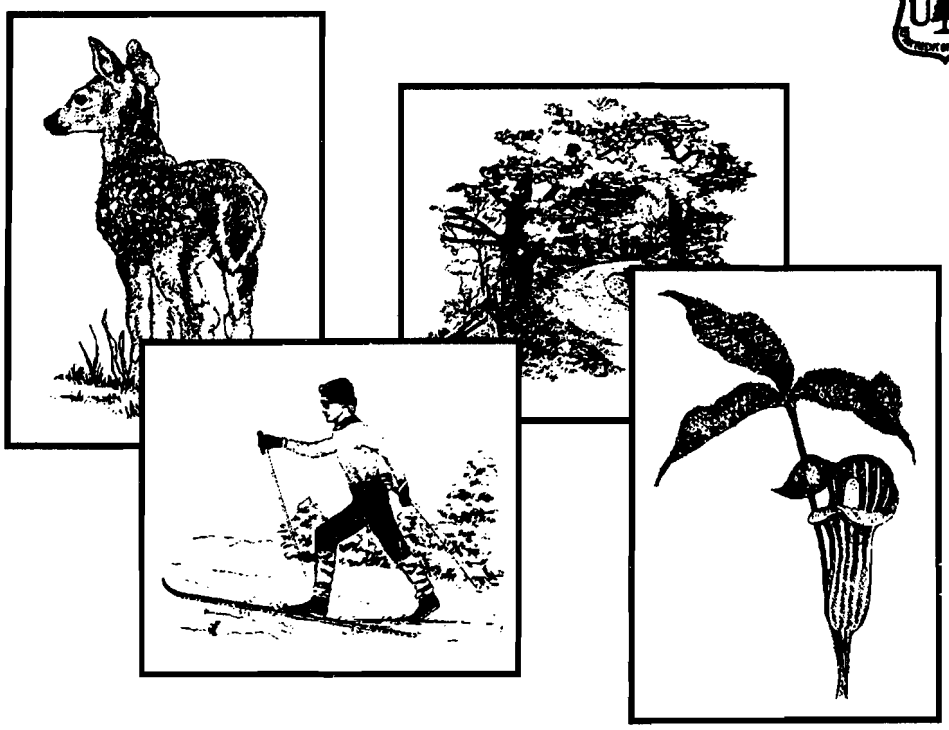
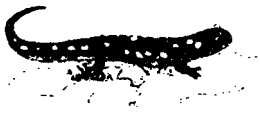
United States
Department
of Agriculture

Forest Service



White Mountain National Forest



Monitoring Report 1993

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Contents

1993 Land and Resource Management Plan Monitoring Report White Mountain National Forest Forest Supervisor's Assessment

This is the most comprehensive monitoring report that we have prepared that assesses the status of the 1986 White Mountain National Forest Land and Resource Management Plan. It focuses on our monitoring efforts to date but it also contains information describing other work we are doing in assessing the validity of the Plan and our implementation efforts. (PLEASE NOTE: This section of the report is also being mailed as a separate document to those who we thought wouldn't be interested in reading the entire report.)

The White Mountain National Forest comprises about three-quarter million acres of federal land in the states of Maine and New Hampshire. Unlike a National Park, a National Forest is managed for multiple uses, producing a wide range of goods and services to the American public. Management of the Forest is guided by a Land and Resource Management Plan (Forest Plan) completed in 1986.

Introduction

The following sections of this document are comprised of individual reports on different resources, each one authored by one or two Forest Service specialists, often using data developed by or with one or more of our many cooperators. If you have questions, please feel free to contact us for more information. The full monitoring plan is available and our staff is ready and willing to assist you.

I have not attempted to comment on every one of the resource areas or on every facet of any resource area. I've tried to focus on what I perceive are the major areas of interest and hope that if I missed some important point, you'll contact one of us separately with your concerns.

When you read this document, you will not find that all the questions and issues concerning management of the Forest have been fully answered or resolved. All we can tell you about some things is that we are still investigating and considering them but don't know yet whether they will require some change in the Plan. Whatever the topic, though, I invite and ask you to let us know how you evaluate the monitoring data, what you believe should be done as a result, what you think the new and emerging

issues are, other aspects of the Plan that you believe should be monitored, and how you think the Plan needs to be changed or why you think it stands well as it is. We'll consider your thoughts and report to you next year. Some of our work during the past year is an analysis of the adequacy of Chapter IV of the Plan - the monitoring requirements. We're looking to see if the monitoring questions it contains are really the best ones to ask in determining the Plan's currency. Our preliminary thoughts are that some need to be dropped or changed and others added so we may be proposing an amendment to that section in the coming year.

Subtitles divide the rest of this narrative. Because the resources of the National Forest are so interrelated, we really have to consider each topic as part of the whole. That's what ecosystem management means. So, as you read through the following subjects, please realize that each resource has a complex relationship to all of the others.

Ecosystem Management

The "new" topic that transcends all individual resource management areas is "ecosystem management." I put the word "new" in quotes because I want to highlight that, although there may be new concepts and wider emphasis on the topic, the concept itself is not entirely new. The regulations (36 CFR 219.1(b)(5)) under which the current Plan was written state "...forest planning will be based on the following principles:...(3) recognition that the National Forests are ecosystems and their management for goods and services requires an awareness and consideration of the interrelationships among plants, animals, soil, water, air, and other environmental factors within such ecosystems." This requirement was well in mind when the Forest Plan was prepared and we think the Plan has a strong ecological framework based on the current level of knowledge.
The concept of an ecological approach to multiple use is rapidly evolving. There is and will continue to be much debate on how this concept should be applied to this National Forest. We have developed partnerships with various research organizations and resource managers to be active participants in shaping what ecosystem management will mean to us. Several ecological inventories and assessments are occurring in New England. When results are available, they will help us determine what changes will be needed in the Plan to achieve our ecological objectives.

Wildlife Habitat/Even-Aged Management

An ecological approach to multiple use management is embodied throughout the Plan in such subjects as management area prescriptions, the allocation of land to the various management areas, and the standards and guidelines that govern our day-to-day activities. One of the most complex of these

subjects is the wildlife management strategy - the strategy for preservation and enhancement of the diversity and viability of plant and animal species. This strategy is the focus of interest for many people, especially on how part of it is implemented through commercial timber harvests and, in particular, clearcutting.

The wildlife strategy focuses on management of the land and vegetation since management of animal life generally falls under the jurisdiction of the States. Vegetation is managed for several objectives such as for animal habitat and our principal tool for vegetative management is timber harvest. The animal habitat strategy described in Appendix B of the Forest Plan is a complex and far-reaching effort. Its success depends as much on that area of the Forest (over half of it) where no timber harvesting is done as it does on the area where timber harvest is our primary tool. In that area where we do harvest, its success depends on different kinds and intensities of harvest, the rate of harvest, and the spatial distribution of harvest sites.

With respect to clearcutting, the problem boils down to this: Of the 339 inland animal species in New England, 257 of them have a primary or secondary dependence on a forested habitat. Of these 257 species, 90% (233) of them have a primary or secondary dependence on forest vegetation in the regeneration (0-10 years old) or young (from 10 up to 69 years for some species) age classes. Clearcutting is the vegetative management practice that produces these various age classes of the Forest. It's difficult to provide enough of this habitat when the means of doing so is one that so many people find objectionable - clearcutting.

The concern over clearcutting is not new. It existed on this Forest before the current Plan and, as a result, the Plan prescribed a lower level of the practice than had occurred in the years before. Some concern continues after adoption of the Plan. The level at which the practice has been used has declined each year since the Plan was adopted. This means we are falling short of the Forest Plan objective for creation of regeneration and young age class habitat and, if the trend continues, we expect the result will be a decline in the kinds and numbers of animal species that depend on it.

Whether or not we are right in our wildlife strategy and expectations will be tested, in part, by what we think is one of the most comprehensive animal population monitoring efforts ever attempted on a national forest. This effort is undertaken with a lot of help from people outside of the Forest Service. This is a complex, costly, and time consuming effort that took much work to develop and implement and which will not begin to yield conclusive results for some years. Preliminary indications, however, seem to confirm the Plan's habitat strategy, including the need for young and regeneration age classes and the role of clearcutting in providing it.

