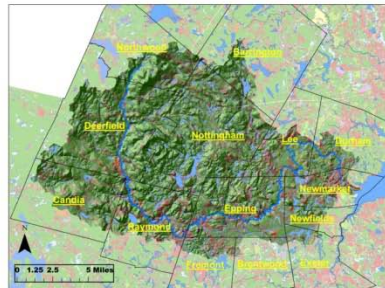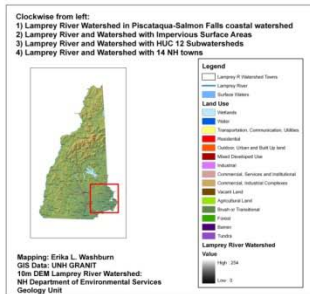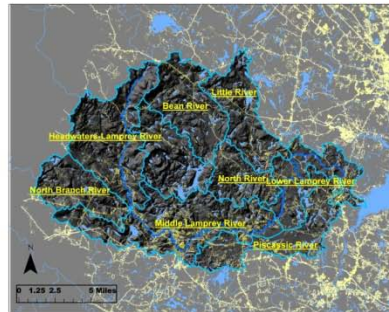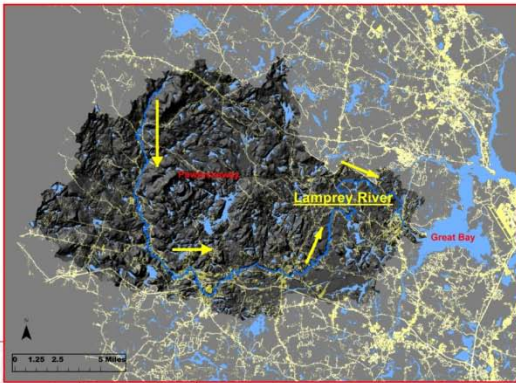# A SOCIAL LANDSCAPE ANALYSIS OF
LAND USE DECISION MAKING IN THE TOWNS OF THE LAMPREY RIVER WATERSHED
Erika Washburn, Ph.D. Candidate, UNH NRESS (*NOAA Fellowship)

Q: Is there a potential for watershed based land use decision making and how can this be determined?

Clockwise from left:
1) Lamprey River Watershed in Piscataqua-Salmon Falls coastal watershed
2) Lamprey River and Watershed with Impervious Surface Areas
3) Lamprey River and Watershed with HUC 12 Subwatersheds
4) Lamprey River and Watershed with 14 NH towns

Mapping: Erika L. Washburn
GIS Data: UNH GRANIT
10m DEM Lamprey River Watershed:
NH Department of Environmental Services
Geology Unit

10M DEM courtesy of New Hampshire Geological Survey

Methods
Mixed Qualitative:
semi-structured interviews and participatory GIS

Interviews:
Primary - Planning Boards, Conservation Commissions, Zoning Boards, Open Space Committees, Heritage/Historical
Secondary –NOAA, EPA, Regional Planning Commissions, DES, OEP, NGOs (Lamprey River Watershed Association, Lamprey River Advisory Committee, Bear Paw, etc.) realtors, developers

Do decision makers...

• **consider impacts of cumulative decisions** ...in the town, watershed, region?

• **recognize spatial relationships** between towns and subwatersheds?

• **communicate** upriver and downriver, or **between towns**?

• **know** what other towns are doing?

• **consider Great Bay**, the coasts or the ocean?

A SOCIAL LANDSCAPE ANALYSIS OF LAND USE DECISION MAKING IN THE TOWNS OF THE LAMPREY RIVER WATERSHED

Erika L. Washburn, Ph.D. Candidate (NRESS)
University of New Hampshire
Institute for the Study of Earth, Oceans and Space
Ocean Process Analysis Lab
**Committee Chair: Andy Rosenberg**

What is a social landscape?

• The affect we derive from the landscapes around us

• Landscape ecology: the social and demographic processes underlying the characterization of people, social organizational structure and relations on the land

