For Discussion Purposes

TAC CHARRETTE WORKBOOK
Ecosystem Management and Sustainable Forestry Practices

NEW JERSEY HIGHLANDS COUNCIL

March 28, 2006

Overview of RMP Goals and Structure

NEW JERSEY HIGHLANDS COUNCIL

New Jersey Highlands

Goals of the Act

- Protect and conserve the quality and quantity of drinking water
- Protect natural, scenic, recreational, cultural and historic resources
- Preserve contiguous lands in their natural state
- Preserve farmland and farming
- Promote appropriate patterns of development, redevelopment and economic growth
- Promote a sound and balanced transportation system

Highlands Regional Master Plan

I. Policy Guidance Document

- Resource Assessment
- Smart Growth
- Transportation
- Consistency
- Local Participation
- Financial

II. Technical Documentation

- Water Resource Management
- Ecosystem Management
- Agriculture and Forestry
- Land Preservation
- Historic and Scenic Resources
- Regional Development and Design
- TDR Guidelines
- Utility Capacity
- Transportation/Air Quality
- Financial Analysis

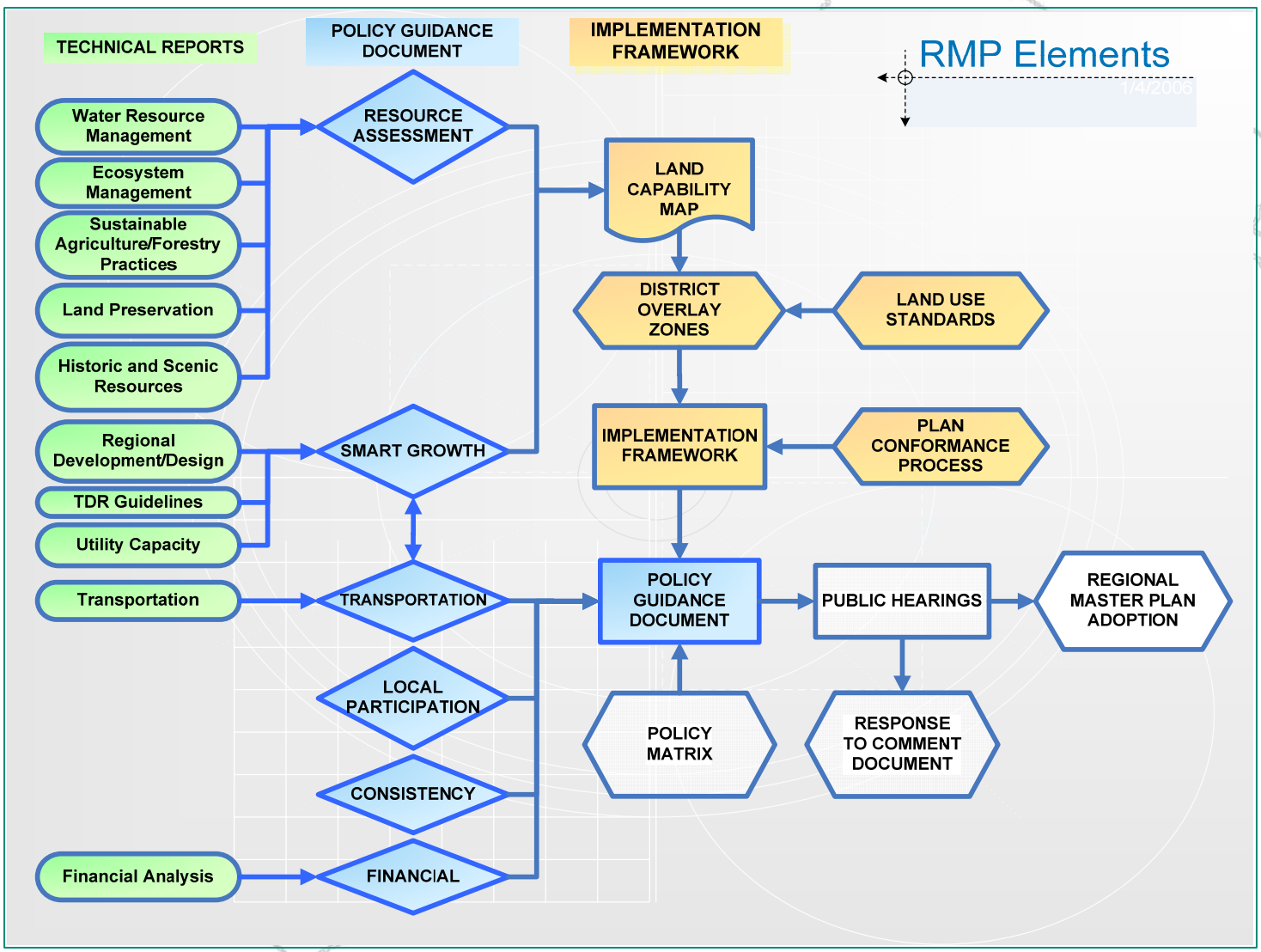
III. Implementation Framework

- Land Capability Map
- Conformance Process
- Resource Protection Standards
- Regional Growth Standards
- Adjustments/Revisions

Highlands Regional Master Plan

I. Policy Guidance Document	II. Technical Documentation	III. Implementation Framework
A statement of the goals, policies, strategies and public participation necessary to develop the RMP and implement the Act	The technical basis supporting the policies and standards, explains science and technical analyses supporting the RMP	The Land Use Capability Map, including district overlay zones and other tools for RMP conformance and implementation

Highlands Regional Master Plan



Ecosystem Management and Sustainable Forestry Practices Requirements of the Act

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Determine "the amount and type of human development and activity which the ecosystem of the Highlands Region can sustain while still maintaining the overall ecological values thereof, with special reference to…

- **contiguous forests and woodlands;**
- **endangered and threatened animals, plants, and biotic communities;**
