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1. **Inventory and classify conservation values of landscapes**
2. **Apply environmental analysis techniques**

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Land Suitability Analysis

What are the major goals of an environmental inventory and classification?

- Suitability of uses for development
  - commercial, residential, and industrial
- Productiveness of working natural resources
  - forestry, farmland
- Value of services provided by ecological functions
  - pollutant filtering, groundwater recharge
- Level of threat from natural hazards
  - slopes, floodplain,
- Level of intrinsic values offered by nature
  - natural heritage, scenery

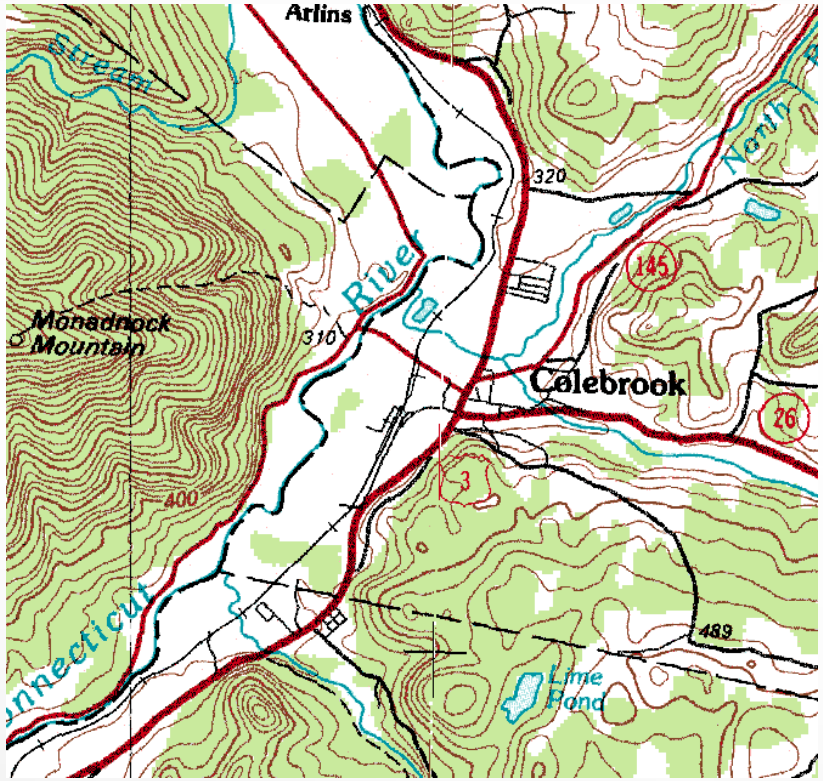
Key Components of Environmental Plan

Purposes of Environmental Inventory

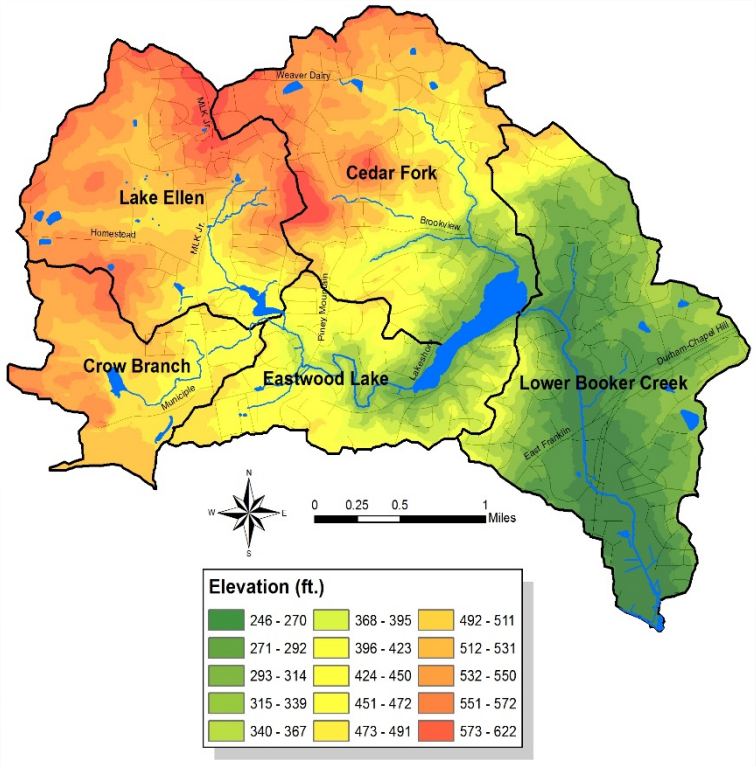
- Assemble information bases for ecological & other landscape features
  - Topography/slopes
  - Soils
  - Wetlands
  - Habitats/biodiversity
  - Water resources
  - Natural hazards
  - Noise
  - Infrastructure (roads, sewer)
- Classification of ecological features
  - Conservation Values (wildlife habitat, recreation, soil productivity for agriculture)
  - Ecological Services (stream buffers and wetlands for flood storage and nutrient trapping, percolating soils for septic)
  - Threats (slope instability, floods, earthquakes)
  - Intrinsic values (heritage, scenery)