communities, resource use (land use)
+ local knowledge (communication, connections)
+ sense of place (cultural inheritance, history)
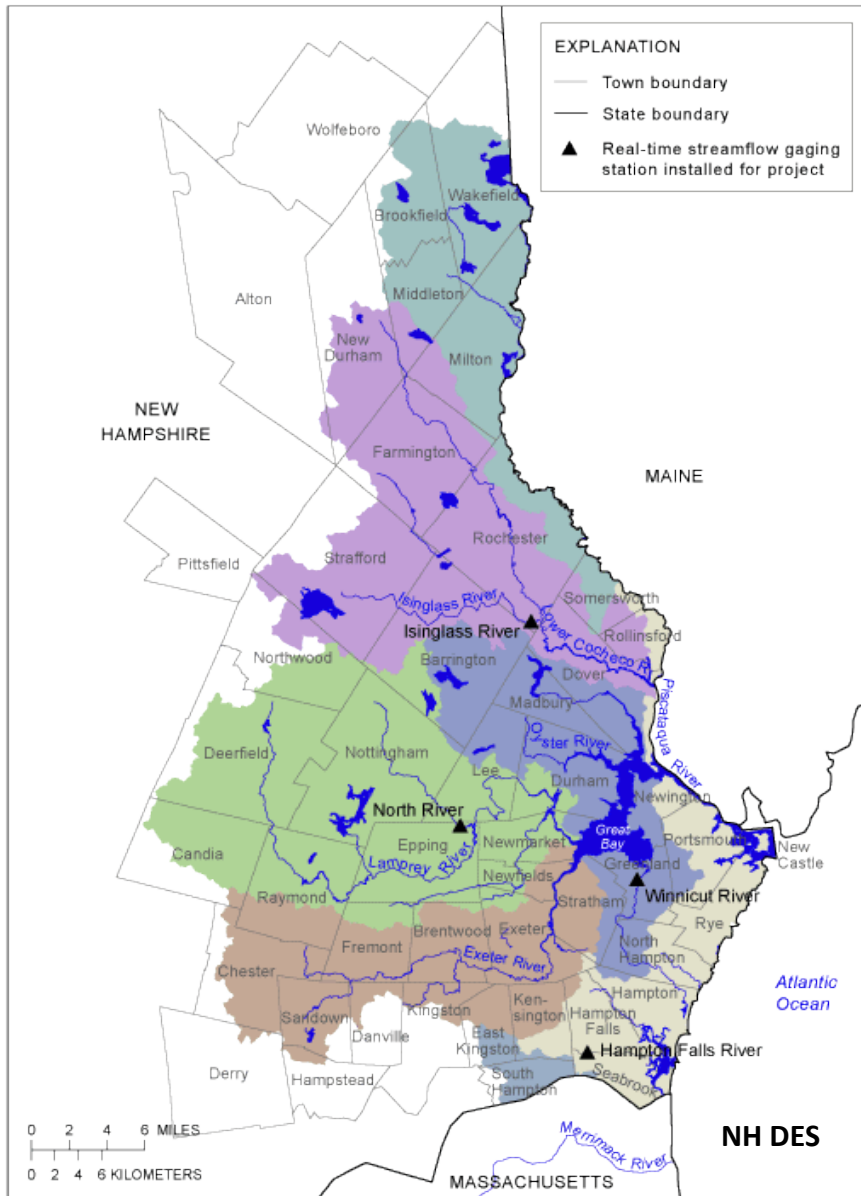+ varying across space (watershed)

Current Land Use Decision Making….
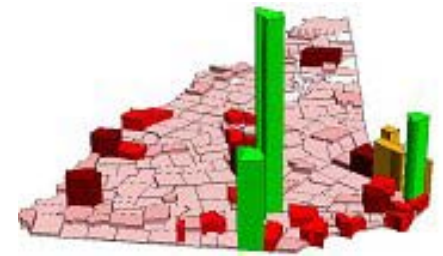# Severely Challenged
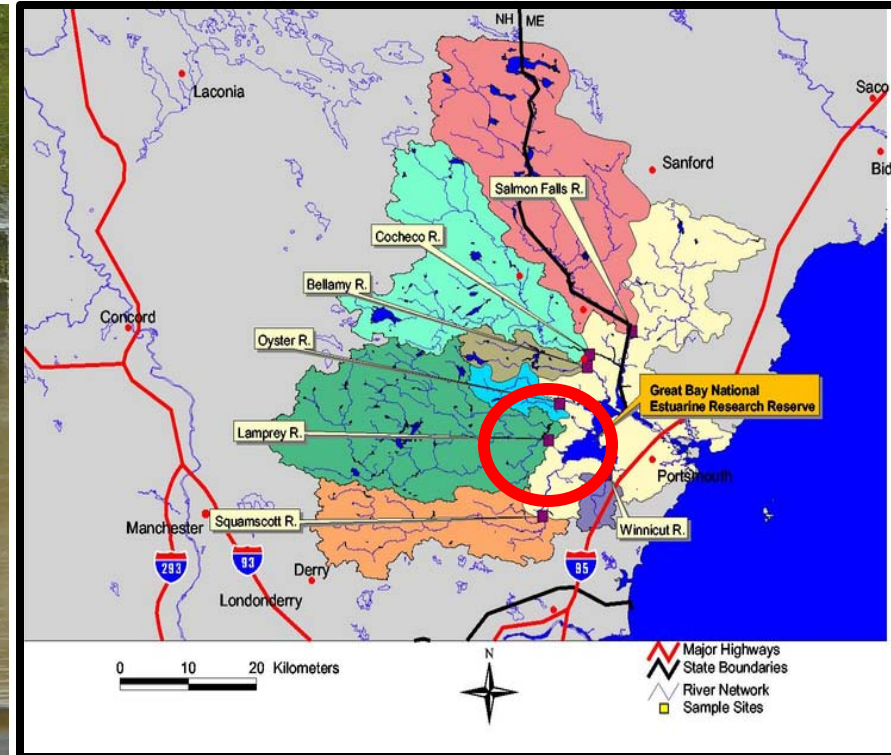
Is there a potential for watershed based land use decision making? How can this be determined?

