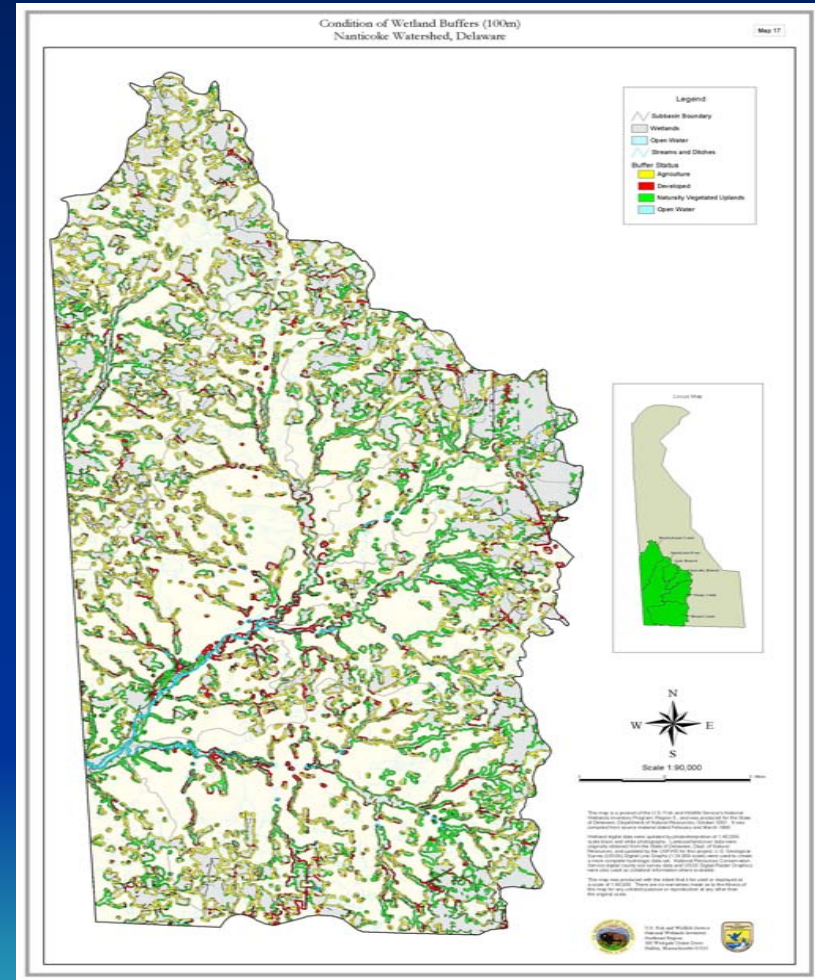
# Landscape Assessment

- Beyond wetlands/deepwater habitats
- **Buffers** (100m)
  - Wetlands
  - Streams
  - Ponds
  - Lakes
- **Potential Restoration Sites**
- “Natural Habitat” in the watershed