Not everyone agrees with the objective of retaining the present diversity of animal life on the Forest, that the type of habitat created by clearcutting is necessary, or that clearcutting is the only or best way to provide it. Some believe that all timber harvesting - and other activities - on the Forest should cease so the plant and animal life could revert to some type of "pre-settlement" condition and that the surrounding private lands (there are few other public lands) should be relied on to provide any "managed" habitat like the young and regeneration age types. Others note that nearby private forest lands are moving steadily into the more mature age classes as less timber is harvested there, that more of the land is being used for residential and commercial purposes, and that the availability and diversity of wildlife habitat is declining on those lands with no effective way to reverse the trend. One can find almost any combination of opinions between those divergent views.

Threatened, Endangered, and Sensitive Species

The peregrine falcon seems to be doing well in its "comeback" effort and the robbins cinquefoil is holding its own in the rocky soil on Mt. Washington. There have been no confirmed reports of either the Canada lynx or the eastern cougar on the Forest or of any nesting by the bald eagle. Colonies of an endangered plant, the small whorled pogonia, have been located on the Forest for the first time. An effort is underway to identify other places where habitat may be present for the plant and to search there for its presence. This, and other plant inventory work, is being carried out in close cooperation with the Maine and New Hampshire Natural Heritage Inventories and the U.S. Fish and Wildlife Service.

Wildlife in General

Many sources indicate that the population of large animals - moose, deer, and bear - seems to be doing well but the populations of neo-tropical migrant songbirds remains a concern. The problem appears to stem from habitat changes in Central and South America and a regional reduction in young and regeneration age classes in this, their summer range. We have monitoring work underway on bats and other small mammals, reptiles, and amphibians but it's too early for conclusive findings on populations or trends. We are also active partners in the effort to restore the atlantic salmon to its native habitat.

Timber Management

The market for national forest timber remains strong. The allowable sale quantity (ASQ = a harvest "ceiling") established in the Plan was 350 million board feet for the first decade - an average of 35 million board feet annually. Primarily because of budget constraints, our volume offered has averaged 29 million board feet per year since the Plan was adopted.

The matter of "below cost" timber sales is an issue in the national arena. From the standpoint of the Plan for the White Mountain National Forest, however, it is important to keep some things in mind when thinking about the issue: A "timber sale" is designed to provide more than a short-term supply of wood fiber to industry and the eventual consumers of their products. If that were the only intent, costs would be much lower. Timber sales also provide the principal means for us to accomplish the wildlife management strategy, as discussed earlier and for maintenance or enhancement of the land's ability to produce more timber products for the future. Timber sales are also used to attain visual quality objectives such as a "big tree" image or to open vistas along roads or trails. It's still not known how the "below cost" issue will affect this Forest or, if resolution of the issue reduces our ability to make commercial timber sales, whether other means will be provided that will help us do what is needed to manage vegetation for other purposes.

Visual Quality

Intertwined with the timber management/wildlife habitat issue and with recreational use of the Forest is the subject of visual quality. It's something we are vitally concerned with in everything we do since a large number of visitors and the mountainous terrain combine to place most of our actions in the public eye. Our landscape architects are routinely involved in project design and often use computer modeling to analyze visual effects.

Timber harvesting has the potential for creating significant visual impacts. The more intensive the practice, the greater the impact potential. Clearcutting is an intensive timber harvesting practice used to create regeneration age (0-10 years old) vegetative classes for wildlife habitat. Our wildlife strategy calls for about ten percent of the land on which even-aged timber management is permissible to be in the 0-10 year class. There are a few areas on the Forest where we are approaching this goal. We looked at some of them and were concerned with the overall visual impact resulting from both the extent and design of the harvest units. The result is the cumulative visual impact study we are doing in cooperation with the State University of New York. We expect to see some results from the study in the fall of 1994.

Recreation and Wilderness

This continues to be one of the most heavily used national forests in the system in both developed and dispersed types of recreational activities.

In April I signed the Record of Decision authorizing expansion of the Loon Mountain Ski Area. The environmental impact statement for this project had been in preparation for several years. My decision has been appealed to the Regional Forester and his ruling is due soon. Feelings have run high on both sides of the issue, some believing that no more National Forest System land should be used for downhill ski area development and some feeling it is one of the best uses for those lands. We continue to believe that the Forest Plan properly treats downhill skiing as a legitimate part of the spectrum of recreational opportunities provided by the National Forest and that cooperation with private industry is an effective means of doing so.

National Forest campgrounds are heavily used and late-arriving visitors often find a "no vacancy" sign. Budget limitations and heavy use of existing sites have caused us to focus on maintenance and reconstruction at those sites rather than on the new construction discussed in the Forest Plan. Increases in the trail maintenance budget have allowed us to do a good bit of that much needed work in the past few years. The work done by our many cooperating trail clubs and volunteer workers has been important in providing a quality hiking experience.

Addition of the 12,000-acre Caribou-Speckled Wilderness in 1990 raised the total amount of Congressionally designated wilderness on the Forest to 114,932 acres. Wilderness implementation schedules have been completed for each Wilderness.

Transportation System

There was significant public concern during preparation of the Plan that too many roads were being constructed, that the roads were being built at too high a standard and that more roads would be opened to for public vehicular use. Road construction mileage was reduced by one half in the plan and the construction standards were clarified. We have constructed less than half of the miles planned for the first six years of the plan and have kept within the planned standards. There are also fewer miles of road open to public use by conventional motor vehicles now than there were when the Plan was adopted.

Water

The watersheds of the Forest continue to provide high quality water. Water quality data has been collected at selected streams for 3-10 years or more, depending on the site. The monitored streams are in municipal watersheds where there is timber harvesting, roads and recreation use and at alpine ski areas. The conditions and uses at those places are representative of the Forest and we believe the results of monitoring there are valid Forest-wide. The key to maintaining good water quality is in careful design, layout, and administration of projects. We are fortunate to have the results of many years of study at the Hubbard Brook Experimental Forest, which is part of the White Mountain National Forest, to guide our estimation of project impacts and to help determine and implement effective mitigation measures.

Soil

The soil scientist's report focuses on ongoing research about the impacts of timber harvesting on long term soil productivity and practices we employ to incorporate the results of that research. As is true with any consumptive use of natural resources, be it coal, oil, metals, or water, the harvest and removal of wood products from the forest will result in some on-site depletion of those resources. In terms of long-term soil productivity, a major concern is nutrient depletion. Timber harvest results in nutrient depletion both directly through removal of wood products from the site and indirectly through the effects of the harvest activity. The amount of depletion varies by nutrient and depends on many factors including the amount, method, timing, and frequency of tree removal as well as on the physical characteristics of the site. The amount of nutrient replenishment which occurs from parent sources through natural means also varies by site and by nutrient.

The short-term (some hundreds of years) productivity of the soil does not appear to have been significantly diminished as evidenced by vigorous forest re-growth following earlier harvests and the plentiful regeneration after modern-day harvests. Most of our tree species are harvested at ages between 90 and 120 years. The number of such harvest cycles we can anticipate without witnessing the effects of nutrient depletion is still unknown and will depend on the evolution of natural and human events within the forest and on a far broader scale.

Forest Health

In spite of localized problems over the last decade or so, the health of the trees on the Forest is good. The problems include "winter injury" (frozen foliage), normally at the higher elevations, and sporadic outbreaks of defoliating insects, primarily the gypsy moth. "Winter injury" does not

normally result in significant mortality although the considerable "dieback" of high elevation spruce in the 1960's may have been due to this problem. The gypsy moth resulted in some severe injury to oak during the 1989-91 outbreak but actual mortality was quite low. The moth also defoliated areas of the northern hardwood type ranging from 20 to 500 acres in size during 1993 but no serious consequences are anticipated from this.

Budget

Our Forest budget over the past few years has generally totaled about 60 percent of our estimated cost of full forest plan implementation. In addition, the "mix" of dollars we receive seldom coincides with any of our proposed budgets. For example, we will often receive funding for recreation that approximates one of our alternatives and funding for wildlife or timber that approximates another alternative. In other words, the "mix" doesn't always provide for the balance we had hoped for among resource management areas.

Based on current events at the national level, it looks as if our budget will continue to shrink but it is too early to tell what the effect of that will be on specific resource management areas or our ability to implement the Forest Plan in general.

