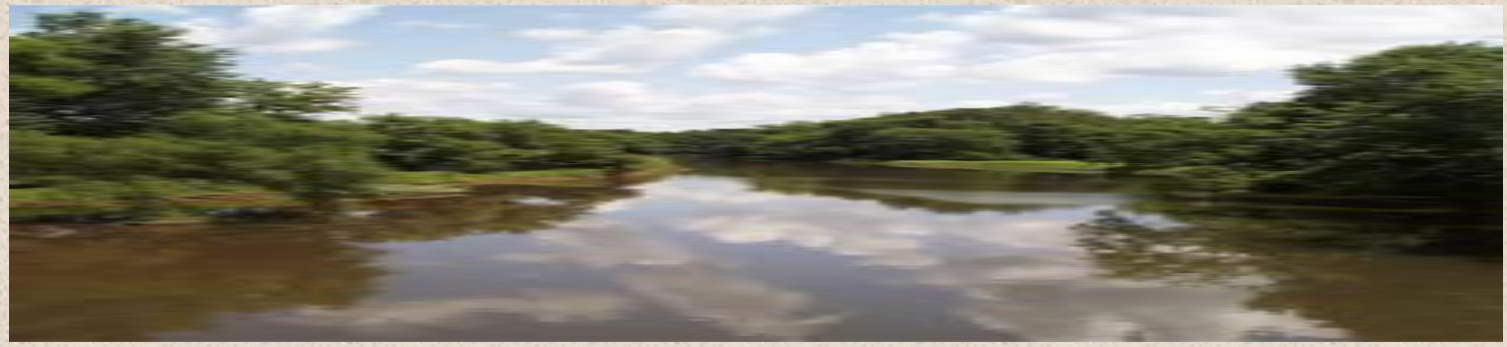

Landscape of the Raritan Basin Technical Report

Presentation By:

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Tom Stanuikynas

August 22, 2001

Raritan Basin Watershed Management Project

ACKNOWLEDGEMENTS

Caroline Phillipuk, GIS Specialist
Upper Raritan Watershed Association

Dan Van Abs, Manager
NJ Water Supply Authority

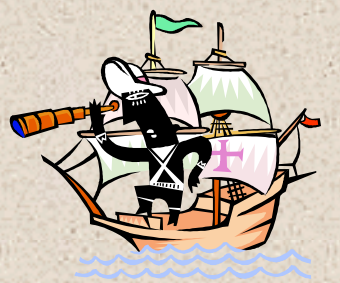
HISTORY OF THE RARITAN BASIN

Lenni-Lenape Tribes

- Minsi and Unami
- Hunting and Gathering
- Cleared Land for Gardens
- Beans, Corn & Squash
- Villages
- Trails
- Low impact to environment

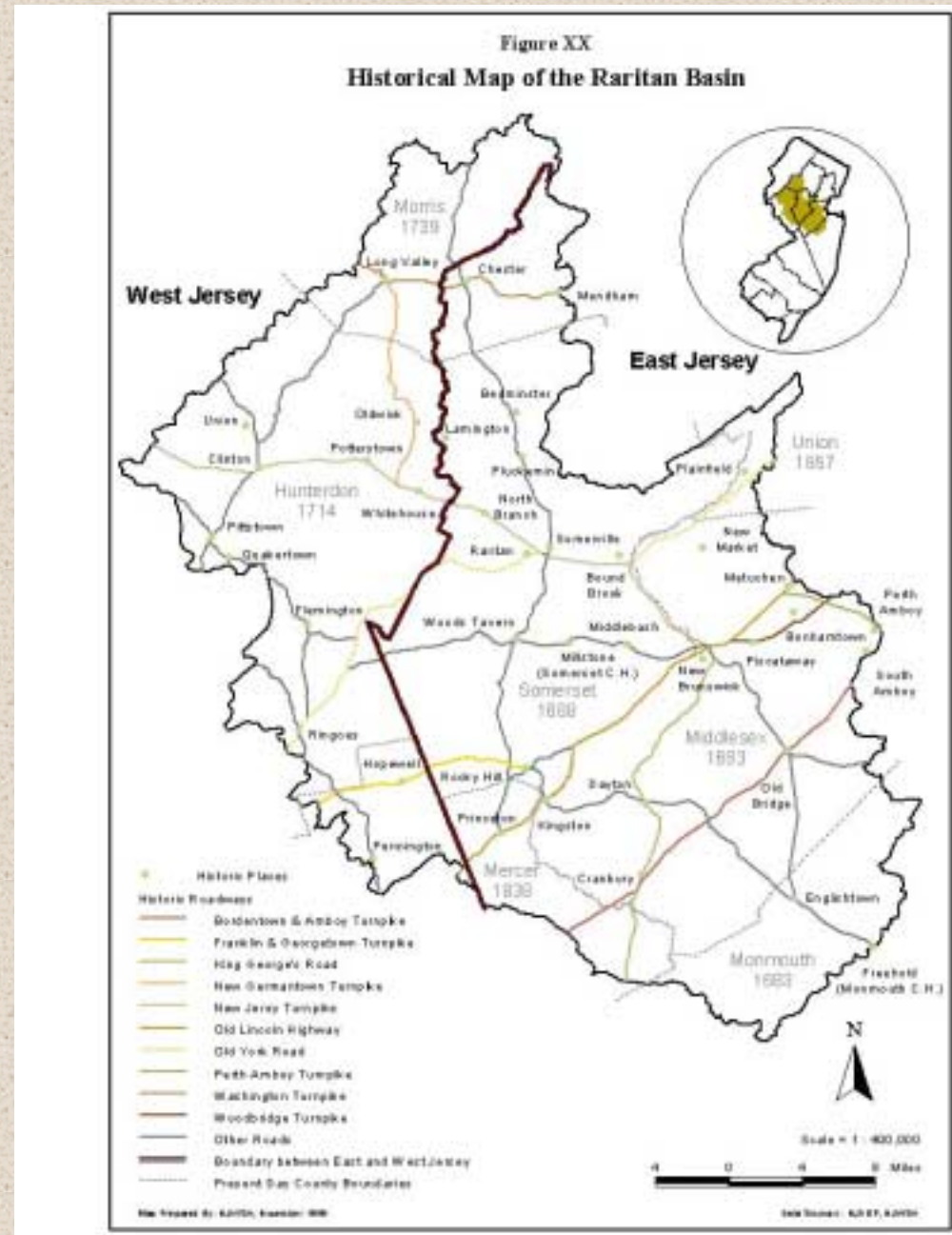
Colonial Settlement

- Dutch Settled along the Hudson River
- New Netherlands
- British in 1664
- Elizabethtown
- Piscataway & Woodbridge
- East and West Jersey
- Counties formed



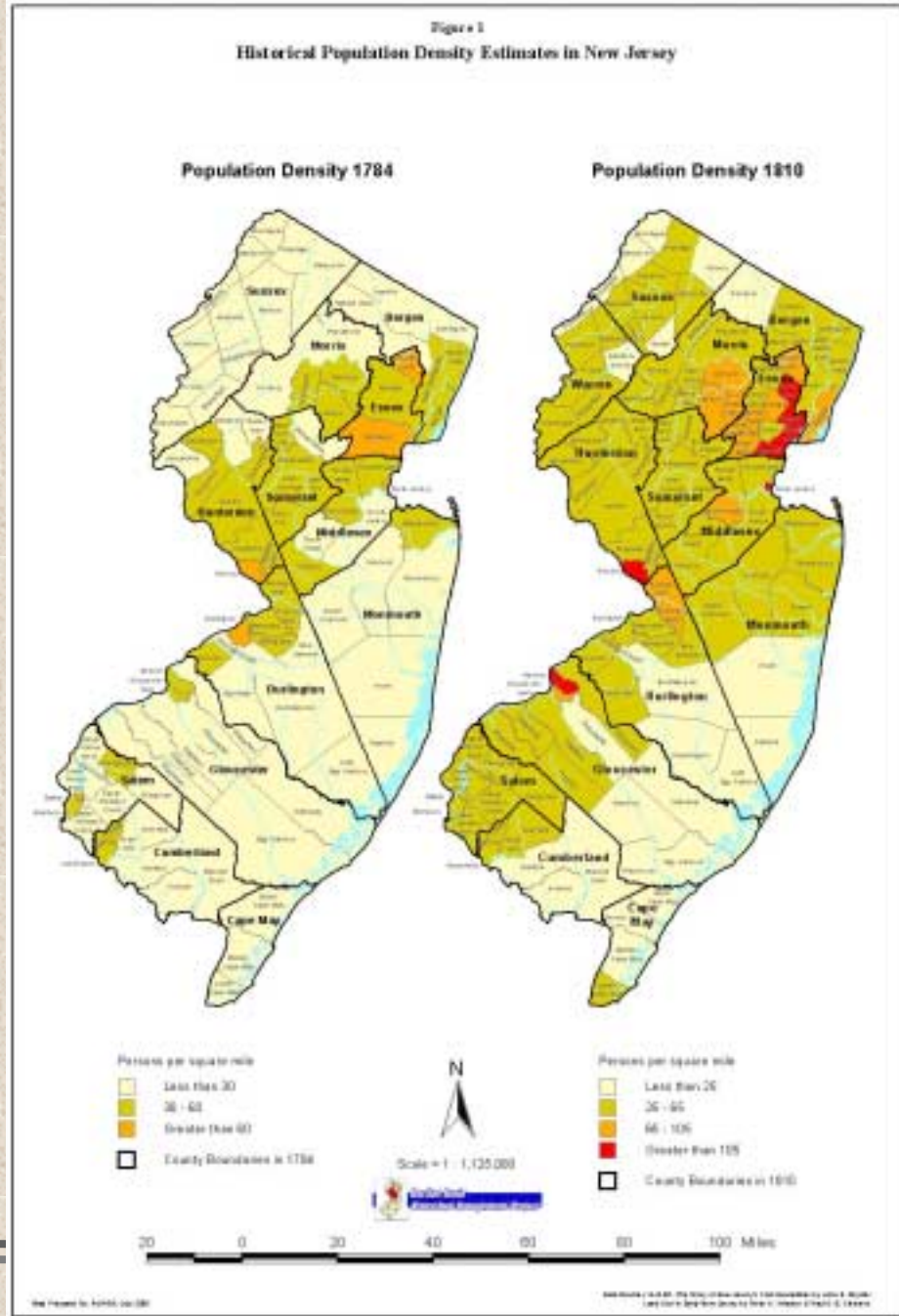
HISTORY – CONTINUED

- Agriculture
  - Rich Soils & Moderate Climate
  - Wheat, Fruits, Vegetables
  - Farms Dominated the Area
- Industry
  - Rivers and Streams Powered Early Industry
  - Industrial Revolution
- Transportation
  - Crossroads of the Colonies
  - Turnpikes, Canals, Railroads



