United States
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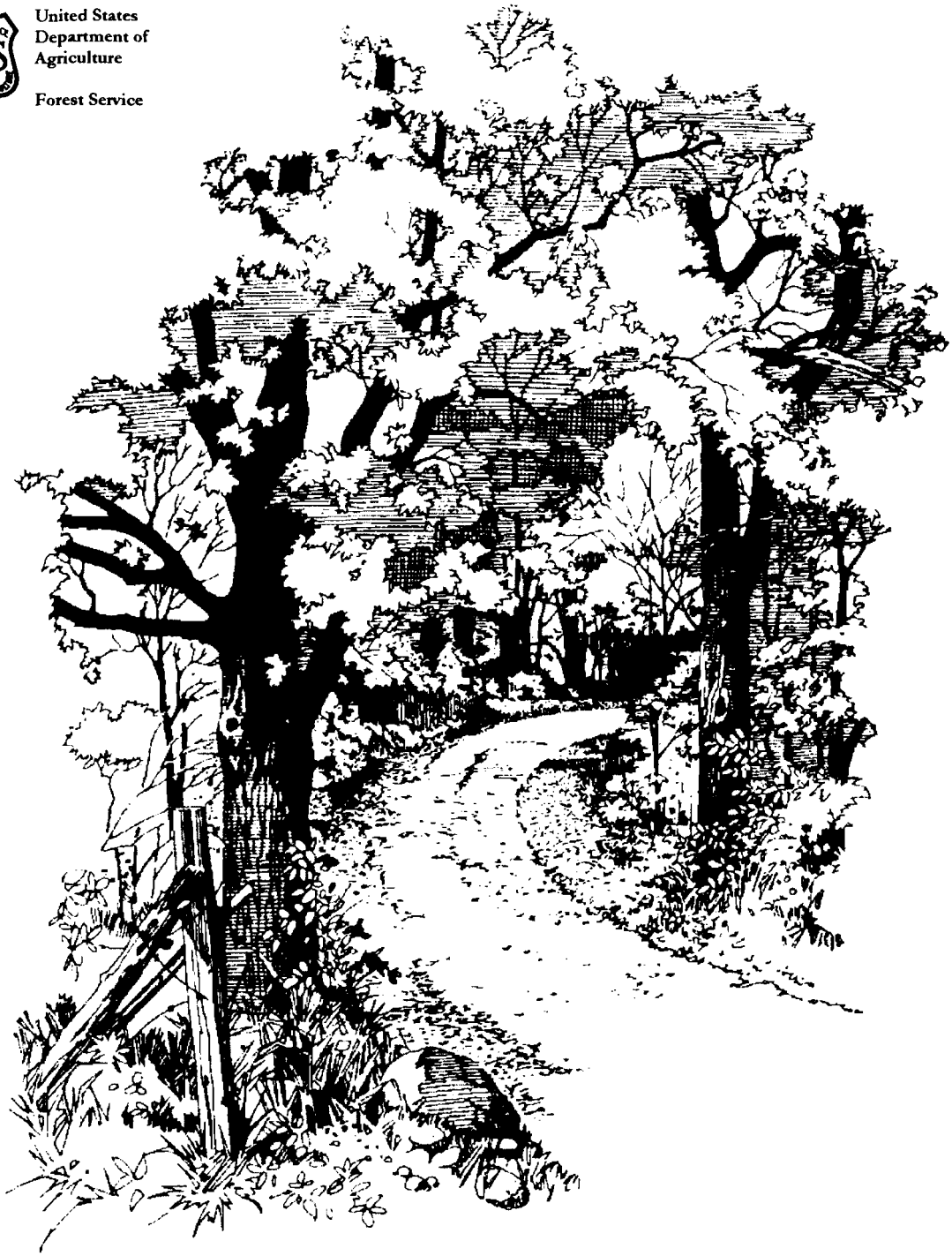
Forest Service



White Mountain National Forest Monitoring Report 1995

FOREST PLAN MONITORING AND EVALUATION REPORT
WHITE MOUNTAIN NATIONAL FOREST
1995

FOREST SUPERVISOR'S ASSESSMENT

In last year's monitoring report we provided information about the status of terrestrial and aquatic ecosystems and assessed our progress in managing these ecosystems to provide for the needs of people. We identified some issues that will be addressed as we update the Forest Plan. In this year's report, we will bring you up to date on some of those issues.