Conclusions

The conditions on the lands covered by the Forest's Land and Resource Management Plan appear to me to have changed little since the Plan was approved. The physical and biological components of the environment remain much as they were described in the environmental impact statement for the Plan with only such relatively few changes as we have been able to make in moving the condition of some resources and facilities toward that which the Plan identified as the desired future condition. Water quality remains good and there have been no pathological, insect, or other factors that have significantly changed the vegetative picture. The population of large animals seems to be increasing somewhat but we are concerned with the possible decline in some bird species due, we believe, to a continuing loss in young and regeneration age classes of forest in the area. A better idea of the actual population trends for these species, and for many other species of plant and animal life, will come as more data is accumulated for a longer period through our monitoring efforts.

The Forest gained many more neighbors during the real estate boom of the late eighties but much of this was of a seasonal type with the resident's leisure time focused on particular recreational opportunities such as skiing. The major effect of this changing residential neighborhood has been to increase the visual sensitivity of some of our projects, something we have been able to take into consideration in project design.

As I mentioned early in my narrative, there is wide and increasing interest in the concepts of ecosystem management, a principle which we believe is well addressed in the existing plan although subject to change as our monitoring efforts continue. The growing question, though, is the "place" of the Forest in a wider landscape. Questions of the Forest's role in rural development are being asked both within and outside of government. We have been talking with our counterparts in the States and with representatives from large industrial forest land ownerships about the values and roles of our respective areas and what we might do on a coordinated basis to better the total ecosystems of the states and, possibly New England itself.

The Forest Plan determined that the demand for timber products was such that the market would continue to absorb a supply from the Forest up to our full allowable sale quantity and that continues to be the case. Most of our transportation system is used for support of vegetative management and we have been able to satisfy this need within the framework of the existing Plan. The public's acceptance of the visual impacts of vegetative management is the subject of a current study.

Use at existing alpine ski areas on the Forest already exceeds the demand projected during forest planning. The increased use over that which occurred at the time of the Plan has been accommodated within the existing ski areas. The Plan already provides for the possibility of expansion adjacent to those areas, such as that at Loon Mountain, to accommodate additional needs. I believe the present Plan direction is sufficient, for now, to address the apparent increase in demand over that projected in 1986.

Use at existing developed recreation sites has not grown to the level projected in the Plan since we have not yet constructed additional sites to meet that demand. Judging from the rate of occupancy in our present sites and the number of times we have had to turn campers away because of there being no room, the demand for additional sites remains. I believe the current direction in the Plan remains valid and that additional capacity should be constructed when our budget permits.

The Plan acknowledges the importance of the White Mountain National Forest for dispersed recreation opportunities, including wilderness, and the Forest remains heavily used in that respect. In a later section of the report we discuss the need to develop better means for estimating use, user satisfaction, and impacts so as to be more able to determine any needed changes in management.

The demand for water from the National Forest for municipal supply purposes continues as described in the Plan and water quality continues to

be suitable for that use. Alpine ski areas are relying increasingly on snowmaking to provide a quality skiing experience and this places additional demands on water quantity. As in consideration of the expansion at Loon Mountain we will continue to work with other agencies having jurisdiction in this matter to assure adequate protection of other users and resources. This issue can be addressed within the scope of the existing Plan.

The forest planning regulations (36 CFR 219.10(g)) require that I periodically determine whether there have been any significant changes in public demands or in the condition of the lands covered by the forest plan. I've done so here and overall, I believe the demands and conditions on the Forest are much as the Forest Plan projected they would be (the Plan, page II-10) and, with the possible exception of a few non-significant amendments, that the Plan continues to provide adequate direction for management of the White Mountain National Forest. Any problems we have had are not due to inadequacies in the Plan but, rather, to the resources available for its implementation. As I mentioned earlier, I would be very interested in hearing your thoughts on anything touched on in this report. We'll be continuing to monitor the Plan and talking to many people about the results and about new developments in natural resource management. Your thoughts will help us in this work.

Rick D. Cables
Forest Supervisor

Recreation and Wilderness Programs

By
Fred Kacprzynski - Developed Recreation Program Leader
Carl Gebhardt - Dispersed Recreation Program Leader
Gary Davis - Recreation Planner

The White Mountain National Forest offers a wide spectrum of recreation opportunities, from wilderness and backpacking to roadside camping and downhill skiing at winter resorts.

The Forest annually hosts millions of visitors. Some only stop at overlooks along highways while others enjoy extended stays at one of the 20 campgrounds. Many visitors stay in local communities while visiting the Forest for sightseeing, hiking or skiing.

The monitoring information about the different recreation uses is described in detail in the sections below. In general, it shows that there has been a considerable increase in recreation use since 1986. Popular trailhead parking lots are often full with parking overflowing to the roadsides during high use periods. Developed campgrounds are filling up sooner in the week, and alpine ski areas are experiencing greater numbers of sell-out days. Overall, the Forest is heavily used for recreation purposes during all seasons of the year.

Traditional kinds and patterns of use as identified in the Forest Plan continue. Developed recreation takes place in distinct areas such as campgrounds, picnic areas, and downhill ski areas. Dispersed recreation occurs outside of the developed recreation sites including activities such as hiking, backpacking, snowmobiling, hunting, fishing, cross country skiing, and driving for pleasure.

The Forest Plan lists several recreation goals. These are:

1. Feature quality recreation opportunities not likely to be provided elsewhere on other lands

2. Recognize the demand for and importance of day-use areas and driving for pleasure as part of the Forests total recreation opportunity spectrum

3. Recognize the need for the Forest user to bear a share of management costs through continued use of volunteer programs, payment for services, cooperative agreements, and voluntary contributions and donations.

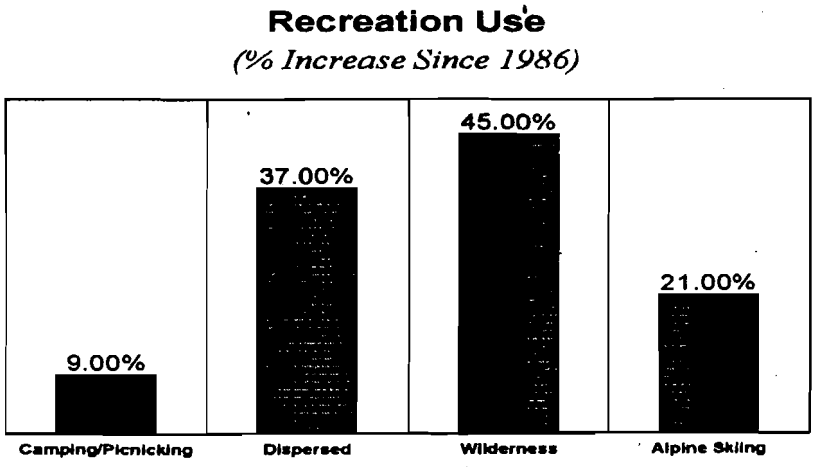
Progress toward meeting these goals is monitored in several ways. These are discussed below.

Recreation Use

Recreation use has been increasing in the White Mountain Region for all forms of recreation. The State of New Hampshire and associated tourism groups have been successful in marketing NH to out of state visitors. Studies commissioned by the NH Department of Travel and Tourism show more visitors who are staying for shorter periods (day and weekend visits). Foreign visits are increasing.

Staff observations of all aspects of recreation use on the Forest indicates increases in the numbers of visitors at all seasons. While the accuracy of our use figures for dispersed recreation needs improvement, the growth observed is consistent with the projections and use figures provided by the State.

Monitoring recreation use in most developed areas is relatively easy, but measuring dispersed recreation use along trails and in wilderness is less accurate. We do make extensive use of trail counters and are developing sampling protocols to gain more accurate data, particularly for areas stressed by heavy use.



The recreation use shown is based on Recreation Visitor Days. One Recreation Visitor Day is equal to one person spending 12 hours or equivalent combination of people and hours spent on the Forest engaged in a recreation activity.

The use of developed sites shows a moderate increase as compared to other uses (9 percent). This is probably due to limited availability of campground sites during high use periods of the summer and fall. Dispersed use shows an increase of 37 percent above 1986 figures.

The alpine ski areas (Loon Mountain, Waterville Valley, Wildcat and Attitash) have shown an increase in use of 21 percent. Mittersill and Evergreen Valley are no longer in operation. The Loon Mountain ski area expansion proposal has been the most controversial project studied since the Forest Plan. The decision to allow expansion will increase the capacity of the area by 3,200 skiers per day. The Record of Decision for the expansion was signed in April 1993 and the decision is currently under appeal.