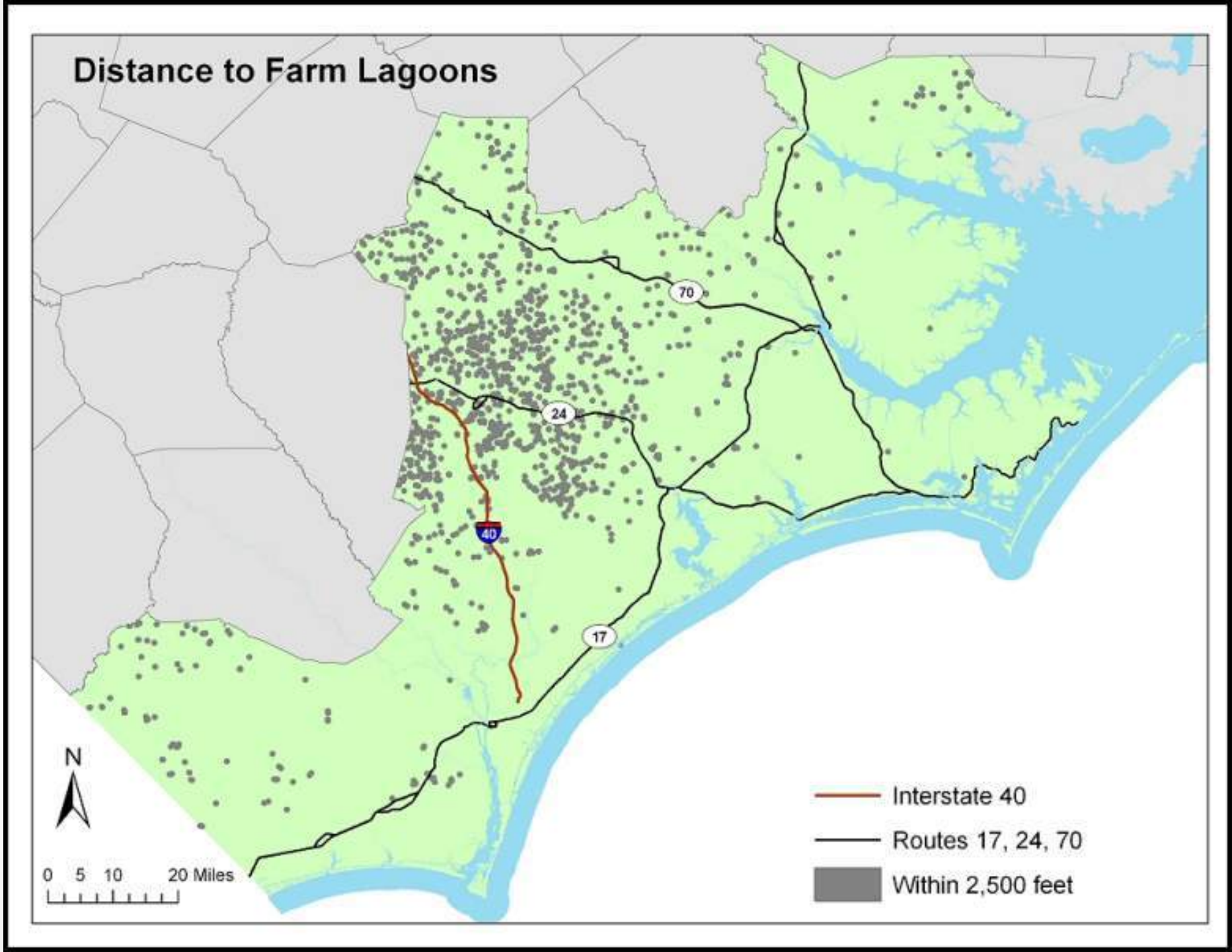
Topography and Slopes

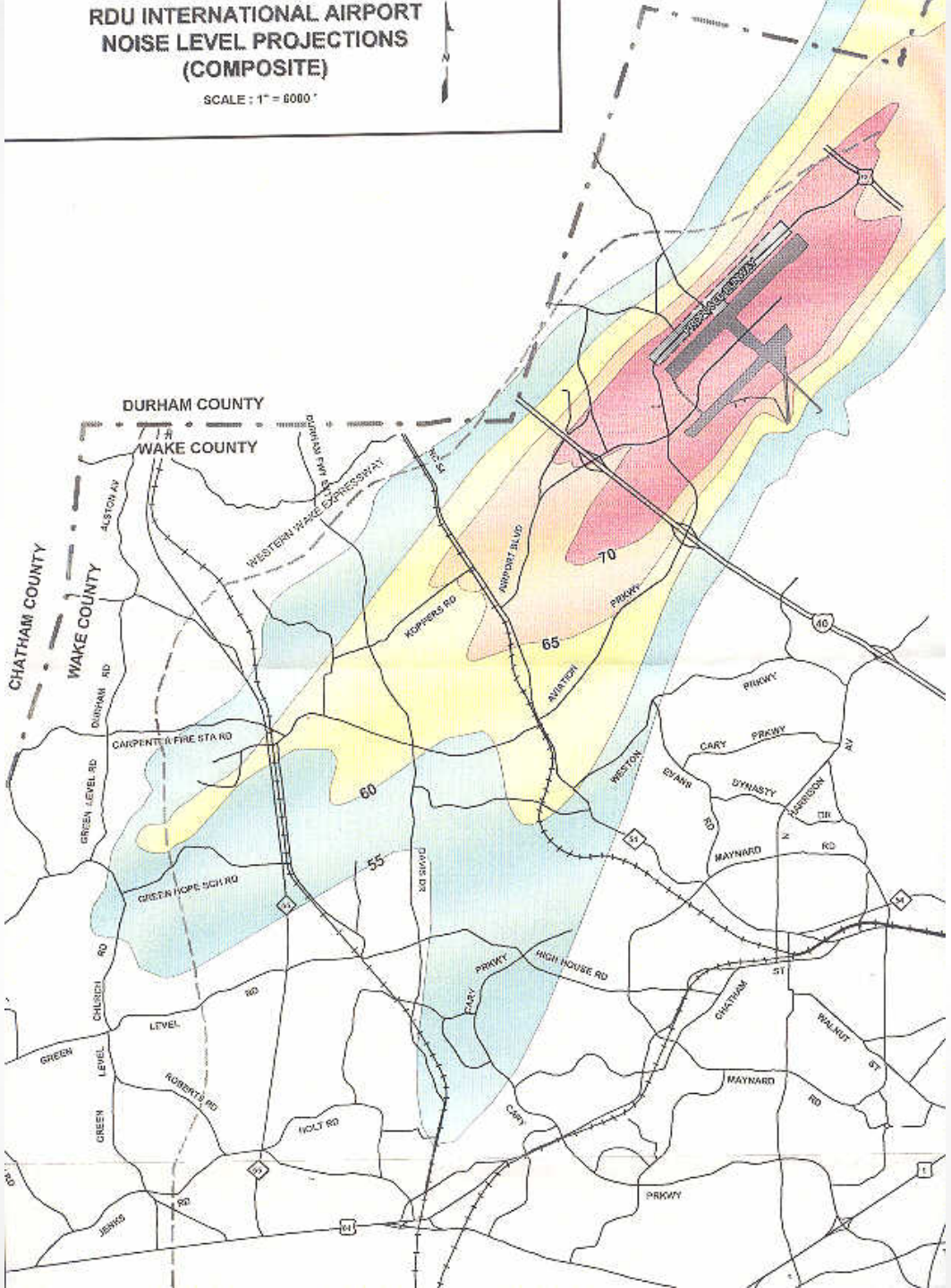
- Source: USGS Topographic Maps



- Classification: USGS Digital Elevation Model (DEM)




Distance to Farm Lagoons
70
24
40
17
N
0 5 10 20 Miles
Interstate 40
Routes 17, 24, 70
Within 2,500 feet



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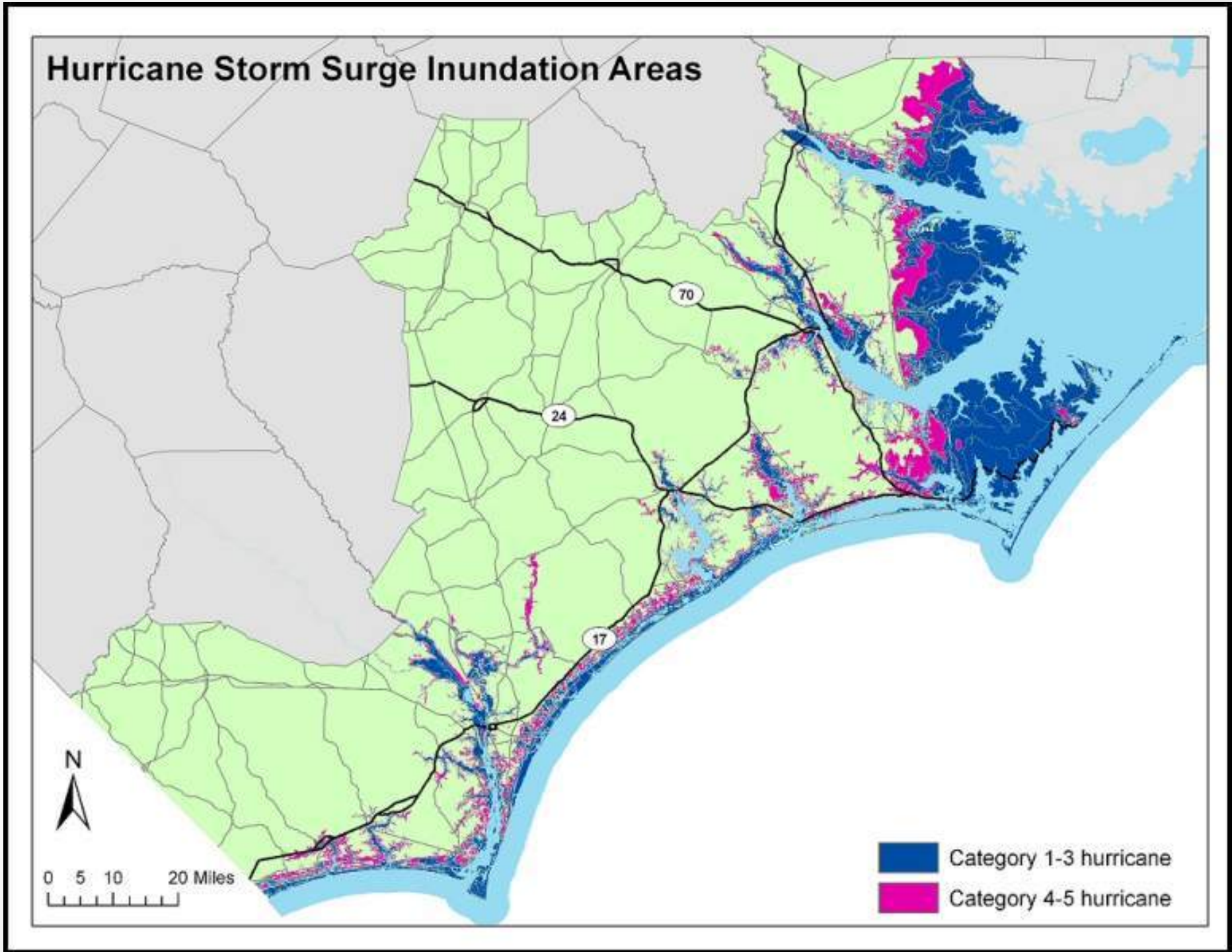