- **other appropriate considerations affecting the ecological integrity of the Highlands Region."**

Highlands Act, N.J.S.A. 13:20-11.a(1)(a)

Ecosystem Management and Sustainable Forestry Practices

Identify "critical environmental areas and other critical natural resource lands where development should be limited."

Highlands Act, N.J.S.A. 13:20-11.a (6)

Identify "zones within the Preservation Area where development shall not occur."

Highlands Act, N.J.S.A. 13:20-12.a

Assess the "...forest resources of the region, together with a determination of overall policies required to maintain and enhance such resources."

Highlands Act, N.J.S.A. 13:20-11.a (1) (b)

Technical Approach and Methods
Ecosystem Management and Sustainable Forestry Practices

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Ecosystem Management and Sustainable Forestry Practices

Objectives

- Describe the current ecological condition of the Highlands.
- Establish the level of growth that can be accommodated without impairing the health and integrity of natural systems.
- Determine the level of protection that is necessary to conserve biological diversity.
- Evaluate how sustainable forestry practices can be best promoted.

Ecosystem Management and Sustainable Forestry Practices

Technical Approach

- **Highlands Open Water Protection**
  - Identify Highlands Open Waters
  - Stream Integrity Model
  - Riparian Corridor Analysis
  - Regulatory Constraints
- **Ecological Resources**
  - Forest Integrity
  - Critical Habitat Areas
  - Significant Natural Areas
- **Steep Slope Analysis**
- **Conservation Threat Assessment**
- **Sustainable Forestry**
  - Forest Sustainability Strategies

Black River, New Jersey Highlands,
Morris County, NJ
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Sparta Mountains, NJ Highlands
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Ecosystem Management
Highlands Open Waters Protection

The Highlands Water Protection and Planning Act defines Highlands open waters as

"*all springs, streams including intermittent streams, wetlands, and bodies of surface water, whether natural or artificial, located wholly or partially within the boundaries of the Highlands Region, but shall not mean swimming pools.*"

