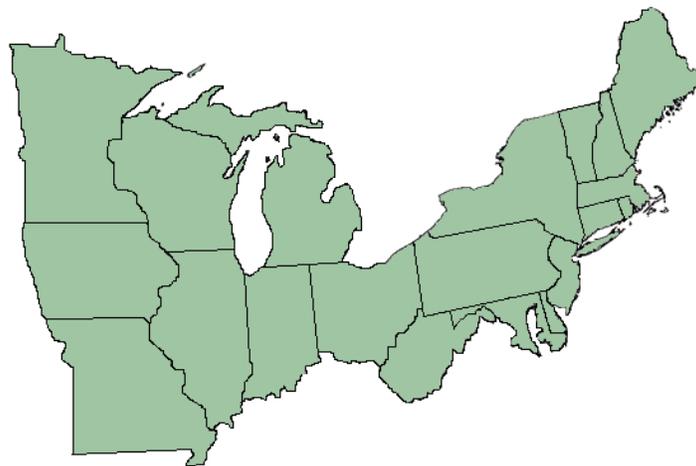


Northern Forest Futures Project

Scoping of Issues in the Forests of the Northeast and Midwest United States

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Northeastern Area Association of State Foresters

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Introduction

The Northern Forest Futures Project

The Northern Forest Futures Project (NFFP) is a window on tomorrow's forests, revealing how today's trends and choices can change the future landscape of the Northeast and Midwest. This effort starts with existing assessments and inventories and a scoping of trends and public issues, builds alternative futures based on those trends and the latest ecological and social science, and analyzes what those futures mean for people and forests. The final step is an educational outreach that allows individuals, organizations, and resource managers to directly assess what difference possible lifestyle, policy, and management choices make to the well-being of their communities and their forests. Ultimately, the NFFP informs decision-making regarding the protection and sustainable management of public and private forests in the Northern United States.

The Northern Forest Futures Project started in late 2008 and is a 3-year joint venture of the U.S. Department of Agriculture Forest Service and the Northeastern Area Association of State Foresters. The project seeks to forecast how known and emerging natural resource and societal trends will change the character of tomorrow's forests and how the resulting changes will alter the ability of forests to contribute to the well-being of people and communities.

Role of Issue Scoping

The initial task of the Northern Forest Futures Project is to understand the issues and influences that are shaping or will shape the region's forests. The diversity and complexity of those issues goes beyond a single organization's viewpoint. Therefore, one of the first steps of the Northern Forest Futures Project is gaining a comprehensive understanding of the issues through a scoping effort that embraces many sources of input and viewpoints. The goals of this scoping process are:

- Develop a clear understanding of stakeholder issues and concerns, using existing resources where possible.
- Support analysis work with clear syntheses of issues and description of stakeholder interests.

This early groundwork is critical to the project's ultimate success. Thorough summaries of the issues will lead to products that meet stakeholders' needs and effective delivery of those products.

Approach

The issue scoping process is intended to be systematic, expeditious, and responsive to new information as it emerges. The process started with the NFFP Implementation team, which brainstormed possible issues affecting the region (Appendix A) and major stakeholder groups (Appendix B) who would be interested in the Northern Forest Futures Project. This brainstorming gave the team a general sense of the array of issues that they might need to address as the NFFP evolved.

The next step in the process was to identify existing efforts that had already identified the major forestry issues affecting the region. In particular, the team looked for documents in which the public had been engaged in generating or reviewing issues. This approach capitalized on previous outreach efforts, avoided "stakeholder burnout" from yet another government agency asking the same set of

organizations about their priorities and concerns, and was completed in a shorter timeframe than scheduling multiple meetings across the region.

We located existing natural resource assessment documents or planning efforts that identified issues through public involvement and included the perspectives of a diverse array of organizations. Sources were selected with the goal of covering the entire geographic range of the Northeast and Midwest, including Washington D.C. This 20-state region includes the corner states of Missouri in the southwest, Minnesota in the northwest, Maine in the northeast, and Maryland in the southeast. The type of media was not limited to print; both on-line documents and personal interviews were included. A partial list of documents reviewed for issues is included in Appendix C.

We reviewed the documents for text describing issues or concerns relating to forests in the Northern United States. The relevant text was captured on a response form (Appendix D), which recorded the text from the document, the categories addressed by the text, the individual comment's type, timeframe, and geographic applicability. Each source document was assigned an identifying number as were the individual comments that were derived from it. Then each comment was assigned to a category and subcategory. The category topics were a standard set generated from the initial issue brainstorming completed by the NFFP Implementation Team (Appendix A). A standard set of subcategories was also available, but reviewers were free to create their own subcategories if none of the standard set fit.

Response forms were compiled into a single spreadsheet and organized by category. We then reviewed the initial category and subcategory assigned to each comment and, where necessary, adjusted the coding for consistency across all document reviewers. In some cases, closely related subcategories, such as "water," "water-quality," and "water-quantity," were grouped into a single, more encompassing subcategory. Where identical subcategories occurred in multiple categories, the subcategories and associated comments were assigned to a single category.

After the first refinement of subcategories, comments were assigned to multiple subcategories where appropriate, which reflects the interrelatedness of the subcategories. For example, the comment "Residential and urban development is contributing to forest fragmentation" could simultaneously be labeled with the subcategories *Fragmentation & Parcelization* and *Development*. Through this process, the sum of all the comment categorizations (1087) is significantly greater than the total number of comments (701).

One of the major sources of information for this scoping effort was a summary of issues collected from the region's 20 State Foresters. In April and May 2009, members of the State Forest Planners Committee of the Northeastern Area Association of State Foresters responded to an online survey created by the NFFP team. That survey asked about each state's progress toward completing a state forest assessment that would serve as the eligibility baseline for future federal state and private forestry assistance and asked about their issue analysis process and any issues they had already identified. Since that survey, each of the states has completed their state forest assessments. The issues raised in the state forest assessments were included separately from other sources, as a method of validating the document-review process that was initially used in place of direct public scoping (see "Comparison to Issues and Goals in State Forest Action Plans").

The balance of this report presents the results of this coding and review process. Frequency of occurrence was based on counts of the simple presence-absence of each issue, and was not weighted

based on the type of public involvement or number of stakeholders consulted. Comments from the top ten most frequently mentioned subcategories are discussed in some detail. A list of issues found in each of the subcategories can be found in Appendix E - Topics in Each Subcategory.

Summary of Sources and Comments

Sources Reviewed

A total of 74 sources were reviewed for issues relevant to the future of Northern Forests. Fifty-two of the sources were affiliated with a particular state, representing 19 of the 20 states in the region. Maine and Washington D.C. both did not have a source specifically associated them, but were specifically referenced in comments from sources that represented multiple states in the region. Eleven sources represented multiple states in the region, and 11 more sources represented a national or global scale.

Affiliation of Source Document Authors

More 75% of the sources reviewed were government sources, either federal or state (Figure 1). Over half of all the source documents were from the U.S. Forest Service. One reason for this is that public comment is required for many U.S. Forest Service documents, such as National Forest management plans. The nonprofit and professional organization sources represented such groups the National Audubon Society, the Pinchot Institute for Conservation, the National Woodland Owners Association, and the Society of American Foresters. No local government documents were reviewed, although they are represented in the public comments compiled by other sources.

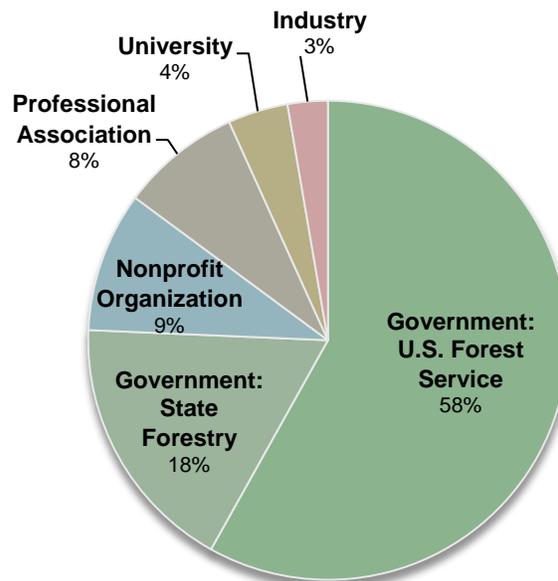


Figure 1. Affiliation of source documents

Types of Source Documents

Most of the source material came from published documents (74 %), with the majority of those publications having been produced by the U.S. Forest Service (Figure 2). There were two main types of U.S. Forest Service documents: Forest Inventory and Analysis reports and National Forest management plans or environmental impact statements. The other types of publications usually represented state forestry management plans or resource assessments. Online websites from agencies or organizations represented a small portion of the sources (7%), but were the main source of information obtained directly from nonprofit or professional organizations. Several personal interviews and group surveys were conducted, including the survey of State Forest Planners.

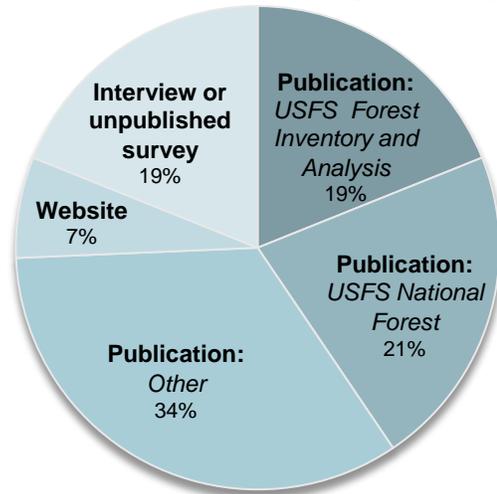


Figure 2. Types of source documents

Year of Source Document Publication

More than half of the sources reviewed were published in 2008 or later (Figure 3). The majority of sources reviewed (89%) were completed since 2004.