Growth in 42 NH Communities

Figure 1. Study area for the ground-water resources assessment project

EXPLANATION

Town boundary
State boundary
▲ Real-time streamflow gaging station installed for project
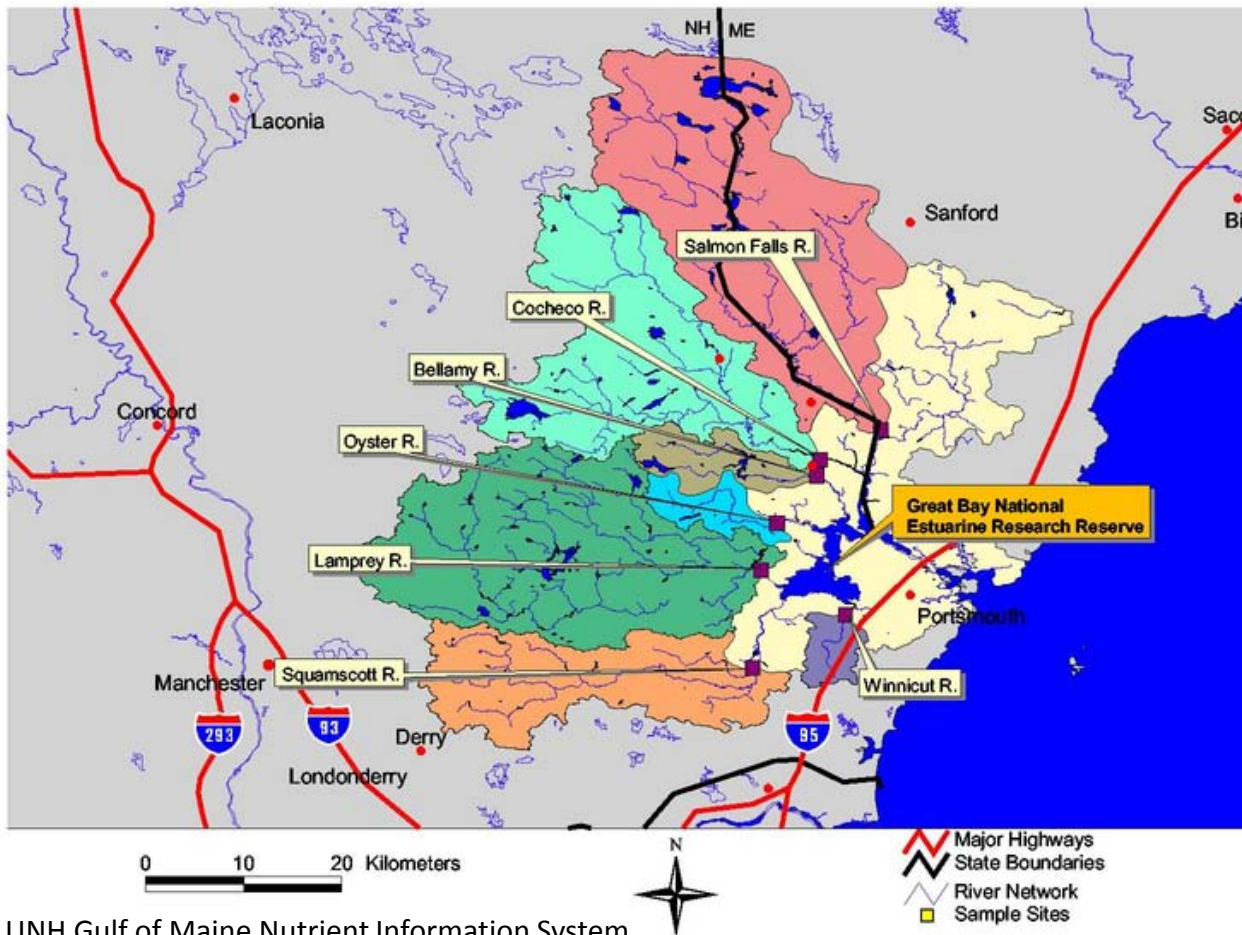
NH DES

1950

1970

1998

2020

Watersheds of Great Bay

- All watersheds increased population pressure

- Impervious surface area +1185 acres/yr

- In 2005, 41/42 towns sprawling

- 1990 – 2004 pop growth 17.2%

- 2 coastal counties: 450,000

Efforts Needed!!:
within coastal watersheds RE: growth, development and land use planning