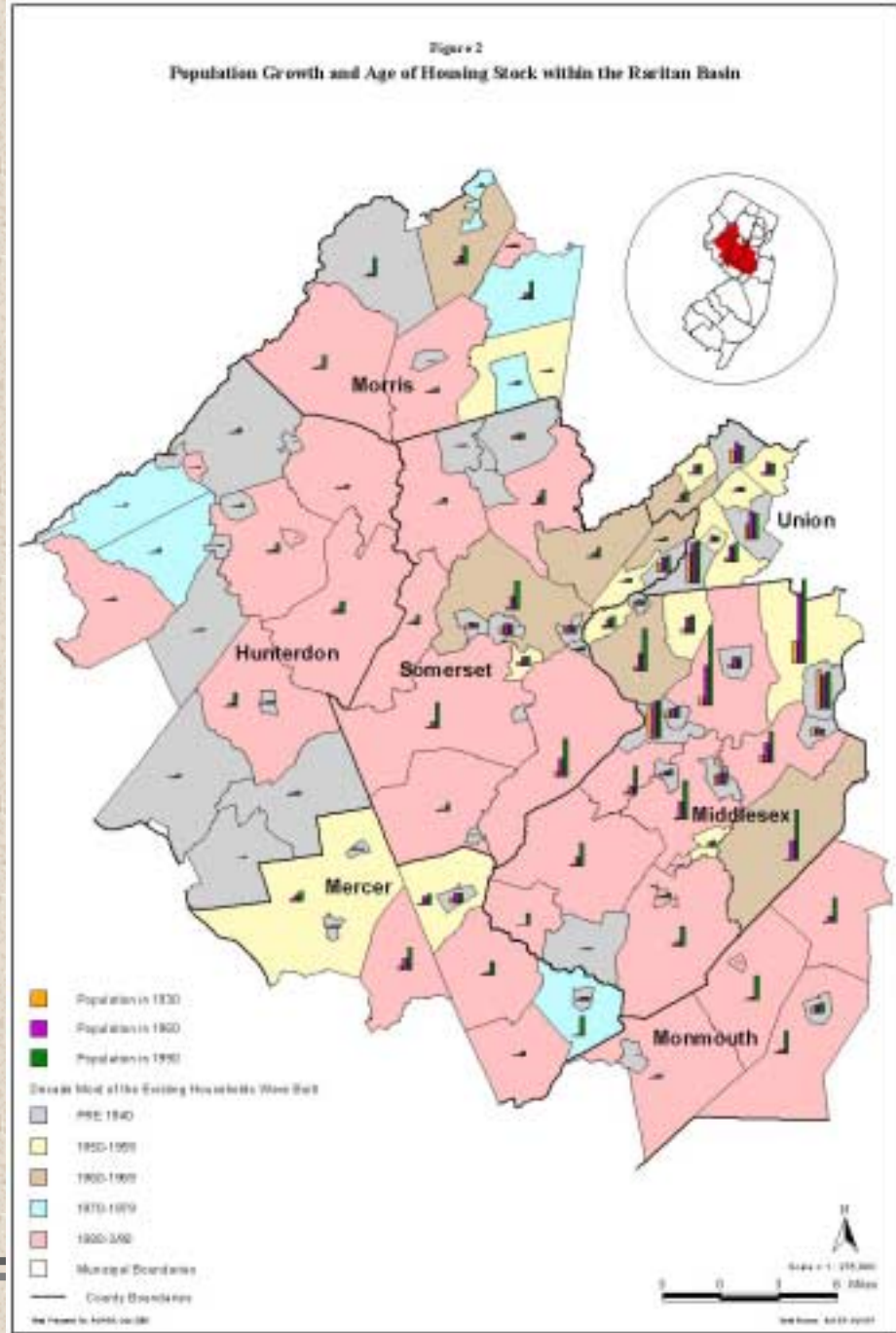
POPULATION GROWTH

- Mainstem Raritan River
- Ports - Perth Amboy & New Brunswick
- Population Centers
  - Flemington
  - Freehold
  - Princeton
  - Somerville
- Development Along Transportation Corridors
  - Plainfield
  - Bound Brook



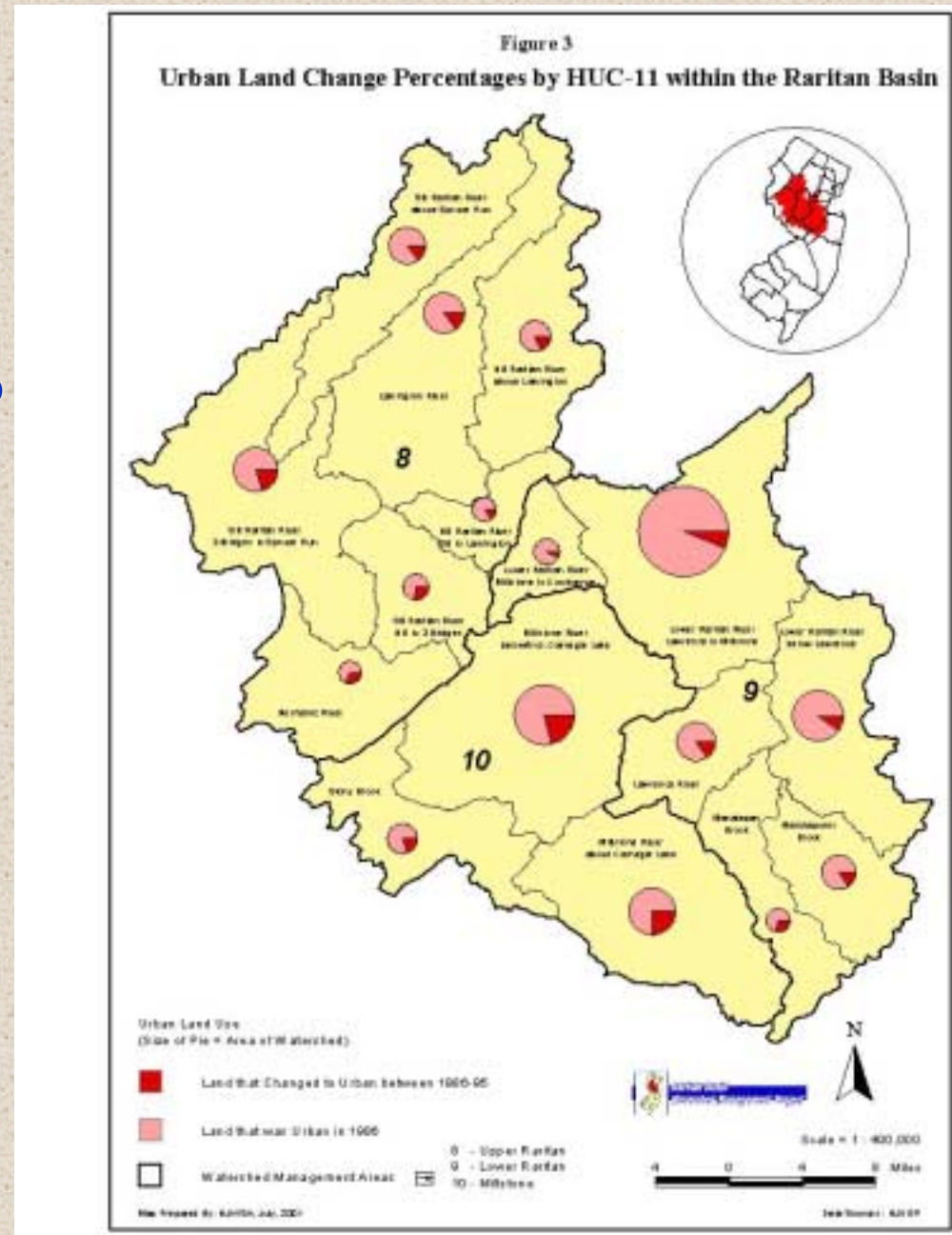
POPULATION GROWTH CONTINUED

- Population Growth in NJ
  - 1880 – 1,131,116
  - 1930 – 4,041,334
  - 2000 – 8,414,350
- Railroads and Interstate Highways
- Cities and Towns Lose Population
- Suburban Growth Extends South & West
- Commuters Travel Further