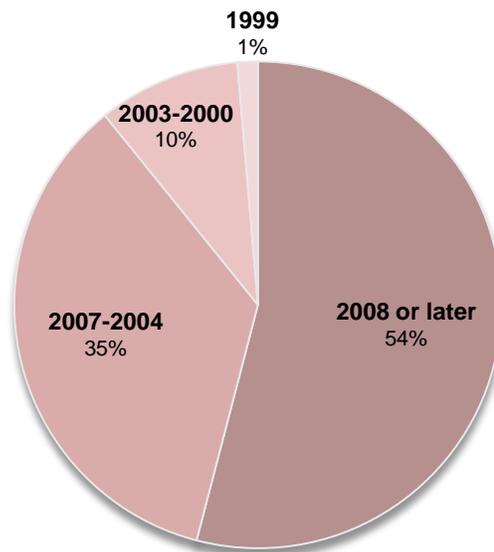


Figure 3. Year of publication of source documents

Comments Collected

A total of 701 comments or issue statements were excerpted from the documents reviewed. Those comments were spread among 10 categories and 55 subcategories.

The 10 categories were grouped into three clusters:

Natural Resources

Forest Characteristics
Ecosystem Services
Changing Climate

Human Systems

Land Use & Tradeoffs
Economics
Societal Frameworks
Natural Resource Consumption

Natural Resource - Human Interactions

Forest Ownership
Forest Management
Forest Threats

These clusters admittedly gloss over the many and complex interactions among the issues covered in the individual categories and subcategories. Yet they are helpful in grasping the full scope of comments.

Frequency of Topics

From the categorization of comments into subcategories, we have summarized the number of times that each subcategory occurred (Table 1). There were a total of 1087 categorizations, due to the overlap of multiple subcategories being applied to a single comment.

Each of the most frequently occurring topics were mentioned in at least 30 comments. These top subcategories are summarized in detail in the remainder of the document, and a list of topics found in all the subcategories are summarized in Appendix E - Topics in Each Subcategory. While we present this information based on the number of comments associated with each subcategory, we do not intend to assign relative importance to individual subcategories. Rather, this process allows us to examine the overall presence of these issues obtained through scoping of public comments.

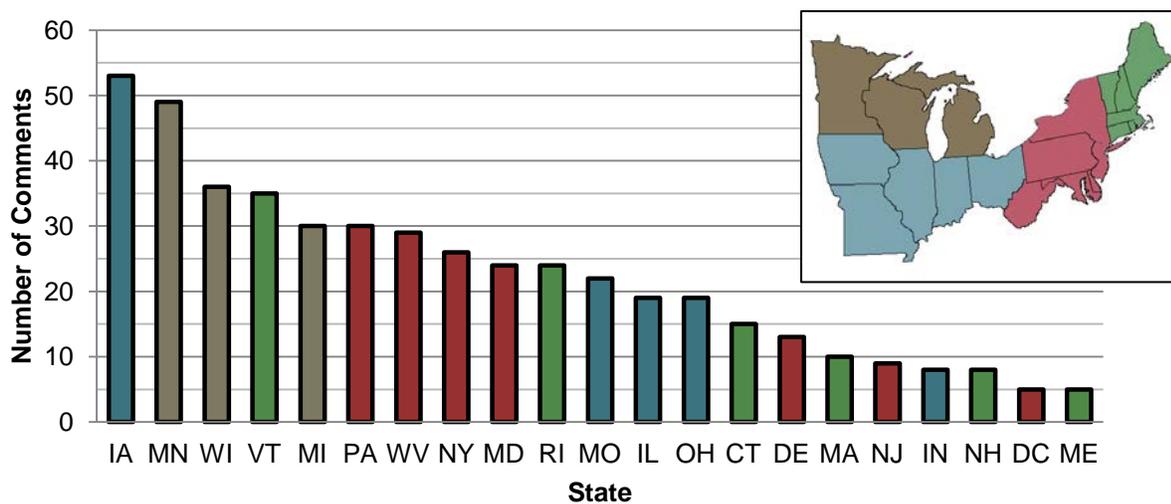
Table 1. Frequency of subcategory occurrences, presented by category as "Subcategory Name (*number of comments*)"

<i>Category</i>		Frequently Occurring (30-45 Comments)	Often Occurring (15-30 Comments)	Occasionally Occurring (1-15 Comments)
Natural Resource	Forest Characteristics (181)	Forest Composition & Demographics (41)	Forest Health (29) Wildlife & Fish (26) Volume, Growth, Mortality, Removals (24) Biodiversity (21)	Forest Regeneration (13) Threatened & Endangered Species (10) Landscape Pattern (10) Access (7)
	Ecosystem Services (179)	Wildlife Habitat (42) Water (40) Recreation (36)	Markets for Ecosystem Services (20)	Air (15) Ecosystem Services - General (10) Cultural, Psychological, & Scenic (10) Soil (6)
	Changing Climate (98)	Biomass & Bioenergy (32)	Climate Change - General (20)	Carbon (12) Forest Management (Climate Change) (10) Severe Weather & Natural Disasters (9) Species Migration (7) Social Effects of Climate Change (5) Forest Characteristics (Climate Change) (3)
Human Systems	Land Use & Tradeoffs (69)		Development (28) Impacts of Land Use Change (20)	Special Land Use Allocations (12) Public Land Management (9)
	Economics (30)		Cost of Management (16)	Economy & Jobs (14)
	Societal Framework (123)	Environmental Literacy (37)	Public Opinion & Values (21) Forest Policy & Law (19) Taxes (16)	Community Stability (11) Forestry Workforce (10) Human Population Growth & Change (7)
	Natural Resource Consumption (63)	Wood Products (38)	Energy Consumption (18)	Non-timber Forest Products (7)
Natural Resource - Human Interaction	Forest Ownership (45)		Shifting Ownership Patterns (25)	Land Transfer & Changing Demographics (9) Land Ownership - General (7) Landowner Management Objectives (4)
	Forest Management (137)	Management Standards & Practices (43) Stewardship & Forest Management (35)	Sustainability (25) Urban Forest Management (23)	Certification (11)
	Forest Threats (167)	Insects & Diseases (53) Fragmentation & Parcelization (41) Invasive Species (37)	Fire & Fuels (27)	Pollution (6)

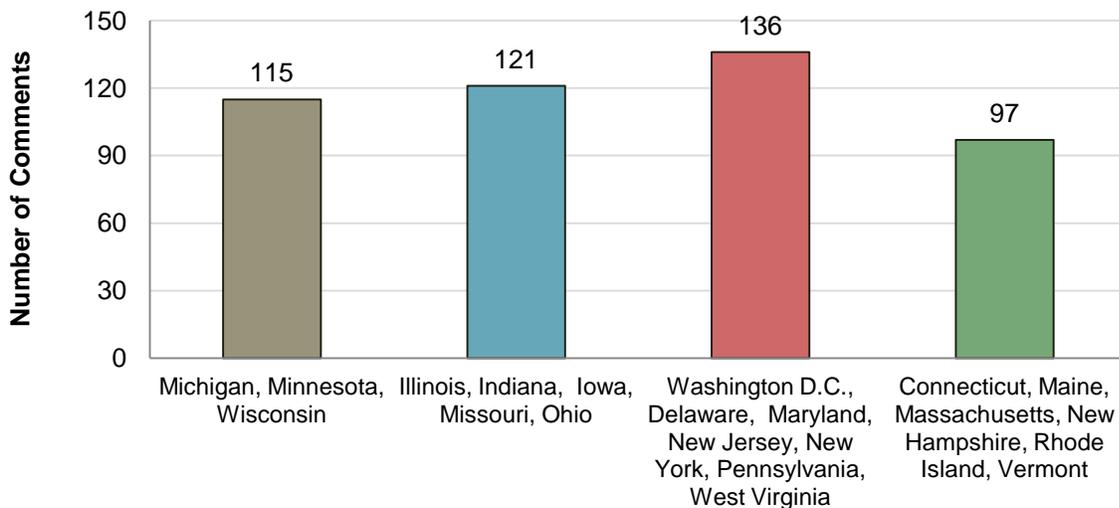
Geographic Distribution of Comments

As each comment was categorized, it was also labeled with its state origin. The 20 states, in addition to Washington D.C., were all represented in the comments that were categorized for this synthesis (Figure 4.a). Iowa was represented by the most number of comments, likely because it is the state that had the most number of source documents associated with it (9 sources). The number of comments associated with each state should not be looked upon as a reflection of public interest, but rather the availability of information for this synthesis.

The variation in the number of comments associated with each state does not allow us to examine the top subcategories of issues in each state. Instead we have assembled groups of contiguous states in order to examine geographic areas with approximately equal numbers of comments (Figure 4.b).



(a) The number of comments associated with each state in the summary area.



(b) Number of comments in each group of geographically contiguous states.

Figure 4. Count of comments representing each state or group of states, including the District of Columbia, in the study area of the Northern Forest Futures Project.

Listed below are the most frequently occurring subcategories in each of the state groupings (greater than 7 comments).

Michigan, Minnesota, Wisconsin:

- Forest Composition & Demographics (*18 comments*)
- Insects & Diseases (*8 comments*)
- Management Standards & Practices (*12 comments*)
- Recreation (*11 comments*)
- Volume, Growth, Mortality, & Removals (*12 comments*)
- Water (*8 comments*)
- Wildlife Habitat (*8 comments*)

Illinois, Indiana, Iowa, Missouri, Ohio:

- Environmental Literacy (*8 comments*)
- Forest Composition & Demographics (*10 comments*)
- Fragmentation & Parcelization (*9 comments*)
- Insects & Diseases (*14 comments*)
- Invasive Species (*8 comments*)
- Stewardship & Forest Management (*10 comments*)
- Volume, Growth, Mortality, & Removals (*9 comments*)
- Wildlife Habitat (*12 comments*)
- Wood Products (*8 comments*)

Washington D.C., Delaware, Maryland, New Jersey, New York, Pennsylvania, West Virginia:

- Biodiversity (*8 comments*)
- Environmental Literacy (*8 comments*)
- Forest Health (*8 comments*)
- Fragmentation & Parcelization (*8 comments*)
- Insects & Diseases (*10 comments*)
- Invasive Species (*8 comments*)
- Management Standards & Practices (*9 comments*)
- Urban Forest Management (*11 comments*)
- Water (*9 comments*)

Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont:

- Fragmentation & Parcelization (*10 comments*)
- Stewardship & Forest Management (*9 comments*)
- Wildlife Habitat (*9 comments*)

Summary of Frequently Occurring Issues

The issues compiled in the summary are broad both in scope and geographic scale addressed. If a comment addressed a local issue, such as concern over the endangered Delmarva Fox Squirrel in Delaware, it was classified in a broader region-wide category, such as “Threatened or Endangered Species” (Forest Characteristics). It is important to note that the documents used as source material were prepared for other purposes. In some instances, single phrases rather than detailed discourse on a topic were used to cite issues. Therefore, the rationale or details were sometimes lacking to support the intent of the original source. While some of the sources listed issues in priority order based on public involvement, this synthesis does not capture such ranking.