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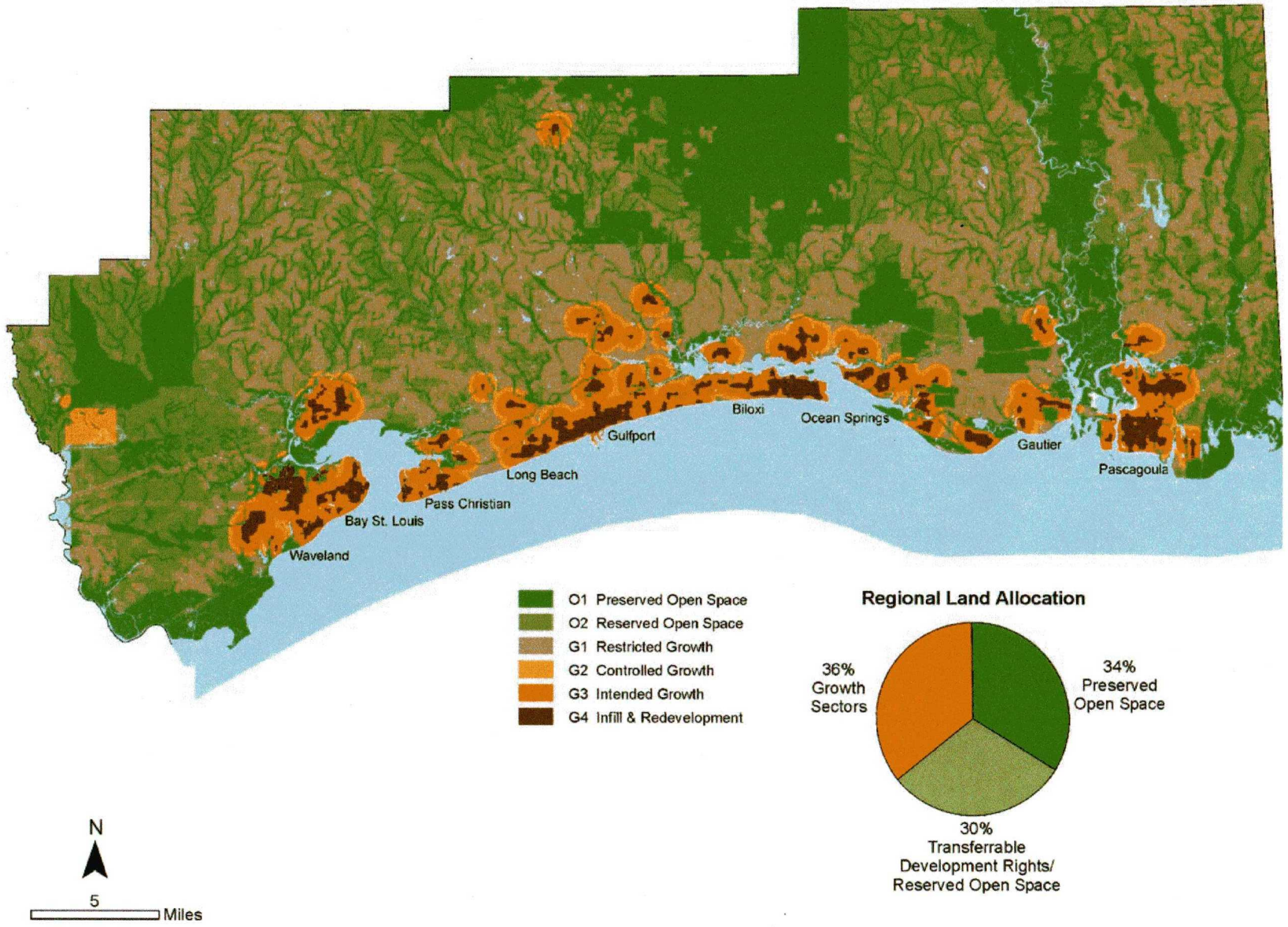
Gulf Coast Regional Growth Transect



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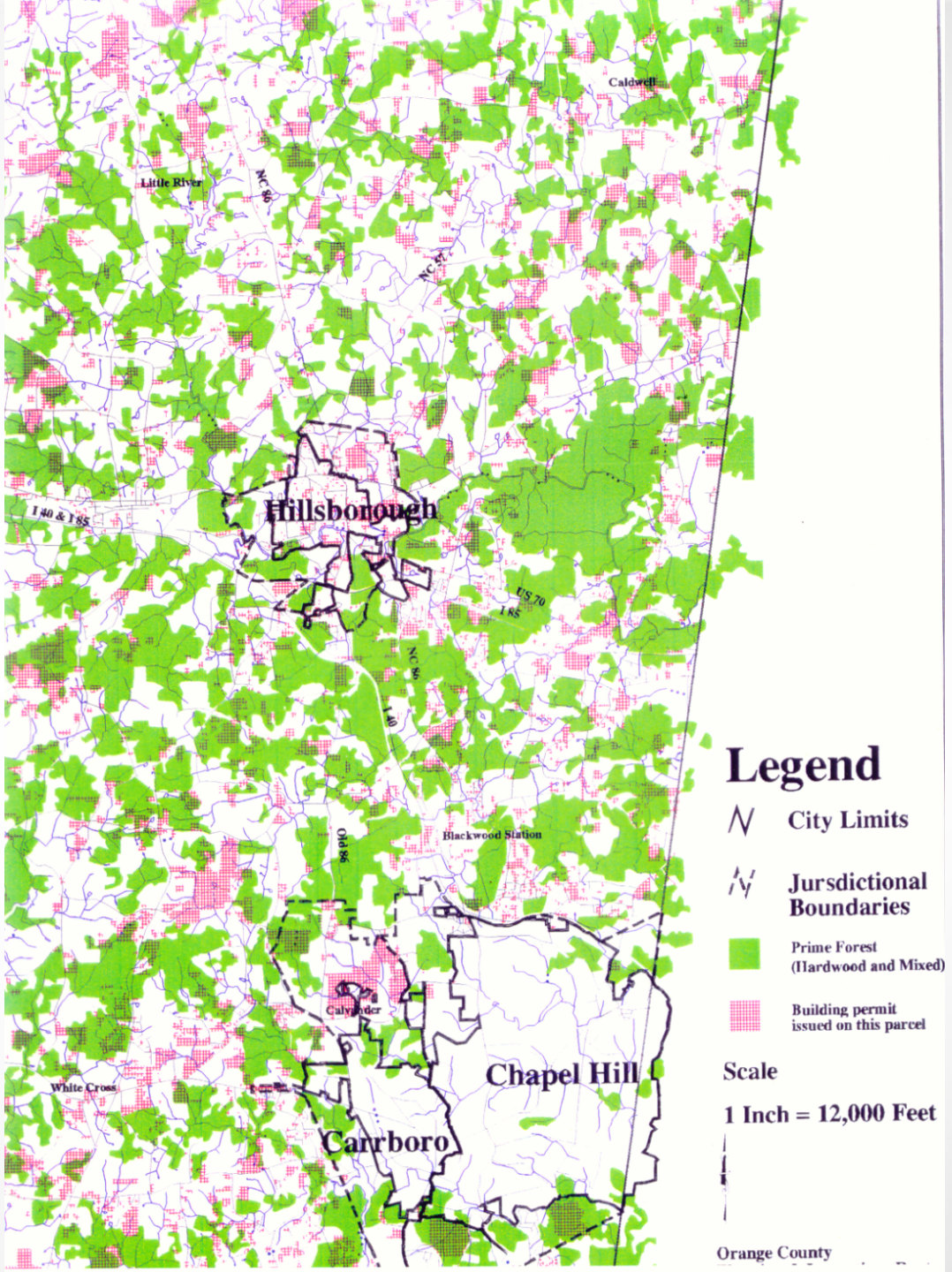
Landscape Biodiversity

- Benefits
  - Conservation value (medicinal, economic production)
  - Ecological services (pollinators, waste assimilation)
  - Intrinsic values (beauty, saving species for their own sake)
- Key Components
  - Composition
    - Type and abundance of species
  - Structure
    - Horizontal patchiness of vegetation on landscape
  - Function
    - Geological, hydrological and climatic processes