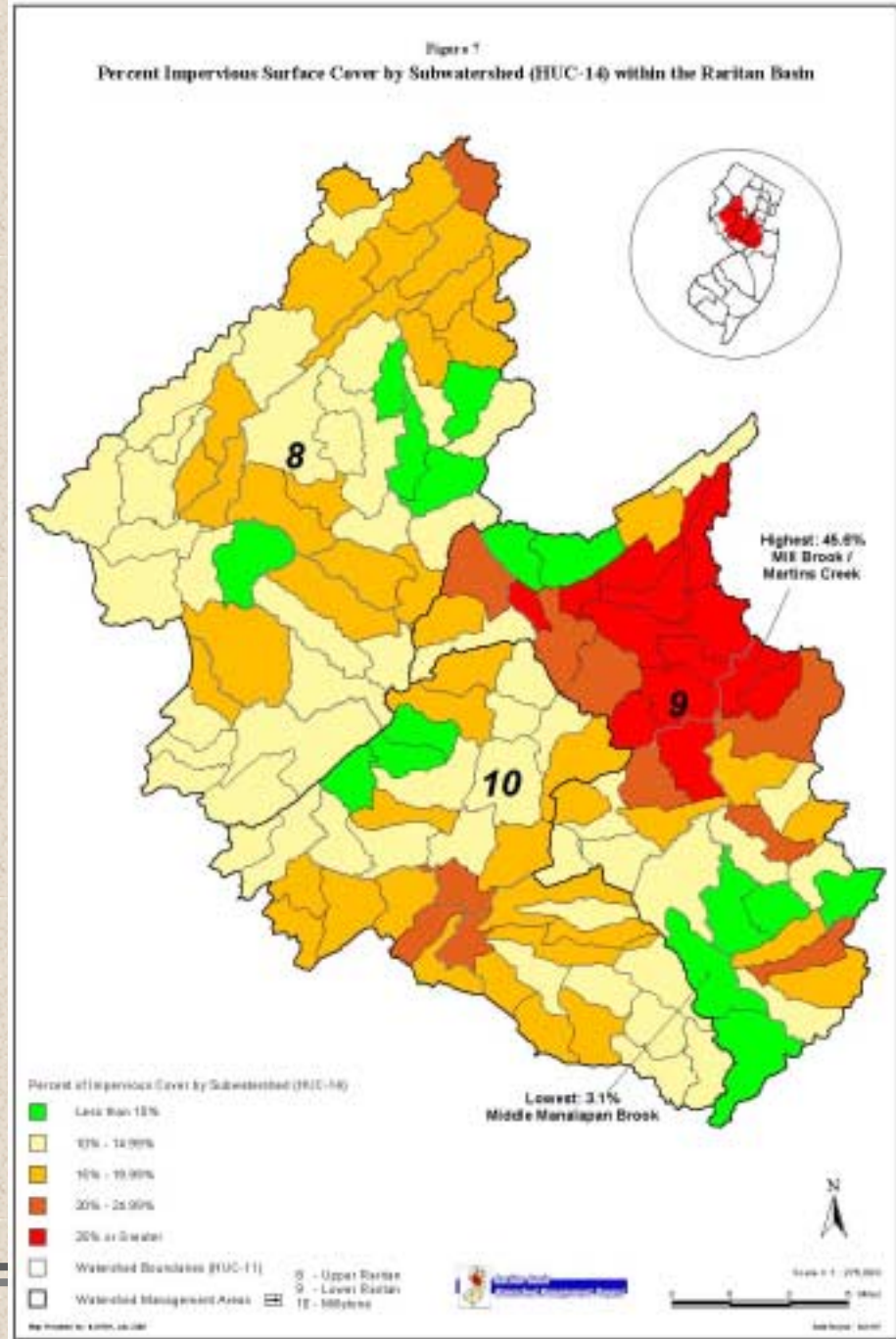
LAND USE / LAND COVER

- Change from 1986 & 1995
  - 14% converted to urban
  - Neshanic
  - Manalapan
- Low Density/Rural Development
- Urban Land Use
  - Green Brook
  - Lower Raritan
- Agricultural Land Use
  - Neshanic
  - South Branch Raritan



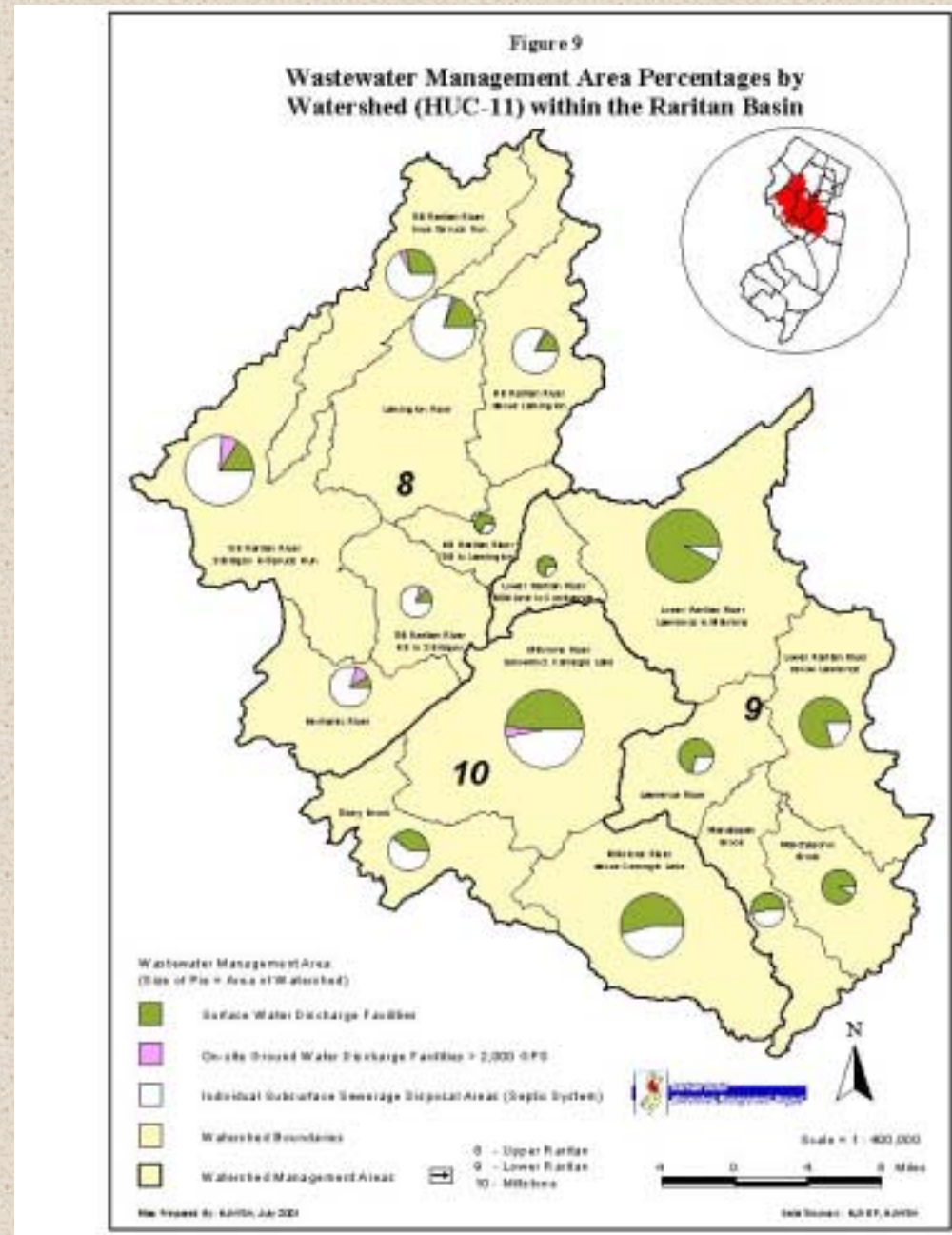
IMPERVIOUS SURFACE (IS)

- NJDEP 1995/97 LU/LC data
- Raritan Basin is 11% IS
- IS by Land Use
  - Residential (Union, Middlesex)
  - Industrial (Near Interchanges)
  - Commercial (Routes 1, 9, 18)
- IS by HUC 14
  - Center for Watershed Protection
  - Less than 10%
  - Between 10% and 25%
  - Greater than 25%



WASTEWATER DISCHARGE AREAS

- Sewer Service Areas –50%
  - Surface Water
  - Ground Water
- Septic Systems –50%
  - Low Density, Rural Areas
- Relationship to Land Use
  - 71% of Urban Areas Sewered
  - 71% of Ag in Septic Areas
- Projected Growth Areas
  - Raritan & Montgomery Twps



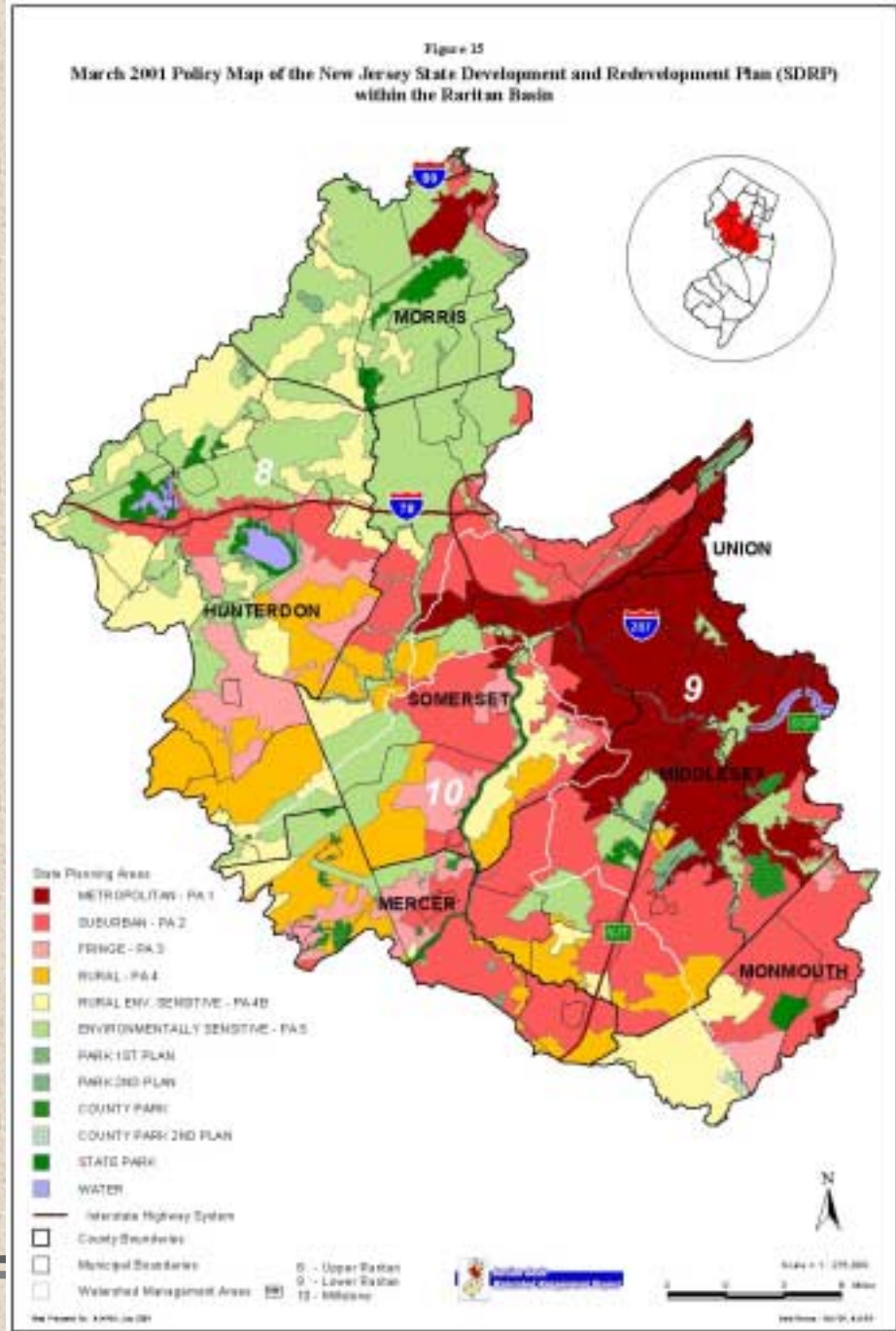
TRANSPORTATION

- Highway Network
  - Interstates (I-78, I-287)
  - Arterial Roads (US 1, 22)
- Rail Network
  - 5 NJTRANSIT Lines
  - 25 Stations in Basin
- Urban Land within 1 Mile
  - Highways – 80% in 1986
  - Rail – 12% in 1986
  - Highways – 59% new urban
  - Rail – 3% new urban
  - Overall % decrease by 1995