However, taken together the issues statements do provide a broad overview of the concerns about forests and people’s interactions with them. The number of times an issue is raised represents a sense of the significance of the issue to the region.

Through this synthesis, the issues statements can steer the Northern Forest Futures Project into addressing the subject areas of most concern to people in the region and providing a platform for engaging citizens in a dialogue on what issues need to be addressed in future projections. The following sections present the top subcategories, grouped by cluster.

Natural Resources

Forest Composition & Demographics (Category: Forest Characteristics)

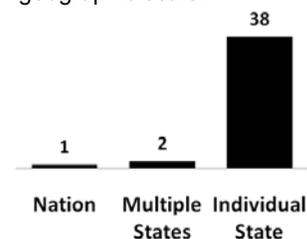
This subcategory included comments relating to forest area, composition, structure, age, size, and density. The number and type of comments in the category may have been influenced by large the number of U.S. Forest Service Forest Inventory and Analysis 5-year state reports included as source material.

Forestland Area – Several comments addressed changes in area of forest land but noted that the change was uneven across the landscape. Decline in forest area was usually in the context of either a particular forest type or overall global decline. For example, a Wisconsin comment reported declines in acreage of trees more than 100 years old. Conversely, a Maryland comment reported that the area of mature forests has been increasing and that of early successional forests has been decreasing. Iowa reported that forest acreage is increasing overall but the quality of the species composition and the quality of individual trees is declining. An Ohio comment reported that state trends in land use change indicate that the area of forest land may be near a peak and that we are now at a turning point.

Forest Composition – Several comments noted that the region’s forests are aging and shifting in composition. Iowa and Michigan reported shifts toward more shade-tolerant species with a resultant decline of species that are adapted to disturbances. Several National Forests reported divided public

Subcategory Summary Statistics

- Total number of comments: 41
- Percent of all comments: 5.8%
- Number of comments at each geographic scale:



sentiment on whether existing forest composition was good due to the benefits provided or whether management should be adjusted to better reflect historic forest conditions. This debate was especially true of old growth management.

Many comments addressed concerns about tree species that are considered important to a specific geographic area. Taken in sum, these comments show that species composition is of concern to land managers and stakeholders. Table 2 captures the array of species, geography, and comments.

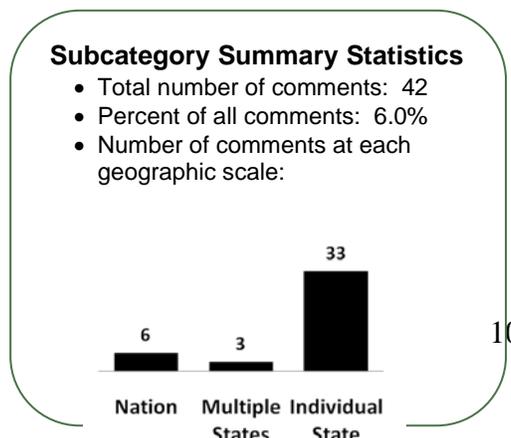
Table 2. Examples of the issues addressed pertaining to types of trees in some of the states in the Northeast and Midwest.

Type of Tree	States	Sample Comments
Aspen	MI, MN, WI	Need to reevaluate aspen acreage to align with ecological capability (MI). Strong social, economic and wildlife values associated with aspen (MI). Declining area (WI).
Conifers (general)	MI, MN	Concerned that the decrease in old conifer trees has diminished scenic quality, the variety of recreation settings, and the quality of wildlife habitat associated with conifers (MN). Differing public opinions on best management approach for forest composition and distribution (MI). Need to maintain or increase to match ecological capability (MI).
Hardwoods (general)	MI, IA	Mixed public response on even-aged vs. uneven-aged management of hardwoods (MI). Shade-tolerant hardwoods are increasing due to an absence of stand disturbances (IA).
Loblolly Pine	DE	Decreasing due to maturation of stands, harvest and land use changes.
Oak	IA, IL, OH, VT, WV	Losing oak component of forest (IA, WV, VT). Existing stands comprised mostly of large mature trees with few seedling/saplings (OH). Being replaced by maple (IL).
Paper Birch	WI	In decline as forests shift toward shade-tolerant species
Red Spruce	WV	Expanding but still not at historic levels.

Subcategory Overlap – Of the comments in this subcategory, 22% (9 comments) were also part of the *Forest Regeneration* subcategory. There were also many comments that overlapped with the *Stewardship & Forest Management* (17%, 7 comments) and *Wildlife Habitat* subcategories (10%, 4 comments).

Wildlife Habitat (Category: Ecosystem Services)

The topic of wildlife habitat included issues concerning the management for habitat diversity and the effects of human activity on habitat quality and quantity. This subcategory differs from the *Wildlife and Fish* category in that it specifically referred to the habitats or ecosystems used by animals, rather than wildlife populations or species diversity.



Habitat diversity and quality – Managing forests for habitat diversity was cited as an issue of concern. This included determining the appropriate mix of habitat types, amounts, and distributions that will support a diverse array of wildlife. Related to habitat diversity was the issue of habitat quality and ensuring that mix of diverse habitat also results in high quality habitats. There was also mention of a need for wildlife corridors and riparian zones for habitat.

Effects of land use – Changes in land use were cited as an area of concern for wildlife habitat, especially as it relates to habitat loss or a decrease in habitat quality. For example, increases in development pressure may lead to direct habitat loss, or it may result in a habitat quality decrease from fragmentation or a decrease in water quality.

Effects of forest management – Another issue was ensuring that we understand and take into consideration the effects of forest management on wildlife habitat. For example, a timber harvest or change in grazing will alter the type of species supported by that ecosystem.

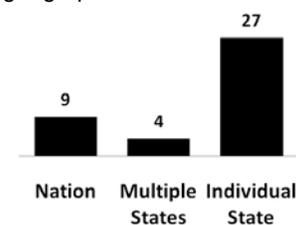
Subcategory Overlap – Almost 24% of the comments in the *Wildlife Habitat* subcategory were also categorized in the *Wildlife & Fish* subcategory because they referenced direct relationships between habitat and populations. Many of the comments were also categorized in the *Water* subcategory, as riparian zones were sometime referenced as habitat, or when wildlife habitat was referenced in conjunction with other ecosystem services such as water quality. There was also some overlap with the *Fragmentation & Parcelization* subcategory (overlapping in 14.3 % of Wildlife Habitat comments), especially in the relationship between land use change and wildlife habitat.

Water (Category: Ecosystem Services)

Water quality, watershed health, and availability of water for human uses were issues in this subcategory. Municipal water supply was a key concern, cited by one source as the top citizen priority to be addressed and by another as the top emerging problem deserving government attention now. Future regional water shortages for communities and cities were the only water quantity issue raised. In the survey of state forest resource planners, eight planners listed it among their state's top priorities and it was a recurrent theme in the state resource priorities and land management plans surveyed.

Subcategory Summary Statistics

- Total number of comments: 40
- Percent of all comments: 5.7%
- Number of comments at each geographic scale:



Water Quality – More than half of the comments in the water subcategory addressed water quality or clean water. Issue statements about water quality clustered around the downstream impacts of local management decisions. The significance of forest cover in benefiting water quality was noted, as was the potential adverse impacts of timber removal, logging systems and associated transportation systems.

Watershed Health – A cluster of comments concerned forest management activities and their potentially significant effects on basic watershed functions and lake, stream, wetland, and groundwater quality. At least one National Forest plan specified the need to develop explicit goals, objectives and management standards and guidelines to address management, protection and restoration of

watersheds. Another comment noted divergent public opinion about how much emphasis to give watershed health in forest management, with some believing current emphasis is adequate and others favoring more influence for an approach that fosters ecosystem integrity on a watershed basis.

Human Uses – In the context of water quality and quantity, human dependence on water was cited as important. Wetlands, streams, lakes and rivers, serve multiple functions in human society for recreation, drinking, transportation, and irrigation.

Subcategory Overlap – Over 25% of the comments in this category were also categorized in *Wildlife Habitat* or *Wildlife & Fish*. Often wildlife and water impacts were mentioned together as when describing the effects from human development or management activities. There was also overlap with the *Air* subcategory in 10% of comments, often because the two resources are mentioned together, such as concern for “air and water quality.”

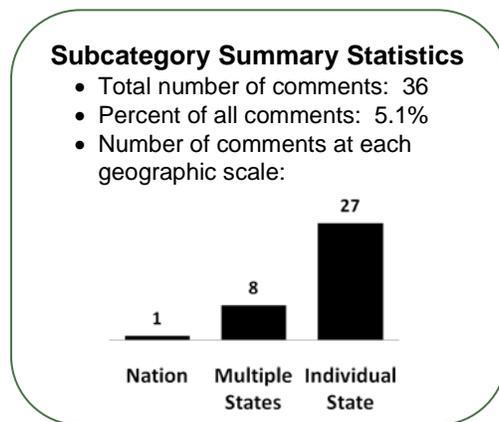
Recreation (Category: Ecosystem Services)

There were a wide variety of issues concerning recreation, which are a reflection of the diversity of opinions regarding appropriate levels of recreation use and types of recreation activities. The one national-level issue was that recreation and ecotourism are highly publicized ecosystem services, but they do not garner much attention in the forest sector.