Case Study: Fragmented Forest of Orange County, NC

- Indicators for Identifying High Value Habitats
  - Types of tree species (composition)
  - Size of patch (structure)
- Classes of High Value Habitats
  - Patches at least 90% hardwood and 10 acres in size
  - Patches 50-90% hardwood and at least 40 acres in size

Fragmented Forest, Orange County, NC



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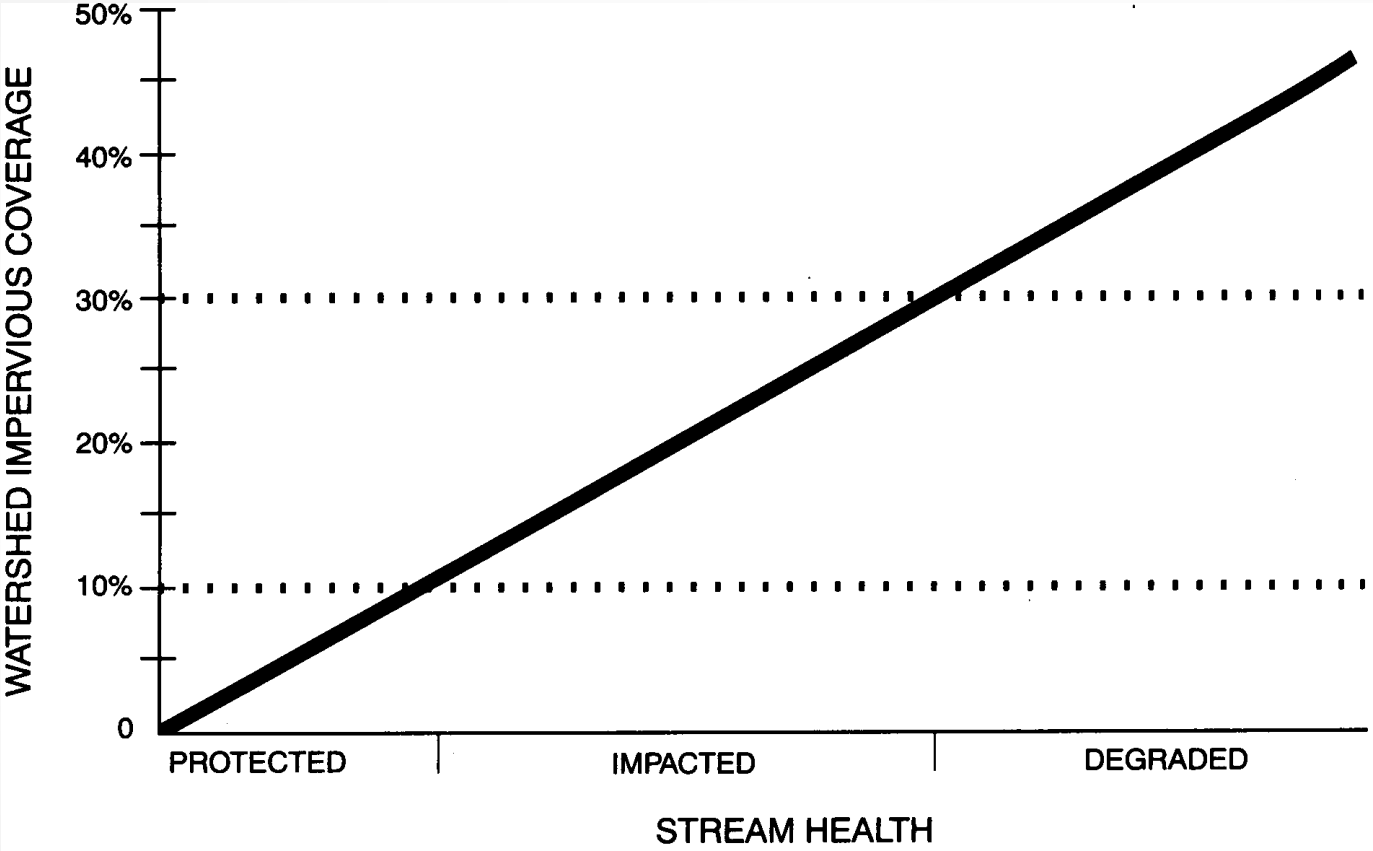
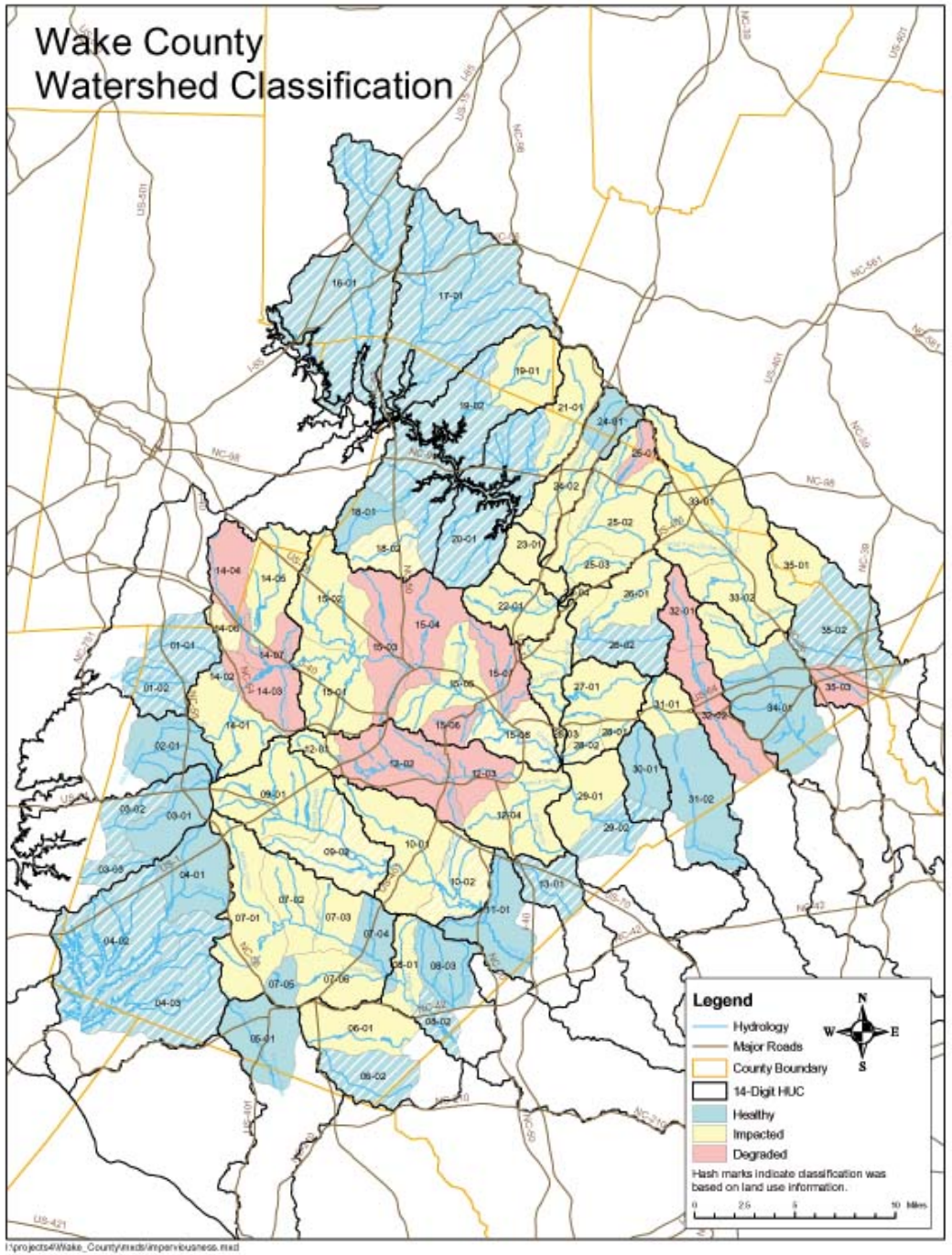
Classification of Watershed Health Based on Impervious Cover





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Key Components of Environmental Plan