STATE DEVELOPMENT & REDEVELOPMENT PLAN

Planning Areas – Urban LU

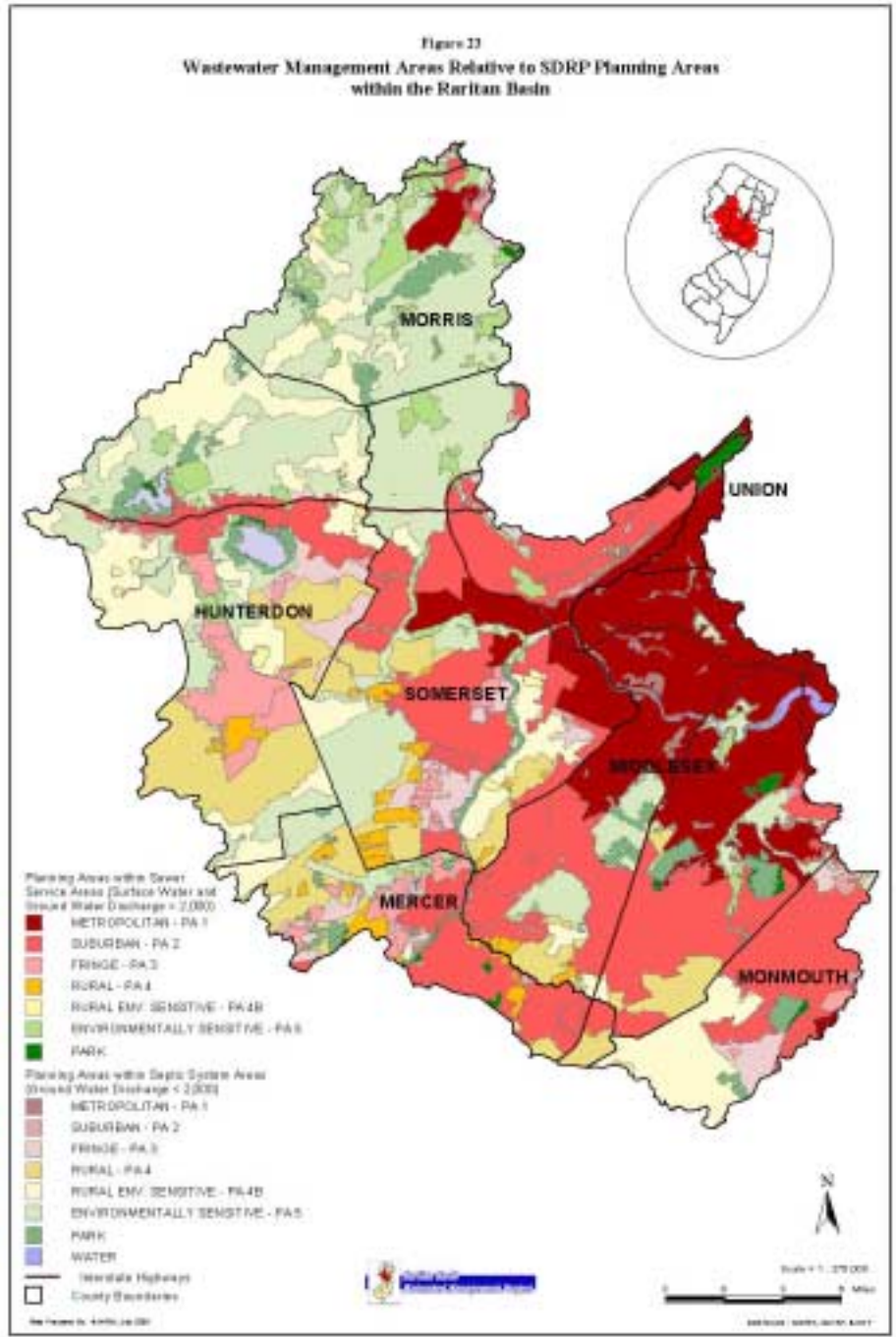
- Metropolitan – 74% Urban
- Suburban – 47%
- Fringe – 44%
- Rural – 18%
- Rural Env. Sensitive – 17%
- Environmentally Sensitive – 22%
- Park – 10%



STATE PLAN – CONTINUED

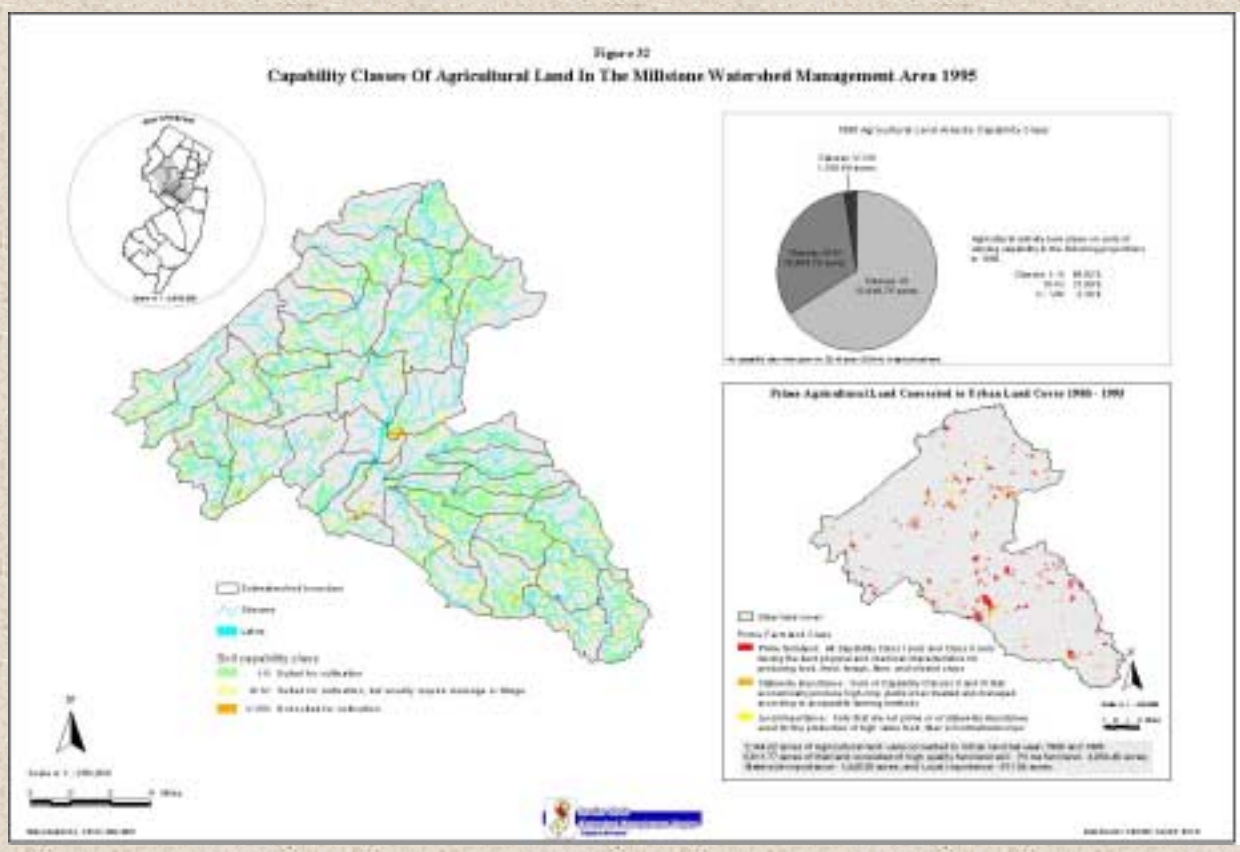
Relationships to:

- Land Use/Land Cover
- Land Use Change between 1986-95
- Sewer Service Areas
- Transportation Network
- First Order Streams
- Impervious Surface



SOIL SUITABILITY FOR AGRICULTURE

- Assessed soils by capability class (i.e., suitability for cultivation)
- Identified areas with limitations due to erosion, excess water and stoniness
- Calculated losses of Prime Agricultural Land b/t 1986-95