Although we have learned a great deal, not all of our monitoring questions are answered. Without funding to fully implement and monitor the Plan, we do not have all the information we need to address some issues. Members of the wildlife Committee of Scientists have continued their monitoring, and some preliminary monitoring results should be available this summer. This information will begin to describe population trends of resident and neotropical migrant bird species and their affinities for certain community types and vegetation management practices. The scientific community and others who assisted in pulling new information together are helping us build on past New England planning efforts to determine changes needed in the Forest Plan.

With 10 years of monitoring and new information available to us, we believe it is time to start a full review of the current Plan. We have joined with the Green Mountain National Forest in developing a revision process that will involve you from the start. We developed a schedule to complete Plan revision by the year 2000 and meet the time frames specified in the National Forest Management Act.

I concur with the interdisciplinary team's recommendations included in the body of this report and do not believe we need immediate changes in Plan direction or implementation. Neither this report nor past monitoring have shown an urgent need for change. The 5-year review required by the National Forest Management Act was provided in our 1993 Monitoring Report, did not indicate substantive changes in conditions on the Forest. The 1994 Monitoring Report introduced the concept of ecosystem management and how it will be carried out. Monitoring has raised several questions that need to be examined, but has not shown the direction in which we need to change. We intend to explore these questions in the Forest Plan revision process, but until then we will operate under the current plan.

Monitoring and evaluation results and new scientific information offer fresh perspectives that build the momentum for exploring opportunities to revise our Forest Plan. For example, ecosystem management takes a new approach to balancing human needs and environmental concerns on broader scales. To discover this balance we will involve people with views and expectations about the uses of the White Mountain National Forest. People and ecosystems will be at the center of the Plan revision. The process will be open and participative, with

opportunities for involvement ranging from newsletters to public planning groups. We hope you will help us determine the direction the future will take.

The Forest Supervisor on the Green Mountain National Forest, Jim Bartelme, and I are looking forward to working with you to revise the Forest Plans in New England. I am confident we can join together to develop plans to sustain our ecosystems and meet the needs of people.

Donna L. Hepp

DONNA L. HEPP
Forest Supervisor

OVERVIEW OF THE 1995 MONITORING REPORT

We monitor and evaluate key aspects of the Forest annually to measure our success in meeting the goals and objectives of the Forest Plan. Following guidelines in the Forest Plan, we perform monitoring activities and establish an interdisciplinary team to evaluate the information. The interdisciplinary team makes recommendations to the Forest Supervisor on proposed amendments, revisions, or other changes in management direction to the Forest Plan. This forms the basis for the evaluation and annual monitoring report.

This report includes a few highlights of 1995 accomplishments, but mostly contains information about changed conditions and trends suggested by monitoring results that differed from previous years. We introduce a new format that emphasizes specific findings of monitoring that show changed conditions or new trends. This format differs from the 1993 Monitoring Report, which included the 5-year review required by the National Forest Management Act, and the 1994 Monitoring Report, which summarized the current condition of terrestrial and aquatic ecosystems in the National Forest. Our intent is to use the format of this report in future years.

TERRESTRIAL ECOSYSTEMS

POPULATION TRENDS FOR MANAGEMENT INDICATOR SPECIES

The Committee of Scientists continued their oversight of vertebrate species monitoring in 1995. The Committee is attempting to determine the effectiveness of using Management Indicator Species (MIS) to understand the effects of vegetation management on entire communities of species. By collecting data over several years, we learned that some MIS are not abundant enough or habitat-specific enough to provide significant information about their habitats. Nevertheless, the data we are collecting is not limited to MIS and will provide critical information about the diversity of species on the Forest, and their habitat requirements. Species data integrated with vegetation inventory data and ecological land type data will provide a greater understanding of terrestrial ecosystems and their wildlife communities than we have had to date. This extensive monitoring effort will be used to guide wildlife habitat planning.