Techniques for Analyzing Environmental Information

- Composite land suitability
- Environmental impact
- Carrying capacity

Composite Land Suitability Analysis

- Definition: Land uses that are intrinsically suitability for different parts of a planning area
- Common techniques for calculating land suitability
  - Pass/fail screening
  - Equivalent rating
    - Total Score = Ra + Rb + Rc +…Rn
    - R = rating; a, b, c…n = landscape feature
  - Weighted rating
    - Total Score = (Wa x Ra) + (Wb x Rb) + (Wc x Rc)…(Wn x Rn)
    - W = weight; R = rating; a, b, c…n = landscape feature
  - Direct assignment rating

Assessment of Land Suitability Techniques

Technique	Ease in Understanding	Degree of Suitability	Weight of Suitability	Unique Combinations
Pass/Fail Screening	Yes	No	No	No
Equivalent Rating	Yes	Yes	No	No
Weighted Rating	Yes	Yes	Yes	No
Direct Assignment Rating	No	Yes	Yes	Yes

Santa Clara County

- Pass/Fail Screening Technique
- Displays individual types of development constraints

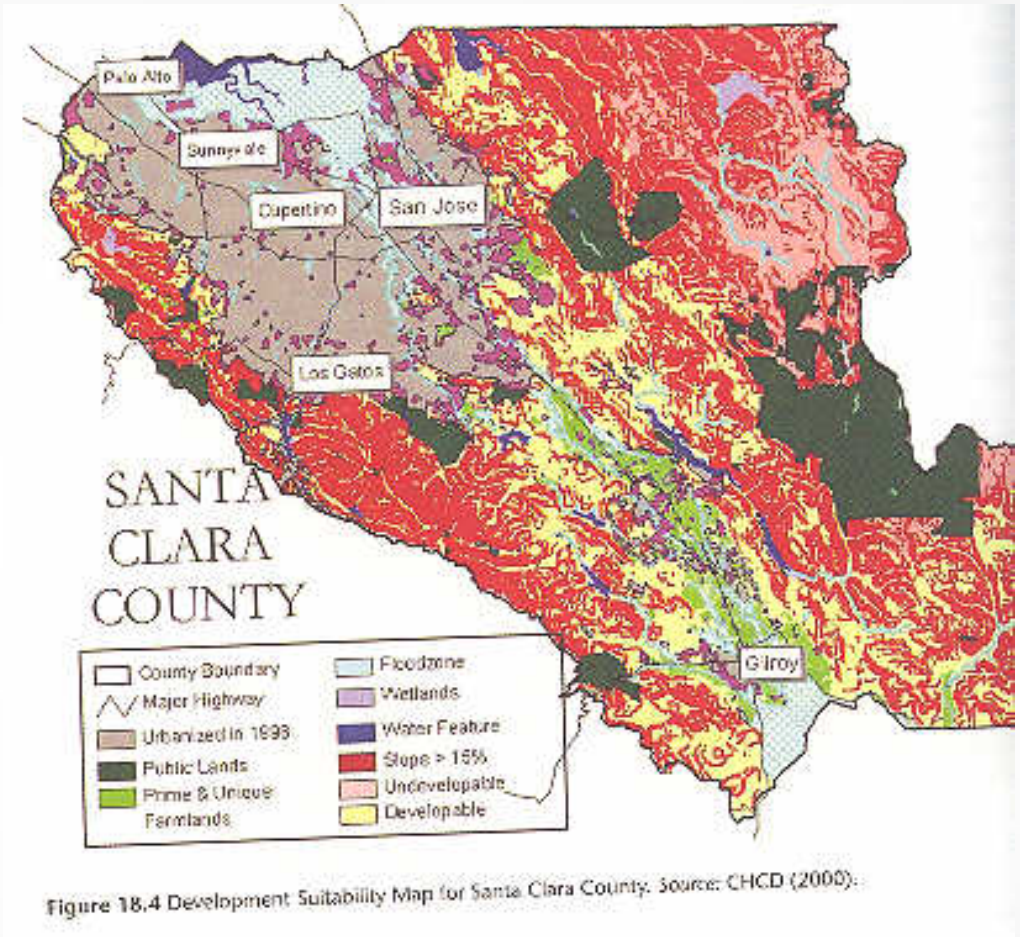
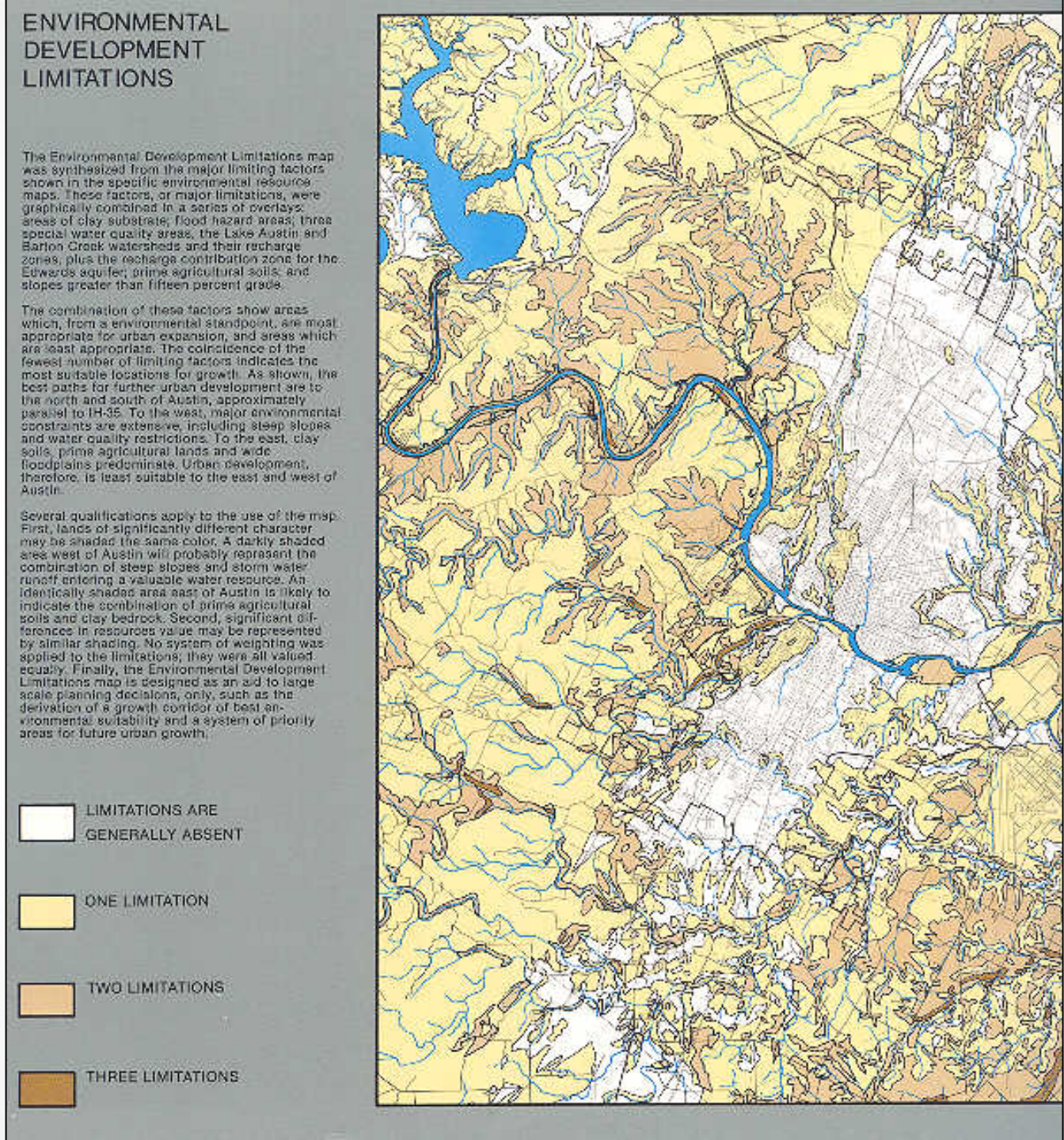


Figure 18.4 Development Suitability Map for Santa Clara County. Source: CHCD (2000).