The 45 percent increase in the use of Wilderness is partly the result of the designation of the Caribou-Speckled Wilderness which increased the Wilderness acreage on the Forest by 12 percent. Wilderness areas such as the Great Gulf and the Pemigewasset have extremely heavy use.

Recreation Fees

Total recreation receipts in FY 92 were $834,000 - a 132 percent increase since the Forest Plan was approved in 1986. Fees for use of national forest campgrounds was $534,000 which represents 64 percent of total receipts. Fees from ski area permits include a minor amount of other recreation fees such as Outfitter and Guide Permits.

Dollars

	1986	1987	1988	1989	1990	1991	1992
Campgrounds	302,000	263,000	330,000	374,000	448,000	565,000	534,000
Ski areas and other rec permits	328,000	432,000	564,000	480,000	484,000	429,000	300,000
Totals	630,000	695,000	894,000	854,000	932,000	984,000	834,000

These figures are payments received in a specific fiscal year. This is different from the amount billed & contributes to some of the variation from year to year.

Developed Recreation Facilities

In general, the campgrounds and other developed sites on the Forest have been maintained in an attractive condition, but many display deterioration of steps, crib work, toilets, inadequate water or electrical systems, and poor accessibility. In many instances the initial design of the campsites and in particular, the size, shape and location of parking spurs, do not provide the flexibility expected by todays users. New campground campsites have not been been built as was proposed in the Plan. Some additional capacity has been provided as we restore the campsites and make changes to the campground layouts.

Monitoring of recreation site conditions is done as a routine part of operations and maintenance. A capital investment inventory is maintained which lists heavy maintenance and restoration needs. This backlog includes over one hundred projects. It includes work that is needed at Campton and Waterville Valley Campgrounds, Glen Ellis Falls, several sites on the Kancamagus Scenic Byway, and Russel Pond Campground. Also included in the inventory is expansion of two existing campgrounds, group campground construction, and additional toilet improvements.

Some progress has been made in reducing the backlog of recreation site restoration including White Ledge, Sugarloaf II, Big Rock, Wildwood, Russel Pond, and Wild River Campgrounds as well as Beaver Brook Wayside and Albany Covered Bridge. In addition, toilets have been replaced. Other work has been done to prevent further deterioration of sites or to eliminate safety problems.

Backcountry Facilities

Since the mid 1980's, accomplishments have been in rehabilitation, reconstruction, or construction of approximately 24 trailhead parking lots across the Forest. Most provide parking for 12-18 vehicles with some larger ones such as the Great Gulf, Ammonoosuc Ravine, Livermore, and Crawford Path. Headway has been made in addressing the backlog of Dispersed Recreation Facilities improvements such as reconstruction of cabins and shelters by both the Forest Service and cooperators who manage these structures under special use permit.

Remaining work includes improving several more trailheads, removal of eight shelters, rehabilitation at 20 existing shelters, and completing rehabilitation/construction of several backcountry campsites.

Trails

The Forest Plan requires annual monitoring of trails and dispersed recreation sites to determine whether they are being maintained to Forest Plan standards.

Trail Logs: Trail condition monitoring, which is generally done during Spring and early Summer, determines the effectiveness of previous work, whether or not the trail is being maintained to standard and where more restoration work is needed. The trail logs include an inventory of trail conditions and describe the location and prescription for specific maintenance tasks. The log is translated into work projects for Forest Service and volunteer trail crews.

Code-A-Site: Backcountry campsites are inventoried using the Code-a-site system. This requires recording data such as amount of exposed or compacted soil, extent of the impacted area, and changes in vegetation. Site conditions are also documented with photographs. The camp sites are subsequently revisited and monitored to determine if site conditions have changed over time. Unacceptable changes of site conditions may trigger corrective actions ranging from restoration to closure.

Limits of Acceptable Change: The Limits of Acceptable Change (LAC) monitoring system is being implemented in the Sandwich Range, Great Gulf, Pemigewasset and Caribou-Speckled Wildernesses and may be implemented in other dispersed areas. LAC will establish and monitor acceptable levels of biological change and whether visitors are experiencing the expected level of solitude or contact with others. This system uses much of the same information collected by Code-a-site; however, acceptable limits are determined through public involvement and Recreation Opportunity Spectrum (ROS) class standards.

The following table displays miles of trail that were monitored for trail condition and subsequently maintained during fiscal year 1993. Most trails receive different kinds of use during different seasons. Trail miles are listed below according to their primary use. Each mile of trail receives a minimum level of maintenance (i.e., providing drainage and cleaning of water bars as needed to prevent soil erosion).

	Trail Miles		
	Hiking	XC Skiing[2/]	Bicycling
Trail System (total)	981	174	22
Trail Condition Monitoring	783	174	7
Maintained Annually			
Maintained by WMNF	533[1/]	75	8
Maintained by Cooperator	531	61	7

[1/] Many miles of trail are maintained by both the Trail Adopter and the Forest Service during the field work season. Trail adopters often accomplish the brushing of trail vegetation, sign maintenance, cleaning of water bars, etc., whereas seasonal work crews may complete the rock work and bridge and water bar construction requiring larger crews and more time. The Forest Service does the heavier maintenance on approximately 133 miles of adopted trails.

[2/] This includes 81 miles of cross country ski trail administered under special use permit. Trail maintenance is performed by the permittee.

Trail Conditions

The results of trail condition monitoring are shown in the table below. The trails were rated as to their overall condition for a specific activity. The type of trail means the primary activity for which the trail is used and maintained.

Type of Trail	# of Trails	# of Miles	Trail Condition (percent) Good	Fair	Poor	Uninventoried
Hiking	395	981	56	23	21	-
Equestrian	2	3	100	-	-	-
Mountain Bicycle	4	22	63	20	-	17
Cross Country Skiing	39	174	66	14	-	20
Snowmobile	44	259	46	54	-	-
Interpretive	6	5	34	26	-	40
Barrier Free	2	1	100	-	-	-
National Trails	5	90	52	42	6	-

Source: 1991 RIM data

Fifty-six percent of the hiking trails are in good condition. Although the trails with lower ratings do receive the annual minimum maintenance (i.e., water bar maintenance and clearing), most of these trails are in need of further resource protection work (i.e., water bars, steps and elimination of wet areas).

Cooperators and many individual trail adopters maintain approximately 531 miles of hiking trails, 61 miles of cross country ski trails and 7 miles of bicycling trails on the Forest.

Although most volunteer trail work is accomplished by individual clubs and small crews throughout the work season, there is an enormous amount of work accomplished during special events such as White Mountain Trails Day.

In addition to the trails described above the Forest Service has taken responsibility for the Appalachian Trail and corridor lands acquired by the National Park Service in New Hampshire. This amounts to 8,300 acres of land and 45 miles of trails. The Forest is working with the Appalachian Trail Conference and the cooperator clubs to inventory the Trail's condition and to include the entire New Hampshire corridor in the Forest Plan direction.

Accessible Recreation

The objective of planning universal access into the design of Forest Service facilities is to allow a greater ease and efficiency of use for all vistors. The developed recreation sites as well as facilities under Special Use permits (e.g., ski areas) on the Forest have been evaluated for accessibility for people with disabilities. Results of the survey work identify those improvements that need to be made to assure fully accessible sites. Replacement of approximately 50 toilets with an accessible design has solved one of the major access problems. Recent rehabilitation/construction work at Albany Covered Bridge, Beaver Brook Wayside, and Wild River Campground provide for completely accessible facilities. Universal access has been incorporated in the design work for Russel Pond Campground and the conceptual plans for the Kancamagus Scenic Byway improvements. Full accessibility for all developed recreation sites will depend on how quickly the overall restoration needs outlined under developed recreation can be completed.

Some trails have been identified that have the potential to provide universal access. One such trail, for example, is the South Pond trail on the Androscoggin District. Reconstruction of this lakeside trail in 1991 significantly improved access to the extent that people with disabilities can enjoy the viewing and fishing opportunities available.

Wilderness

The National Forest has five Congressionally designated Wildernesses totalling 114,932 acres. The Forest Plan provides overall direction for their management, including the direction to complete Wilderness Plans and Implementation Schedules.