Level of Recreation Use – All sources that discussed recreation use trends concerned the impacts of increased levels of recreation. Off-road vehicle use, dispersed camping, and river use were cited as specific types of recreation that are increasing and all have potential to exceed existing capacity. One source cited increasing population as the driver for increasing recreation demand and another source identified increasing use due to proximity to urban populations as a likely trend. The consequences of increasing recreation use included ecological impacts, competition or conflict among recreation users, and competition with other land management objectives. At least two comments described the future challenge for land managers as balancing increasing use demands so as to resolve conflicts among users of incompatible recreation types.

Types of Recreation Opportunity – The full spectrum of recreation opportunity, from remote wilderness camping to developed campgrounds, surfaced in the scoping effort. Specific clusters of comments emerged around water-based recreation, off-road vehicle use, developed facilities, and semi-primitive recreation. The water-based recreation comments focused on the type of access provided and the type of water body accessed (inland lakes and Great Lakes). Numerous sources raised off-road vehicle use as a concern. Specific issues included road density, especially as it affects non-motorized recreation experiences, and the environmental impacts of recreation on riparian areas, wildlife, soils, vegetation and aquatic areas. The challenge of finding the appropriate mix of recreation opportunities was also identified.

Land Ownership – Ownership was a concern as it affects access to recreation opportunities. Public land ownership was mentioned as important to recreation but the influence of private landownership on



access to recreation opportunities and on scenic quality was also key. Reduced access to private land recreation opportunities had increased recreation pressure on public lands and caused economic impacts to local communities as recreationists sought other locations.

Subcategory Overlap – The *Access* subcategory was cited in 14% of recreation-related comments. Access was connected to a wide variety of recreation issues, including off-highway vehicle access, water recreation access to inland lakes, access to private lands for recreation, and the availability of roads for recreation on public lands.

Biomass & Bioenergy (Category: Changing Climate)

Comments in this subcategory addressed the changing role of forests as the use of bioenergy continues to expand. There was an emphasis on the unknown impacts of woody biomass use for bioenergy and the need to ensure that sustainable practices are maintained.

Impacts of Increasing Demand – There was general concern about the impacts on forests of increasing bioenergy use. There was consensus that many of the impacts are unknown, given the rapidly expanding demands on U.S. forests for wood-based bioenergy. Some areas of concern were:

- the existing relationships between users and suppliers of wood,
- the nature of forest practices,
- the ability of forests to produce ecosystem services other than fiber and energy,
- biological diversity, and
- water quality.

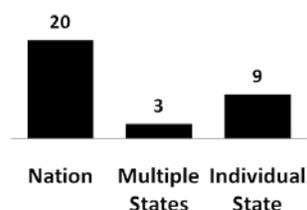
Sustainability – This group of comments addressed the need to consider sustainable harvest levels and the effect that biomass use will have on ecosystems. In the advent of new demand for bioenergy, commenters were concerned about such issues as the effects of biomass harvesting on nutrient cycling and the environmental protections needed for lands managed for intensive biofuel production.

Supply Concerns – Another cluster of comments addressed concerns about the amount of biomass that is needed to increase our use of bioenergy. One comment posed the question, “Will more timber become available as the result of investments in bioenergy and improvements in forest management in response to climate change?” Others were clearly concerned about the future increased competition between the bioenergy market and the pulp, paper, and timber markets.

Economic Feasibility and Social Impacts – Some comments addressed challenges of making biofuels economically feasible, including how to obtain tax credits for private land owners in return for providing biomass for biofuels and the need to maintain and develop markets. Other economic and social concerns included the potential impact on bioenergy investments of cheaper fuel prices and the role of wood-based energy in community development.

Subcategory Summary Statistics

- Total number of comments: 32
- Percent of all comments: 4.6%
- Number of comments at each geographic scale:



Subcategory Overlap – The main subcategory that overlapped with *Biomass & Bioenergy* was the *Energy Consumption* subcategory (31% overlap, 10 comments). These comments related to the increased demand for bioenergy and concern about how to sustainably plan for those energy demands in the future.

Human Systems

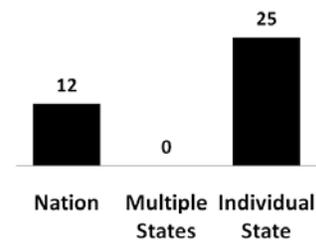
Environmental Literacy (Category: Societal Framework)

Environmental Literacy encompasses the need for public awareness of forests and the subsequent understanding of forestry practices. While environmental literacy was frequently identified as important to the future of forests, it was recognized that there is much work to be done in this area of emphasis. Fifteen state resource planners mentioned this as a priority issue for their state.

Demand for Environmental Literacy – Several comments noted a strong public interest in environmental literacy. The importance of a well-informed public for carrying out natural resource management activities, training the next generation to be stewards of the land, and being advocates for the environment were also highlighted.

Subcategory Summary Statistics

- Total number of comments: 37
- Percent of all comments: 5.3%
- Number of comments at each geographic scale:



Challenges – A cluster of comments addressed the challenges of promoting environmental literacy. An urban society’s dissociation from forests and the natural environment and people’s failure to understand the value of forests are examples of those challenges. Another comment noted the challenges faced by universities in finding the right mix of curriculum to meet the future needs of the forestry profession.

Next Steps to Environmental Literacy – These comments identified knowledge of natural resource management, the benefits derived from forests, practices that improve forest health, and urban forestry as key components of environmental literacy. Other comments listed the some of the major gaps in people’s knowledge about the environment. These included value of forests and their benefits to people and the importance of forestry to forests and human quality of life.

Future Actions Needed – The following activities were identified as important steps towards more widespread environmental literacy: connecting people with nature, connecting people with sustainable forestry, promoting better communication between the public and decision-makers, educating the general public about forestry and conservation, and increasing Forest Service efforts in public involvement, education projects, and partnerships. One comment noted the need to conduct educational activities for all ages and audiences.

Subcategory Overlap – Although the *Environmental Literacy* subcategory can be considered linked to all of the other subcategories, there was not a specific subcategory that showed substantial overlap in this summary.

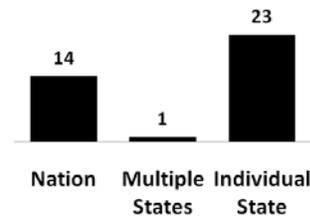
Wood Products – Production, Consumption, and Trade (Category: Natural Resources Consumption)

Production of wood for human use is a critical function of northern forests. Recent changes in the forest products industry generated comment, as did changing consumption patterns and the sustainability of production levels.

Forest Products Industry – One cluster of comments addresses the state of the forest products industry. Multiple comments expressed concern for declines in wood production and what that would mean for forest health and the socioeconomic part of communities. A related cluster addressed the influence of international trade: specifically effects on sustainability of world resources, conservation of biological diversity, ability of U.S. lands to compete with Southern Hemisphere plantations, and U.S. industries’ ability to “separate itself within a global economy.”

Subcategory Summary Statistics

- Total number of comments: 38
- Percent of all comments: 5.4%
- Number of comments at each geographic scale:



Demand and Consumption – Several comments addressed concerns about maintaining sustainable forest products industries in the future and demand and consumption change. Comments on demand ranged from those that noted a significant increase in demand since 1986 in Wisconsin to a report of static wood products demand nationally. Several comments raised concern that the U.S. is a net importer of wood and that this trend will increase as population grows. One comment predicted growing competition between traditional (lumber, paper) and emerging wood uses (bioenergy).

Production – A third cluster of comments focused on production levels and the debate over what the level should be. Some comments from Wisconsin reported declines in production, while a Michigan comment reported increased production. One comment asked the question of how much can we harvest without adverse effects and another raised the concerns about impacts on social and economic stability if National Forest harvest levels are reduced. Another comment indicated that while increasing production in the state was sustainable, achieving any increase would be influenced by landowner objectives, stumpage prices, and available markets.

Subcategory Overlap – There was not a large amount of overlap between the *Wood Products* subcategory and other subcategory, but each of the following subcategories had three comments that overlapped: *Biomass & Bioenergy*, *Economy & Jobs*, *Recreation*, *Volume*, *Growth*, *Mortality*, & *Removals*, and *Non-timber Forest Products*.

Natural Resource - Human Interactions

Management Standards & Practices (Category: Forest Management)

Comments in this subcategory addressed specific management standards and practices that may be relevant to the future of northern forests. The standards and practices usually concerned the management of a specific type of ecosystem or forest resource, ranging from riparian areas to shade-intolerant trees stands and soil protection to carbon sequestration.

Specific management techniques – There were many specific types of management techniques mentioned in this subcategory. These included practices that commenters believed should be encouraged in the future, such as the use of management indicator species, prescribed burning, management prescriptions for timber management, and other “best management practices.” There were also management techniques that were considered controversial, such as the use of herbicide or the prohibition of clearcutting.

Information Management – There was a subset of comments that addressed issues relating to the collection and use of information for natural resource management. The need for accurate and timely monitoring and inventory was addressed, with the acknowledgement that this expensive endeavor may necessitate more collaborative partnerships. It was also emphasized that there is benefit in having a written forest management plan that outlines specific goals for areas such as vegetation management and identifies the need for adaptive strategies. Written plans will also aid in creating targeted priority lands, and delineating management areas, two needs that were identified in the comments.

Subcategory Overlap – This subcategory is closely related to the *Stewardship & Forest Management* subcategory, although there was not often overlap in terms of categorization of comments. The two subcategories that had some overlap were *Forest Composition & Demographics* (3 comments overlap) and *Fire & Fuels* (3 comments overlap).