Austin, Texas

- Equivalent Rating Technique
- Development rating that combines multiple constraints



Weighted & Pass/Fail Rating Techniques: (Strategic Lands Inventory)

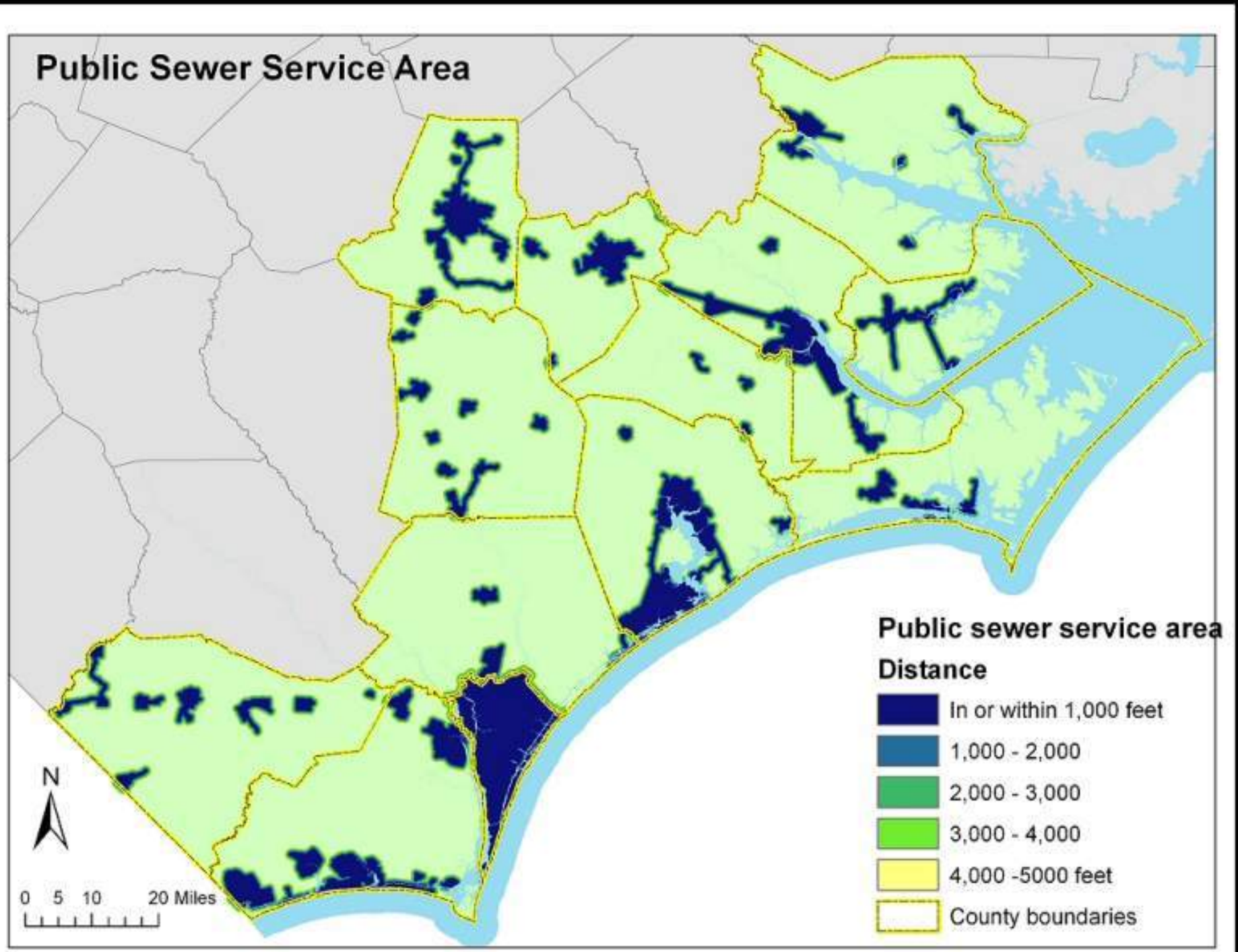
- Strategic Lands Inventory
  - http://serppas.org/Maps.aspx
  - http://portal.ncdenr.org/c/document_library/get_file?uuid=dac9f945-3dc6-477a-be2a-fa2cef8101db&groupId=5118315

- 13 County Region in Eastern NC
- 979,297 people (2005)
- 114 municipalities
- Infrastructure
- Forests
- Farmland
- Natural areas
- Streams and coast
- Military bases

Suitable Locations for Residential

1. Infrastructure location
   - Near primary roads (Interstates, US and NC Highways)
   - Near incorporated areas
   - Access to public water service
   - Access to public sewer service
2. Site location preferences
   - Distance from military installations ("close but not too close")
   - Not near military landing fields
   - Compatibility with military mission
   - Not close to farm lagoons
   - Existing land cover type
3. Land constraints
   - Steep Slope
   - Not within 100 feet of river or stream
   - Floodplain
   - Wetlands
   - Hurricane Storm Surge Inundation Areas
4. Out of Bounds
   - Conservation and open space lands
   - Lakes and ponds
   - Military installations and ranges

#1: Infrastructure



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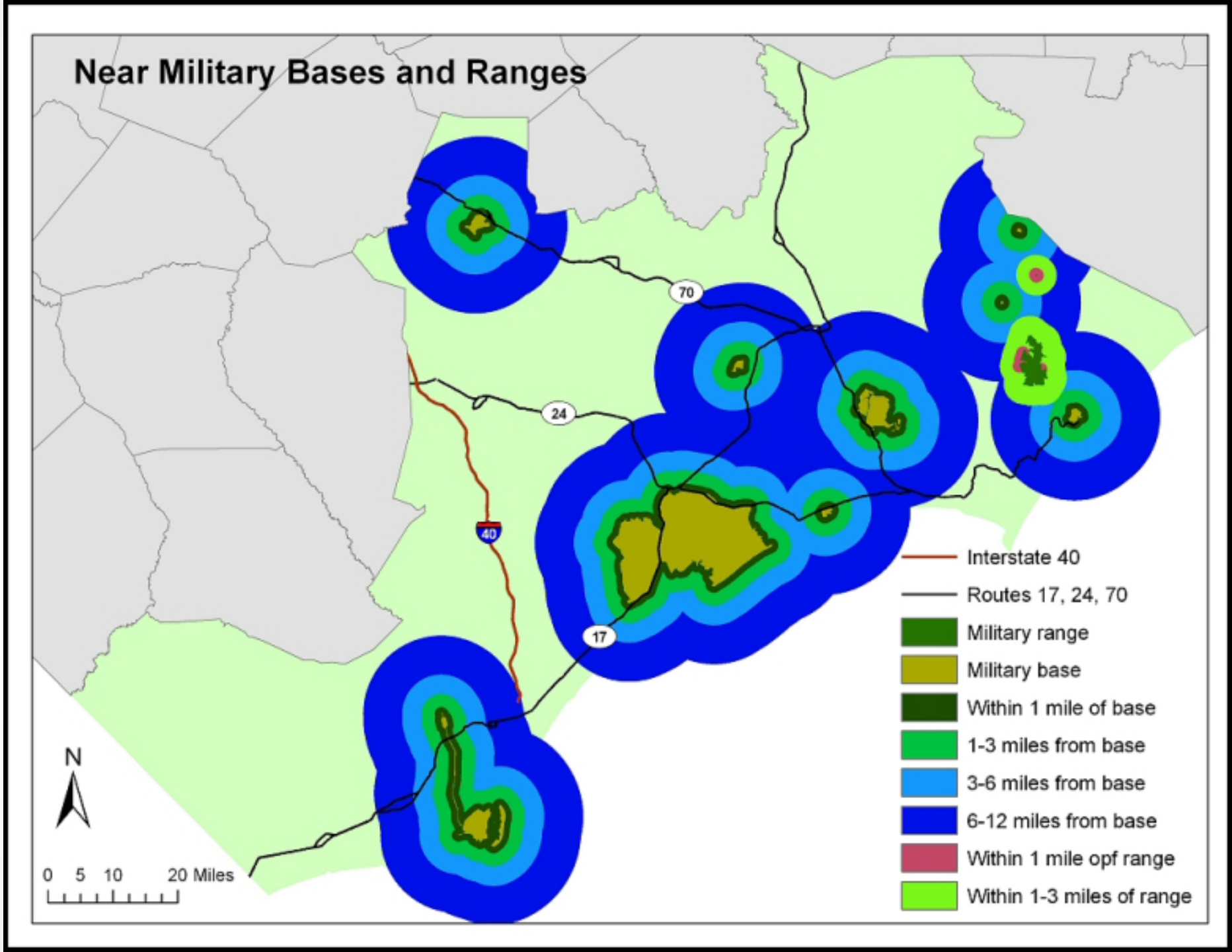
#2 Site Preference



