



# **Northeastern Area Association of State Foresters**

## **Suggested Framework for Statewide Forest Resource Assessments**

**November 2008**

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Background—at the request of the Northeastern Area Association of State Foresters (NAASF), this document was developed by the NAASF Forest Resource Planning Committee with staff support from the Northeastern Area State and Private Forestry and with review and input from all NAASF Committees. There is an accompanying document, *NAASF Guide for Statewide Forest Resource Assessment and Strategies*, which provides an overview of the national requirements, regional guidance, and an appendix with more detail on geospatial data.

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## NAASF Suggested Framework for Statewide Forest Resource Assessments

This document provides a suggested framework for the Statewide Forest Resource Assessments. States may organize their State Assessment differently than outlined below. The seven criteria of forest sustainability<sup>1</sup> are used because: (1) they provide broad goals for sustainable forest management, encompassing ecological, social, and economic aspects of forests; (2) they are agreed to and monitored at multiple scales (international, national, regional, in some states, and finer), (3) some related state-level data are compiled and will be available on-line. The Northeastern Area Association of State Foresters (NAASF) and the Northeastern Area (NA) have worked in partnership to assess and support forest sustainability at regional and state levels following the seven nationally-monitored criteria and 18 measurable base indicators of forest sustainability.<sup>2</sup> Trend data useful for the State Assessments that will be available on the on-line NA Forest Sustainability Indicators Information System are noted throughout the forest conditions and trends section below.

Qualitative, quantitative, and geospatial data should be used for analysis of the conditions and trends in forest resources. There are seven data themes that are suggested for the geospatial component of the State Assessment. Chapter 5 of the framework is focused on the analysis to identify priority forest areas. Throughout the forest conditions and trends sections, each suggested geospatial data theme, along with other potential geospatial data, is referenced where it may be included as a separate map. Specific data sources for these layers are in the NAASF Guide for Assessments and Strategies.

The Farm Bill and national guidance calls for the State Assessments and Strategies to be consistent with the three national S&PF themes: (1) conserve working forest landscapes, (2) protect forests from harm, and (3) enhance public benefits from trees and forests. States may want to show how state issues and priorities are related to the national themes in the State Assessments (in a preface, summary, or appendix). This connection to the national themes is particularly important for the Resource Strategy.

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### Suggested Table of Contents for State Forest Resource Assessments

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- 1. Introduction**
- 2. Forest Conditions and Trends**—analysis of present and future forest conditions and trends on all ownerships in the state, including analysis of market and non-market forces. Qualitative, quantitative, and geospatial data can be used. This may be organized by the seven criteria of forest sustainability, as shown below.
- 3. Existing and Emerging Benefits and Services**—highlight the benefits and services of forests and trees, including ecosystem services.
- 4. Issues, Threats, and Opportunities**—considering the analysis in the above two sections, outline the key forest-related issues, threats, and opportunities in the state.
- 5. Priority Landscape Areas**—description of the priority areas in the state, spanning ownerships and the urban to rural continuum, identified as a result of the geospatial analyses, non-geospatial data, and qualitative inputs. Include multi-state areas that are a regional priority.
- 6. Summary**—highlight and summarize key issues, threats, opportunities, and resulting priorities; including priority landscape areas identified as part of the geospatial assessment and priorities that are not illustrated geospatially.
- 7. Appendices: References, Methodology for geospatial analysis, Data gaps**

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<sup>1</sup> The seven criteria come from the set of criteria and indicators (C&I) used at the national and international levels to monitor the sustainability of temperate and boreal forests. They are commonly referred to as the Montreal Process C&I.

<sup>2</sup> See the last page of this document for a list of the NAASF/NA base indicators of forest sustainability.

# Suggested Framework for State Assessments

## 1. Introduction

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## 2. Forest Conditions and Trends

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Analysis of present and future forest conditions and trends on all ownerships in the state, including analysis of market and non-market forces. Qualitative, quantitative, and geospatial data can be used. This may be organized by the seven criteria of forest sustainability, as shown below.