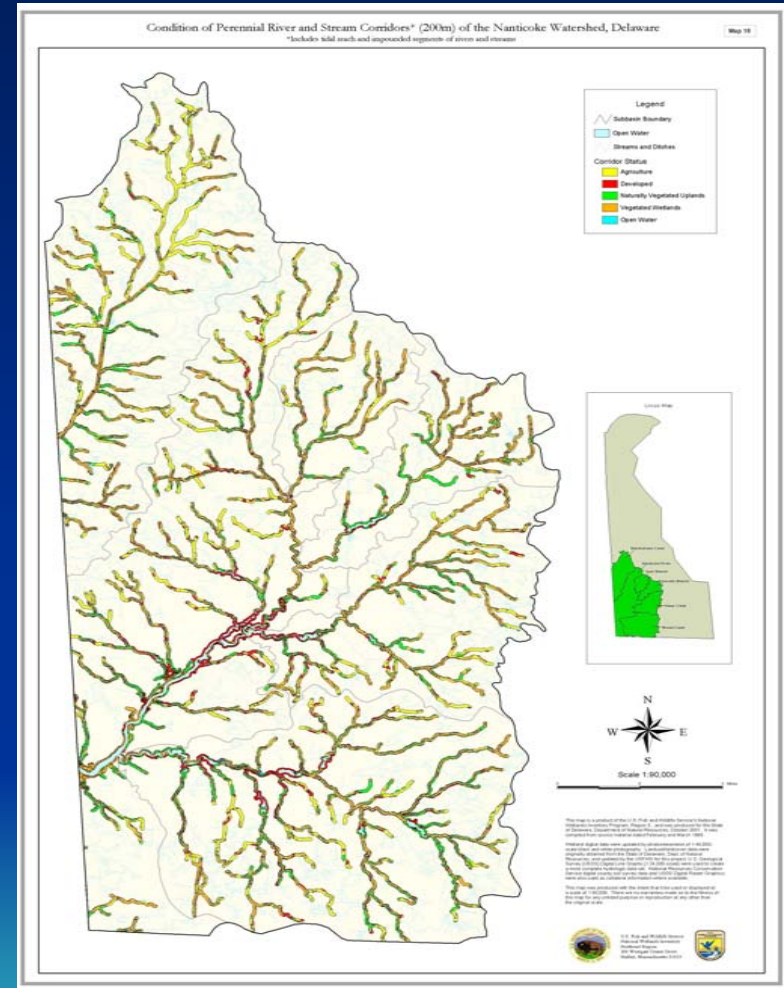
# Condition of Wetland Buffers

- Vegetated (“Natural Habitat”) (36%)
- Developed
- Agriculture
- Identifies potential wetland buffer restoration sites



# Condition of Stream Buffers

- Vegetated (59%)
- Developed (8%)
- Agriculture (33%)
- Identifies potential stream buffer restoration sites



# Potential Wetland Restoration Sites

## Type 1 Sites

- Former wetlands
  - Effectively drained hydric soil map units
  - Filled areas with no development
  - Impounded areas
  - Excavated areas
  - Farmed “wetlands”

## Type 2 Sites

- Degraded/altered wetlands
  - Partly drained
  - Impounded
  - Excavated
  - Farmed “wetlands”
  - Tidally restricted wetlands



# Wetland Restoration Opportunities for the Nanticoke

## Type 1 Sites

(#/acreage)

- Drained/Filled 57/85
- Farmed 1,397/3,310
- Impounded 10/653
- Excavated 7/131

Total = 1,471/4,179

(conservative)