UNH Gulf of Maine Nutrient Information System

NH Land Use Decision Making

- local government function

- no mandated regional planning frameworks

- towns required to develop Master Plans

- towns may contract with Regional Planning Commissions for assistance

- Land use groups involved:
    - Planning Boards
    - Conservation Commissions
    - Zoning Boards
    - *Open Space Commissions*
    - *Heritage Commissions /*
        Historical Societies / Historic District
        Commissions
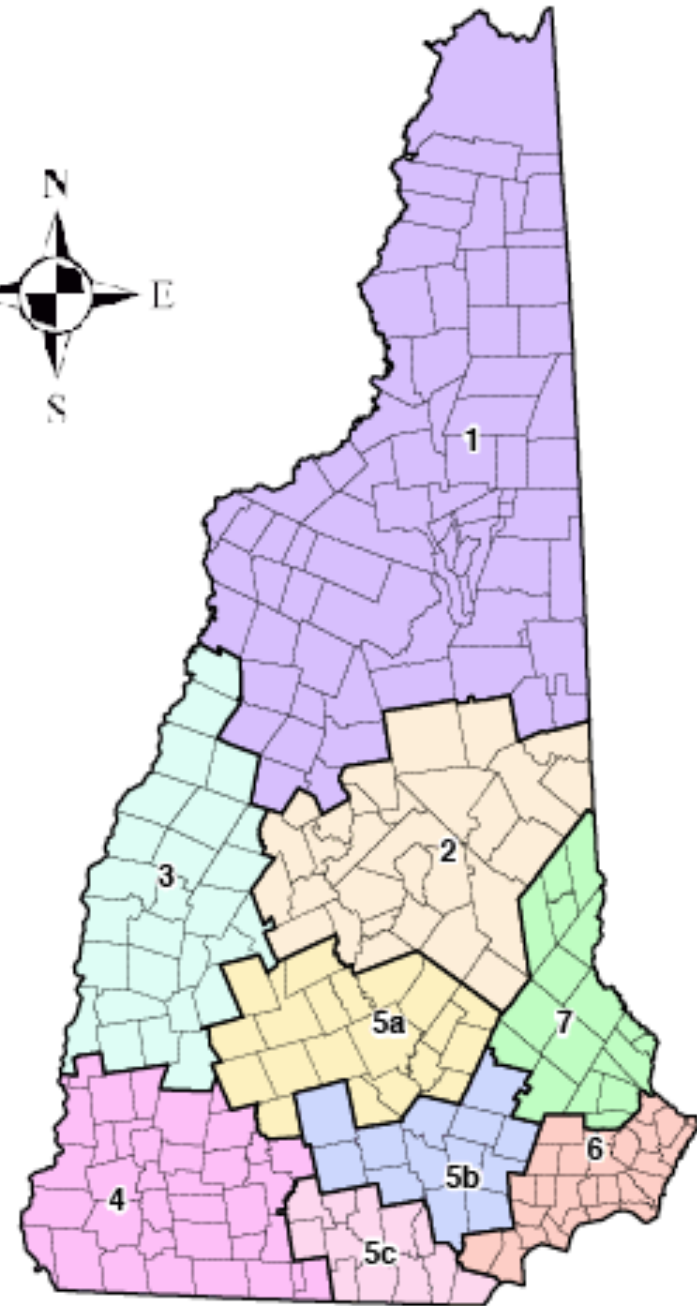
Case study: Lamprey River Watershed, 14 towns and land use decision makers
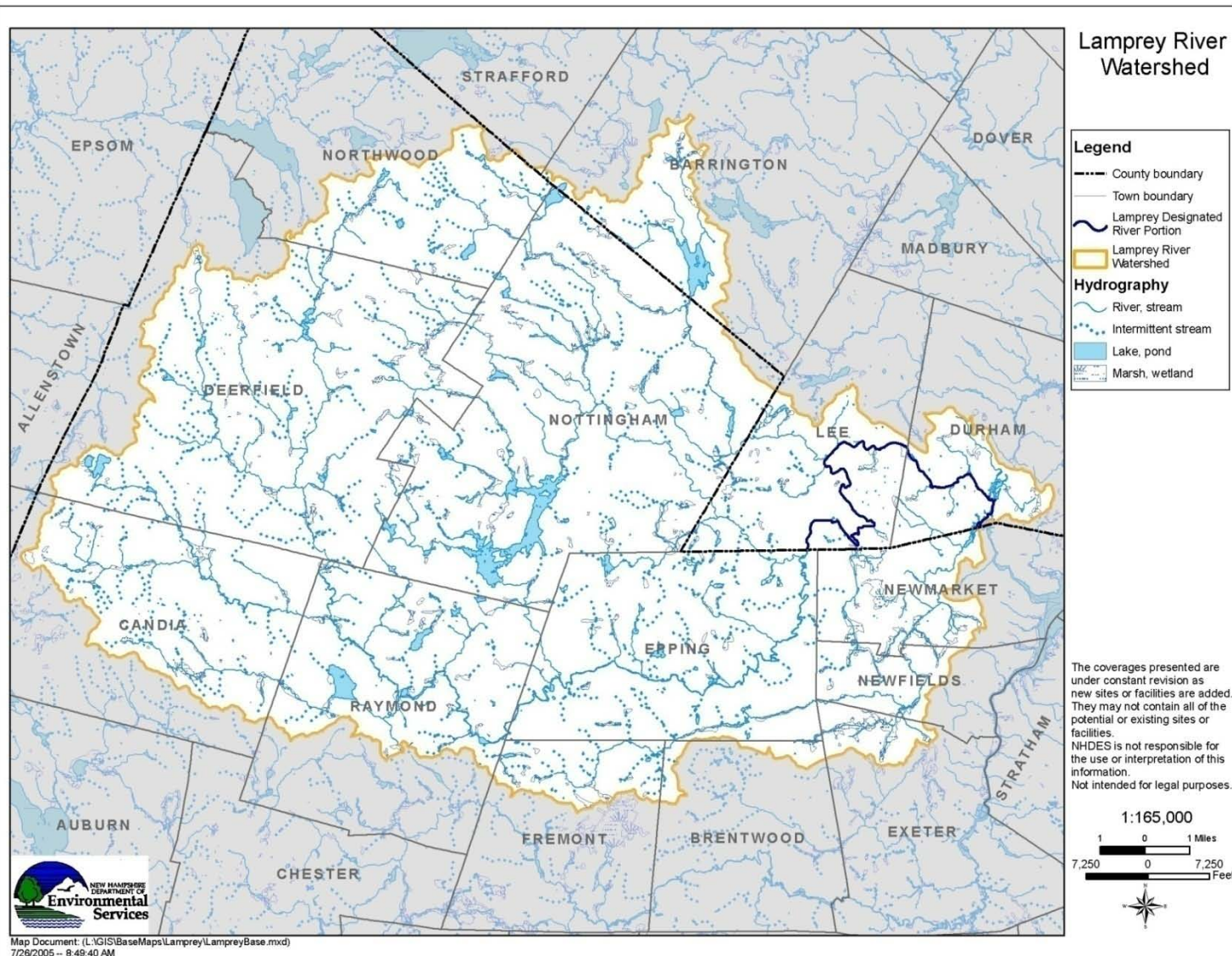
- **Active watershed efforts**

- **Diverse towns**

- **Diverse natural features**

- **Many transboundary issues**

Mixed Qualitative Methods

semi-structured interviews

Grounded Theory approach

set of strategies for data collection and analysis AND a product of that analysis

- *in-depth, case studies where data collection and analysis aim to <u>build theory about socially complex phenomena such as decision making, which is grounded in the inductive analysis of empirical data itself</u>.*

- rigorous, highly systematic

- coding and line by line analysis of interview data - Nvivo software

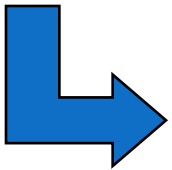**Theory: social landscape of watershed based land use decision making**

Developing Units of Analysis and Interview Questions

Units of Analysis:

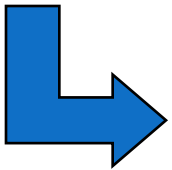Watershed communication and connections

Resource inventorying

Policy adoption and implementation

Topical Questions:

• *How is the communication characterized between communities and groups within the watershed?*

•What facilitates or hinders communication?