### Criterion 1: Conservation of biological diversity



**Importance:** Biological diversity is about variety—in the number and kinds of life forms, in their genetic makeup, and in the habitats where they live. Generally, greater diversity means a greater potential to adapt to changes. To preserve biological diversity, animal and plant species must be able to freely interact with one another and with their environment. There must be food, water, and shelter in sufficient amounts spread across the landscape. Biological diversity is often studied at ecosystem, species, and genetic levels.

**Present and future conditions and trends in biological diversity:**

Ties to national theme: Conserve Working Forests

#### Related Geospatial Data Layers<sup>3</sup>

Development	Fragmentation and Parcelization	Fish and Wildlife Habitat	Protected Land
<p><i>Source: Housing density projections (threat of development) by Dave Theobald (or other state source).</i></p>	<p><i>Source: NRS FIA urbanization and fragmentation characteristics (or other state source)</i></p>	<p><i>Source: State source-state natural heritage T&amp;E or other data (from state wildlife action plan work).</i></p>	<p><i>Source: data used for Forest Stewardship Spatial Analysis Program—Conservation Biology Institute, Protected Areas Database or state data). This map could go here or under criterion 6.</i></p>

#### Relevant data available on NA Forest Sustainability Indicators Information System

- Forest and total land area (US FS, Forest Inventory and Analysis)
- Forest density (map), US FS, Forest Inventory and Analysis
- Population, U.S. DOC, Census Bureau
- Reserved forest land, US FS, Forest Inventory and Analysis
- Urban forest (tree cover), US FS, Northeastern Research Station, Urban Forestry Unit
- Forest cover type groups, US FS, Forest Inventory and Analysis
- Size class and age group, US FS, Forest Inventory and Analysis
- Forest parcel sizes, US FS, National Woodland Owner Survey

<sup>3</sup> More detail about the geospatial data is in the NAASF Guide for State Forest Resource Assessments and Strategies.

- Forest and woodland communities, NatureServe
- Forest-associated and all species, NatureServe
- Forest-associated species of concern by taxonomic group, NatureServe
- Bird populations, USGS North American Breeding Bird Survey

**Criterion 2: Maintenance of productive capacity of forest ecosystems**



**Importance:** Productive forests supply important goods and services to society. They help prevent soil erosion, produce oxygen, filter pollutants, protect and enhance water quality, and offer a haven for recreation and spiritual renewal. Forests supply lumber and wood for homes, furniture, papermaking, and fuel. Other products include cones, boughs, herbs, medicines, and foods such as mushrooms and berries. Forest productivity varies according to the amount of forest land available, and its fertility, health, environmental pollutants, location along the urban to rural continuum, past and current uses, and management. Managing forests sustainably means balancing resource

production with the ecosystem’s capacity to renew and sustain itself. Measuring and tracking the amount of forest land available for producing goods and services, the productivity of that forest land, and the amount, quality, and type of trees and other plants growing there is critical to determining whether we are balancing production and long term ecological health and the capacity of forest products markets to utilize timber and other forest products.

**Present and future conditions and trends in productive capacity of forests:**

Ties to national theme: Conserve Working Forests

**Related Geospatial Data Layers<sup>4</sup>**

<p><b>Development Risk</b></p> <p><i>Source: Housing density projections (threat of development) by Dave Theobald (or other state source).</i></p> <p><i>Listed under Criterion 1, but may also be considered here.</i></p>	<p><b>Fragmentation</b></p> <p><i>Source: NRS FIA urbanization and fragmentation characteristics (or other state source)</i></p> <p><i>Listed under Criterion 1, but may also be considered here.</i></p>	<p><b>Additional FIA Data</b></p> <p><i>Potentially work with FIA at a regional level to provide additional related geospatial data.</i></p>
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**Relevant data available on NA Forest Sustainability Indicators Information System**

- Amount of timberland (US FS, Forest Inventory and Analysis)
- Net growth and removals (US FS, Forest Inventory and Analysis)
- Type of removals (US FS, Forest Inventory and Analysis)

<sup>4</sup> More detail about the geospatial data is in the NAASF Guide for State Forest Resource Assessments and Strategies.