Wilderness	Year Designated	Acres	Year Plan Completed
Great Gulf	1964	5,552	1986
Presidential/ Dry River	1979	20,380	1993
Pemigewasset	1984	45,00	1989
Sandwich Range	1984	25,00	1989
Presidential/ Dry River Addition	1984	7,000	1993
Caribou-Speckled Mountain	1990	12,000	1993

The monitoring objective in Wilderness is to compare use, facilities and the degree of Forest Service presence to the wilderness experience being sought.

Wilderness Plans: Individual Wilderness Plans address the desired wilderness experience, levels of use, and Forest Service presence, as well as the actions and projects needed to achieve these objectives. All Wilderness plans, including the projects proposed in them, are consistent with Forest Plan standards and guidelines for management area 5.1 (Wilderness) and the Forest's Wilderness management framework which was developed in 1988. To date, all actions such as trail improvements, signing, removal of structures and administrative controls, have been consistent with the Forest Plan standards and guidelines.

Wilderness Rangers: There is an effort to provide Wilderness information outside Wilderness boundaries, before hikers begin their trip, in order to encourage good planning and wise use of Wilderness resources. The use of Wilderness Rangers to accomplish this work has been inconsistent since implementation of the Forest Plan. FY 92 was the only year staffing objectives were achieved.

Wilderness Use: Wilderness use information is collected through use of trail counters and an extensive network of registers located at portals including the Lincoln Woods Visitor Center. The use of Wilderness has increased 45 percent since 1986. This increase is partly due to the addition of the Caribou-Speckled Wilderness which accounts for a 12 percent increase in wilderness acreage. The Great Gulf and portions of the Pemigewassett Wilderness receive extremely heavy use.

Campsites and Non-conforming Structures: Eleven designated campsites and several other dispersed sites within the Great Gulf Wilderness have been monitored since 1990. Photo points and site condition reports were used to implement the initial phases of a Limits of Acceptable Change system (LAC). The Six Husbands campsite was closed in 1993 due to site deterioration and sanitation concerns. Other sites are being evaluated annually.

The Presidential Range/Dry River Wilderness is in its second year of campsite evaluations. Several campsites have been obliterated and others rehabilitated . This is an ongoing effort and an integral part of the LAC process.

Dispersed sites and non-conforming structures in the Pemigewasset Wilderness were inventoried by Lyndon State College students in 1993, using Global Positioning System equipment. Pictures of each structure were taken and a notebook was developed with specific information on each site. Severely impacted campsites within the wilderness are being obliterated. Follow-up monitoring of these sites is done to ensure that the campsites do not reappear.

Recreation Opportunities

The Forest Plan includes Management Area (MA) assignments for the land and a corresponding system (Recreation Opportunity Spectrum) for defining the appropriate recreation activities and experiences that a person would find when using that MA. An objective of recreation monitoring is to determine whether or not the Forest is providing the conditions appropriate for recreation activities within each MA.

All recreation projects planned for implementation are examined to insure they are consistent with the Forest Plan. Public involvement is included to insure that participants have a chance to comment on their particular recreation activity and how it will be managed.

The following statements relate to recreation opportunities and come from analysis of a variety of sources including accomplishments over the past 7 years. Most of these observations deal with public concerns identified in the Forest Plan. The management actions described relate to protecting the recreation experience.

Developed Recreation

* All developed facilities are consistent in providing facilities and opportunities in accord with the management area within which they lie.

* A large diversity of opportunities for people with disabilities are now available or have been identified at most developed sites.

* There is a need to define the range of developed campground experiences the Forest Service might provide from highly developed (flush toilets and showers) to primitive (walk in tent sites only) and provide a range of facilities that will best meet diverse public needs.

* Campgrounds and picnic areas are heavily used. The facilities fill a need not available at other locations providing a more undeveloped and natural environment than most other similar opportunities outside the National Forest.

Dispersed Recreation

* The Forest continues to provide the major opportunity for hiking, solitude, and remote activities in New England.

* Conflicts between winter users (snowmobilers, skiers, loggers, snowshoers) have been reduced through MA allocation, trail corridor improvements and administration of projects.

* A mountain biking trail network is being developed and advertised thus reducing hiker/biker conflicts.

* Road construction has been reduced. Where roads do exist they are gated with vehicle access allowed only for specific purposes and time periods such as for hunter access.

* Since completion of the Forest Plan, substantial increases in trail reconstruction has taken place. Resource protection has been greatly improved.

* The mileage and quality of crosscountry ski trails has increased. The majority of these winter trails have been constructed and maintained by recreation service partners.

Motorized Use

* The National Forest has not identified any areas for summer off road vehicles. Unauthorized use, mostly by all terrain vehicles and dirt bikes is localized and not serious.

* The use of snowmobiles is confined to designated trail corridors identified in the Plan. The trail mileage has been expanded . The quality of the corridors has been improved with numerous bridges and trail improvements. Most work has been shared between the snowmobile clubs, State of NH and the Forest Service. Trail grooming continues to be done by the snowmobile clubs. Conflicts with others users have been reduced.

Wildcat National Scenic and Recreation River

by

Carl Gebhardt, Recreation Program Leader

In October 1988, Congress passed legislation designating segments of the Wildcat River and its tributaries as components of the Wild and Scenic Rivers system. The WMNF has a role in monitoring the values for which the river was designated. The function of the Wildcat River Advisory Commission, which was established by legislation, is to monitor the current condition of the river, including its water quality and meandering behavior and to work with the Town of Jackson to monitor and evaluate structural development. The ongoing monitoring programs and their results are described below.

Water Quality Monitoring

Samples from seven test sites are taken once a month from spring break-up to fall freeze-up until a sufficient baseline is established, and then quarterly thereafter, unless the fecal coliform bacteria count is high. Samples are analyzed for color, pH, alkalinity, acidity, turbidity, conductivity (a relative measure of dissolved ions like road salts, sulfates, etc.), and fecal coliform bacteria count (from animal or human waste).

Preliminary results from May through July 1992 showed no unusual conditions, except for moderately high conductivity and coliform counts in Great Brook. The high conductivity in Great Brook was traced to a road salt storage area and resulted in the storage area being moved to another location. The coliform occurrence is being evaluated to determine its origin. The bed of Great Brook appears to be moderately impacted by sediment from road encroachment on the stream.

Nonpoint pollution, primarily sediment, is probably the greatest threat to water quality in the Wildcat River watershed. A turbidometer was installed for a citizens' monitoring program to measure stream turbidity, especially during summer rainstorms.

Fisheries Inventory

Forest Service biologists have inventoried fish habitat conditions on the Wildcat. The data is being analyzed and will be used to establish a baseline from which to monitor change and help develop projects for enhancing the quality of the environment in and along the stream.

Lower River Profile

At the recommendation of the Commission, the Forest Service contracted with the University of New Hampshire to perform a river profile of the lower 8 miles of river. The profile will help us understand the movement of the stream course and its potential impact on existing streambanks and facilities, and to help learn how to protect the river's natural, free-flowing qualities.

Field Reviews

Commission members led a field trip to Carter Notch. This monitoring effort identified four problem areas: (a) erosion at the Bogbrook trailhead; (b) two river crossings that need relocation, owing to their impassability during high water; (c) severe washouts along a 100-yard section above the Forest Service road; and (d) high-use campsites along the river. These problem areas have been improved through projects completed by the WMNF during summer 1992.

A second field trip focused on timber harvest practices and road construction and restoration in the Wildcat River watershed. The Commissioners visited harvest areas and evaluated the effects of even-age management on water quality and scenery. Timber access roads also were inspected to assure the roads were constructed, stabilized and later vegetated according to Forest Plan standards.

Cultural and Heritage Resources

by

Karl Roenke, Heritage Resource Program Leader

The Forest Plan states that cultural resources be identified, through cultural resource reconnaissance surveys, prior to any earth disturbing activity and that they be protected through avoidance, enhancement, or mitigation. The following table shows yearly accomplishments in Cultural Resource surveys.