Interview Questions:

• *Describe the circumstances under which you might approach upstream or downstream towns regarding land use.*

• What are the challenges and opportunities you see in communicating between towns?
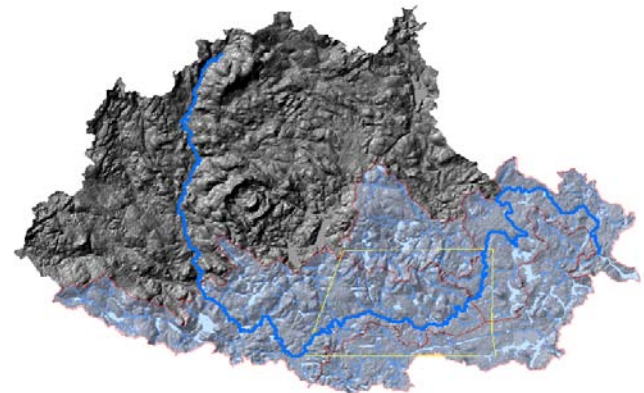
Data Collection

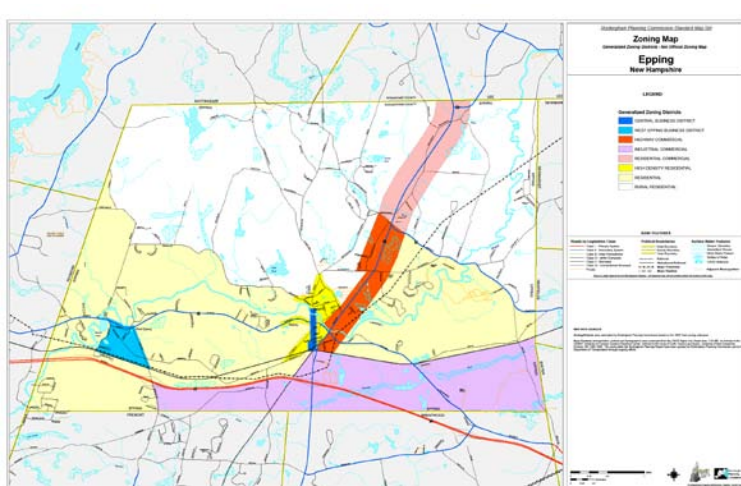## Expert/Scoping Interviews

•NOAA, EPA, Regional Planning Commissions, Lamprey River Watershed Association, developers, realtors, NGOs, etc.