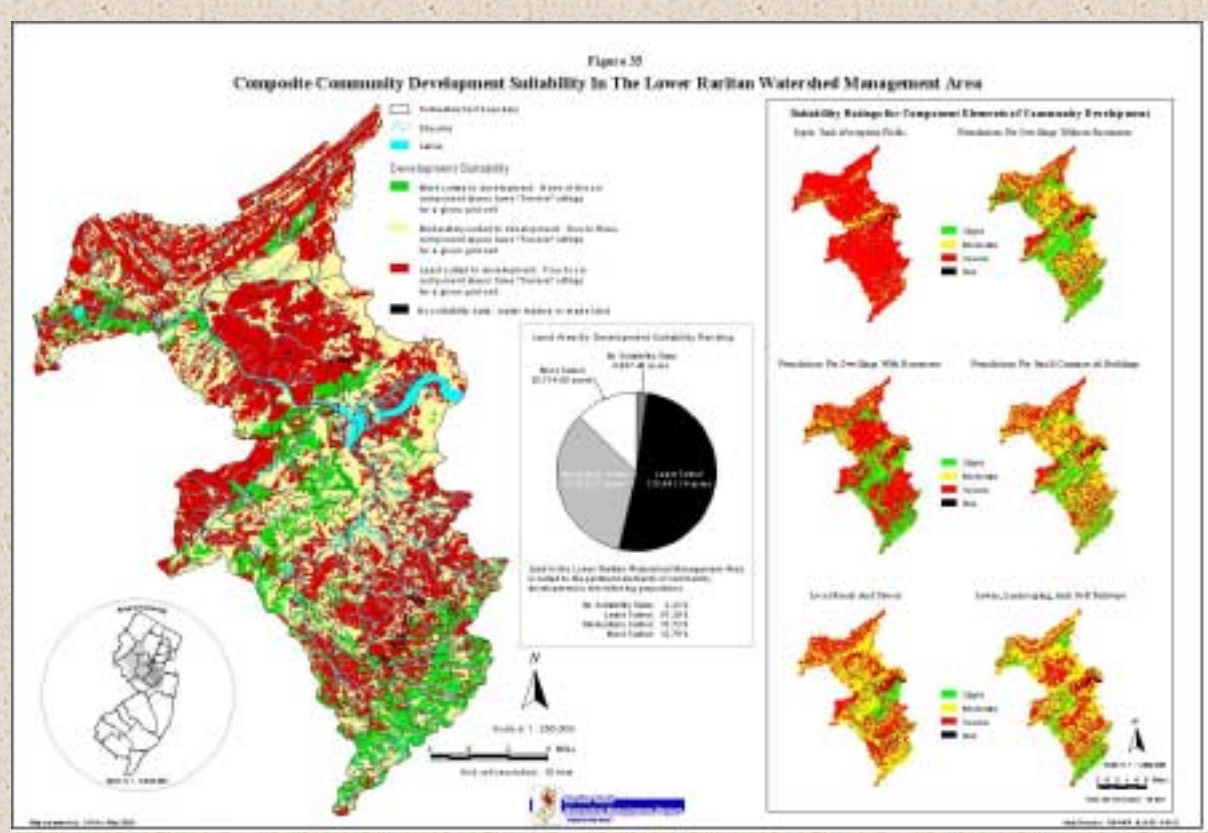


RESULTS OF AGRICULTURAL SUITABILITY ANALYSIS

- **Most Ag lands in Raritan at least somewhat suitable for cultivation**
- **Conversion of Agricultural Land to Urban Land Uses Between 1986 and 1995**
  - 7,593 acres of Upper Raritan WMA
    - 47% was prime farmland
  - 3,446 acres of Lower Raritan WMA
    - 64% was prime farmland
  - 7,144 acres of Millstone WMA
    - **68%** was prime farmland

SOIL SUITABILITY FOR DEVELOPMENT

- Assessed soils for 6 elements of development:
  - Septic tanks
  - Foundations w/ basements
  - Foundations w/o basements
  - Small commercial buildings
  - Local roads/streets
  - Lawns, landscaping, golf fairways

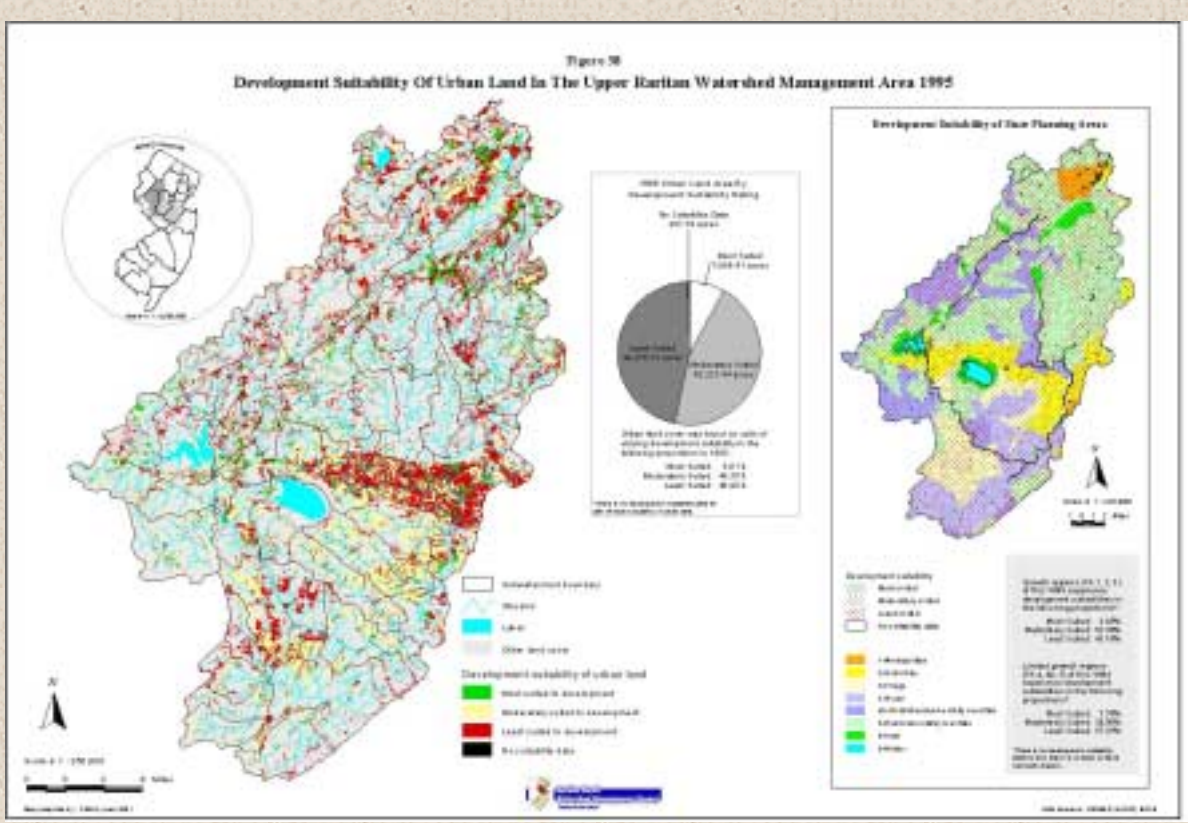


RESULTS OF DEVELOPMENT SUITABILITY ANALYSIS

- **Soils Most Suited to Development**
  - 6.6% of Upper Raritan WMA
  - 13% of Lower Raritan WMA
  - 12% of Millstone WMA
- **Soils Least Suited to Development**
  - 54% of Upper Raritan
  - 51% of Lower Raritan
  - 47% of Millstone

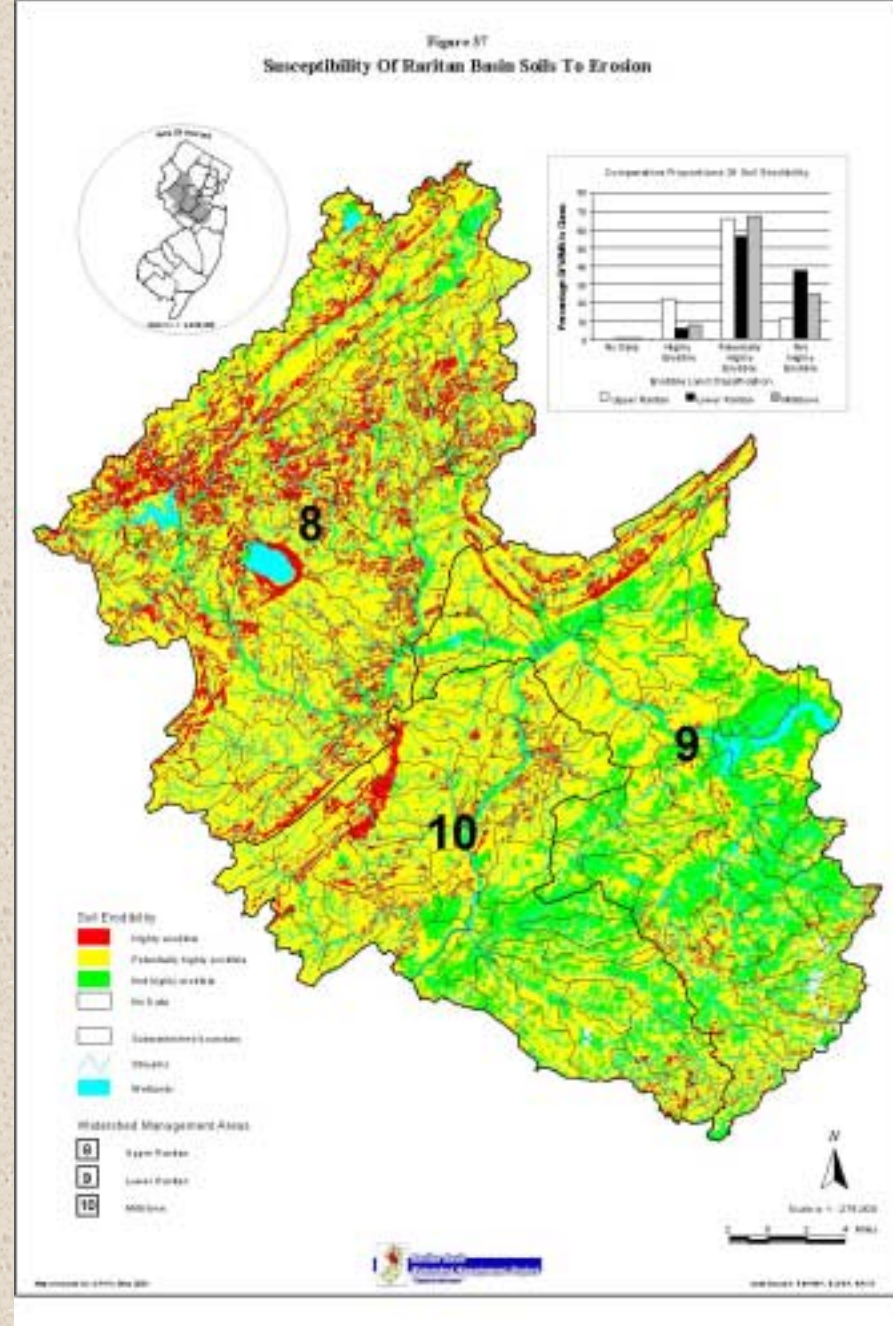
RESULTS OF DEVELOPMENT SUITABILITY ANALYSIS CONT'D

- **Development as of 1995 Occurring on <u>Least</u> Suitable Soils**
  - 47% of Upper Raritan
  - 38% of Lower Raritan WMA
  - 36% of Millstone WMA