Copperhead Pond (#1), New Jersey Highlands, Sussex County, NJ

Ecosystem Management
Highlands Open Waters Protection

Identify Highlands Open Waters in accordance with the Act

- Delineate streams and other surface water bodies using 2002 hydrography (HYDRO) layer and 2002 land use/land cover (LULC)
- Identify Highlands wetlands using 2002 LULC
- Identify vernal habitats using NJDEP vernal habitat maps
- Assign existing NJDEP surface water quality classifications
- Utilize riparian corridor analysis to improve the identification of potential headwater streams, seeps and springs using the Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database, updated mapping from 2002 LULC and other methods
- Identify unmapped headwater streams using Soil Conservation Service mapping and NJDEP 10-meter digital elevation grid data.

Ecosystem Management
Highlands Open Waters Protection

INDETERMINATE STREAM MAPPING UPDATE

NJ SCS Soil Surveys

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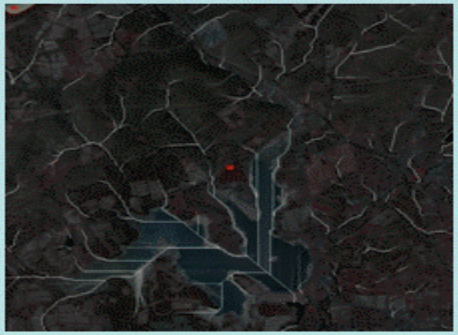


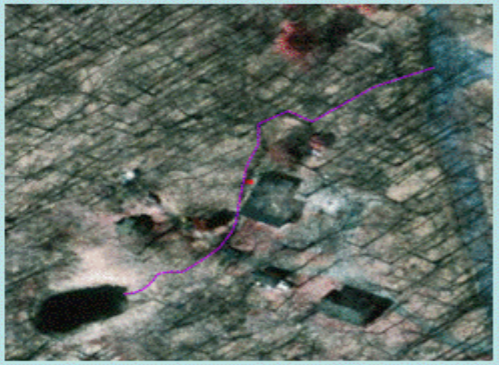
Flow Accumulation Rasters

Ancillary Datasets

NJDEP Hydrography Data

Using ancillary datasets as a guide a team of analysts has carried out an update of the NJDEP 2002 hydrography layer for the NJ Highlands Region. Indeterminate streams omitted from the digital dataset have been hand-digitized to coincide with existing hydrography datasets to increase data completeness across the Region.

Before Update



After Update

Hand-Digitized Update

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Highlands Open Waters Protection

Stream Integrity Model

- **Develop an ecologically-based approach to characterize stream integrity based on land use and biological indicators**

Highlands stream network

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Highlands Open Waters Protection

Stream Integrity Model

- **Use the following data as indicator(s) of stream integrity**
  - **NJDEP Ambient Biomonitoring Network (AMNET) data. For HUC 14 basins with limited or no AMNET data, extrapolate AMNET score correlated with and/or based on HUC14 land use condition from basins with data. Develop statistical relationship between AMNET scores and HUC 14 LULC. Extrapolate to all 183 HUC 14 basins to estimate stream health.**
  - **Use development intensity which is measured by impervious cover percentage, total urban and agricultural LULC data.**
  - **NJDEP water quality monitoring/assessment data [e.g., 305(b), 303(d)]**
  - **Additional biological indicators (i.e., mussel, aquatic and wetland dependent wildlife species data) as indicators of stream integrity.**

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Stream Integrity Model (continued)

- **Use surface water classification as indicator of regulatory constraints.**
- **Develop criteria/threshold for each indicator (e.g. AMNET classifications, stream classification, development intensity, etc.) for determining buffer requirements.**
- **Include stream integrity indicators as criteria for assigning watershed conservation value of contributing drainage area.**

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Highlands Open Waters Protection