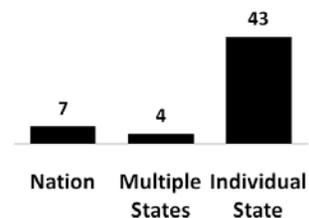
Stewardship & Forest Management (Category: Forest Management)

Comments were placed in this subcategory if they addressed opinions about and effects of management of forests. Comments that addressed principally the long-term viability of forests and natural systems were placed in the *Sustainability* subcategory and comments that addressed specific management techniques were placed in the *Management Standards & Practices* subcategory.

Desired Outcomes of Stewardship Activities – Many comments addressed the need to increase the amount of

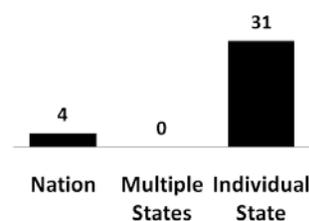
Subcategory Summary Statistics

- Total number of comments: 43
- Percent of all comments: 6.1%
- Number of comments at each geographic scale:



Subcategory Summary Statistics

- Total number of comments: 35
- Percent of all comments: 5.0%
- Number of comments at each geographic scale:



forest management and improve current management activities. Comments identified long-term retention of forest land as a desirable result of forest stewardship and part of management for the future. Vegetation composition and structure management goals were also emphasized for certain forest types. Coupled with the desired outcomes of forest management were the potential negative effects that management activities can have on the landscape. These included the effects of management activities on scenic value and the effects of timber harvest on aquatic conditions.

Stewardship on Private and Public Lands – More than one-third of the comments in this subcategory addressed stewardship on private lands, especially non-industrial private forestland. One comment addressed the need for balance between incentives and disincentives to management of private lands. There is concern over lack of forest stewardship and the need for improved stewardship on both private and public lands alike.

Challenges to Forest Stewardship – One cluster of comments concerned the availability of land for forest management. These comments cited the loss of forest to parcelization, fragmentation, and urbanization as barriers to stewardship. The increasing number of landowners and the challenges posed by lack of assistance, planning, and financial resources to support them was raised by one comment. Other challenges to forest stewardship included growing pressure from public use and the pressure to increase harvests on private land as forests mature. One comment noted that a combination of factors is making it more difficult to manage for timber, wildlife and recreation access.

Subcategory Overlap – The only subcategory that substantially overlapped with *Stewardship & Forest Management* was the *Forest Composition & Demographics* subcategory. This overlap was generally in relation to the desired condition of forests through forest management.

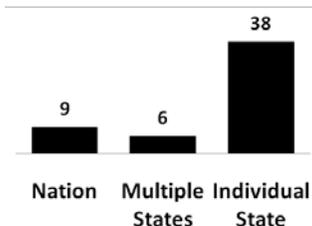
Insects and Diseases (Category: Forest Threats)

Issue statements pertaining to forest insects and diseases either detailed a specific pest affecting a particular geographic area or discussed the impacts of forest insects and diseases generally. In this synthesis, *Insects and Diseases* were considered separately from *Invasive Species*, even though many of these damaging insects can be considered “invasive.” Insects were grouped with diseases because their effects can be similar to the fungal and bacterial diseases in terms of the direct impact on plant health.

Specific Pests – Approximately 42% of the comments in this subcategory referenced general concern over the impacts of insects and diseases and the ability of forest managers to address these threats. The remaining comments addressed specific pests that are of concern in Northern forests. The most frequently mentioned insects were emerald ash borer and gypsy moth. These two pests and their potential spread were cited as a driving force behind future forest changes. Other specific pests included:

Subcategory Summary Statistics

- Total number of comments: 53
- Percent of all comments: 7.6%
- Number of comments at each geographic scale:



Insects

- Asian longhorn beetle
- Beech scale insect
- Chestnut borers
- Emerald ash borer
- Gypsy moth
- Hemlock wooly adelgid
- Larch beetle
- Larch casebearer
- Spruce beetle

Diseases

- Beech bark disease
- Butternut canker
- Chestnut blight
- Dogwood anthracnose
- Dutch elm disease
- Eastern spruce budworm
- Forest tent caterpillar
- Hickory decline
- Jack pine budworm
- Oak tatters
- Oak wilt
- Ramorum blight
- Sycamore anthracnose
- Tubakia

Impacts of Forest Insects and Diseases – Reduced native plant abundance, hindrance of regeneration, threats to existing ecosystem functions, altered forest composition and structure, increased risk of fire and other disasters, and growth and volume loss were all mentioned as impacts of insects and diseases. Several comments raised the question of what future forests would look like, given the multiple stressors currently affecting them. The need for concrete adaptive strategies was identified as necessary but difficult, as was the need to improve capacity to response to this issue.

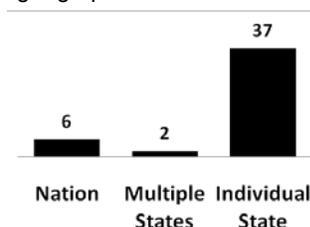
Subcategory Overlap – Insects and diseases were frequently mentioned in conjunction with other forest threats or concern over forest characteristics. Almost 19% of comments referring to *Insects & Diseases* also referenced *Invasive Species*. Other subcategories that overlapped with *Insects & Diseases* were *Fire & Fuels*, *Forest Health*, *Severe Weather & Natural Disasters*, *Climate Change*, and *Urban Forest Management*.

Invasive Species (Category: Forest Threats)

This subcategory of comments referred to invasive plants and non-insect animals as threats to Northern forests. Almost 84% of the comments in this subcategory referenced the general issue of non-native invasive plants and animals, without addressing particular species. The remaining comments addressed such issues as zebra mussels, knapweed, multiflora rose, garlic mustard, and bush honeysuckle.

Subcategory Summary Statistics

- Total number of comments: 37
- Percent of all comments: 5.3%
- Number of comments at each geographic scale:



Impacts – The following were cited as existing or potential impacts of invasive species: displacement of native species and loss of native plant diversity, reduced ecosystem diversity, reduced forest health, altered forest structure and composition, changes to future forest outputs, effect on ability to practice sustainable forest management, degraded wildlife habitat, and economic losses to the timber, nursery, and wood products industry. The effect of invasive species quarantines and impacts on urban trees and communities were also noted.

Response – Several comments identified the challenges of responding to invasive species; one specifically raised the issue of funding for prevention, detection, response and long-term management. Other comments noted the importance of response strategies including concrete adaptive strategies (necessary but difficult) and strategic policy focus.

Subcategory Overlap – Ten out of the 37 comments that referenced invasive species in the context of overall forest health, and another 10 of the 37 referenced other insects and diseases a threat to northern forests. The overlap of the *Insects and Diseases* subcategory and the *Invasive Species* subcategory is partially attributable to the description of some damaging insects as “invasive.”

Fragmentation and Parcelization (Category: Forest Threats)

Many of the comments referenced fragmentation and/or parcelization as a concern for northern forests.

Parcelization (the increase in the number of owners of a block of forest previously held by a single owner) was referenced as potentially leading to fragmentation (the breakup of continuous forest cover into smaller blocks), which can have a variety of impacts on forests.

Fragmentation and parcelization were mentioned by 14 state resource planners as a priority issue.

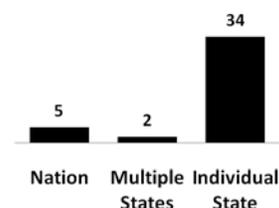
Impacts – Fragmentation and parcelization were cited as leading to a lack of uniformity of forest management. As the number of landowners increases, shifting and diverse landowner objectives increase the development potential. Fragmentation and parcelization were also cited as making forest land more difficult to manage for timber and wildlife as well as making traditional access to forests for recreation more difficult.

Fragmentation was referenced as a threat to biodiversity as there can be a loss of ecosystem integrity. Comments on wildlife habitat impacts included concern about loss of wildlife habitat, especially for species requiring interior or continuous cover forest and loss of connectivity of wildlife habitat.

Causes – Increasing human population and changing land use were cited as the main causes of fragmentation and parcelization. Population pressure has led to an increasing number of

Subcategory Summary Statistics

- Total number of comments: 41
- Percent of all comments: 5.9%
- Number of comments at each geographic scale:



landowners, as well as changing demographics of landowners. These new landowners sometimes encourage the subdivision and development of private forested land that is leading to fragmentation.

Subcategory Overlap – The following subcategories overlap with *Fragmentation & Parcelization: Development, Shifting Ownership Patterns, Impacts of Land Use Change, and Wildlife Habitat*. All of which can be directly linked to the causes or impacts of forest fragmentation.

Comparison to Issues and Goals in State Forest Action Plans

In 2010, State forestry agencies nationwide completed a Statewide Forest Resource Assessment and Strategy, referred to as State Forest Action Plans. Included in these documents were issues, goals, and strategies for the forests of each state that were identified through consultation with stakeholders. A compilation of common themes in the issues and goals found in the State Forest Action Plans of the Northeast and Midwest was assembled by the Northeastern Area of the U.S. Forest Service State and Private Forestry branch. (The regional summary document is available at <http://www.forestationplans.org/regions/northeastern-region>.)

The State Forest Action Plans document stakeholder concerns regarding the same land and resources represented by the Northern Forest Futures Project. The regional-level information from the State Forest Action Plans serves as a way to validate the issues found through the Northern Forest Futures Project scoping process and a way to identify issues that may not have emerged through NFFP process (Table 1).

This comparison is especially important to the NFFP scoping effort because of the geographic distribution of issues from each State Forest Action Plan and the consistency of stakeholder engagement. The geographic distribution of comments from the NFFP was based upon the availability of information from each state at the time of the data collection, and since that time, each state in the Northeast and Midwest has completed a State Forest Action Plan. Each state forestry agency engaged a variety of stakeholders, both individuals and organizations, from private and public entities. Although each state did not use an identical type of stakeholder engagement, it is certain that a representative group of stakeholders was engaged from each state.

The categorization of issues from the State Forest Action Plans and the Northern Forest Futures Project were conducted separately, and then compared through an iterative process to develop a list of the NFFP subcategories that correspond with each of common issues and goals in the State Forest Action Plans across the region. The common themes in State issues and were usually defined more broadly than the NFFP subcategories of issues, and therefore several NFFP subcategories often corresponded with a single State Forest Action Plan issue.