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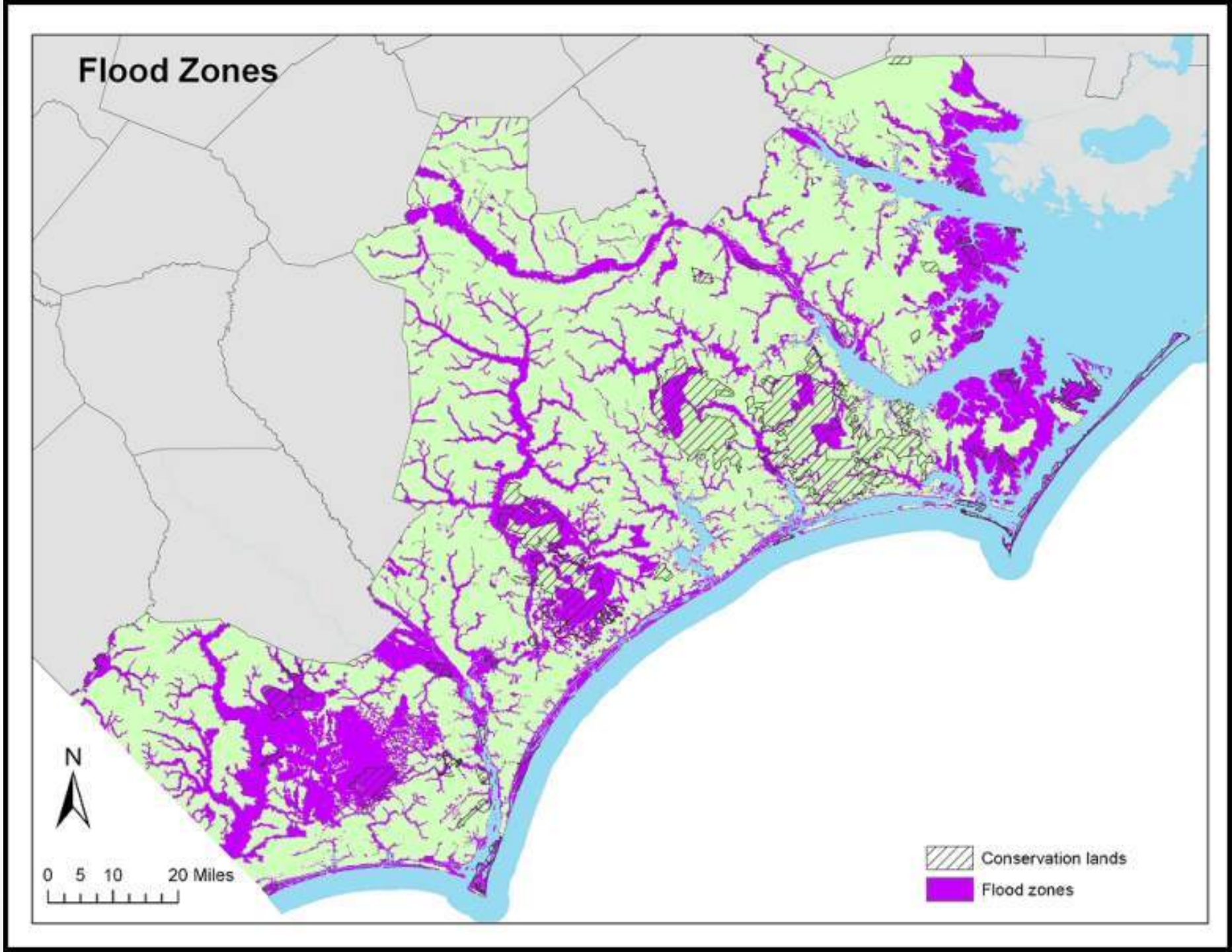
#3 Land Constraints



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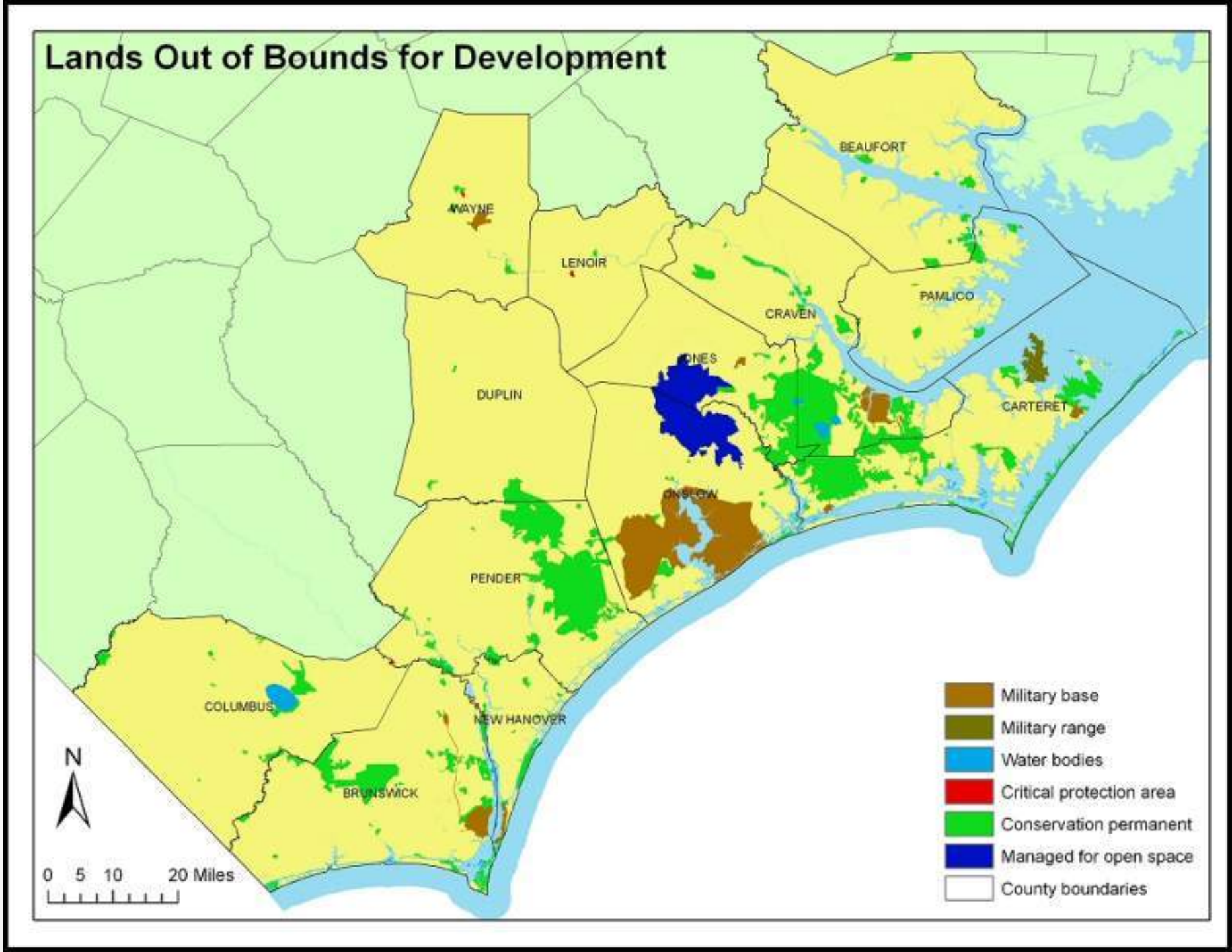
#4 Out of Bounds