Riparian Corridor Analysis

- **Identify riparian areas by integrating hydrography (HYDRO), land use/land cover (LU/LC) with the following GIS coverages.**
  - **Floodprone areas**
    - ✓**NJDEP floodprone coverage (USGS 100-year floodplain)**
    - ✓**FEMA Q3 flood coverage (100-year floodplain).**
  - **Riparian soils derived from SSURGO**
    - ✓**hydric soils**
    - ✓**soils exhibiting a seasonal high water table ≤ 18“**
    - ✓**alluvial soils**
  - **Wetlands and wetland buffers using NJDEP 2002 LU/LC and agriculture wetlands modified that are hydrologically connected to a stream.**
  - **Stream buffer (wildlife habitat and movement corridor)**

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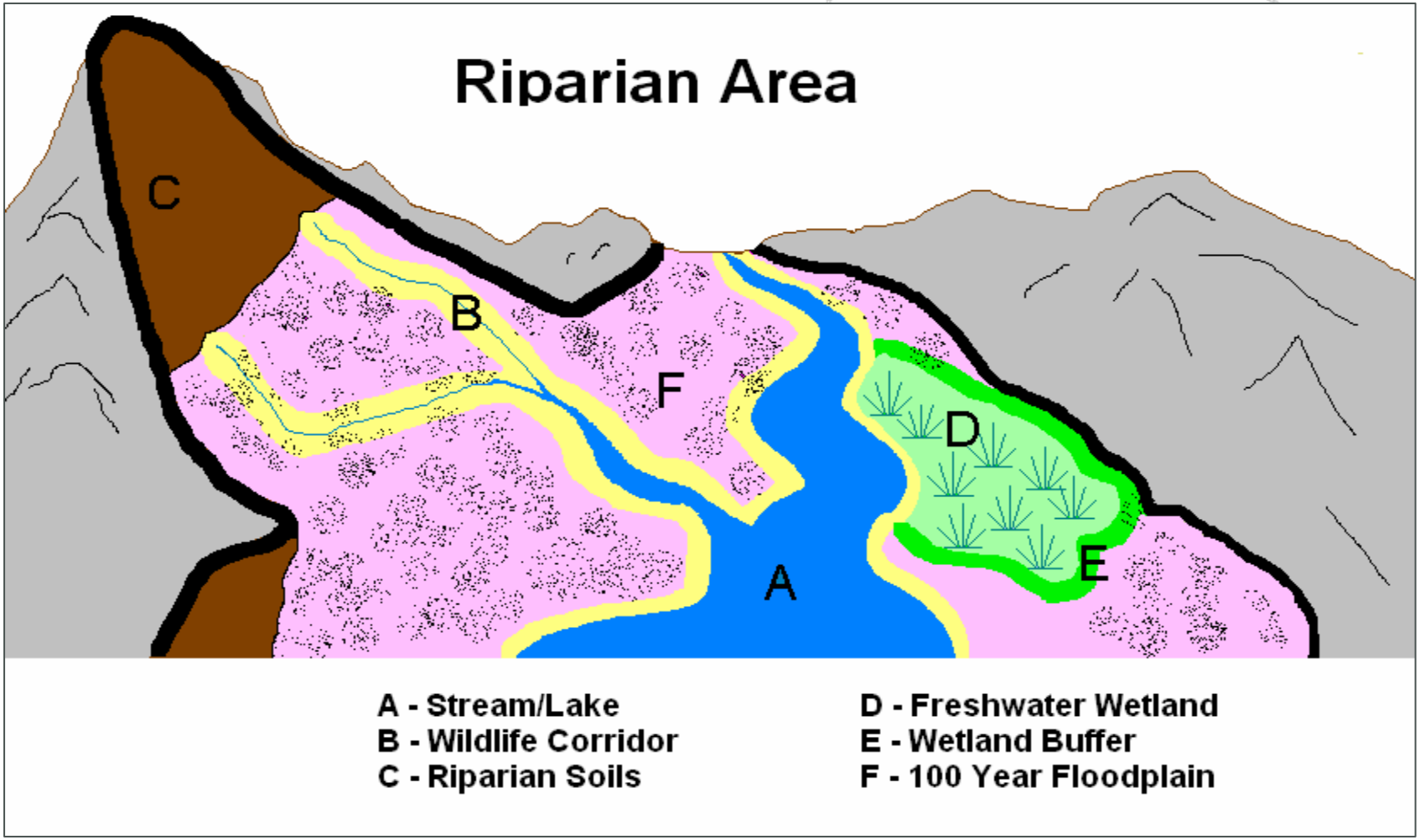
Riparian Corridor Analysis (cont)