Table 3 summarizes a detailed crosswalk between the State issues and goals and the NFFP issue subcategories. Overall, the two lists align very well. One or more NFFP subcategories correspond directly to each of the common themes in State Forest Action Plans issues and goals and one or more of the common themes in State Forest Action Plans addresses each of the most frequently and often occurring NFFP subcategories.

It should be noted that the content of these two analyses are not entirely separate. The NFFP scoping effort included comments from State Forest Planners as they were preparing the State Forest Action Plans, and so some of the ideas included in the NFFP scoping may be directly related to issues from the State stakeholder engagement. Nonetheless, the commonality of the State Forest Action Plan themes and the NFFP subcategories serves as an indication that the method of literature review for the NFFP scoping identified the same issues that might have been collected through direct stakeholder analysis.

Table 3. Common themes in the State Forest Action Plans from the northeastern and Midwestern states and the Northern Forests Futures Project subcategories of issues relating to northern forests.

<p align="center">Common Themes in Issues & Goals in the 2010 State Forest Action Plans</p>	<p align="center">Corresponding NFFP Categories (bold) and Subcategories (“frequently” occurring are in normal font; “often” occurring are in italics)</p>
<p>Keeping forests as forests: Includes changing forest landscapes, conversion of private forest land to nonforest uses, fragmentation, parcelization, and urbanization. Some of the goals to address this issue area include enhancing the financial viability of private forest land ownership, legal framework (state laws); and building support for forests.</p>	<p>Forest Threats: Fragmentation and parcelization Forest Characteristics: Forest composition and demographics Land use and tradeoffs: <i>Development; Impacts of land use change</i> Societal Framework: <i>Forest policy and law</i> Forest Ownership: <i>Shifting ownership patterns</i></p>
<p>Forest ecosystem health and productivity: Overall forest health. Threats from invasive insects, diseases, and plants.</p>	<p>Forest Threats: Insects and diseases; Invasive species; Forest Characteristics: <i>Forest health</i></p>
<p>Urban and community forest health and sustainability: Benefits of urban and community trees and forests to contribute to the quality of life in urban areas. Increasing urban and community tree canopy and species diversity.</p>	<p>Forest Management: <i>Urban forest management</i> Economics: <i>Cost of management</i></p>
<p>Water, biodiversity, recreation and other ecosystem services: Ensure clean and abundant drinking water; protect/restore watersheds; maintain and manage forest ecosystem habitats for biodiversity; provide forest-based recreational opportunities and minimize the impact of recreational activities on forest resources.</p>	<p>Ecosystem Services: Water; Wildlife habitat; Recreation Forest Characteristics: <i>Wildlife and fish; Biodiversity</i></p>
<p>Forest industry and markets: Issues facing the forest products industry and traditional markets and focus on improving and diversifying markets for timber and non-timber forest products, woody biomass, ecosystem services, and renewable energy development.</p>	<p>Natural Resources Consumption: Wood products; <i>Energy consumption</i> Changing Climate: Biomass and bioenergy Ecosystem Services: <i>Markets for ecosystem services</i> Forest Characteristics: <i>Volume, growth, mortality, & removals</i></p>
<p>Sustainable forest management across all ownerships: Sustainable management of public and private forests issues and opportunities include size and age diversity within forests, sustainable timber harvesting, forest certification, and inadequate forest regeneration (including impact of deer on regeneration). On private lands: changing ownership, high cost of owning private forest land, and sustainable, active management are of particular concern.</p>	<p>Forest Characteristics: Forest composition and demographics Forest Management: Management standards and practices; Stewardship and forest management; <i>Sustainability</i> Societal Framework: <i>Taxes</i> Economics: <i>Cost of management</i></p>
<p>Climate Change: Impacts of, resilience to, and carbon sequestration to mitigate climate change.</p>	<p>Changing Climate: <i>Climate change - general</i></p>
<p>Wildfire Threats to Forests, Public Safety, and Property</p>	<p>Forest Threats: <i>Fire and fuels</i></p>
<p>State and Private Capacity for Forestry: Decline of state and private forestry professionals, lack of funding for forestry programs, and community forestry capacity.</p>	<p>Economics: <i>Cost of management</i></p>
<p>Awareness of and Support for Forests: Communications and education to promote the importance of forests.</p>	<p>Societal Framework: Environmental literacy; <i>Public opinion and values</i></p>

Next Steps

This list of issues will be a resource as we progress with the Northern Forest Futures Project. It will provide a framework of issues relevant to the changing future landscape of the Northeast and Midwest. The following next steps are planned for the use of this information:

- Frame the assessment of current forest conditions with issues of concern to the forests of the Northern United States
- Guide the focus of the projections analysis. We recognize that it will not be feasible to provide projects regarding all of the issues presented in this synthesis, such as Environmental Literacy, but other topics such as Insects and Diseases are within the scope of this project. Each issue found through the scoping effort will be evaluated by the NFFP Projections team as to if and how and can be incorporated into the projection analysis.
- Focus communication of the NFFP results around issues most relevant to the stakeholders of the forests in the Northeast and Midwest.

The scoping of issues in the forests of the Northeast and Midwest United States aids in understanding the diversity and complexity of the issues and influences that are shaping or will shape the region's forests. Through this and future steps in the Northern Forests Futures Project, we will continue to work to reveal how today's trends and choices can change the future landscape of the Northeast and Midwest.

Appendix A. Northern Forest Futures Project Brainstorming of Issues

This list was developed by the NFFP Implementation Team as part of the NFFP Framework (November 2008) as a preliminary compilation of issues relating to Northern forests.

The 10-20 most important facts that people should know/understand about forests in the Northern U.S.	
Changing Forest Characteristics	Total forest land area has increased in the Northern Region in the past century. But it is in different places. Abandoned farms have reverted to forest, but around metropolitan areas forest and open land of all sorts continue to be converted to commercial and residential uses.
Changing Forest Characteristics	Vastly increasing volume of standing wood in the Northern Region.
Changing Forest Characteristics	The Northern Region has greater proportion of forest land (41%) than the South, West, or Intermountain regions
Changing Forest Characteristics	The Land mass of the Earth is on-third forested, North America is one-third forested, and the U.S. is one-third forested. The Northern Region of the U.S. is 41% forested. We are comparatively rich in forest area.
Changing Forest Characteristics	How are they changing?
Changing Forest Characteristics/Access	Where are they located and how can I get to them?
Changing Forest Characteristics/Biodiversity	We are losing forest diversity in the North. Forests are aging and early successional habitats are declining. We lack significant areas of intact old-growth forests. We lack significant areas of savanna, woodland, and intact prairie habitat.
Changing Forest Characteristics/Health	How healthy are the forests?
Changing Forest Characteristics/Human Well-Being	How does human well-being benefit from the presence of forests? Is it possible to model the effect?
Changing Forest Ownership/Owner Demographics	The many small owners of timberland in the Northern Region have varied management objectives, many ownerships are small, and it is hard to get relevant and timely information to that many owners.
Changing Forest Ownership/Owner Demographics	Public ownership (25%) includes National Forest land (7%), State land (12%) and other public owners (6%).
Changing Forest Products Consumption/Population Change	We each consume the equivalent of about 70 cubic feet of wood each year. That supplies us with renewable natural resources that improve our lives
Changing Forest Products Consumption/Population Change	People in the U.S. consume about 20 billion cubic feet of wood each year. Our population is increasing and our total wood consumption is increasing, even though per capita wood consumption is expected to remain steady or to decline slightly.
Changing Forest Products/Availability	How much forest is really available for utilization?
Changing Forest Products/Ecosystem Services	How much carbon/water/other ecological services do the forests sequester/produce?

Changing Forest Threats	What disturbances (biotic and abiotic) have the potential to radically change our forests?
Changing Land use/Forest-Nonforest Juxtaposition	At what level do forests influence their neighbors: city, county, landscape, region and how do they influence?
Changing Land use/Tradeoffs	What is the effect of land-use set-asides on the ecological integrity of a landscape? Is the benefit worth the cost in foregone tax revenues and social income?
Changing Users/Multiple Uses	People in the Northern Region care deeply for their forests for many reasons: aesthetics, recreation, products, clean water, wildlife, carbon sequestration, biodiversity. This inevitably creates conflicts over how best to manage forest resources. There are no easy solutions, but there are ways to improve the health, productivity, resilience, and sustainability of our forests.
Changing Wildlife Habitat	What wildlife live in the forests now vs. what wildlife could live in the forests in the future?