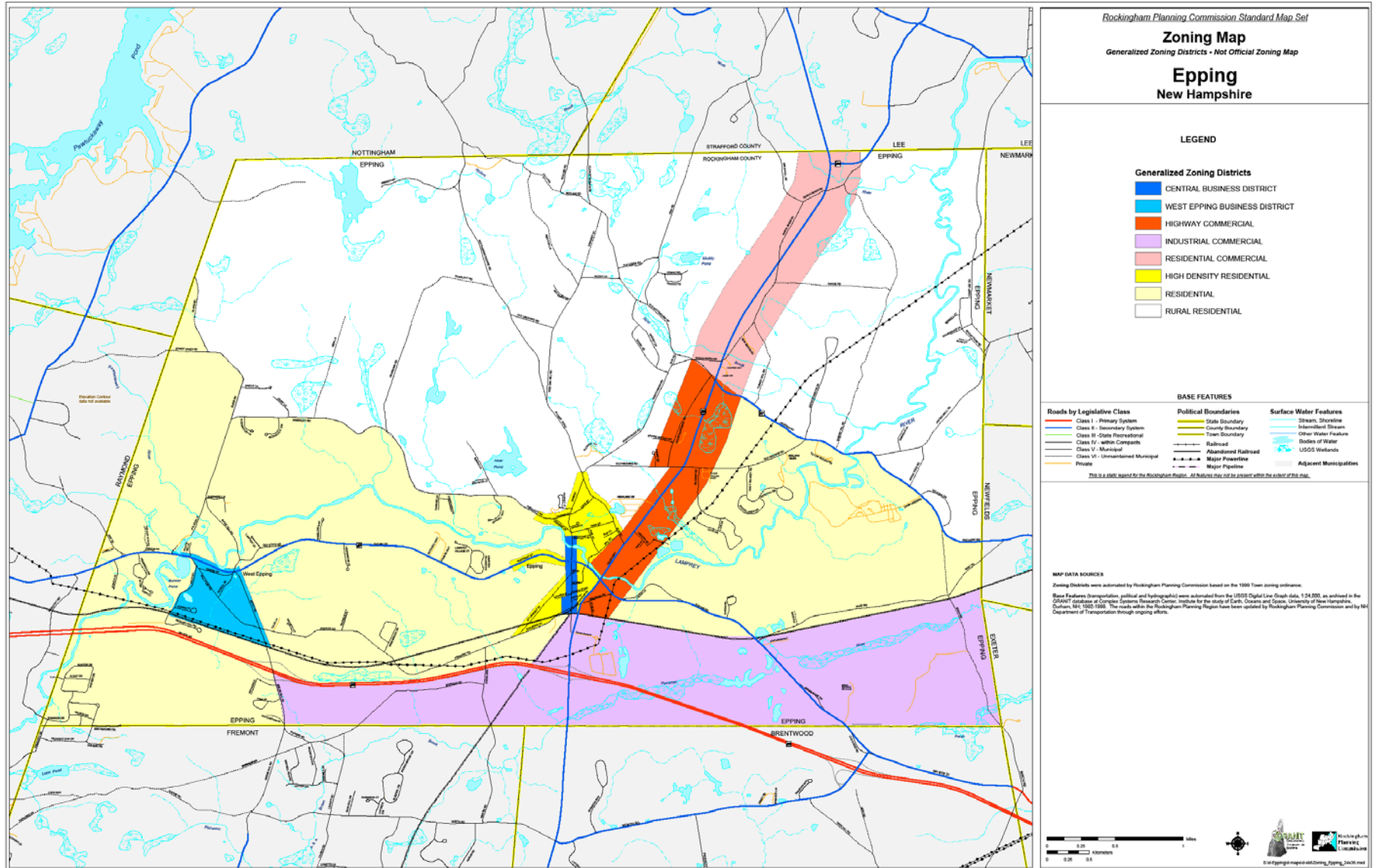
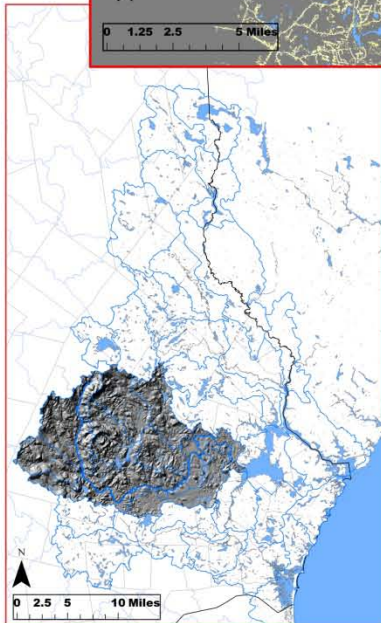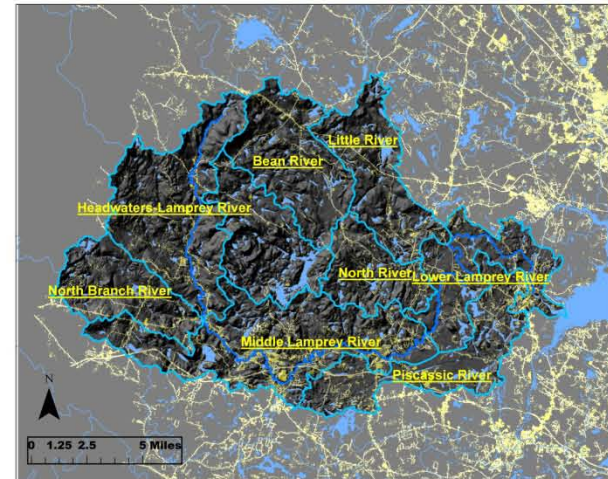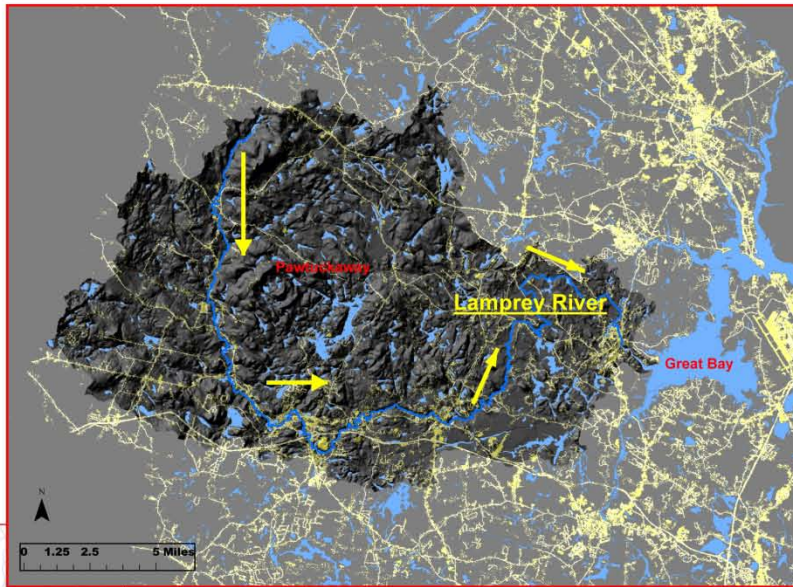## Primary Sources - Town Boards and Commissions

- Planning Boards
- Conservation Commissions
- Zoning Boards
- Open Space Commissions
- Heritage Commissions / *Historical Societies / Historic District Commissions*