Monitoring the effects of vegetation management on resident and neotropical migratory birds continued for the fourth consecutive year. Total number of species detected and individuals counted during 1995 was similar to 1994. Initial evaluation of the cumulative data sets collected annually since 1992 is currently in progress at the University of Vermont. Data from the upcoming 1996 bird monitoring season will be added to this evaluation and an assessment of short-term bird population trends over a 5-year period will be completed for reporting in 1997.

Small mammals continued to be monitored. Based on preliminary data collected in 1993, monitoring methods and sites were adjusted to target species of concern, namely long-tailed shrew, Sorex dispar; rock vole, Microtus chrotorrhinus; northern bog lemming, Synaptomys borealis; and southern bog lemming, Synaptomys cooperi. In 1994, these four species were monitored by directed searches of their respective specific habitats. In 1995, methods were further refined to focus on northern bog lemming, a species that has not yet been collected on any survey transects. The Committee of Scientists has determined that a minimum of 2 more years of data collection will be required for accurate statistical analysis and the bog lemming is being specifically targeted for directive searches during that period. It is expected that species other than those targeted will be caught and this information will also be used to evaluate the wildlife strategy of the National Forest in managed, unmanaged and remote areas.

Large mammal winter tracking was completed for the third consecutive year. This type of monitoring has proved difficult since conditions for conducting track surveys must be ideal to identify species accurately and harsh weather can disrupt our ability to collect data. Each year the Committee of Scientists evaluated the methodology. They decided that the data will at best provide information regarding the presence of species among the managed, unmanaged and remote areas. The Committee will evaluate data from 1995 and 1996 to draw conclusions about the effectiveness of the methods, and about the presence of large mammal species on the Forest.

Recommendations

Identifying dependable population trends for birds requires long term monitoring. This ensures that short-term fluctuations caused by harsh winters, drought or the cyclic nature of some food sources, can be explained in relation to the overall condition of the population and vegetation community it inhabits. We recommend that monitoring for resident and neotropical migratory birds, initiated in 1992, be continued in 1996. Bird monitoring data collected from 1992-1996 should be analyzed completely at the end of this year to make an initial estimate of population trends. This analysis should also be used to set the frequency of bird monitoring in the future, and to identify relationships between populations trends on the White Mountain National Forest and trends identified through national Breeding Bird Surveys.

Small mammal data should be collected for at least another 2 years before statistical evaluation is completed. This information should then be used to determine the diversity of small mammal species present on the Forest, and the frequency with which they inhabit areas under different vegetation management regimes.

The large mammal winter track data analysis should be completed this year. We will need to decide if this component of wildlife monitoring is providing information that is useful in evaluating our wildlife strategy. If it is not, we will need to explore other methods to monitor population trends in this group of forest wildlife.

WILDLIFE HABITAT IMPROVEMENTS

The Forest Plan specifies a desired future condition of having a certain percentage of each Habitat Management Unit (HMU) on the Forest in permanent wildlife opening habitats. The objective of wildlife opening management is to increase herbaceous growth, and prevent invasions of woody plants to perpetuate the habitat. As stated in last year's monitoring report, we are not meeting Forest Plan objectives for upland wildlife openings for several reasons. Permanent openings are expensive to maintain, and therefore many openings are reverting to forested community types. We have hesitated to create new openings knowing that adequate funding to maintain openings is not likely. Ideally wildlife openings are evaluated every few years to determine if maintenance treatment is needed.

Currently, some of our permanent openings are maintained every 3 to 5 years by brush hogging, hand brush cutting, or prescribed burning. In 1995, 336 acres of wildlife openings were maintained. Several openings were monitored to evaluate the effectiveness of the different maintenance techniques. Overall the wildlife openings visited had a strong component of brushy or grassy vegetation. When treated regularly, these openings appear to be meeting our desired condition. There is a concern about the size of permanent wildlife openings. Many of them may be too small to provide adequate benefits to early successional species. Treating fewer large openings rather than many small openings would also be more efficient.