Some trends affecting Northern Forests	
Changing Climate	Climate change
Changing Economy	Jobs and economic stability (or prosperity) are important to most people
Changing Energy Consumption	Increasing energy consumption
Changing Energy Consumption/Self-Sufficiency	Increased interest in biofuels and other renewable energy
Changing Environmental Literacy	Population increasingly disassociated with forest environments
Changing Forest Characteristics	Stable forest area overall, but not where most people live.
Changing Forest Characteristics	Greatly increasing total wood volume
Changing Forest Characteristics	Aging forests
Changing Forest Characteristics	Gradually changing species composition
Changing Forest Characteristics/Biodiversity	Decreasing diversity for many groups of species
Changing Forest Management	Low management intensity in Northern forests
Changing Forest Management	Low and decreasing harvest levels on National Forests
Changing Forest Products/Ecosystem Services/Carbon	Increased interest in carbon storage
Changing Forest Threats/Animal	Massive deer populations limiting forest regeneration
Changing Forest Threats/Insect & Disease	Problems with insects/disease/declines
Changing Forest Threats/Invasives	Problems with invasive species
Changing Human Population and Migration	Increasing population and shifts in places people live
Changing Indicator Species/Health	Regional declines of some species of birds and insects may be indicative of ecosystem health
Changing Land use/Development	Loss of forest and open land associated with urban/suburban/exurban development

Changing Forest Ownership/Owner Demographics	Changing owners/diverse owner objectives/increasing number of individual owners/aging owners
Changing Natural Resource Consumption	Increasing utilization of wood, water, and other commodities, services, and amenities

Big issues facing Northern forests now	
Changing Climate	Climate change impacts on forest structure, composition, health, diversity, and resilience.
Changing Energy Consumption/Self-Sufficiency	Renewable energy/biofuel
Changing Environmental Literacy	Connecting people with nature
Changing Forest Characteristics	Sustainable forest management-what is it and how to progress toward that goal.
Changing Forest Characteristics/Biodiversity/T&E	Maintaining biodiversity; restoring threatened and endangered species
Changing Forest Characteristics/Health/Economics	High cost of maintaining healthy, resilient, diverse public forests
Changing Forest Characteristics/Water	Water quantity
Changing Forest Characteristics/Water	Water quality
Changing Forest Management	Management (and lack thereof) on private forestland
Changing Forest Management/Ecosystem Services/Carbon	Will natural northern forests be able to compete in a carbon credits market with southern plantation forests
Changing Forest Management/Taxes	Problems with disincentives (taxes) to keep land in forest production
Changing Forest Products Consumption	Consumption of forest resources and the associated consequences; export of consequences.
Changing Forest Products/Ecosystem Services/Carbon	Carbon sequestration opportunities and responsibilities
Changing Forest Threats	Maintaining forest health and resilience
Changing Forest Threats/Fire & Fuels	Fire management: reducing risk of wildfire and using prescribed fire for restoration.
Changing Forest Threats/Invasives	Invasive species management/mitigation
Changing Land use/Changing Forest Ownership	Impacts of forest fragmentation and parcelization
Changing Land use/Development	Management of developed and open space in urban, suburban, and exurban areas.
Changing Land use/Development/Population	The growing footprint of urban and urbanizing areas; effects on people and natural systems.

The most important issues/questions/concerns that will affect the future of the forests in the Northern U.S.	
Changing Climate	How will any change in climate affect forest composition and structure?
Changing Climate	Will the drought cycle be impacted and are we more likely to see disturbance cascades as forests still recovering from the last disturbance are hit with a new one?
Changing Climate	Global climate change. It creates winners and losers. And the underlying social, biological, ecological, and physical interactions are extraordinarily complex.
Changing Climate/Severe Weather	How will changes in severe weather, a hypothesized effect of climate change, impact forest composition and structure?
Changing Climates/Insects & Disease	Will climate change affect the rate and patterns of biotic disturbances such as insects and fungi?
Changing Environmental Literacy	Connecting people with nature.
Changing Forest Characteristics/T&E	Will we have more endangered species (plants and animals) in the future? Which species are negatively impacted by disturbance and fragmentation?
Changing Forest Characteristics/Invasives	If biotic disturbances like EAB or adelgid completely wipe out a species, what does the resulting forest look like?
Changing Forest Management	No common understanding of forest sustainability or mechanism to quantify it.
Changing Forest Management	Forest resources are widely distributed and generally have low economic value; resource management requires spatially distributed, scalable solutions.
Changing Forest Management	declining management of commercially owned timberland
Changing Forest Management	Lack of management = loss of productivity, loss of options.
Changing Forest Management/Economics	What are the costs and timing of remediative efforts or investment in forest management vs. the timing of benefits and the foregone benefits of other alternatives?
Changing Forest Management/Economics	Impossibly high cost of maintaining healthy, resilient, diverse forests without a revenue stream.
Changing Forest Ownership/Owner Demographics	Access issues to forest lands
Changing Forest Ownership/Owner Demographics	declining forest industry
Changing Forest Products Consumption	We are net importers of wood and will import more as population grows—when we import wood we export the consequences of producing wood (good and bad).
Changing Forest Products Consumption/Energy	Renewable energy from wood issues
Changing Forest Products/Ecosystem Services/Carbon	Carbon sequestration issues
Changing Forest Threats	Forest health issues: insects, disease, invasive species, loss of biodiversity.

Changing Forest Threats/Invasives	How much will gypsy moth, emerald ash borer, and hemlock wooly adelgid, among others, grow and how will their changing populations affect our forests?
Changing Forest Threats/Pollution	Will increasing pollution impede the carbon sequestration capacities of northern forests?
Changing Land use/Changing Forest Ownership	Forest fragmentation and ownership parcelization with impacts on wildlife and on management options.
Changing Land use/Development	What are the effects of expanding development of a metropolitan area on a) the presence of open space just beyond the development zone, b) the rate at which forestland converts to residential treed land, and c) the relative opportunities for

Appendix B. Project Stakeholders

A selection of project stakeholders listed in the Northern Forest Futures Project Framework (November 2008). This list does not include project partners or informational contacts.

<p>Participants</p> <p>Individuals or organizations choosing to be active in the NFFP implementation process through public meeting participation, informing with data, or conducting analysis from other than a team member position</p>
<ul style="list-style-type: none"> State Foresters National Association of Professional Forestry Schools and Colleges (NAPFSC) Deans Forest Supervisors Tribes Multi-state planning organizations Natural Resource Conservation Service (NRCS) U.S. Geological Survey (USGS) Nature Conservancy/Trust for Public Lands Woodland Owners Association
<p>Anticipated NFFP Users</p> <p>Governmental entities, academic interests, or environmental and industry organizations making or informing decisions affecting Northern forests</p>
<ul style="list-style-type: none"> Forest industry Conservation groups Land Trusts Rural Economic Development Groups City Planners Extension Service Universities Local governments (city, town, county) Public land managers Water resource agencies Air and waste agencies Federal agencies (USFS, NRCS, APHIS, Rural Dev. USGS, NPS, FWS) Regional planning commissions RC&Ds Arborists Environmental groups Family forest owners Industrial landowners Farm advocacy groups Open space groups Recreation groups Consulting foresters Forest products companies Energy companies (including utilities) Tribes State climate action networks Natural resource education (public schools, state department of education) State department of health

Appendix C. Selected Source Documents

The following documents or websites were consulted in developing the preliminary list of issues presented in this document. Only those sources that had either active on-line sources or bibliographic citations are included here. Documents that were in press at the time of the initial scoping were not included.

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Appendix D. Issues Response Form

Category	Subcategory	Issue Statement	Type of Comment	Timeframe	Geography	Source	Source No.	Comment No.	Initials	Date added
Subject of comment – from master category list	Further detail on subject of comment	Verbatim text or summary of comment	Characterization of comment	Current condition or future projection	Location where issue applies	Publication title or conversation record	Unique number assigned to source	Sequential number assigned to individual comments in a single source	Initials of individual recording comment	Date comment added to spreadsheet
Forest Characteristics Ecosystem Services Changing Climate Human Populations Land Use / Tradeoffs Economics Societal Frameworks Natural Resource Consumption Forest Ownership/ Owner Demographics Forest Management Forest Threats			Driver of change: Comment describes a factor or that is causing changes in the current environment Trend: Comment describes a new direction happening in the current environment, without necessarily describing the cause of that change Fact/Statistic: Comment cites a statistic, fact, or statement relevant to a futuring exercise without describing the cause or significance of that bit of knowledge Concern: Comment states an area of concern or describes an issue. Often expresses a point of view or preference for a particular outcome	Current: Comment describes a current condition Future: Comment describes primarily a future condition Current and future: Comment describes both a current condition and likely future condition	Local: Applies at a geographic area smaller than an entire state State: Applies across the entire geographic area of a state. List the state where appropriate Regional: Applies to a geographic area that encompasses all or part of several states. List the states or ecological region where appropriate National: Applies at least to the entire United States					

Appendix E. Topics in Each Subcategory

Changing Climate

Biomass & Bioenergy: Wood biomass energy, wood fuel heating, increased demand for and use of biomass, environmental concerns of managing for biofuels, wood pellet boilers, sustainability of production, alternative fuel sources, changes in forest management as a result of investments in bioenergy

Carbon: Carbon sequestration, forest carbon sink capacity, carbon markets, carbon inventories

Climate Change – General: Unknown or uncertain impacts of climate change, overall implications of climate change, climate change adaptation and mitigation

Extreme Weather & Natural Disasters: Natural disasters, drought, warmer temperatures, flooding

Forest Characteristics in a Changing Climate: Impact of climate change on forest characteristics, at-risk ecosystems in the face of climate change, impacts on populations of species

Forest Management: Adaptation of conservation techniques in a changing climate, managing for biofuels, dynamic/adaptive strategies and policies needed in the face of climate change, challenges of uncertainty, potential for loss of forest because of unfavorable conditions

Social Effects of Climate Change: Impact of climate change on environmental awareness and human health, social justice issues as a consequence of climate change

Species Migration: Changing species presence, species range shifts, potential use of trees in broader ranges

Economics

Cost of Management: Lack of sufficient resources (time, funds, staff), cost of urban forest maintenance, maintenance and repair of recreation facilities, cost of replacement due to damage from invasive insects, challenge of making biofuels economically feasible, cost of protecting endangered species habitat on private land, economic consequences of managing forests on many small private inholdings, investment in fire suppression

Economy & Jobs: Impact of the economy on forestry, impact of forestry on local economies, jobs created by forest management, maintenance of a forest-based economy, economic sustainability, socio-economic concerns of forest management, revenues from forests, economic impact of changing recreation patterns, economic benefit of trees to communities, effect on economy of losing species

Ecosystem Services

Air: Air quality from wood fuel heating, greenhouse gas emissions, urban air quality, atmospheric particulate matter regulation, ground-level ozone

Cultural, Psychological, & Scenic: Scenic integrity, enjoyment, heritage resources, sense of place

Ecosystem Services – General: Concern over ecosystem services, multiple benefits of public lands

Markets for Ecosystem Services: Carbon markets as incentive to keep land forested, compensation to landowners for carbon storage, emerging carbon markets, challenge of asking people to pay for what had previously been free, market-based incentives, need for new markets rewarding private landowners for protecting public values, incentives to encourage private landowners to engage in conservation