YEAR	AREA SURVEYED (AC.)	# CR PROJECT REPORTS
1987	14,861	20
1988	9,990	17
1989	7,052	10
1990	3,736	27
1991	8,532	24
1992	5,799	43
1993	3,378	28 *

(* for three quarters of the year)

Cultural resource surveys are being conducted on all earth disturbing activities. As depicted in the table, we are performing cultural surveys on more projects than in previous years due to more recreation site development and maintenance projects. To accommodate the increase in the number of project surveys, we have been concentrating only on the specific areas of proposed activity such as timber sale harvest units and road locations rather than entire timber sale areas. These changes have resulted in a pronounced reduction in the number of acres inventoried through time. Most of the work is preformed by District Archaeological Technicians (para-professionals). The Forest's cadre of para-professionals presently numbers four, down from the employment of seven in 1985.

The types of cultural sites located in these inventories include Native American sites, early day homestead and town sites, logging industry sites, hunting camps, Grand Hotel related sites, recreation sites from the early 1800's, and early Forest Service administrative sites. Our aim is to document an important part of New England land use history and use this information to help manage forest resources today and in the future.

Partnerships are used to accomplish Cultural Resource management. We currently work with the Institute for NH Studies, Plymouth State College and the Maine Historic Preservation Commission to survey National Forest

lands adjacent to ponds for prehistoric sites. Six sites were located in the 1993 field season. Another partnership with Plymouth State College is to survey the Little River Railroad, a 19th century logging railroad. This project is designed to develop an interpretive plan while offering college students the opportunity to work in historical archaeology as part of their course work in the "Heritage Studies Program."

A project to document cultural sites along the Appalachian National Scenic trail corridor has begun.

Additional accomplishments include historic structure rehabilitation and interpretive planning for the North Kearsarge Fire Tower, Fabyan Cabin, Black Mountain High Country Cabin, Jim Liberty High Country Cabin, and North Doublehead High Country Cabin. Three of these cabins are available for rent to the public.

In 1988, 2 years following adoption of the Forest Plan, an amendment was made to the Archeological Resources Protection Act. As a result, an amendment to the Forest Plan has been drafted that will better address the legal requirements for resource inventory, site evaluation, maintenance and interpretation for cultural resources.

Long Term Soil Productivity

by

Steve Fay, Forest Planner/Soil Scientist

The Forest Plan provides for the protection of the soil resource. It does so through a combination of standards, guidelines and management area assignment. The monitoring section of the Plan directs that we will "document significant changes in the productivity of the land" by "keeping abreast of research results at the Hubbard Brook Experimental Forest, and ongoing forest management activities."

Soil nutrient depletion from timber harvest is a main concern with respect to permanent impairment of land productivity. Soil nutrients are lost from the forest by the removal of trees, especially the leaves and smaller branches. For some elements there is leaching even without harvest, apparently related to acid deposition.

Monitoring for nutrient depletion as a surrogate for long term productivity of the land is in two parts. First, there is regular communication with researchers at the Hubbard Brook Experimental Forest to keep abreast of research studies. Second, we keep track of our own practices, such as length of time since last clearcut harvest on the Forest, to make sure they are in concert with the research studies.

Research Results and Monitoring

Research by scientists at the Hubbard Brook Experimental Forest indicates forest harvesting, depending on method, frequency, timing and site could lead toward depletion of some elements in the soil. Losses at the time of harvest may range up to 1/2 to 5 percent varying by element. Over time, elements such as nitrogen accumulate because of atmospheric deposition, while others such as calcium continue to deplete. Potassium, phosphorus and magnesium losses are projected to be moderate, while losses of calcium is estimated to be the highest. Calcium is not considered a limiting factor for tree growth in eastern forests. While the research suggests depletion may be a concern in the future, there is not evidence at this point that forest productivity is affected. Restocking of forest stands after whole tree and clearcut harvests has been monitored for up to 20 years at some sites, and biomass accumulation and species composition do not appear unusual compared to reports in the literature about forest development. Research studies are continuing to evaluate the impacts of changes in total nutrient supply on that actually available to support forest productivity. New findings will be incorporated into our monitoring.

Research recommendations are to final clearcut harvest no more often than every 65 years because by this time in the growth of a forest nutrient availability, chemical and physical properties, and nutrient cycling processes have returned to pre-cutting conditions. Rotation lengths on this Forest are much longer than this other than for aspen as discussed in the next section on practices. It is also suggested to avoid soil conditions where the total nutrient capital may be limited at the outset (e.g., shallow to ledge). This, too, is discussed in the practices section.

This research highlights a concern about nutrient depletion in general, and recently, about whole tree harvesting. Whole tree harvest is a growing development on the Forest apparently related to the proximity of the Ammonoosuc and Pemigewasset Ranger Districts to wood-fired electric generation plants. Our best estimate is that 60-75 percent of the harvest volume this past year from these Districts is whole tree harvested.

Staff specialists have held field visits and discussions with researchers about whole tree harvesting. We visited actual harvest sites. The conclusion was that based on what is known about reliance on the minimum 65 year rotation length, especially since the majority of our rotation lengths are substantially longer, our practices are sufficient to protect soil productivity. We do need, however, to closely follow research as it becomes available. Field studies show that only about 10-20 percent of the limbs and tops are left in the harvest units when whole tree chipping is used. This is much less than a traditional clearcut. It was also apparent that mechanical shears used on some sites left the least amount of tree tops and limbs, probably because it lowers the trees more gently to the ground. Winter harvest appears to leave relatively more woody material than summer operations because the wood is more brittle and susceptible to breaking at the time of harvest. Winter harvest of hardwoods conserves the 10-20 percent of nutrients found in the foliage.

A study was begun in 1993 at five different forest sites in New England where it is believed previous land use, timber harvest and agriculture, may have had substantial nutrient impacts. The purpose of the work is to better establish the chemical status of heavily impacted sites. No results are yet available, but the hope is to provide better benchmarks against which to evaluate other existing information. This may provide a better context for the nutrient depletion discussions related to forest harvesting.

In summary, there are indications of nutrient depletion for some elements in forest soils attributable to timber harvesting. It is accelerated by acid deposition for some elements. However, there is also evidence that forest stands after harvest are adequately restocking and growing. Research results do not appear to warrant a change in practices related to nutrient depletion at this time.

Forest Practices and Monitoring

The second form of monitoring is to keep track of our own forest practices. In this case the questions are (a) Do we clearcut final harvest at 65 years, or later; (b) Do we select sites for the clearcut where the soils are deep, and not mainly a sand texture, or shallow to hardpan or ledge? (c) Do our timber stands adequately restock with new trees after harvest?

Rotation Length: In analyzing rotation length, our attention has been on the aspen forest type. Unlike other forest types with rotation lengths of 90 years (paper birch) to 120 years (northern hardwoods/spruce), the silvicultural rotation for aspen is 60 years. Therefore, it is unlikely that, other than through disease or windthrow, a forest would be clearcut before 65 years except in the case of aspen forests. Softwoods forests are managed primarily by uneven-aged methods, not clearcutting where the nutrient concern is greatest.

Review of the data base since 1986 for aspen stands harvested by clearcutting revealed five aspen stands clearcut harvest at age 70, or older. Discussion with District Foresters revealed a few aspen stands already harvested, and a few that are planned for harvest, but not yet cut. Some Districts have not harvested any aspen stands since 1986. This cross-check revealed a few stands may have been harvested in the vicinity 65 years. We have few pure aspen stands where the rotation age of 60 would be directly applied with a clearcut prescription. In the absence of large fires or blowdowns, aspen is usually in small patches that may be harvested by small groups, or it is intermingled in another forest type (e.g., northern hardwood) where harvest plans are driven by other species with longer rotation ages.

It is evident that very few stands are harvested at, or even near, 65 years. For this reason, we are well within the recommendations based on current research. The strategy in the Forest Plan appears adequate.

Soil Depth: The second monitoring question is when we practice clearcutting, or whole tree harvesting, do we avoid ledge, other shallow impervious soil layers, or sands, to provide an extra measure of concern for nutrient depletion. The idea is that shallowness, or sandiness, may mean a smaller nutrient capital in the soil.

We have not monitored harvest sites directly for this purpose. However, there are some systematic features of the Forest Plan, and its implementation, which address this concern. The assignment of Management Areas during Forest Planning used our ecological land typing to place shallow to ledge areas outside the places where harvesting is permitted. This is supplemented when specific sites are reviewed for possible

harvest activity. We have recently assigned tentative uneven or even-aged management prescriptions to forest stands based on our ecological land classification. The result is that clearcutting, especially for aspen regeneration, is mainly featured on deep, well-drained soils without shallow impervious layers. Softwood forest sites with very sandy soils are identified for unevenage management, and hardwood forest stands on shallow to hardpan soils are primarily also unevenage management. When forest stands are visited in the field, these tentative assignments are confirmed, or altered, as necessary.