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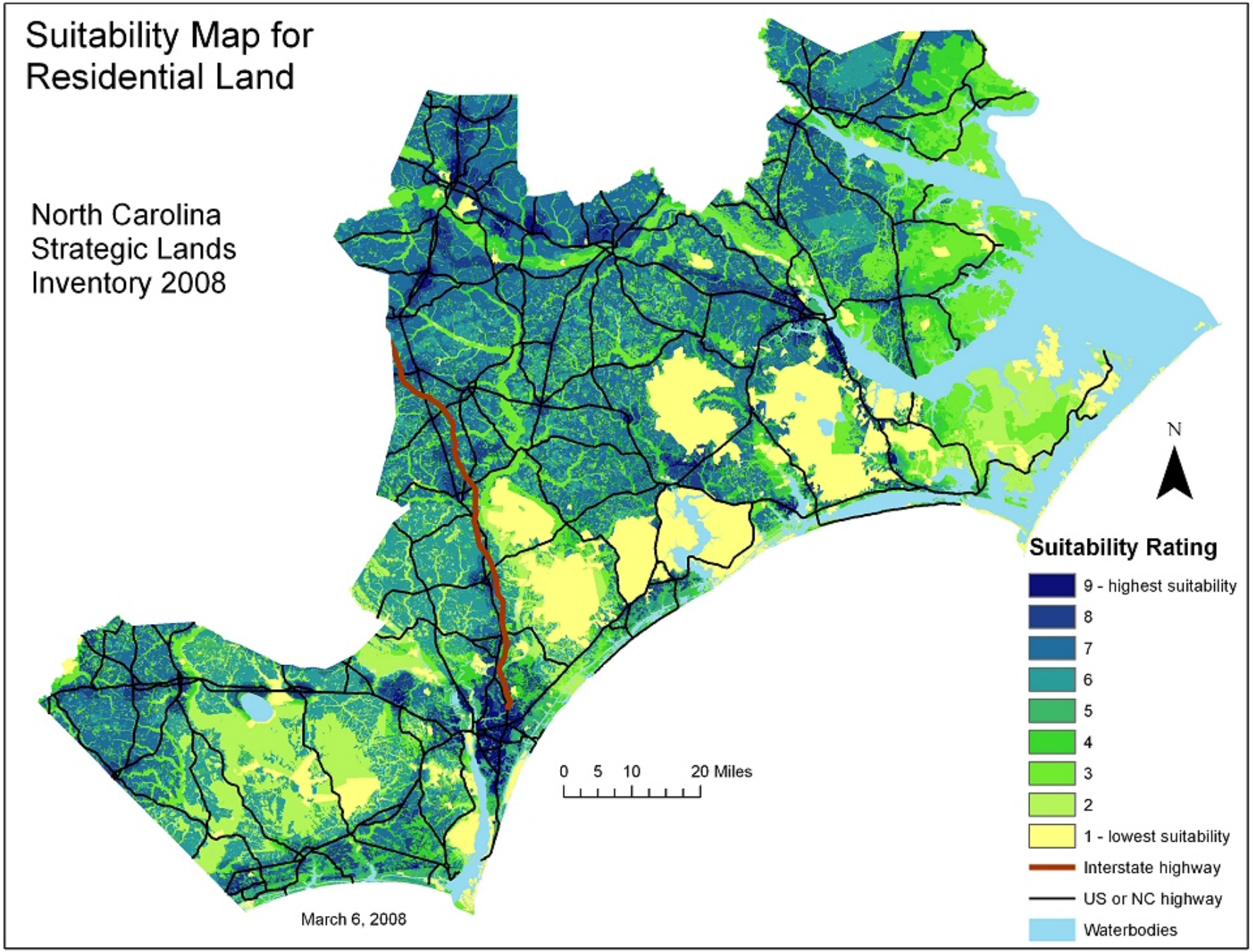

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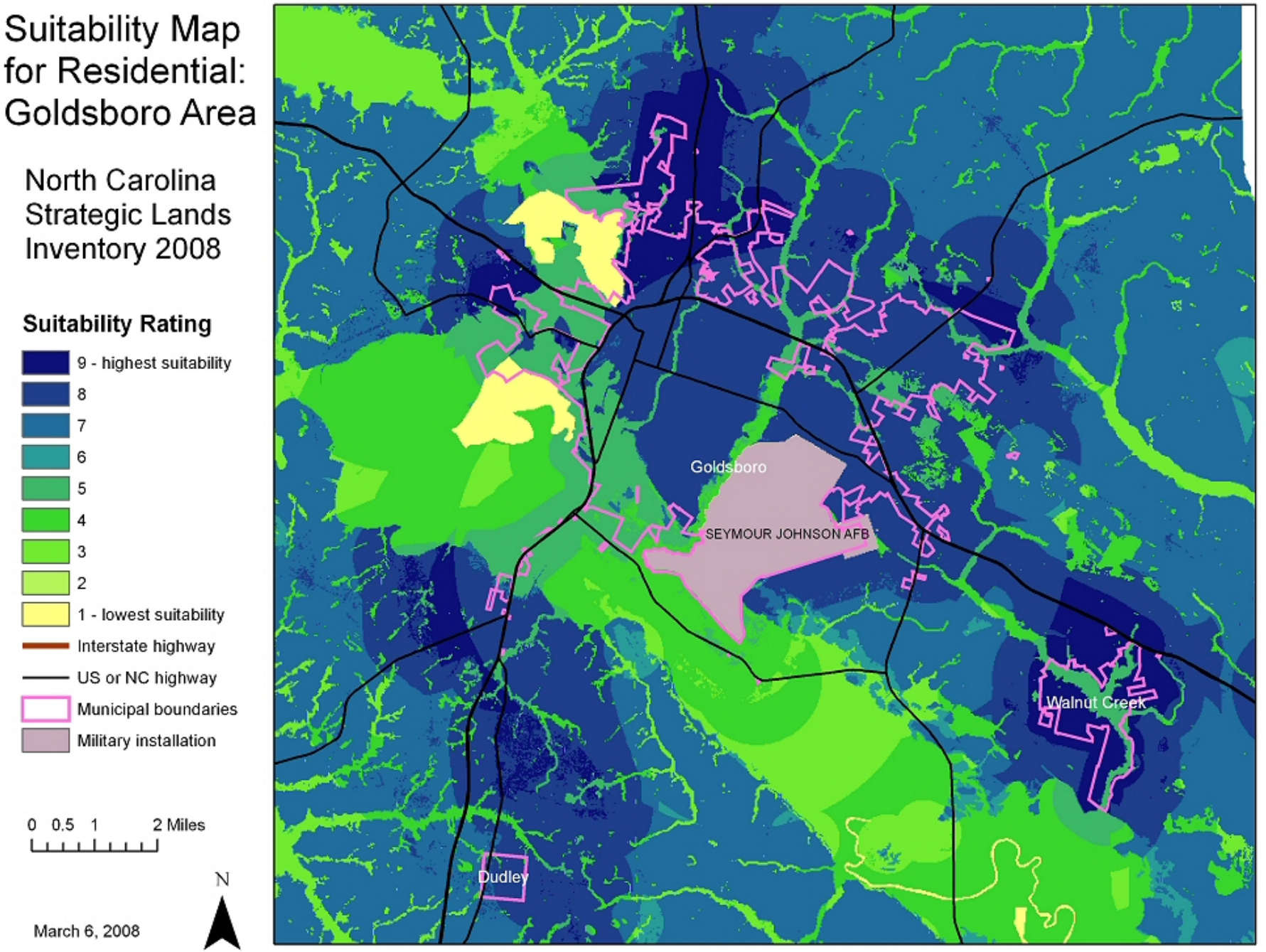
Suitability Map for Residential: Goldsboro Area

North Carolina Strategic Lands Inventory 2008



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Key Lessons from Practice

- Identify and inventory critical landscape features and classify values of the features.
- Whenever possible, provide evidence of the land suitability and impacts of land use alternatives.
- Formulate goals and policies based on a strong fact base consisting of an environmental inventory, classification, and analysis.

Some cool papers…

- Marisa Berry and Todd BenDor 2015
  - "*Integrating sea level rise into development suitability analysis*"
    - *Computers, Environment and Urban Systems* 51: 13–24
- Daniel Widis, Todd BenDor, and Michael Deegan 2015
  - "*Prioritizing Wetland Restoration Sites: A Review and Application to a Large-Scale Coastal Restoration Program*"
    - *Ecological Restoration* 33(4): 358-377