Recreation: Economic benefits of recreation, recreation overuse leading to conflict and resource damage, tourism, ecotourism, condition of recreation facilities, competing demands of user types, motorized and non-motorized recreation management, challenge of finding the appropriate mix of recreation opportunities, difficulty of identifying primitive recreation areas

Specific recreation activities included: Hiking, biking, hunting, nature watching, mushroom pickers, berry pickers, fishing, geo-caching, OHV, canoeing, back-country recreation

Soil: Maintenance of soil resource, mineral nutrition, soil moisture, fragile soils

Water: Future water limitations or shortages, water quality, potable water, wetlands and streams, rivers, lakes, aquifers, watersheds, groundwater

Wildlife Habitat: Wildlife corridors, wildlife habitat, aquatic habitat, importance of the landscape to wildlife, riparian zones for habitat, loss of habitat, habitat diversity, habitat monitoring, lack of early successional habitat, ecological habitats, habitat conservation, effects of timber harvests on wildlife, grassland bird habitat, managing for wildlife habitat, effect of fragmentation on wildlife that have large, continuous ranges or need interior habitat

Forest Characteristics

Access: Decrease in access to private forested lands for recreation, increase access but decrease opportunities for solitude, boat access, motorized recreation on public lands, road transportation system, access to timber

Biodiversity: Biodiversity, diverse aquatic environments, genetic characteristics, multiple species inventory, lack of diversity, managing for all wildlife species, forest floor diversity

Forest Composition & Demographics: Area, composition, structure, age, size, density, shifting species composition, shifting species abundance, acreage, quality of trees, sapling/pole timber density, numbers, species decline, vegetation composition and structure, amount of old growth, age classes, un-even age condition, distribution of vegetation, size class, total forested area

Forest Health: Forest health, watershed health, ecosystem health

Forest Regeneration: Impact of regeneration failure on wood products industry, low oak regeneration, impact of deer browsing on regeneration, aspen regeneration, minimal natural aspen regeneration, vegetation restoration, loss of early successional habitat, declines due to absence of regeneration, reforestation

Landscape Pattern: Landscape-level patterns, forest spatial pattern, managing wildlife at landscape scales, challenges of planning at the landscape scale, sustainable working landscapes

Threatened or Endangered Species: Rare and endangered species, Endangered Species Act, species of concern (not listed), human-caused imperilment and extinction

Volume, Growth, Mortality, & Removals: Mortality, decline in volume, effect of removals for biofuels on nutrient cycling, effects of ozone on tree growth, timber inventory, increased pulpwood removals, timber harvest, growth-to-removals ratio, timber inventory, rate of growth, timber management, suitability of land for timber harvest

Wildlife & Fish: Aquatic organisms, management indicator species (MIS), game species, nongame species, climate change impacts on birds

Specific wildlife included: Deer, turkey, cerulean warbler, wild turkey, northern flying squirrel, eastern brook trout, black bear, bison, elk, ruffed grouse, moose, Kirtland's warbler

Forest Management

Certification: Demand for green certified wood in economic downturn, sustainable management certification, green certification, determining the role of certification, third party certification not yet leading to consistent increase in revenue, certification of private forests, certification of state forests, managing the data & monitoring requirements for certification, certification of loggers, foresters, and practices

Management Standards & Practices: Effects of harvesting pines over hardwoods, abusive forestry practices, prohibition of clearcutting, increased use of prescribed burning as a management tool, controversial use of herbicide or decline in use of herbicide, need for timely monitoring and inventory, creating targeted priority lands, use of management indicator species, community-based natural resource management, best management practices, silvicultural methods, management area delineation, benefits of having a written management plan, data and information needs for forest management, cooperation among agencies, adaptive strategies needed, vegetation management goals, timber management through management prescriptions

Stewardship & Forest Management: Forest resource management, Effects of management on scenic value, effects of timber harvest on watershed, riparian, and aquatic conditions, vegetation composition and structure management goals, lack of forest stewardship, improving management, active management, management for the future

Sustainability: Ecological sustainability, sustainable management certification

Urban Forest Management: Urban forests, urban tree care industry, resources needed to management, protect and expand urban tree canopy, tree canopy goals to enhance water quality, dealing with structural/replacement costs from EAB, urban forest sustainability, maintaining and enhancing urban tree cover, managing tree canopy

Forest Ownership

Land Ownership - General: Challenges and opportunities for private forest landowners, promoting private forest land ownership, funds for outreach to forest owners, opportunities for compensation/markets for ecosystem services, enhancing assistance to private forest landowners

Land Transfer & Changing Demographics: The passing on of land ownership to the next generation, the aging of society and of landowners, educating new owners, private forest landowner demographic trends

Management Objectives or concerns: Disrespectful use of lands if open for recreation, family forest owners interest in non-timber amenities, nontraditional land ownership and management

Shifting Ownership Patterns: Increased number of owners through parcelization, trend toward more and smaller landowners, restructuring of industrial ownership, new class of large landowners (TIMO and REITs) with shift away from industrial landowners, small parcels sold to nonindustrial owners

Forest Threats

Fire & Fuels: Wildfire management- resource protection and public safety, fire severity, funds to manage, challenges of fitting prescribed burns into new atmospheric particulate matter regulations, fuel loadings of down woody material, education regarding wildfire, negative effects of wildfire suppression, damage from wildfires, investment in wildfire suppression, prescribed burning, adaptive strategies to wildfire, lack of businesses working on prescribed fire, differing opinions about the role of fire, reducing man-made fire (arson, mine breaks fires)

Fragmentation & Parcelization: Fragmentation of habitat, impact on species range shifts, increase in forest edge, parcelization of land

Insects & Diseases: Exotic pests, pathogens, outbreaks in the face of climate change, funds to manage

Specific insects and diseases included: Emerald ash borer, oak wilt, anthracnose, beech bark disease, beech scale insect hickory decline, chestnut blight, tubakia , gypsy moths, hickory decline, defoliating insects, larch beetles, chestnut borers, spruce beetles, and oak wilt, Asian longhorn beetle, hemlock wooly adelgid, ramorum blight, Dutch elm disease , butternut canker, dogwood anthracnose, red imported fire ants

Invasive Species: Invasive plants and animals, non-native invasive species, non-indigenous invasive species, effects of quarantines, effects on economies

Specific invasive species included: Russian olive, buckthorn, brome grass, zebra mussels and knapweeds, multiflora rose, garlic mustard, and bush honeysuckles

Pollution: Pollution of rivers and lakes, sediment as a nonpoint pollutant, impacts on air quality from wood fuel heating, greenhouse gas emissions from wood pellet boilers, contamination problems, ozone exposure, particulate matter and Nitrogen Oxide emissions from timber harvesting and prescribed fire

Land Use & Tradeoffs

Impacts of Land Use Change: Land use change, local land use decisions, conversion of land to non-timber uses, conversion of timberland to non-forest uses, loss of benefits of forest cover after land conversion, competing land uses

Development: Development on private and public lands, causing decrease in recreation access on private lands, open space being converted to development, sustainable development, urbanization, construction of housing, urbanization, development pressure

Public Lands Management: Economic benefits of public lands, lack of sufficient resources, benefits of public lands, identifying proper roles and capacity of public land management, differing opinions regarding land acquisition on public lands

Special Land Allocation: Research natural areas (RNAs), candidate Research Natural Areas (CRNAs), Wilderness areas, Wild and Scenic Rivers, National Recreation Areas (NRAs)—some people want more, some want less; special uses for communication towers, wind turbines, large group gatherings, and special non-timber forest products; Challenges of finding funds for conservation easements; conservation easements are not appropriate for all forestlands

Natural Resource Consumption

Wood Products- Production, consumption, & trade: Increased competition for wood products, effects of regeneration failures on timber products industry, domestic markets for forest products, economic benefits of forest products, lumber production, timber sales, global forest products market, retaining a viable and competitive primary forest products industry, differing opinions regarding the benefits of timber harvest, supply of timber, loss of forest industries, maintaining sustainable forest products industries

Energy Consumption: Energy use, expansion of scale of bioenergy, expanding demands of energy, consumption of energy, environmental impacts of fuel extraction (biomass), impacts of renewable energy (wind turbines), cost of energy rising, mining for oil and gas

Non-timber Forest Products: Secondary forest products, wild plants for herbal supplements, birch bark, birch stems, Christmas trees, pine cones, conifer boughs, firewood, maple sap, sheet moss

Societal Framework

Human Population Growth & Change: Increasing human population, population pressure on forests

Environmental Literacy: Public awareness of forests, funds for environmental education, information, education and outreach for the general public, education regarding wildfire, extension education regarding forestry, disconnection from understanding forestry, misunderstanding of the relationship between forestry and logging, lack of public understanding about the importance of forests and forestry, education needs for the future of the forestry profession, awareness of environmental problems

Public Opinion & Values: Public support of environmental issues, including climate change, public value of forests, public support of the need to maintain healthy forests and environmental quality

Forest Policy & Law: Policies affecting changes in land owners, call for changes to forest policy, effects of climate change policy, atmospheric particulate matter regulation,

Endangered Species Act, forest policy issues, courts and congress making decisions that affect forests, environmental regulation and restricted use designations, Energy Policy Act, working with governments

Community Stability: Effects of changes in forest management on communities and local economies, communities preparing for future water shortages, forest communities' dependence on government subsidies for stability, remaining competitive in global markets seen as key to vibrant communities, social justice issues, preservation of subsistence cultures, adapting to reduced resources

Taxes: Tax loss from land acquisition, tax credits for biomass for biofuels, property taxes, federal income tax, tax structure affecting the ability to keep forests as working forests, reserve property tax exemption program at risk because of financial pressure on local government, declining tax revenue from wood products

Forestry Workforce: Recruitment, education, and training of professionals, workforce planning for retirement waive, inability to recruit professional foresters for higher management positions, maintenance of a trained workforce to respond to the state's forestry needs, certification of loggers and foresters, continued viability of consulting foresters & vendors