In sum, harvest methods are selected with nutrient depletion concerns in mind based on the best science known today. We rely on research findings at many sites to understand the impacts of these practices.

Restocking of Forest Stands: Natural biological regulation of soil nutrients in areas that have been harvested begins when trees, and other vegetation such as raspberries, start to grow back. Our experience is that re-growth is very rapid and we can successfully rely on natural regeneration rather than planting. On the rare occasions when we replant an area, it is done to promote a specific species, such as white pine, and not because of concerns over nutrient depletion.

In 1989-1992 stocking surveys of regeneration-age stands showed 88-93 percent average total stocking across the Forest. This means there was excellent cover with seedlings 3 years after a timber stand was clearcut. The importance of these results is that it indicates success at reinitiating the biological processes that conserve, and rebuild, nutrient levels in the soil after harvesting.

Conclusion

Soil management practices used in road construction and ski area management are described in detail in the water quality part of this monitoring report. Measurement of stream turbidity over many years in both municipal watersheds and at alpine ski areas indicates a very low incidence of sediment delivery to the streams. This indicates that soil erosion is relatively minor. We believe this is due to the relatively deep, well-drained soils where percolation rates tend to be very high and soil protection practices that are adhered to on timber harvest and construction projects.

Water Quality

by
Joan Carlson, Air and Water Program Leader
Steve Fay, Forest Planner/Soil Scientist

The Forest Plan sets out standards, guidelines and direction to protect both soil and water resources. These reflect the longstanding importance of water quality, and a history of experience at applying these kinds of practices.

Impacts on water quality from timber harvesting, and associated roads, is a continuing concern to the Forest. The same is true for alpine ski areas. We also are concerned with human impacts from recreational use. The monitoring item in the Forest Plan seeks to document significant changes in water quality aimed at detecting any trend of declining water quality conditions, or exceeding important criteria for maintaining instream values or beneficial uses.

Water quality data has been collected for 3-10 years or more, dependent on the site. The emphasis has been on municipal watersheds and ski areas. Of the 14 municipal watersheds on the Forest, those where sampling occurs include the towns of Littleton, Twin Mountain, Berlin, and Lancaster, New Hampshire. The alpine ski areas include Wildcat, Waterville, and Loon Mountain. Sample frequency varies by site, and ranges from monthly to quarterly. For alpine ski areas there is an effort to focus sampling on periods of heavy recreational use. All the data is recorded, some is computerized, and ultimately all will be in a computer data base for selective analysis.

Municipal Watersheds

Summarized below are the monitoring efforts within three municipal watersheds: Littleton, Twin Mountain, and Lancaster, NH. For this report we have focused on turbidity and fecal coliform because these parameters are relevant to our obligations toward municipal watersheds. Other stream parameters are monitored as well (e.g., conductivity, alkalinity, pH, etc). All three watersheds have soil and stream characteristics common to the Forest as a whole. Timber management and recreational use are consistent with direction, standards, and guidelines in the Forest Plan. There are no unusual circumstances.

The sampling site for the Town of Littleton municipal water supply is on the North Branch of the Gale River. The watershed is 9,564 acres. During the past 10 years there was a total of 496 acres of timber harvest of which 88 acres were clearcut, or less than 1 percent of the watershed. The remainder

were thinnings or selective harvests. The Forest Plan standard/guidelines allows up to 25 percent of a 1000 acre, or larger, watershed to be clearcut in a 10 year period. There are 6.0 miles of permanent (system) road and approximately 1.0 mile of temporary road. Some camping occurs on the roadside, and there is heavy traffic into the 20 car parking lot serving Galehead Hut and the Appalachian Trail.

From 1986-1993 there were 32 separate turbidity measurements taken, and of these only one was in excess of 5 NTU's (a value reflecting water clarity) which is a threshold value for municipalities using surface water sources. It was in the spring of the year, and according to field notes the weather was rainy. Turbidity is not uncommon during storms. During the same period, 10 out of 24 samples of fecal coliform showed some evidence of occurrence. The source may have been human, or other warm-blooded animals.

The sampling site for the Town of Twin Mountain municipal water supply is on the Little River. The watershed is 5,900 acres. During the past 10 years there was one timber sale in this watershed where a total of 139 acres were harvested and 85 acres, or less than one percent of the watershed, was clearcut. There is slightly more than 1 mile of permanent (system) road and about a tenth mile of temporary road. Roadside camping occurs occasionally along the Haystack Road, and there is light use of a parking lot for hiking trail access. From 1986-1993 there were 27 separate turbidity measurements of which none surpassed the threshold value for municipalities of 5 NTU's. Fecal coliform was found in 7 out of 18 samples during the same period.

The sampling site for the Town of Lancaster municipal water supply is on Garland Brook. The municipal watershed is 6,779 acres. During the past 10 years there has been a total of 333 acres, or 4.9 percent, of the area affected by timber harvest, and all of it has been on private land using a shelterwood-like method. There are two roads on private land on either side of Garland Brook which together are probably 2 miles in length. Recreational use in the watershed is light, mainly hunting, and some cross-country skiing and hiking. There are some camps in the watershed of which one was recently constructed.

From 1986-1993 there were 54 separate turbidity measurements taken, and of these only two surpassed the threshold value of 5 NTU. For the same period fecal coliform sample reported 9 out of 22 samples had some contamination.

These turbidity results appear, in general, to be in concert with the findings of more intensive study at Hubbard Brook Experimental Forest. For example, 301 samples in a watershed with progressive strip cuts resulted in 13 samples greater than 5 NTU's. Block clearcuts in a watershed where 140

samples were taken resulted in five instances greater than 5 NTU's. Both areas had typical harvest with rubber-tired skidder, though in neither case were there truck roads in the watersheds. A nearby control watershed had no turbidity measures greater than the threshold for the period of study.

Using the above data, there does not appear to be any trend toward declining water quality. Turbidity values are low, and higher values are infrequent. While the source of the higher values is unknown, it is known that natural events (storms) themselves often cause high values because of natural streambank erosion or natural debris dams breaking apart at high flows. It is also known that poor forestry practices, especially related to roads, can cause very high values for turbidity when standards and guidelines are not applied.

Successful protection of water quality originates from careful use of standards and guidelines developed either through research, or long experience on the ground. In this respect, it is useful to at least briefly report the kind of effort made at administration of timber sales when the soil disturbing activities actually take place. While no year, or Ranger District, is necessarily typical, in 1993 one District sale administrator spent about 80 days inspecting for soil, water and other purposes during the removal of 3 million board feet of timber. In the same year another District spent about 100 days on-the-ground primarily for soil and water protection administering the harvest of 9 million board feet of timber harvest on 14 separate sales. Nine million board feet would affect about 1500-1800 acres of land. Inspection reports, mainly recording problem areas and their solution, are on file at District Offices for most sales. Post harvest inspections are generally made to confirm successful revegetation of temporary roads, or landings, though no permanent record is necessarily kept. These activities are over and above the original time spent by interdisciplinary teams, and others, designing and planning projects in keeping with the Forest Plan.

Alpine Ski Areas

Turbidity monitoring has been conducted at three ski areas over the past 7 years. Turbidity is a concern because it indicates potential erosion problems associated with construction and maintenance of ski runs, base facilities and roads.

Mt. Attitash: This ski area operation is private land except for about the top one-quarter of the mountain. No routine water quality monitoring occurs at this ski area.

Loon Mountain: This ski area operation is National Forest land except about the bottom one-quarter. Water quality monitoring occurred at three points

along the East Branch Pemigewasset River near Loon Mountain Ski Area in 1988-1990 to gather background baseline data for the South Mountain Expansion Project. All 23 turbidity samples taken during this three year period were at less than 1 NTU. Future water quality monitoring will be conducted in the East Branch Pemigewasset River and Loon Pond by the Ski Area as a condition of their special use permit. Details of the water monitoring plan are contained in Appendix G - Water Resources Mitigation Plan of the Final Environmental Impact Statement for the South Mountain Expansion Project.