Recommendations

Monitoring is needed to determine which early successional species are using these upland openings, and the optimum size opening for early successional habitat. The ability to carry this out will depend on available funding. We should seek the assistance of the Northeast Forest Experiment Station to address these questions.

SOIL PRODUCTIVITY

Methods of monitoring soil productivity on the Forest include routine literature reviews, close contact with the scientific community at Hubbard Brook Experimental Forest, and evaluation of forest management activities to ensure that standards and guidelines for soil protection are employed and effective.

In our 1993 report we discussed the concern for soil nutrient depletion related to timber harvest. At that time research results did not warrant changing harvest practices as they are currently employed. Contacts with scientists at Hubbard Brook Experimental Forest in 1995 provide no further evidence that forest growth is affected by nutrient depletion. There is still not complete agreement about whether depletion occurs.

Preliminary evidence suggests that the intensity at which forest practices occur over the landscape as a whole, not whole-tree harvest per-se, is the cause for concern about nutrient depletion. For example, short interval single tree selection may be of greater concern than whole tree clearcutting occurring at long intervals. It is worth remembering that acid deposition, and its impacts on soil chemistry, is by far the largest contributor to estimated changes in soil cations.

Plans for research on the Forest include studies to unravel whether nutrient-poor sites, generally growing softwoods, or nutrient-rich sites, growing sugar maple and other demanding species, are most susceptible to the possible impacts of nutrient depletion. Studies are also planned on soil mineralogy to start assessing, at a landscape scale, places that may be more, or less, susceptible to depletion impacts.

Recommendations

The interdisciplinary team does not recommend any changes in practices or plan direction based on this information. We need to continue to ensure that we avoid intensive forest practices on soils with insufficient nutrient content to provide for regrowth.

VEGETATION GOALS FOR HABITAT MANAGEMENT UNITS

In the 1994 monitoring report, we recognized the need to emphasize monitoring of the implementation of our Habitat Management Unit strategy. Each unit is about 4,000 acres and

includes a variety of features to optimize habitat for wildlife species (food, shelter and water). The Forest Plan set Habitat Management Unit (HMU) goals to achieve a mix of forest cover types (based on dominant tree species) and size/age classes (reflecting the structural arrangement of trees and other vegetation). The goals were intended to apply across the Forest in management areas where vegetation management is planned (MA 2.1 and 3.1). The Plan did not assume that all Habitat Management Unit goals would be accomplished within the first decade of the 50-year planning period. (See pages VII-B-1-16 of the Forest Plan for further information on the HMU concept and page III-13 for HMU goals.)

The interdisciplinary team evaluating the 1995 monitoring information started with a finding from the 1994 Monitoring Report: the Habitat Management Unit goals for age/size class were achieved in regenerating northern hardwood, young northern hardwood and overmature spruce-fir classes, but forest cover type goals, irrespective of age/size class, were not met. Two related factors, the intensity of management practices and land capability, were thought to be relevant to these shortfalls.

Habitat Management Unit goals were based on the assumption that management practices of varying intensity would be used. For example, clearcutting, site preparation and planting would be used to achieve goals on certain ecological land types. These practices were expected to be sustained over the 10-year period (Forest Plan page VII-L-2). However, in carrying out the Plan we have used less clearcutting and site preparation. With reduced use of these management practices achieving some Habitat Management Unit goals is more difficult.

In developing the Forest Plan, land capability was estimated by classifying units of land into ecological land types with similar physical and biological features where plant communities and the response of vegetation to management could be predicted. Habitat Management Unit goals are based in part on these estimates about the capability of the land. In setting the desired balance of forest cover types and size/age classes for the Forest, wildlife planners estimated the capability of the land in each ecological land type and aggregated the total to arrive at Forest-wide goals.