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Highlands Open Waters Protection

Regulatory Constraints

- **Identify existing regulatory constraints under the following programs**
  - Freshwater Wetlands Protection Act Rules N.J.A.C. 7:7A
  - Stormwater Management Rules N.J.A.C. 7:8
  - Special Adopted Rules (NJDEP Highlands Rules) N.J.A.C. 7:38
  - Flood Hazard Area Control Act Rules N.J.A.C. 7:13
- **Identify existing regulatory constraints for streams and open waters**
  - Assign 300' buffer to C-1/trout production streams; 150' buffer to FW1 and Non-C-1 streams that intersect with Landscape feature; 50' buffer for trout maintenance and non-trout streams that do not intersect a Landscape feature
  - Buffer from stream bank or where shown on HYDRO layer
  - A Landscape feature includes levels 3, 4 and 5 for forested wetland, emergent wetland and wood turtle only
  - Identify stream buffers of 300' for all Highlands open waters within the Preservation Area

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Highlands Open Waters Protection

Regulatory Constraints (cont)

- **Identify existing regulatory constraints for wetlands**
  - **Exceptional resource value wetlands defined as requiring a 150' buffer where the wetland polygon intersects with landscape 3, 4 and 5 for forest wetland, emergent wetland and wood turtle; or intersects within 300' of a FW1/trout production stream and open water buffer.**
  - **50' buffer for all other wetlands that do not intersect a designated landscape polygon or FW1/Trout Production stream.**
  - **Identify wetland buffers of 300' for all Highlands open waters within the Preservation Area**
- **Identify existing regulatory constraints for floodplain and flood prone areas (the constrained layer is the 100 year floodplain (digital FEMA 100 year) and DEP delineated flood prone areas)**

Ecosystem Management
Ecological Resources

Forest Integrity

- **Conduct a fragmentation analysis to assess forest integrity**
  - **Evaluate forest area and composition**
    - ✓ **Extract forest from NJDEP 2002 LU/LC**
    - ✓ **Intersect 2002 NJDOT roads with forest coverage to exclude roads and further subdivide forest**
  - **Define core vs. edge forest**
    - ✓ **Near edge = <100' to altered edge**
    - ✓ **Far edge = 100–300' to altered edge**
    - ✓ **Core = >300' to altered edge**
    - ✓ **Altered land is Urban (including utility ROW), Agriculture and Barren (excluding beach, bare rock, herbaceous wetland, water)**

Ecosystem Management
Ecological Resources

Forest Integrity (continued)

- Forest patch characteristics
  - ✓Contiguous tracts of forest defined such that adjacent (4 neighbor rule) forest grid cells are clumped into unique patches
  - ✓Determine patch characteristics on a Highlands-wide and HUC14 basin level
- Forest fragmentation at landscape level
  - ✓Largest patch index (LPI)= ratio of size of largest forest patch to HUC area
  - ✓Landscape shape index (LSI) = ratio of edge length to square root HUC area
  - ✓Mean Distance to closest patch (MDCP) = shortest edge-to-edge distance between distinct patches within a 1,000 foot radius
  - ✓Road density (linear feet/acre) = fragmentation due to roads
- Forest cover proportion metrics at 3km scale
  - ✓Calculate forest cover proportion using a 3x3 km roving window as an analysis region