## Type 2 Sites

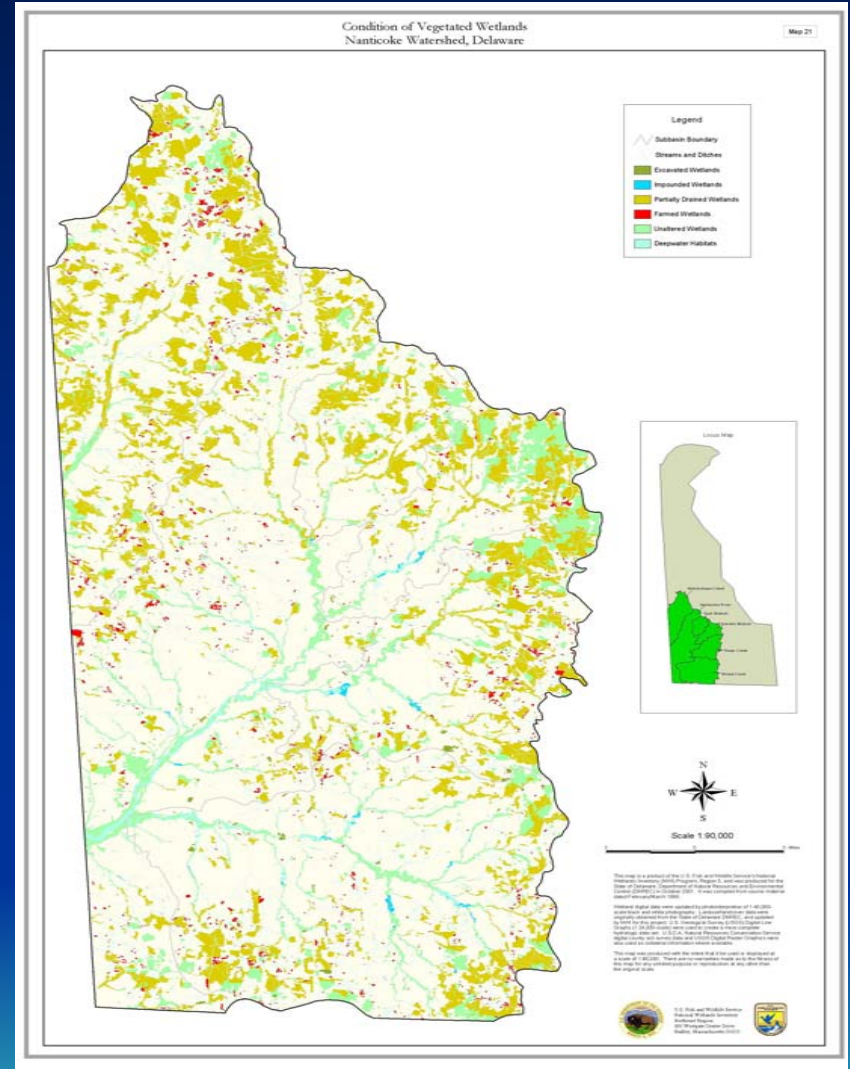
(#/acreage)

- Impounded 98/419
- Partly Drained  
2,886/50,156
- Excavated 371/334

Total = 3,355/50,909



- Potential Wetland Restoration Sites in the Nanticoke Watershed





# New NWI Tools vs. MAP Objectives



# Watershed Characterization

## NWI Data

- Wetlands
  - Status/Function
- Deepwater Habitats
- Riparian Corridors
- Buffers
- Overall Natural Habitat

## Mitigation Action Plan (MAP) Objective

- Landscape Context
  - Current Situation
    - Acreage Status
    - Functions Status



# Historical Assessment/Trends

## NWI Data

- Historical Assessment
  - Wetland Types and Functions
  - Riparian Corridors
  - Buffers
  - Natural Habitat
- Recent Trends

## MAP Objective

- Cumulative Effects of Past Impacts
  - Types of Wetlands Lost
  - Functions Diminished
- Ecological Needs of Watershed



# Inventory of Potential Restoration Sites

## NWI Data

- Restoration
  - Wetlands
  - Stream Corridors
  - Buffers

## MAP Objective

- Opportunities for Mitigation



# Actual Uses of New Tools

- Watershed-based Wetland Conservation
  - State of Maine (Casco Bay watershed)
- Enhance MD DNR's Green Infrastructure Assessment Tool
- Baseline Data for MD/DE's Nanticoke River Watershed Planning Effort
- Watershed Management
  - New York City DEP



# Ballpark Costs

- \$100-150/square mile where land use/cover data and digital soils are available
  - Includes updated/enhanced NWI
- \$50-75/sq. mi. where NWI updated

Based on Northeast experiences



# Bottomline

- New NWI Tools provide a foundation for watershed planning that can be used to HELP make compensatory mitigation decisions in a watershed context.



# Regulatory Agency Decisions re: Compensatory Mitigation

Still must decide:

- Where
- When
- How much to restore





# Additional Information on New NWI Tools

- Watershed report posted on web at:  
<http://wetlands.fws.gov>
- Questions re: methods, products, and  
initiating pilot studies, contact:  
[ralph\\_tiner@fws.gov](mailto:ralph_tiner@fws.gov)