### Criterion 3: Maintenance of forest ecosystem health and vitality



**Importance:** Forest health describes the overall condition of forests and trees and how well they recover from stress. Many factors affect forest health; some are natural, including insects and diseases, and severe weather or catastrophic events such as ice storms, tornados, hurricanes, floods, and droughts. Some are human induced, such as development which causes changes in soil hydrology and reduces the size of forest patches, in effect destroying habitat for native species. Combinations of stressors cause the greatest problem, much as we are more likely to get sick when our resistance is down. Stresses come and go, making forest health difficult to assess at a single point in time. For example, the amount of damage from native insects varies from year to year and decade to decade, depending upon weather, natural population cycles, and other factors.

Ties to national theme: Protect Forests from Harm

#### Present and future conditions and trends in forest ecosystem health and vitality:

#### Related Geospatial Data Layers<sup>5</sup>

##### Wildfire Risk

*Source: state (could use state-provided data used for Spatial Analysis Project, perhaps draw on Landfire data).*

*Note: regional product may be developed for future use.*

##### Forest Health Risk

*Source: National Forest Health Risk Map (1 km scale) and/or aerial survey data.*

*Note: in future, will have 30 meter Forest Health Risk data.*

Individual maps for key insects, diseases, invasive plants of concern as available from aerial survey and other data.

#### Data Available from State and Other Sources<sup>6</sup>

- Fire departments and protection capabilities
- Volunteer vs. career protection areas
- Water supply capability
- Fire occurrence

#### Relevant data available on NA Forest Sustainability Indicators Information System

- Tree mortality (US FS, Forest Inventory and Analysis)
- Insects, diseases, plants, and animals (Cooperative Forest Health Program, aerial survey data/viewer)
- Wildfire occurrence (US FS, Fire and Aviation Management)
- Drought (NOAA, National Climatic Data Center)

<sup>5</sup> More detail about the geospatial data is in the NAASF Guide for State Forest Resource Assessments and Strategies.

<sup>6</sup> Data recommended by the NAASF Forest Fire Supervisors Committee

## Criterion 4: Conservation and maintenance of soil and water resources



**Importance:** Soil and water are the foundation for all other forest resources. *Soil*, which has both living and nonliving elements, holds water between rainstorms and stores nutrients for plants and animals. It is an anchor for vegetation and a seasonal or permanent home for a variety of burrowing animals, insects, and microscopic creatures. Soil conservation means maintaining site productivity and soil resource functions. Soil takes thousands, even millions, of years to develop; therefore, it is not considered renewable even though it can be formulated and restructured to support plant growth.

*Water resources* include the physical features, habitat, and inhabitants of lakes, streams, and wetlands, as well as the water itself. Forests and trees, whether urban or rural, help reduce storm water runoff, filter pollutants, store water and nutrients, clean and cool water, protect municipal water supplies, reduce flooding, replenish groundwater, and provide fish habitat. Water resources are a function (reflection) of watershed condition or percent of area in an undisturbed site.