Participatory GIS

Traditional Planning Maps

Powerhouse

Lamprey River

Great Bay

Little River

Bean River

Headwaters-Lamprey River

North Branch River

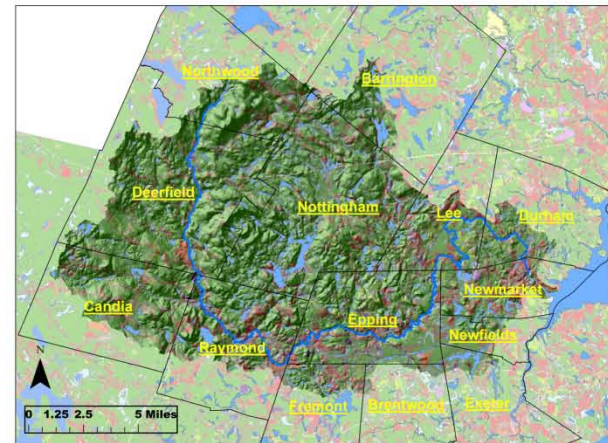North River Lower Lamprey River

Middle Lamprey River

Piscassic River

Clockwise from left:
1) Lamprey River Watershed in Piscataqua-Salmon Falls coastal watershed
2) Lamprey River and Watershed with Impervious Surface Areas
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4) Lamprey River and Watershed with 14 NH towns

Legend

Lamprey R Watershed Towns
Lamprey River
Surface Waters

Land Use

Wetlands
Water
Transportation, Communication, Utilities
Residential
Outdoor, Urban and Built Up land
Mixed Developed Use
Industrial
Commercial, Services and Institutional
Commercial, Industrial Complexes
Vacant Land
Agricultural Land
Brush or Transitional
Forest
Barren
Tundra

Lamprey River Watershed
Value

High : 254

Low : 0

Mapping: Erika L. Washburn
GIS Data: UNH GRANIT
10m DEM Lamprey River Watershed:
NH Department of Environmental Services
Geology Unit

Northwood

Barrington

Deerfield

Nottingham

Lee

Durham

Candia

Newmarket

Epping

Newfields

Raymond

Fremont

Brentwood

Exeter

Lee and Subwatersheds

Bellamy River

Little River

Oyster River

North River   Lower Lamprey River

Piscassic River
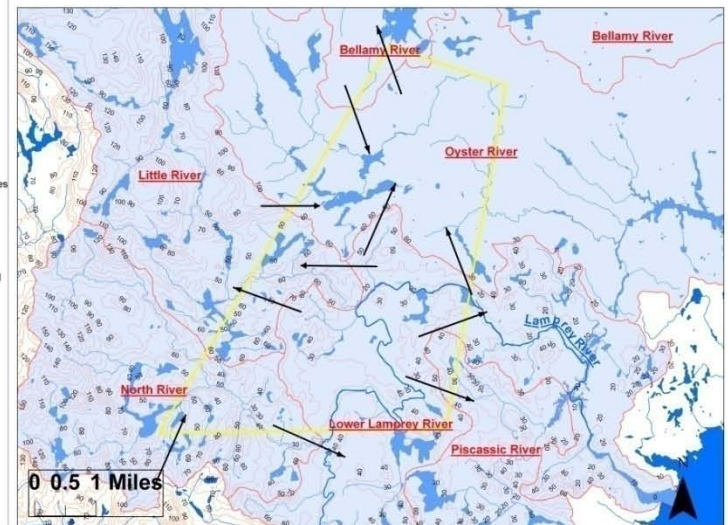
0   2.5   5   10 Miles

N

Conserved Public Land

Cherry Ln

Pinkham Rd

Sackett Rd

West Mill Pond Rd

0 0.5 1 Miles

Cultural Resources

0 0.5 1 Miles

Legend

◇ Grave Markers
■ Cemetery
▲ NRHP Sites
— Conserved Public Land
□ Lee
— Lamprey River
■ Surface Waters
□ Subwatersheds of Lee
— Rivers and Streams
— Roads

Land Use
■ Wetlands
■ Water
■ Transportation, Communication, Utilities
■ Residential
■ Outdoor, Urban and Built Up land
■ Mixed Developed Use
■ Industrial
■ Commercial, Services and Institutional
■ Commercial, Industrial Complexes
■ Vacant Land
■ Agricultural Land
■ Brush or Transitional
■ Forest
■ Barren
■ Tundra
— 10 Ft Contours

Lamprey River Watershed
Value
High : 254

Low : 0

Water Flows and Contours

Bellamy River   Bellamy River

Oyster River

Little River

Lamprey River
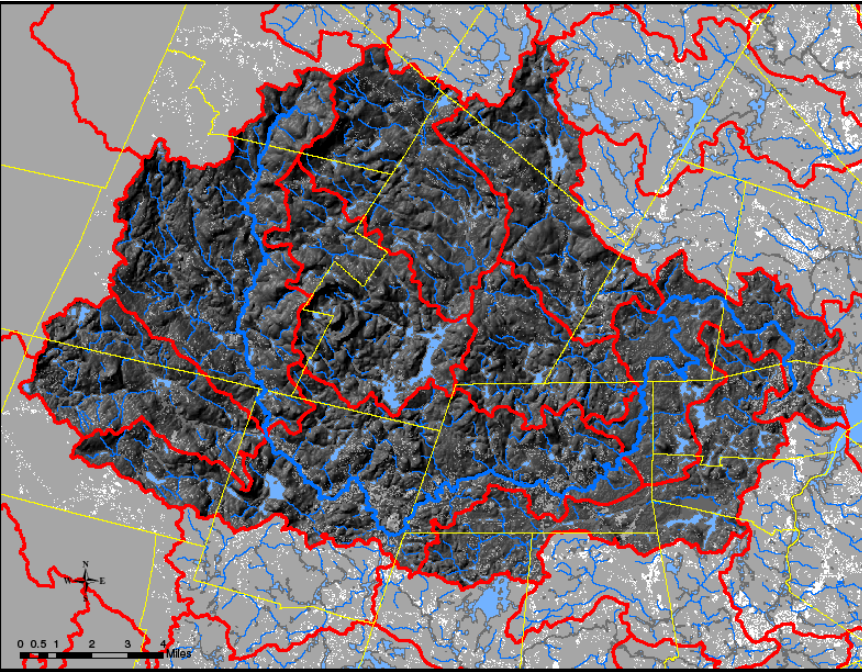
North River

Lower Lamprey River

Piscassic River

0 0.5 1 Miles

Mapping the Social Landscape of LU Decision Making

Lamprey River Watershed Towns

10M DEM courtesy of New Hampshire Geological Survey

• Thinking about the impact of **cumulative** decisions …in the town, watershed, region?