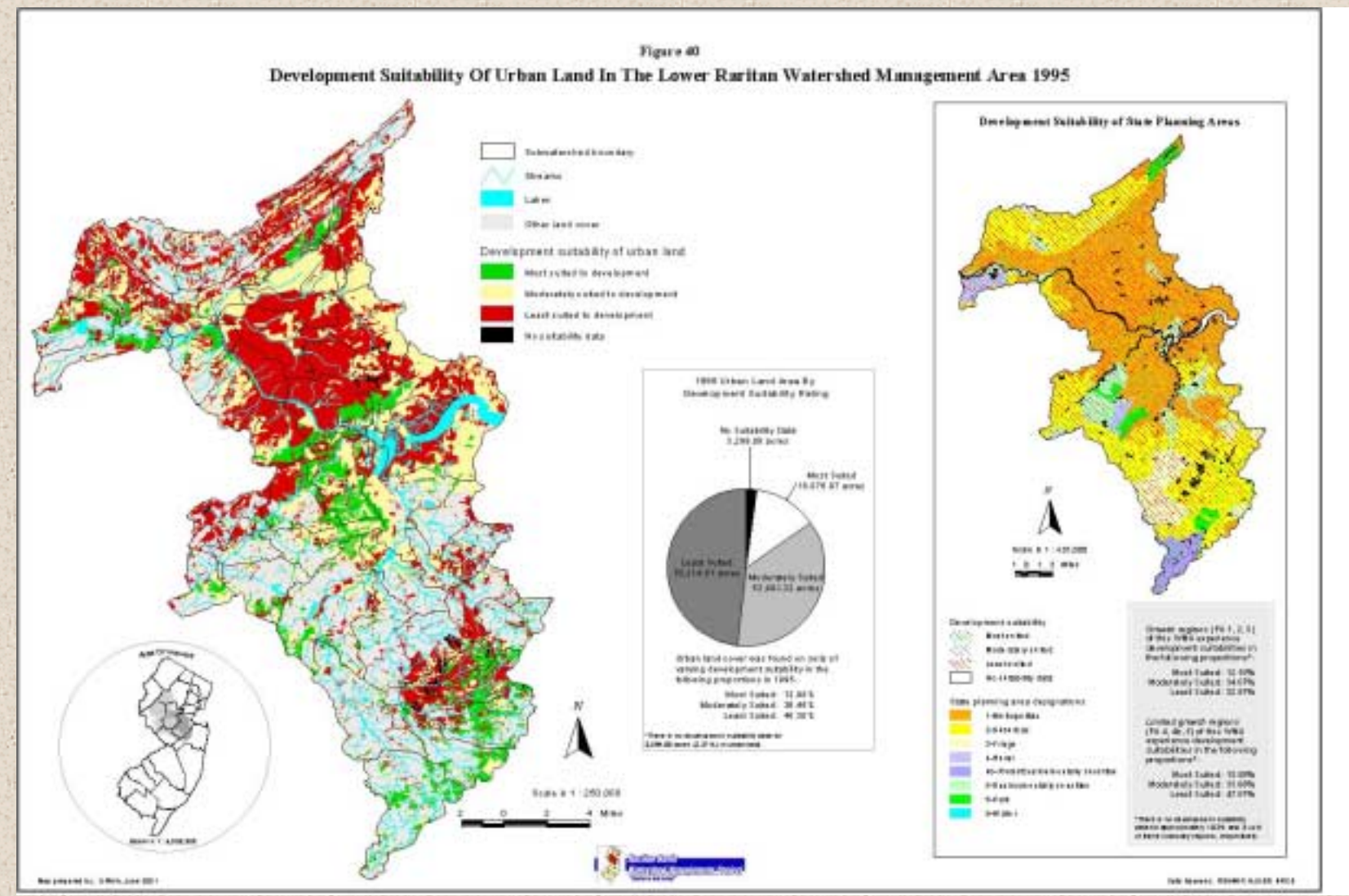


SUSCEPTIBILITY OF SOILS TO EROSION

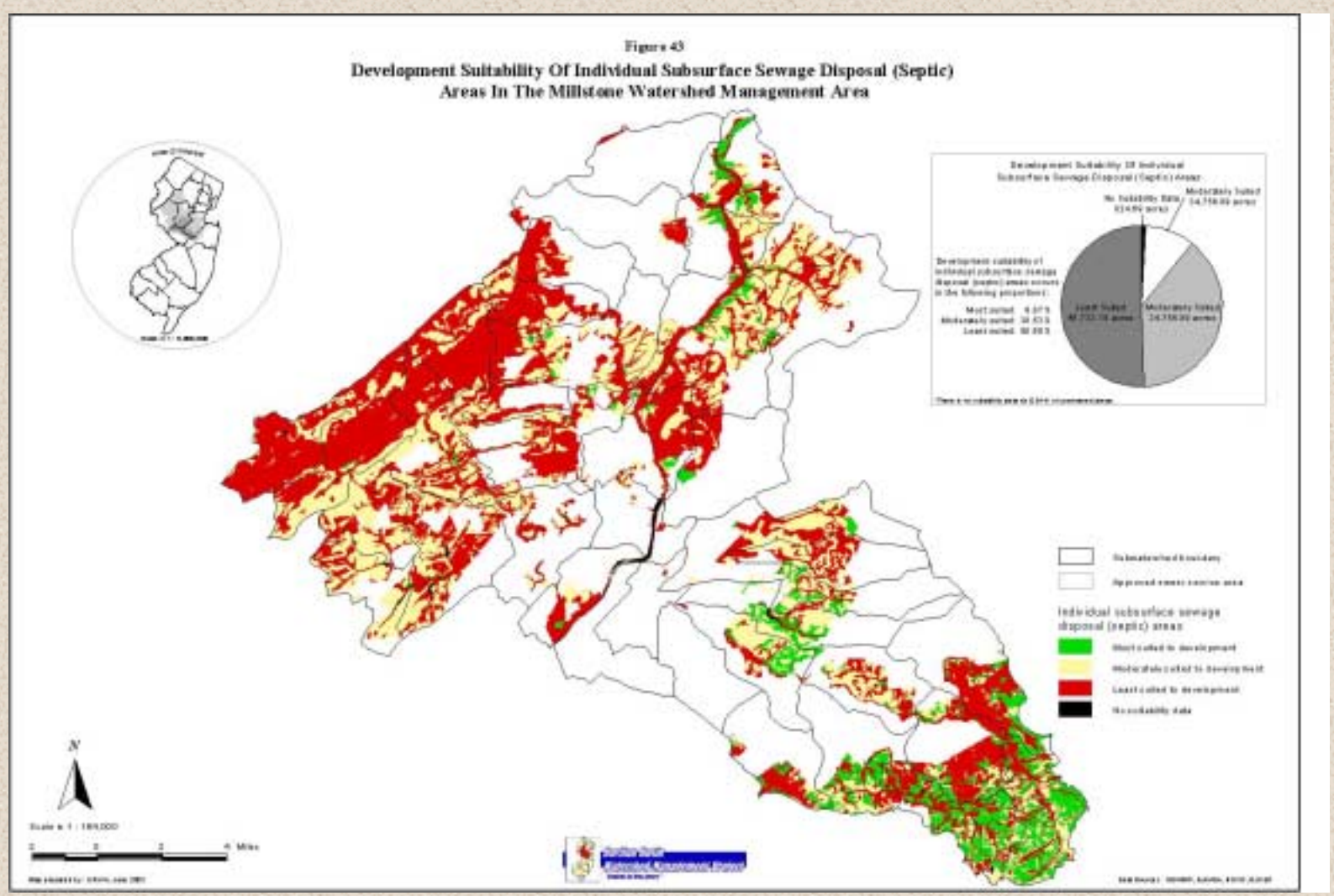
- Erodibility ratings based on subjectivity of soils to erosion by water
- Upper Raritan WMA has greatest highly erodible soils (22%)
- Regions of the Highlands and Piedmont have most highly erodible soils