The interdisciplinary team also considered that land capability within some ecological land types varies more than was assumed when the Forest Plan was developed. We developed a monitoring project to test variability within ecological land types. In essence, the project used a Geographic Information System (GIS) to compare ecological land types with a summary of the desired forest cover types in the Habitat Management Unit goals. We updated the ecological land types with new research findings and 10 years of data we collected.

After making the initial comparison, we aggregated groups of ecological land types into Landtype Associations and Subsections based on common characteristics at landscape scales. These aggregations had not been developed previously, and we determined that the White Mountain National Forest is in the Mahoosic- Rangeley Lake Subsection (northern parts of the Ammonoosuc and Androscoggin Districts) and White Mountain Subsection (rest of the Forest). The Subsection boundaries generally correspond to differences in vegetation response to

management activities. For example, consider two hardwood forests growing on ecological land type 105 (Red Maple/Beech on slightly washed glacial tills) in the Mahoosuc- Rangeley Lake and White Mountain Subsection. If we clearcut the Mahoosuc- Rangeley Lake site we regenerate aspen stands, but if we clearcut the site in White Mountain Subsection we regenerate a forest that includes aspen, but as smaller component of the stand. This suggests that there is variation in land capability within the same ecological land type, and indicates that we may not be able to meet some forest cover type objectives.

The final step was to recalculate the capability of the land to meet HMU goals for forest cover type using the revised mix and known variability of ecological land types. It is shown as "ecological capability" in the third column of the table below. Some values are expressed as a single number and others are expressed as a range of numbers. The ability to predict northern hardwood cover types on certain ecological land types is very well documented, making it possible to estimate the ecological capability for northern hardwoods as 55 percent of the lands we manage for wildlife habitat. The rest of the lands fall into a broad group of ecological land types that support softwoods. Depending on actual site location, biotic conditions and vegetation management, they may support forest cover types that include spruce-fir, paper birch, aspen, hemlock and oak-pine. Since predicting which ecological land types will support these cover types

VEGETATION COVER TYPE DISTRIBUTION
Even and Uneven Aged Systems in MA 2.1 and 3.1
(estimated as percent of total acres)

COVER TYPE	CURRENT	DESIRED(a)	ECOLOGICAL CAPABILITY
Hardwood (b)	77	56	55
Spruce-fir	9	18	25-35
Paper birch	3	10	3-5
Aspen	2	4	1-2
Oak-pine	2	2	2
Hemlock	3	2	3-6
Other ©	4	8	5-8

(a) Combined even and uneven aged composition objectives, Forest Plan page III-13.
(b) Includes northern hardwood and mixedwood cover types.
© Includes permanent openings, wetlands, water, rock outcrops and unvegetated sites.

is complex, the numbers are shown as a range. The other two columns in the table are the current percentage of land in MA 2.1 and 3.1 in each forest cover type, and the objective for percent forest cover type established as optimum within a typical Habitat Management Unit.

With the results of this monitoring project the interdisciplinary team made the following evaluation of our ability to meet current Habitat Management Unit goals for forest cover type:

Northern Hardwood Cover Types. The ecological capability for northern hardwood forest cover is consistent with the objective set in the Forest Plan. The actual amount of northern hardwood exceeds the Forest Plan goal. Many of these hardwood stands are growing on ecological land types with a tendency toward softwood. There are several explanations, including the possibility that intensive harvesting and fires nearly a century ago altered the successional pathways on these sites.

In addition to these findings, we noticed another trend based on last year's conclusion that we are meeting the objective for northern hardwood in the regeneration age class. In this year's monitoring we looked closer at these regenerating stands. We learned that 10 percent will pass into the next age class within a year. Fewer stands will be entering this age class since we are clearcutting at reduced levels. As this trend continues, the proportion of early successional hardwood forest will drop.