Ties to national theme: Enhance Public Benefits

### Present and future conditions and trends in soil and water resources:

#### Related Geospatial Data Layers<sup>7</sup>

##### Water Quality and Supply

*Source: state data used for the Spatial Analysis Project as proxy. NA “ability to produce clean water” index.*

##### Riparian Areas and Wetlands

*Source: data used for the Forest Stewardship Spatial Analysis Project.*

##### Ability to Produce Clean Water

*Source: NA Forests, Water, and People, “ability to produce clean water” index.*

##### Data on Soils

*Source: could use NRCS SSURGO (Soil Survey Geographic Database) or FIA soils data.*

#### Relevant data available on NA Forest Sustainability Indicators Information System

- Soil pH (US FS, Forest Inventory and Analysis)
- Total soil carbon (US FS, Forest Inventory and Analysis)
- Estimated bare soil (US FS, Forest Inventory and Analysis)
- Bulk density (US FS, Forest Inventory and Analysis)
- Calcium-aluminum ratio (US FS, Forest Inventory and Analysis)
- Forested riparian area (MRLC National Land Cover Data; USGS National Hydrography Dataset)
- Forest land by watershed (MRLC National Land Cover Data; USGS 8-digit HUCs)
- Stream miles impaired by percentage of watershed forested (U.S. Environmental Protection Agency, 303(d) Impaired Waters List)

<sup>7</sup> More detail about the geospatial data is in the NAASF Guide for State Forest Resource Assessments and Strategies.

## Criterion 5: Maintenance of forest contribution to global carbon cycles



**Importance:** Carbon-containing gases in the atmosphere, the so-called “greenhouse” gases, are strongly implicated as a potential source of climate change. Carbon dioxide, methane, and nitrous oxide have changed the composition of our atmosphere. Carbon dioxide concentration alone increased since the 18<sup>th</sup> century and greenhouse gases are expected to warm the earth by allowing sunlight to reach the earth’s surface while blocking heat from escaping. Some of the gases also thin the ozone layer that shields the earth from harmful solar radiation.

Growing forests store carbon naturally in both the wood and soil in a process called *carbon sequestration*. Trees are about 50 percent carbon; wood products from harvested trees continue to store carbon throughout the life of the product. In general, forest activities such as tree planting increase carbon sequestration, while activities such as prescribed burning release carbon into the atmosphere. Increasing carbon stored in urban and rural trees and forests is usually an inexpensive way to mitigate increasing atmospheric greenhouse gases. In addition to sequestration, planting and maintaining trees in communities and especially around buildings to provide shade or block prevailing winds can moderate temperatures and substantially reduce energy demands and related greenhouse gas emissions.

### Present and future conditions and trends in forest contribution to global carbon cycles:

Ties to national theme: Enhance Public Benefits

#### *Related Geospatial Data Layer*

Carbon in Aboveground  
Live Tree Biomass in  
Forests

*Source: county level  
data from FIA, available  
through NA Forest  
Sustainability Indicators  
Information System*

#### *Relevant data available on NA Forest Sustainability Indicators Information System*

- Forest ecosystem biomass (US FS, Northern Research Station)
- Forest carbon pools (US FS, Northern Research Station)
- Forest carbon by forest type (US FS, Northern Research Station)

Additional resource: Smith, James E.; Heath, Linda S.; Skog, Kenneth E.; Birdsey, Richard A. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. Gen. Tech. Rep. NE-343. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 216 p. (<http://www.treearch.fs.fed.us/pubs/22954>)

## Criterion 6: Maintenance and enhancement of long-term multiple socioeconomic benefits to meet the needs of societies



**Importance:** This criterion addresses economic values people place on trees and forests for meeting their forest products, recreational, cultural, social, psychological, and spiritual needs. Many people depend on forests for their livelihood and/or for their personal physical and mental well-being and forests in urban and rural areas contribute significantly to many community’s economic base. In addition urban and community trees and forests provide cooling, storm water reduction, and other benefits. Tracking these values, as well as monitoring shifts in demand for products and services, provides useful insights for the future. Changes can indicate potential drains on the

forest resource or highlight management opportunities.

The region’s forests produce a multitude of goods and services—everything from timber and mushrooms to recreation and water. Sustainable forestry requires diverse, strong markets for a wide variety of products. Market forces are often the dominant influence on resource-based goods and services, but nonmarket forces—such as the desire to sustain biological diversity or the opportunity to dwell in or visit a natural place—are also important factors influencing investments in goods and services.. Most forests can provide multiple goods and services simultaneously. However, there will always be situations where multiple activities and desired uses are incompatible.