• Recognizing **spatially** the relationship between towns and subwatersheds?

• **Communicating** upriver and downriver, between towns in the watershed?

• **Knowing** what other towns are doing with regulations and local policy?

• Considering **Great Bay**? The **coast**? **Ocean**?
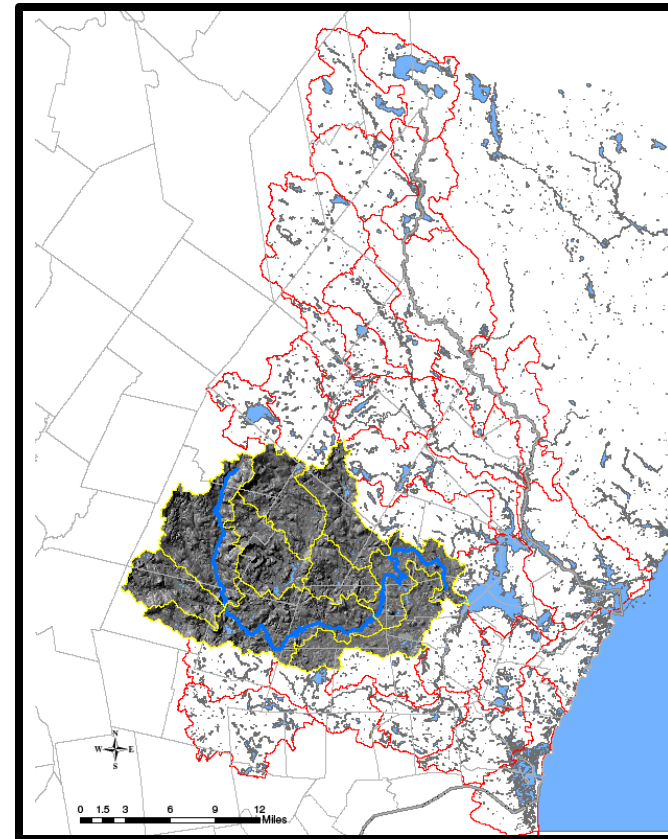
Data Collection Results

Scoping Interviews: 32

- professional planners, NGOs, County, State, Higher Ed and the private sector (developers, realtors)

Primary Interviews: 37

- 54 possible positions (excluding Historical Societies and HDCs) in 14 towns
- Interviewees represent approx. 80-90% positions possible
- Over 66 hours of interview data
- Average interview 1 hour 47 minutes

Proposed Products for Town Outreach
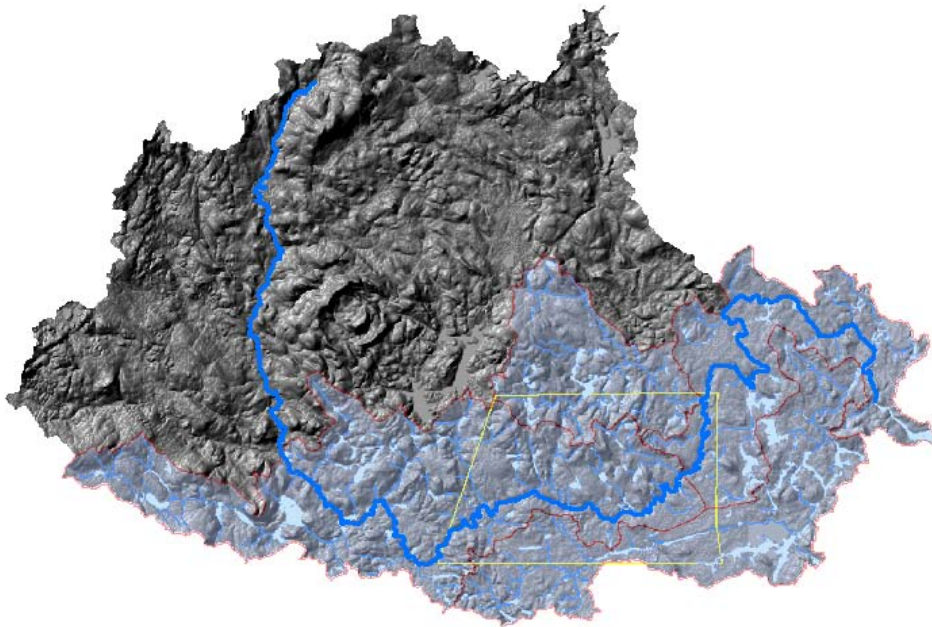
- DVD – all GIS maps, key results, database of land use boards + 3D simulation model

- Multi-Town Information Sessions

- Lamprey River Watershed Symposium on Land Use

- Involved coordination: GBNERR, CTP, NHEP, LRAC, LRWA, Great Bay Stewards