Aspen and Paper Birch Cover Types. It does not appear that we can achieve the aspen and paper birch cover type objectives given the current application and intensity of forest practices. Aspen and paper birch cover types can best be maintained and reproduced are in the Mahoosic- Rangeley Lakes Subsection, corresponding to the boundaries of the Ammonoosuc and Androscoggin Ranger Districts. In the rest of the National Forest, it appears that some aspen and paper birch forest cover types may be sustained at or below current levels.

Spruce-Fir Cover Types. The ecological capability to meet the spruce-fir cover type objective is more than adequate. However, the current amount of spruce-fir is below the desired level. Since some ecological land types where softwoods are predicted to occur are actually growing northern hardwoods, we have not met this cover type objective.

Oak-Pine and Hemlock Cover Types. It appears that the composition objectives are consistent with ecological capability for oak-pine and hemlock cover types. Oak-pine forest types occur almost exclusively in the White Mountain Subsection in the southern parts of the Pemigewasset and Saco Districts in New Hampshire and in Maine. It is unlikely that much oak-pine forest cover type can be maintained on the northern part of the Forest. Hemlock forest cover types are well distributed throughout the Forest.

During this monitoring activity the interdisciplinary team addressed the use of forest type to classify habitat. Part of the Habitat Management Unit strategy is to use forest types based on

dominant tree species to describe wildlife habitats and the association of wildlife species that use the habitat. This allows us to use information in our timber data base to estimate conditions for wildlife habitat, and to classify stands by forest cover type using criteria in published silvicultural guides. During the 1995 interdisciplinary team review of variation within ecological land types, we considered whether a stand that contains aspen, but not enough to be classified as aspen forest cover type, would still provide the desired habitat features to support dependent wildlife. While the answer is not readily apparent, this question suggests that timber inventory data may have limitations for describing wildlife habitat. Additional ecological criteria may be needed.

Recommendations

The interdisciplinary team does not recommend changes in plan direction based on this monitoring information until further work is completed through the Forest Plan revision process. To address forest cover type objectives in analyzing the need to change the Forest Plan adequately, we anticipate drawing on information about: (1) variations in the capability of ecological land types occurring in different Subsections; (2) ecological criteria for using forest cover types and age/size classes as an approximation of wildlife habitats; and (3) wildlife habitats and forest cover types occurring outside the National Forest. We recommend continuing work with partners throughout New England to develop, test and apply this information.

In the interim, we do not recommend any changes in the intensity of forest practices used, but rather ecological capability be incorporated into project planning for Habitat Management Units so that it plays a greater role in determining forest practices. Examples include:

- Emphasizing appropriate harvest methods to stimulate and enhance spruce-fir regeneration on ecological land types that can support spruce-fir but now grow northern hardwood. For example, in the White Mountain Subsection converting northern hardwood stands to softwoods should be accomplished with single-tree selection and light shelterwood cuttings, and artificial reforestation if necessary. In the Mahoosuc- Rangeley Lakes Subsection regeneration of spruce-fir may be accomplished by creating larger openings.

- Managing for paper birch and aspen forest cover types in the Mahoosuc- Rangeley Lakes Subsection on the northern Districts, provided that cumulative visual effects, maintenance of deer wintering cover, and other objectives are considered.

- Vegetation management to maintain the current levels of paper birch and aspen in the White Mountain Subsection on the southern Districts.

The monitoring projects undertaken this year provided some important information about the variability of ecological land types across the Forest and help us understand how forest cover objectives might be considered when we revise the Forest Plan. In addition, the State of New Hampshire is beginning to develop statewide forest structure and composition goals that will provide a broader context for assessing the desired future condition expressed in the Forest Plan

(See New Hampshire Forest Resources Plan). Ultimately the National Forest's forest cover type and age/size class goals must be a collaborative decision based on balancing human needs for commodities with ecosystem sustainability in the New England context.