### Present and future conditions and trends in socioeconomic benefits to meet the needs of societies:

#### *Related Geospatial Data Layers<sup>8</sup>*

**Economic Potential**  
*Source: use state data as available.*

**Tree Cover in Urban Areas**  
*Source: NRS, Urban RPA data and priority planting index for urban areas. Other data related to the value of trees in urban areas as available.*

Ties to national theme: Enhance Public Benefits

#### *Data Available from State and Other Sources (recommended by the NAASF Utilization Committee)*

- Number and type of primary wood-using industry facilities
- Number and type of non-timber or non-traditional forest product markets
- Number and type of existing or planned biomass energy markets
- Federal or state TPO data and state reports indicating types and level of industrial and/or non-industrial timber harvest and economic importance
- State laws and/or resolutions stating the importance of the forest products industry to forest management and the rural economy.

#### *Relevant data available on NA Forest Sustainability Indicators Information System*

- Value of wood-related products (U.S. DOC, Census Bureau, Economic Census)
- Production of roundwood (US FS, Timber Product Output Database)

<sup>8</sup>More detail about the geospatial data is in the NAASF Guide for State Forest Resource Assessments and Strategies.

- Participation in outdoor recreation (US FS, National Survey on Recreation and the Environment and USDI Fish and Wildlife Service, National Survey of Fishing, Hunting, and Wildlife-Associated Recreation)
- Federal land open to recreation (US FS, Wilderness, Urban Forest, and Demographic Trends Unit)
- Recreational facilities on State land (State forestry agencies)
- Trails (State forestry agencies)
- Campgrounds (Woodall Publications Corporation)
- Recreational facilities in national forests (US FS, INFRA Infrastructure Application)
- USDA FS NA S&PF funding (US FS, NA S&FP)
- State forestry agency funding (National Association of State Foresters, State Forestry Statistics)
- Funding for forestry research at universities (USDA Cooperative State Research, Education, and Extension Service)
- USDA FS Research funding (US FS, Research and Development)
- Capital expenditures by manufacturers of wood-related products (U.S. DOC, Census Bureau, Economic Census)
- Forest land ownership (US FS, Forest Inventory and Analysis)
- State lands (State forestry agencies, collected by NA S&PF/NAASF)
- Protected land (map) (Conservation Biology Institute, Protected Areas Database)
- Private land with public conservation easements (US FS, Forest Legacy Program and State forestry agencies)
- Forest land in tax reduction programs (State forestry agencies)
- Forest certification (American Forest and Paper Association, Sustainable Forestry Initiative (SFI); Forest Stewardship Council (FSC); and American Forest Foundation, American Tree Farm System)
- Wood-related products manufacturing employees (U.S. DOC, Census Bureau, Economic Census)
- State forestry employees (National Association of State Foresters, State Forestry Statistics)
- Wood product manufacturing payroll and wages (U.S. DOC, Census Bureau, Economic Census)
- State forestry salaries (National Association of State Foresters, State Forestry Statistics)

## **Criterion 7: Legal, institutional, and economic framework for forest conservation and sustainable management**



**Importance:** Social, legal, economic, and environmental conditions reflect society's values and have a profound effect on forest conservation and sustainable management. These factors create a complex web of influences that can sometimes interact in unexpected ways. For example, some communities, in an effort to slow growth, have enacted zoning ordinances to require larger lot sizes. This has the unintended effect of fragmenting more forest land than if lots were clustered closer together.

The most important question to answer is, Do the region's legal, institutional, and social factors, when taken together, tend to support or undermine urban and rural forest sustainability? A comprehensive planning and monitoring system is critical to answering this question. Some of the important factors to consider include population trends; technology; local, State, national, and international trade; land ownership; and local, State, and national laws and regulations.