SUITABILITY OF SOILS FOR DEVELOPMENT TO PLANNING AREAS OF SDRP

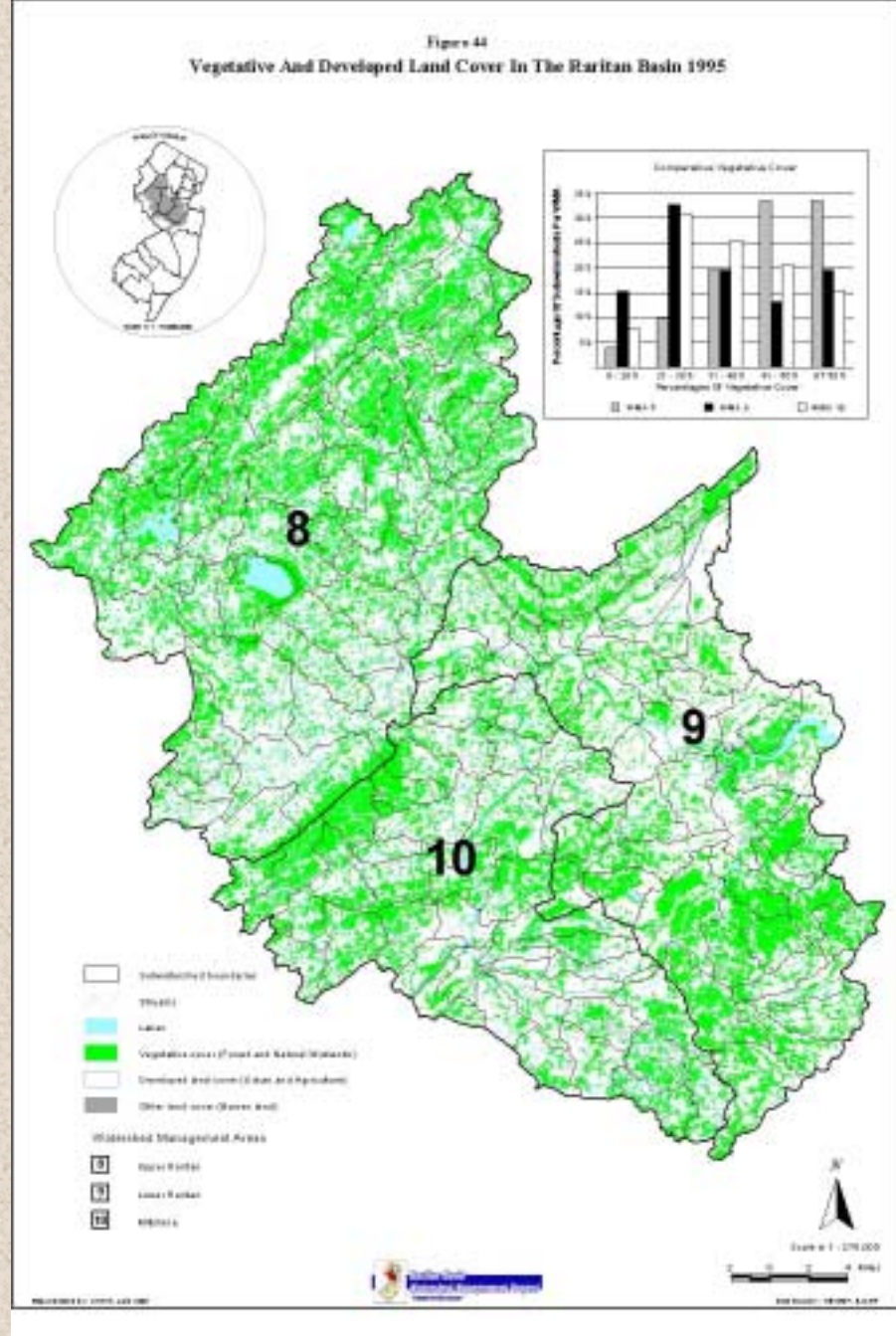


SUITABILITY OF SOILS FOR DEVELOPMENT TO SEPTIC SYSTEM AREAS



VEGETATIVE & DEVELOPED LAND COVER

- Vegetative Cover includes:
  - Forest cover & Natural Wetlands (not Ag-modifed wetlands)
- Basin:
  - 27% forest
  - 15% wetlands
- Upper Raritan WMA has greatest percentage of vegetative cover per subwatershed (HUC-14)

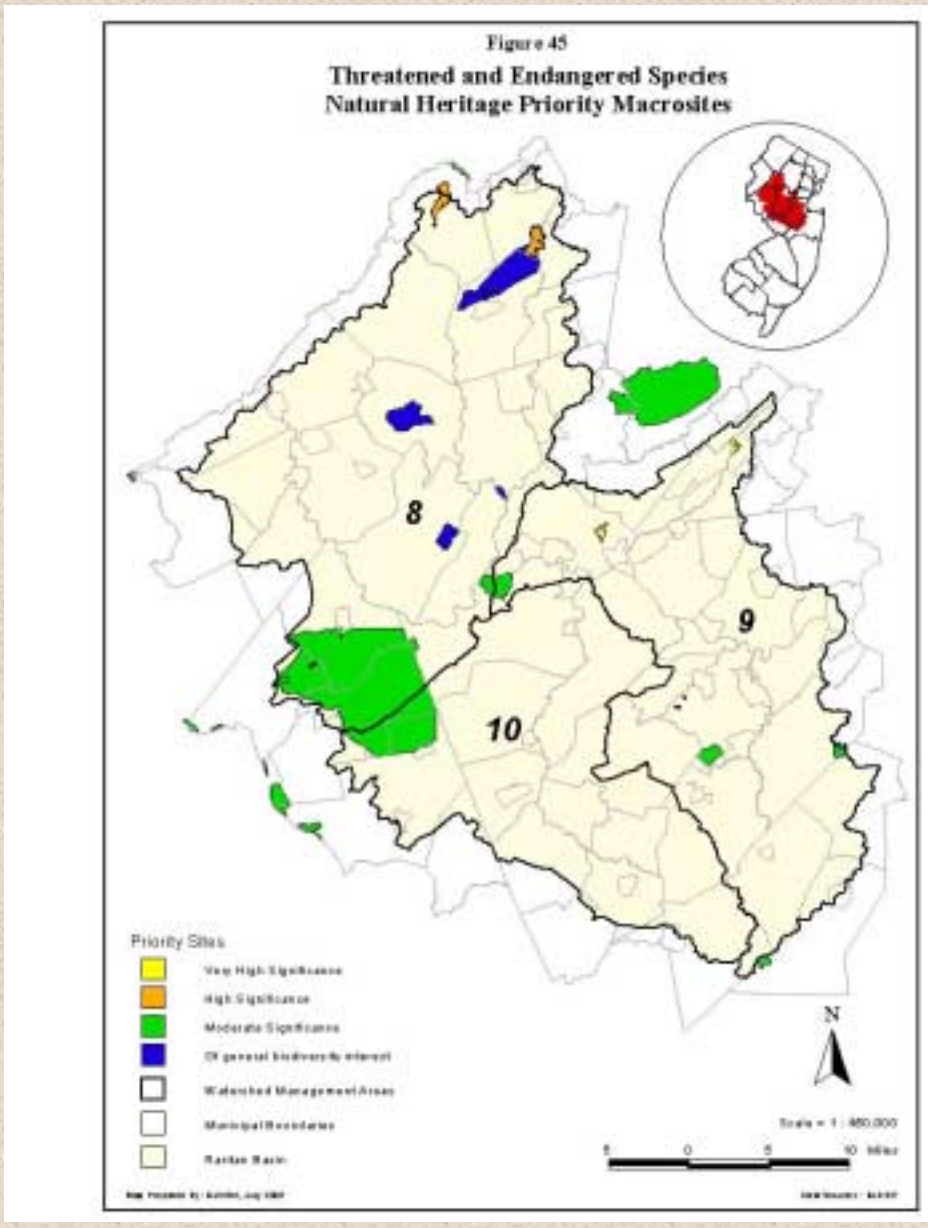


NATURAL HERITAGE PROGRAM PRIORITY SITES

- Sites that provide best habitat for rare plant and animal species and natural communities
- Does not cover all known habitat for T & E species
- Sites ranked by significance of biological diversity
  - B1 – outstanding significance
  - B2 – very high significance
  - B3 – high significance
  - B4 – good occurrence
  - B5 – of general biodiversity interest

NATURAL HERITAGE PROGRAM PRIORITY SITES CONT'D

- 19 sites in Basin:
  - 0 of outstanding significance
  - 2 of very high signif.
  - 3 of high signif.
  - 6 of moderate signif.
  - 8 of general biodiversity interest
- 15 priority plant sites
- 4 priority wildlife sites

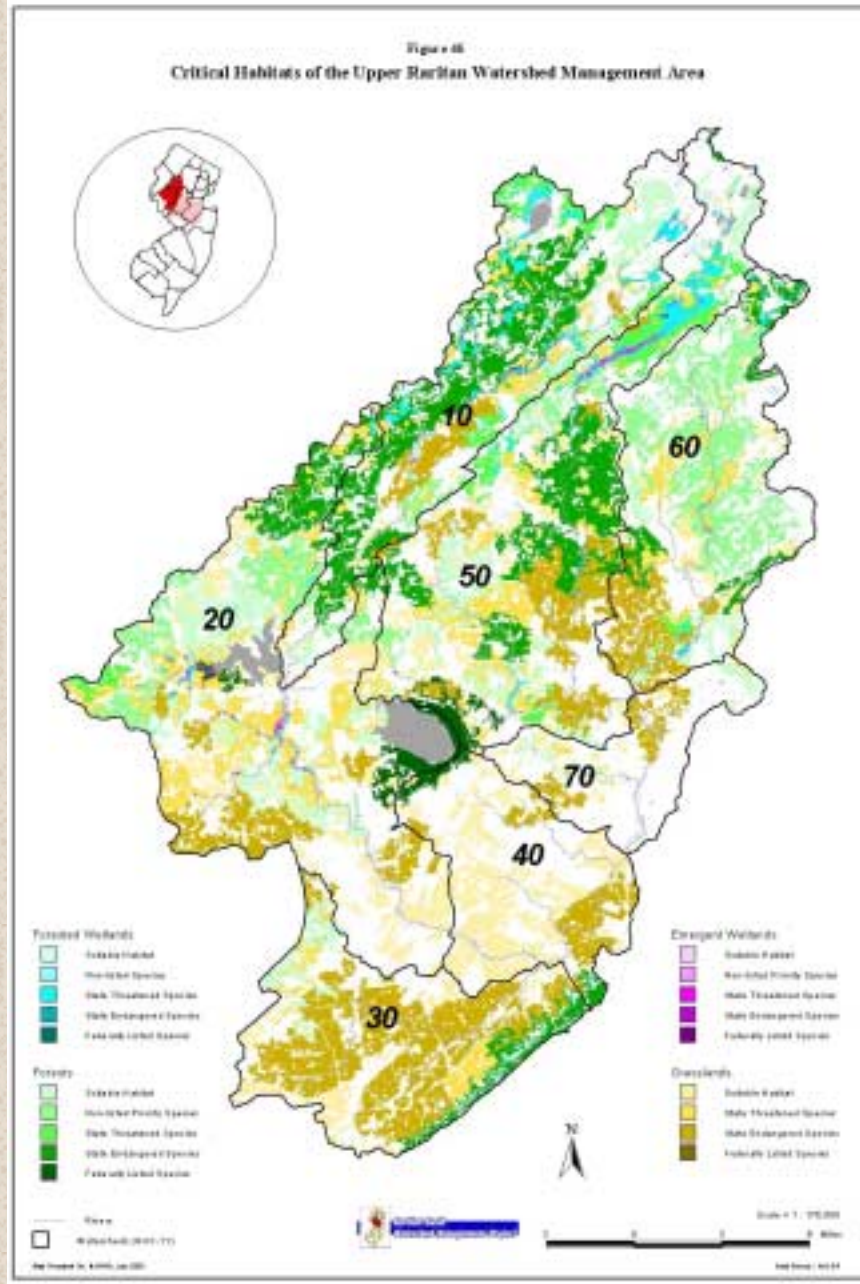


NJDEP ENDANGERED AND NONGAME SPECIES PROGRAM LANDSCAPE PROJECT

- Critical wildlife habitats
- GIS mapping to help landowners, planners and regulatory agencies integrate wildlife protection into land use goals.
- Designed to protect biodiversity and reduce conflicts between developers and endangered species.
- Critical Habitats include:
  - Forest - Grassland
  - Forested wetland - Emergent wetland
- Habitat patches classified by conservation status of species present. 5 = highest rank; 1 = lowest rank