Ecosystem Management
Ecological Resources

Critical Habitat Protection

- **Identify and rank critical wildlife habitat areas.**
  - **Identify rare, threatened and endangered (RTE) animal species and habitats in consultation with NJDEP Endangered and Nongame Species Program (ENSP).**
  - **Rare species includes those ranked as S1, S2 and S3 in New Jersey by Nature Serve and the Nature Conservancy, and those species appearing on the NJDEP species of special concern list.**
  - **Threatened and endangered species means those wildlife species designated pursuant to the Endangered and Nongame Species Conservation Act, N.J.S.A. 23:2A-13 et. seq. and implementing rules, and any species of wildlife appearing on any Federal endangered species list.**

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Ecological Resources

Critical Habitat Protection (cont)

- **Assign conservation value to critical habitat areas according to species rank, richness and vulnerability.**

Ecosystem Management
Ecological Resources

Significant Natural Areas

- **Identify and rank significant natural areas**
  - In consultation with NJDEP Natural Heritage Program (NHP) identify significant natural areas including habitat for rare and endangered plant species.
  - Rare species include those Plant Species of Concern listed pursuant to N.J.A.C. 7:5C-3.1
  - Endangered species means species included on the list of endangered species that the NJDEP promulgates pursuant to the Endangered Plant Species List Act, N.J.S.A. 13:1B-15.151 et seq. and those plants species designated as listed, proposed, or under review by the federal government pursuant to the Endangered Species Act of 1973, 16 U.S.C. § § 1531 et seq.
  - Identify significant natural areas and needs for their protection using information from the USDA Forest Service NY-NJ Highlands Regional Study, NJDEP and other sources.
  - Assign biodiversity conservation value to significant natural areas.

Ecosystem Management
Ecological Resources

Steep Slope Analysis and Digital Elevation Model

- Identify steep slopes using NJDEP 10-meter digital elevation grid (DEM) mapping.
- Classify areas of steep slope based on importance in terms of protecting ecological resources, water resources and scenic attributes.
- Rank steep slopes based on vegetation characteristics, soil characteristics, erodability, soil losses, and proximity to surface water resources.
- Physical constraints. Create a vector data layer from 10 meter Digital Elevation Model (DEM) representing:
  - 5 – <10% slopes
  - 10 – <15% slopes
  - 15 – <20% slopes
  - 20% and greater slopes