AQUATIC ECOSYSTEMS

Aquatic ecosystem monitoring in 1995 included the following: project accomplishment monitoring to learn if habitat improvement project objectives are being met; monitoring to determine if mitigative measures to protect stream and riparian habitat during timber harvest were effective; and Forest Plan monitoring to learn if fisheries and riparian standards and guidelines are being met. Methods used include stream and pond habitat inventory, fish population and macroinvertebrate sampling, temperature readings, and riparian inventory. During the year, we did not discover any new findings from those of previous years. Those conditions identified as a concern in the 1994 Monitoring Report, namely lack of instream pool habitat and impacts to riparian areas from high recreational use, were specifically addressed in 1995 through more focused evaluation.

POOL HABITAT

Over the past several years, we have decided that pool habitat is very limited on the Forest. To evaluate the cause of these conditions, the Northeast Forest Experiment Station is funding research that will first help us to relate habitat types spatially (pools) to other physical information, including geomorphological data, elevation, aspect, and ecological land type. This will in turn lead us to the development of an aquatic classification scheme that can be used to evaluate physical and human-induced processes that affect stream channel morphology and pool density. We are also analyzing existing stream habitat data from the Green and the White Mountain National Forest to identify what other instream and riparian features are correlated with pool quantity and quality. Lastly, the Northeast Station has initiated studies that will focus on the role of large wood in the development and maintenance of pools and their relationships to Atlantic salmon smolt production. Preliminary results of these studies will be published in 1998.

Recommendations

Use the findings of research on pool habitat, when available, to evaluate current Forest Plan standards and guidelines as we assess the need for changes.

IMPACTS OF DISPERSED RECREATION USE ON RIPARIAN ECOSYSTEMS

Field personnel have been increasingly concerned with the potential impacts of high dispersed recreational use on riparian areas. Areas of very high dispersed camping use, such as the Tripoli Road along Eastman Brook, are beginning to show signs of soil compaction, loss of riparian vegetation, depletion of wood in streams and on the forest floor, and streambank instability. In

addition, Eastman Brook has very little high quality pool habitat, exacerbated by the low amount of dead wood in the stream that forms pools.

In 1995, we decided to start a formal evaluation of the Eastman Brook watershed to describe the condition of the stream, its tributaries, and associated riparian corridors. We used a watershed-level analysis to identify the dominant physical processes occurring in the watershed which influenced stream channel morphology and riparian condition. As part of this watershed-scale analysis, 200 dispersed camping sites were inventoried along Eastman Brook and the impacts to the riparian vegetation and soils were identified. Out of these 200 campsites, 65 were characterized as degraded. This information was used along with watershed data such as fish habitat, ecological land types, vegetation composition and age class, water quality, rainfall, road conditions and stream temperatures to characterize the entire watershed. A process was developed by which the available data could be integrated and used to describe natural and man-induced processes that have resulted in the condition of the watershed today. Dispersed camping and road uses are affecting the riparian areas and the stream itself. From this analysis, recommendations for watershed improvements will be presented to address recreational needs, aquatic and riparian habitat restoration, and road improvements that will improve the condition of the Eastman Brook Watershed.

Recommendations

The Eastman Brook watershed analysis should be completed and the recommendations for site-specific improvements should be carried out as future funding allows. During the course of this analysis, we discovered that depending on the appropriate scale of the issue, this process could be a useful tool in evaluating cumulative effects of forest management activities, defining and prioritizing watershed improvement needs, and describing both terrestrial and aquatic ecosystem condition. A formal evaluation of this process for its utility in answering landscape-level and project-level land management questions should be completed. This tool has been found to be useful elsewhere in the National Forest system.

SOCIAL DIMENSIONS OF ECOSYSTEMS

The Forest Plan sets goals for meeting human needs by providing products, services and amenities. Output levels are tracked each year. The table below shows outputs of some products and services of general interest over the last 10 years. It provides a quick snapshot of activities on the Forest.

