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

Ralph Tiner
U.S. Fish & Wildlife Service
National Wetlands Inventory Program
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

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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
- ¼ 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%
Sample Maps
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
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
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