**Present and future conditions and trends in the legal, institution, and economic framework related to forests:**

Ties to all three national themes

## ***Related Geospatial Data Layers<sup>9</sup>***

Community Capacity

*Source: Community  
Accomplishments  
Reporting System (CARS)*

## ***Relevant data available on NA Forest Sustainability Indicators Information System***

- Types of forest management standards/guidelines (State forestry agencies)
- Voluntary and mandatory standards/guidelines (State forestry agencies)
- Monitoring of standards/guidelines (State forestry agencies)
- State forest planning (State forestry agencies)
- Nonindustrial private forest planning (US FS, Performance Measurement Accountability System)
- National forest planning (US FS, Eastern Region)
- State forest assessments (State forestry agencies)
- Forest laws and policies (State forestry agencies and National Association of State Foresters, State Forestry Statistics)
- State forest advisory committees (National Association of State Foresters, State Forestry Statistics)

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<sup>9</sup>More detail about the geospatial data is in the NAASF Guide for State Forest Resource Assessments and Strategies.

### **3. Existing and Emerging Benefits and Services**

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Considering the above analysis, highlight the benefits and services of forests and trees, including ecosystem services.

### **4. Issues, Threats, and Opportunities**

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Considering the analysis in the above two sections, outline the key forest-related issues, threats, and opportunities in the state.

### **5. Priority Landscape Areas**

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This section would include:

- An overview of the geospatial analyses to identify priority landscape areas (include detailed information on data layers, themes, and methodology in an appendix).
- A description of any areas in the state that are identified as a priority by the geospatial analyses and non-geospatial data. Such areas will span ownerships and the urban to rural continuum.
- Description of any multi-state areas that are a regional priority.

### **6. Summary**

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Highlight and summarize key issues, threats, opportunities, and resulting priorities; including priority landscape areas identified as part of the geospatial assessment and priorities that are not illustrated geospatially. May also want to provide a summary of how state issues and priorities are related to the national themes.

### **7. Appendices**

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#### **References**

#### **Methodology for Geospatial Analysis**

**Data gaps**—provide a list of data gaps to help focus work at the national and regional level to fill those gaps.

## For Reference: NAASF/NA Base Indicators of Forest Sustainability<sup>10</sup>

These indicators span the Montreal Process criteria and are recommended for use in NA-wide and State forest sustainability assessments.

### **Criterion 1: Conservation of Biological Diversity**

1. Area of total land, forest land, and reserved forest land
2. Forest type, size class, age class, and successional stage
3. Extent of forest land conversion, fragmentation, and parcelization
4. Status of forest/woodland communities and associated species of concern

### **Criterion 2: Maintenance of Productive Capacity of Forest Ecosystems**

5. Area of timberland
6. Annual removal of merchantable wood volume compared with net growth

### **Criterion 3: Maintenance of Forest Ecosystem Health and Vitality**

7. Area of forest land affected by potentially damaging agents

### **Criterion 4: Conservation and Maintenance of Soil and Water Resources**

8. Soil quality on forest land
9. Area of forest land adjacent to surface water, and forest land by watershed
10. Water quality in forested areas

### **Criterion 5: Maintenance of Forest Contribution to Global Carbon Cycles**

11. Forest ecosystem biomass and forest carbon pools

### **Criterion 6: Maintenance and Enhancement of Long-Term Multiple Socioeconomic Benefits to Meet the Needs of Societies**

12. Wood and wood products production, consumption, and trade
13. Outdoor recreational participation and facilities
14. Investments in forest health, management, research, and wood processing
15. Forest ownership, land use, and specially designated areas
16. Employment and wages in forest-related sectors

### **Criterion 7: Legal, Institutional, and Economic Framework for Forest Conservation and Sustainable Management**

17. Forest management standards/guidelines
18. Forest-related planning, assessment, policy, and law

<sup>10</sup> No priority is implied in the numeric listing of the criteria and indicators.