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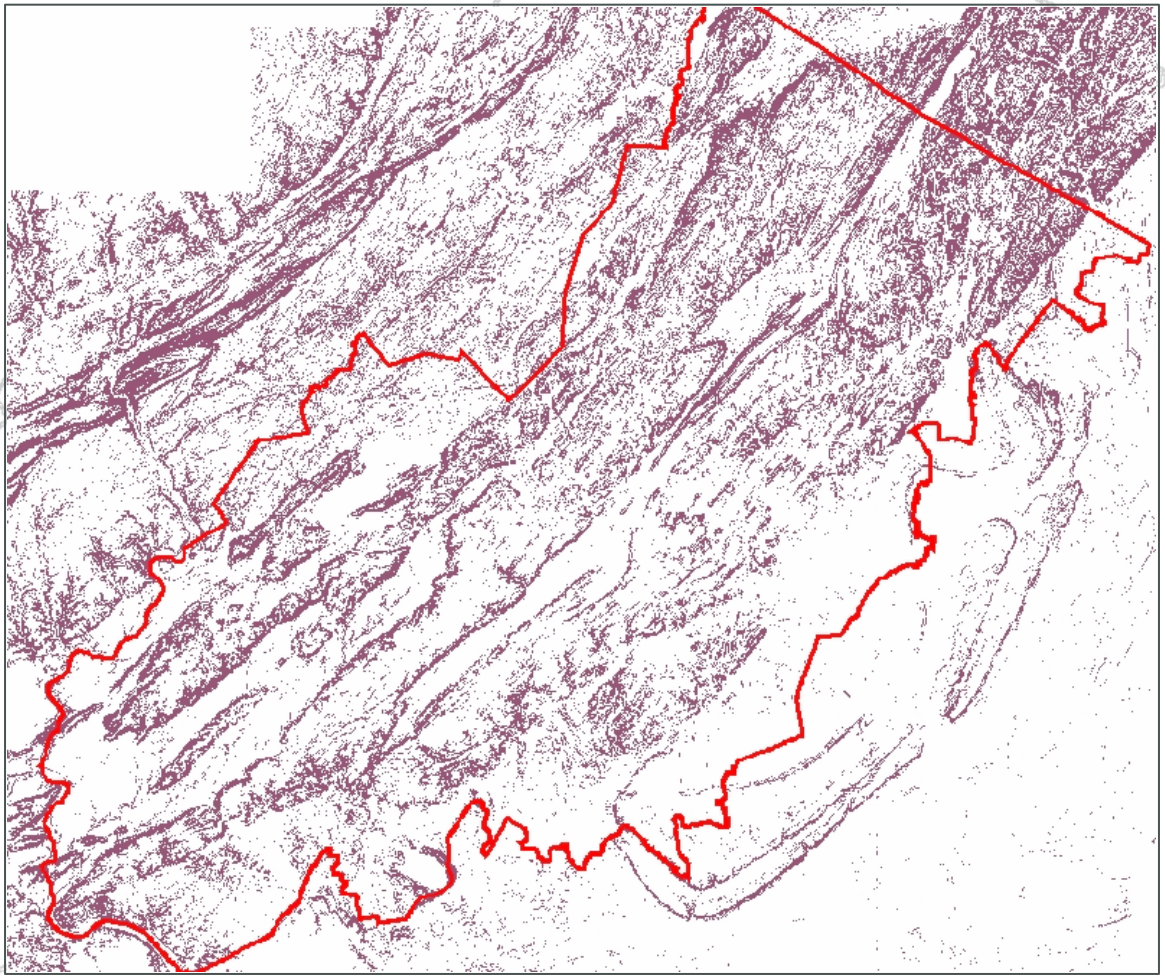
Ecological Resources

New Jersey Highlands Steep Slope Analysis >15% slope



Sustainable Forestry

Forest Sustainability Strategies

- **Identify Existing Forest Resources**
  - Inventory forest stewardship lands based on best available information such as farmland assessed parcels that are forested land.
- **Develop Forest Sustainability Strategies**
  - Document economic, legal, institutional, technical assistance and educational tools.

Ecosystem Management
Conservation Threat Assessment

Objectives

- **Using baseline data derived from the resource assessment, identify relative conservation threats at a regional scale to inform appropriate land use standards.**

Assessment

- **Determine whether permissible zoning uses and densities exceed resource constraints.**
  - **Using data from the resource assessment, buildout analyses and other sources, identify where current zoning and development potential conflicts with resource value.**
- **Evaluate long-term protection of resource value within public lands.**

Problem Statements
Ecosystem Management and Sustainable Forestry Practices

Ecosystem Management and Sustainable Forestry Practices

Problem Statement #1

- What forest metrics are useful for evaluating forest integrity?
- What quantitative thresholds should be used to identify high value forest land that should be prioritized for protection?

Problem Statement #2

- How do we integrate forest stewardship practices with watershed and forest protection (biodiversity, forest health) goals?

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Problem Statement #3

- What biological, chemical and physical attributes should be considered to rank/prioritize protection needs of Highlands open waters (surface waters and wetlands)?

Problem Statement #4

- What are the most effective methods and approaches to conserve biodiversity?
- What indicators of ecosystem health including, but not limited to critical habitat and significant natural areas should be considered?

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Problem Statement #5

- **What considerations should be factored into developing steep slope categories for purposes of regulating land use and development?**