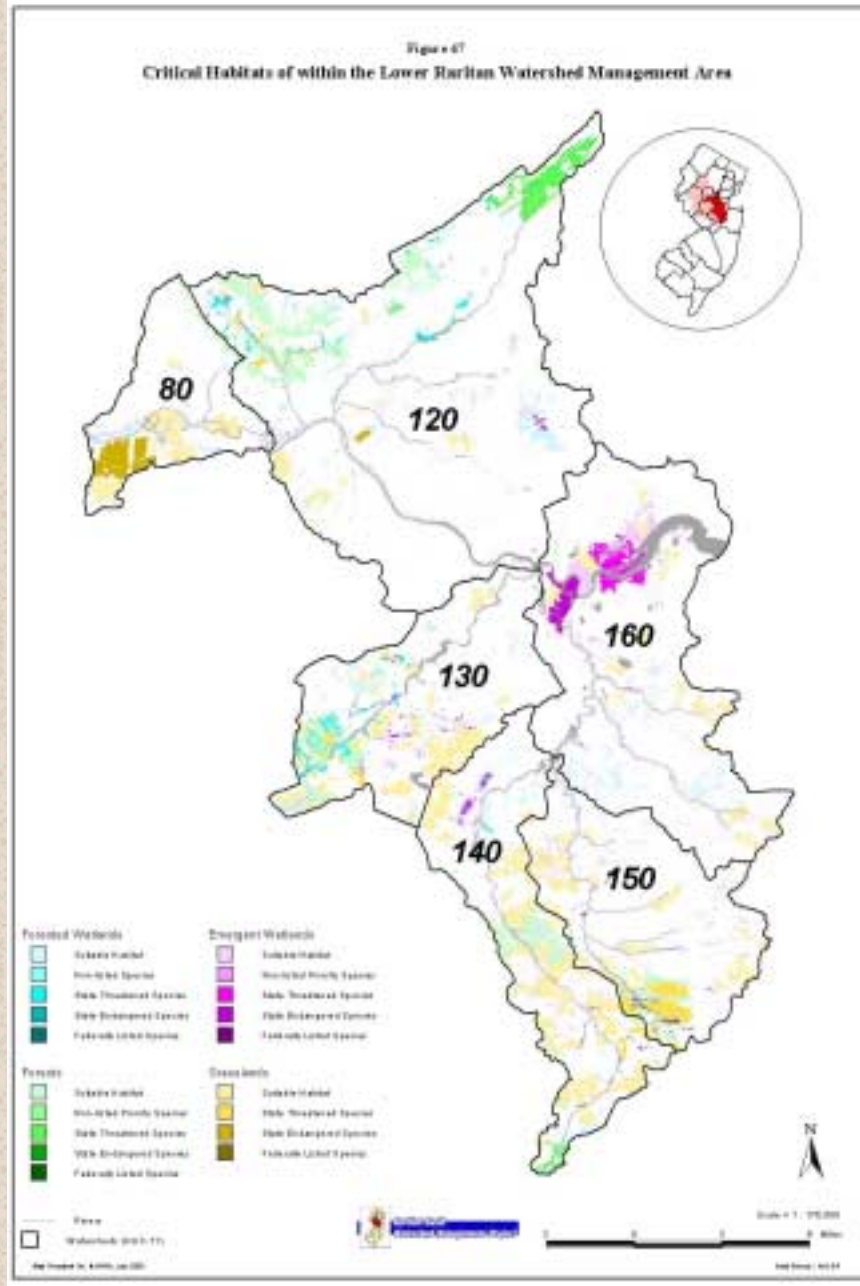
LANDSCAPE PROJECT CONT'D

- Upper Raritan WMA
  - Contains greatest % of critical habitat in Basin
  - SB Raritan River watershed (above Spruce Run) contains highest percentage of critical forest area supporting a state T & E species (40%)
  - Neshanic River watershed contains highest percentage (40%) of grasslands that support a state endangered species of the Basin



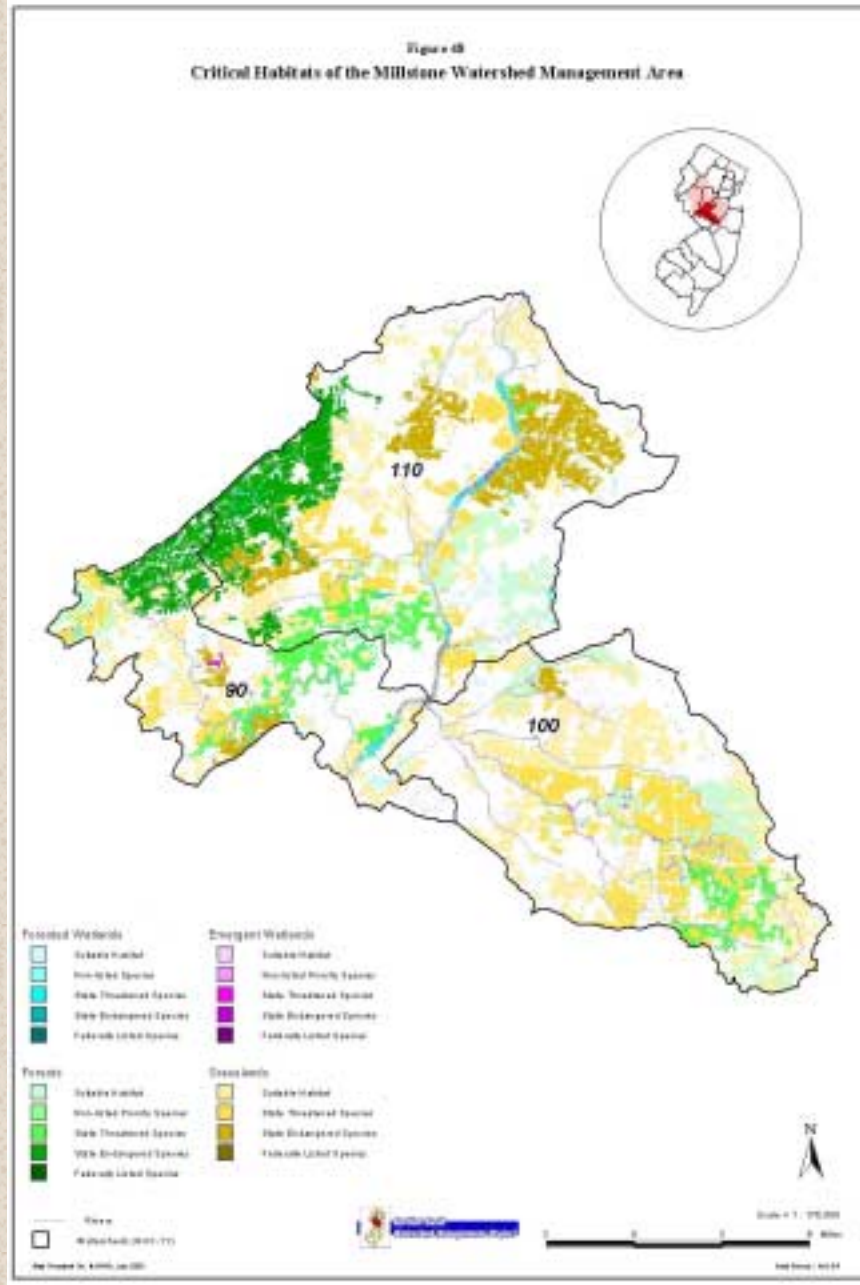
LANDSCAPE PROJECT CONT'D

- Lower Raritan WMA
  - Contains least % of critical habitat of Basin
  - Watershed with the greatest % of critical habitat has approx. 30%
  - Very few watersheds with critical habitat contain T & E species; most contain "suitable habitat"
  - "Patchwork of Remnant Habitats"



LANDSCAPE PROJECT CONT'D

- Millstone WMA
  - Vast areas of critical forest and forested wetland habitat along Sourland Mountains
  - Extensive grassland habitats in Millstone River watershed (below and including Carnegie Lake).



CONCLUSIONS

- 2000 Census shows population increased more than projected earlier
- New urban development in rural areas
- Agricultural loss (Neshanic River)
- Effects of Development
  - Increased impervious surface cover
  - Higher demand on infrastructure
  - Longer commutes affect air & water quality within the Basin

CONCLUSIONS CONT'D

- State Development & Redevelopment Plan
  - Focus development in PA 1, 2 & 3
  - Protect non-urban land uses in PA 4 & 5
  - Balance protection of open space and first-order streams in all Planning Areas
  - Infrastructure (sewers & roads) should be concentrated in PA 1, 2 & 3

CONCLUSIONS CONT'D

- Lost large percentage of prime agricultural soils throughout the Basin b/t 1986 & 1995
  - Next revision of report will identify existing prime ag areas in an effort to help target areas for preservation
- Approximately 50% of the soils in the Basin (and in each WMA) are least suited to development
  - Lower Raritan WMA contains greatest percentage of land (13%) "most suited" to development
  - 12% of Millstone and 6.6% of Upper Raritan are "most suited" to development.

CONCLUSIONS CONT'D

- Need to protect vegetative cover of urban areas as well as extensive habitats of rural areas
- Remaining critical habitat of Lower Raritan WMA confined to areas that have severe limitations to development or are protected parkland/open space areas
- Want to avoid similar development patterns in Upper Raritan and Millstone WMAs. Need to plan ahead to protect these areas.

CONCLUSIONS CONT'D

- Need to acquire open space areas and make regulatory decisions that result in protection of contiguous habitats.
- Factors to consider when making land use decisions (to name a few):
  - Soils suitability
  - Riparian areas
  - Streams and wetlands
  - Critical habitats
  - Ground water recharge areas