SNAPSHOT OF OUTPUTS AND PRODUCTS
(by fiscal year)

Output/ Accomplishment (unit of measure)	86	87	88	89	90	91	92	93	94	95	Actual Cumulative Total or Annual Average	Forest Plan Estimate
Timber Sold (million board feet)	30	28	30	30	27	24	19	27	24	25	264 total	350
Land Acquisition (acres)	62	10,422	259	44,210	155	235	1,745	1,400	552	609	59,649 total	n\a
Wildlife Habitat Improvement (acres)	346	330	517	491	474	699	505	77	224	336	400/yr	590/yr
Ski Area Use (thousand visitor days)	-	-	446	432	457	399	461	480	458	474	448/yr	444 (a)
Trail Construction & Reconstruction (miles)	0	19	51	10	10	7	48	7	53	43	25/yr	9 (b)

(a) Forest Plan originally showed 344; this was later corrected.
(b) Forest Plan does not set a target for trail reconstruction while the annual outputs include both new construction and reconstruction.

The rest of this section summarizes information about changed conditions and trends suggested by monitoring results that differed from previous years.

VISUAL IMPACTS OF MANAGEMENT ACTIVITIES

The Forest Plan recognizes peoples' desire to experience a natural landscape. In last year's report, we discussed people's sensitivity to clearcutting, reduction in clearcutting below the level envisioned in the Forest Plan, and the use of clearcutting to provide habitat necessary for some wildlife. We also reported on our efforts to identify the threshold beyond which a managed landscape no longer seems "natural," through a study to assess people's responses to several types of management activities. The preliminary results of this research indicate that people's threshold may be lower than estimated in developing the Forest Plan. The final report of this research has not been completed.

Recommendations

Continue to use clearcutting as one tool to create the landscape condition needed to achieve ecosystem management. The use of clearcutting should continue to be determined on a project by project basis.

RECREATION USE

The 1995 Monitoring Report recommended direct contact with backcountry users' to reduce people's impacts on the environment. These contacts were made in 1995 but budget reductions will limit our ability to continue direct contacts in 1996. Using the Eastman Brook watershed study described in the aquatic ecosystem section of this report we expect to improve our estimates of recreation impacts in riparian zones. We see a similar need to improve estimates of recreation impacts on the alpine zone and other sensitive areas.

Recommendations

Forest Plan revision will need to assess the impacts of backcountry recreation use and evaluate alternative strategies for dealing with unacceptable impacts. In addition, a monitoring plan for dispersed recreation will be needed to provide information to support future decisions about backcountry recreation use.

PARTNERSHIPS

The purpose of monitoring and evaluation is to measure our success in meeting the goals and objectives of the Forest Plan. A tremendous amount of work was accomplished through partnerships. Experts in a variety of disciplines from universities, organizations, and state and federal agencies across New England participated in the efforts. These are just a sample of the many contributions of people and organizations toward our monitoring efforts:

- Committee of Scientists developed the approach to monitor the HMU strategy.
- Audubon Society of New Hampshire conducted the annual bird surveys.
- Using the GIS capabilities at the University of Vermont, we created a data layer depicting the spatial arrangement of ecological land types.
- Northeast Forest Experiment Station coordinated the small mammal surveys and helped us develop data bases to detect variability in the ecological capability within ecological land types.
- Appalachian Mountain Club helped with air quality monitoring, and along with the New England Wildflower Society, assisted with alpine plant surveys.
- State University of New York at Syracuse conducted the research to assess visual perceptions of managed landscapes.
- New Hampshire Fish and Game Department, New Hampshire Natural Heritage Inventory Program, and US Fish and Wildlife Service provided invaluable assistance on occasions too numerous to recount.
- People who commented on our monitoring reports helped us refine and improve our monitoring activities.

Since the Forest Plan was issued in 1986, we have seen the Northern Forest Lands Study and Northern Forest Lands Council conduct their work on many issues related to forest management on private and public lands across a four-state region. New Hampshire developed a 10-year Forest Resources Plan, Maine is conducting a biodiversity assessment, Vermont reestablished the Governor's Forest Resources Advisory Council, and all three states are developing criteria and indicators of forest sustainability. All of this work, and more, becomes a tremendous resource that will facilitate revision of the Forest Plan. We are excited about the opportunity to work with a wide group of people to use the monitoring results and other information to build on our current Forest Plan and revise it for the future.