Waterville Valley: This ski area operation is entirely on National Forest lands. Water quality monitoring has been conducted by the Forest at nine monitoring stations established near the ski area: two are upstream of the ski area on the West and East Branches of the Mad River, two are on streams that directly drain the ski area (Tecumseh Brook and West Branch Mad River below Tecumseh Brook), two are on tributary streams to the Mad River in Waterville Valley (Campground Brook and Snows Brook) and the remaining three are on the main stem of the Mad River downstream of the ski area. Water samples have been taken four times per year since 1986 with an effort to sample during high recreational use periods.

Of the 215 samples analyzed for turbidity, only five samples had turbidity of greater than 5 NTU. These samples were all taken the same day (April 21, 1992) and the field notes indicate "warm weather with a mixture of clouds and sun and high stream flows," probably a good snowmelt day. The turbidity at Tecumseh Brook that day was 15 NTU, which exceeds the State DES standard for Class B watersheds. The other four samples were taken from the Mad River downstream of Tecumseh Brook. While we don't know for certain the cause of the high turbidity, it may be that late in the season when there is rapid snowmelt into the snowmaking pond at the base, that it "stirs up" some sediment in the pond which is then released into Techmseh Brook.

Wildcat: This ski area operation is entirely on National Forest lands. Water quality monitoring has been conducted by the Forest at six sites on the Peabody River or tributaries near Wildcat Ski Area since 1987. Water samples are taken four times per year with an effort to sample during high use periods.

The vast majority of the water samples (102 of 114) had turbidity of less than 1 NTU. Only five samples had turbidity of greater than 5 NTU. These samples were taken on the same day (March 31, 1987). The field notes for that day state the weather was rain and wind.

The results of the water quality monitoring indicate that on only 2 of the 47

days in which water samples were taken near ski areas did the turbidity levels rise above the minimum threshold of water clarity, 5 NTU's. One of these days, March 31, 1987, was a rainy day in which one would expect higher levels of turbidity as a natural process, not necessarily as a result of poor practices at a ski area. The other day, April 21, 1992, the high turbidity in Tecumseh Brook influenced the turbidity levels in the four samples downstream. As Tecumseh Brook directly drains the ski area, it is possible that something occurred on the ski area to cause elevated turbidity in the stream. In general, however, it appears that implementation of standards and guidelines including an erosion control plan are sufficient for protection of water quality from a turbidity standpoint. A total of 20 to 25 person days is spent by personnel from the Pemigewasset and Androscoggin Ranger Districts each year monitoring soil and water protection at the ski areas.

Snowmaking Water Withdrawal

by

Joan Carlson, Air and Water Program Leader

The Forest Plan addresses flow rates in terms of water withdrawal for snowmaking at downhill ski areas. It directs that there be either a site specific study to determine flow requirements or, depending upon the availability of stream gaging information, low flow will be set at medium August flow. The purpose is to insure that flows in all perennial streams and rivers will be maintained at levels which will protect spawning and nursery habitat for all native fish including Atlantic salmon.

Where state or federal low-flow maintenance requirements have been established, monitoring of water withdrawal is written into the ski area special use permit, with responsibility for implementation resting with the permittee. The Forest Service role is to insure that Forest Plan standards and guidelines are being met, and aquatic resources protected accordingly.

Each of the four alpine ski areas on the Forest have had different amounts and intensity of water quantity monitoring:

Mt. Attitash: Mount Attitash Lift Corporation has recently completed the review of 25 years of stream gaging records for an instream flow incremental methodology (IFIM) study to determine low flow requirements for the Saco River. White Mountain National Forest personnel have participated in the analysis.

Loon Mountain: Low flow requirements and a monitoring plan will be included in the new special use permit issued to Loon Mountain Recreation Corporation when there is approval of the South Mountain expansion. A stream gage for monitoring has already been installed on the East Branch Pemigewasset River.

Waterville Valley: The current low flow requirement in the special use permit is 13.0 cubic feet per second (cfs) in the mainstream of the Mad River. A rating curve (stream depth vs. stream discharge relationship) is recalibrated yearly using a staff gage installed on the river. From the rating curve the depth of flow corresponding to the low flow requirement can be determined. If that depth is reached, water withdrawal should cease. The staff gage is monitored at random times during the low flow period to determine if Waterville Valley is complying with the terms of the special use permit.

Wildcat: The current low flow requirement in the special use permit is 1.0 cfs on the Peabody River. A low flow device which allows the minimum flow to bypass the snowmaking pumps has been installed on the Peabody River and is monitored at random times during the low flow period to determine if Wildcat is complying with the terms of the special use permit.

Waterville Valley and Wildcat Ski Areas have met their respective low flow requirements and were in compliance with their special use permits.

Air Quality

by
Joan Carlson, Air and Water Program Leader
Jim O'Brien, Forest Health Specialist

Under the Clean Air Act as amended in 1977, the Forest Service has a specific role as a Federal Land Manager to protect the air quality related values in its Class I areas. Class I areas under National Forest management are defined as any congressionally-designated Wilderness greater than 5,000 acres established prior to 1977. On the White Mountain National Forest, these are the Great Gulf Wilderness and the Presidential/Dry River Wilderness.

The National Forest System has little direct control over air quality because the greatest contributers are industry and automobile exhaust rather that some action taken by the Forest Service. However, the responsible governmental agencies, the US Environmental Protection Agency and the State air regulatory agencies, consult with Forest Service managers on potential impacts to the air quality related values. In turn, the Forest Service is required to review preconstruction applications for air pollution emission permits. Called Prevention of Significant Deterioration (PSD) permits, these are required for major new air pollution emission sources and major modifications of existing sources within one hundred kilometers of a Class I area.

Forest Service personnel monitor the effects of air pollutants on visibility, acid deposition, vegetation and water quality. The intention is to detect trends and to provide a warning system for potential vegetation and water quality problems. The monitoring information is used as backgound in the review of PSD permit applications.

Visibility

Visual range monitoring for the Great Gulf Wilderness began in 1985. Pictures looking out over the wilderness are taken three times each day. A slide scanning densiometer is then used in computing the Standard Visual Range (SRV) which includes scene contrast and sight distance measurements. The theoretical limit to SVR in clean air is imposed by air molecule scattering and results in a maximum potential SVR of approximately 320 kilometers. Following are the results, by season. (An * indicates sustained cloud or snow cover prevented derivation of a SVR value for that season.)

MEDIAN STANDARDIZED VISUAL RANGE (SVR)
GREAT GULF WILDERNESS

YEAR	SPRING SVR	SUMMER SVR	FALL SVR
1986	81 km	69 km	75 km
1987	75 km	63 km	54 km
1988	*	48 km	66 km
1989	*	54 km	82 km
1990	*	68 km	63 km
1991	*	91 km	*
1992	*	71 km	72 km

The low visual range of 1988 corresponded with some of the worst air quality in recent times. Since then, that situation has not been repeated, but we cannot say that a trend is represented by the data or that visibility will continue to improve. The data does show the range of visibility conditions over the Great Gulf and Presidential Dry River Wildernesses. For perspective, the best visibility occurs in the mountainous areas of the southwest where annual median visibility exceeds 110 km.

Acid Deposition

In order to determine air pollution effects on vegetation and water quality, we need to determine what and how many air-borne pollutants actually reach the land. A regional monitoring record exists of the amounts of air pollutants, particularly sulfur and nitrogen deposition. The following data was extrapolated from studies conducted by the Hubbard Brook Experimental Forest in Thorton, NH.

	DEPOSITION (kg/ha/yr)			
Location	Wet	Dry	Cloud*	Total
	SULFUR			
Mount Washington	10.0	2.0	45.5	57.5
Pinkham Notch	9.0	2.0	11.4	22.4
	NITROGEN			
Mount Washington	6.0	3.0	23.0	32.0
Pinkham Notch	5.0	3.0	6.0	14.0

* high bound cloud estimate by Lovett.

The Forest Service screening process thresholds are 20 kg/ha/yr each of both total sulfur and total nitrogen)

Additionally, Forest Service personnel keep abreast of numerous research activities that are currently underway at Hubbard Brook Experimental Forest and throughout New England to gain a better grasp of the effects of air pollution on both terrestrial and aquatic ecosystems. A few examples include the work being done by R.L. Boyce and A.J. Friedland of the Environmental Studies Program of Dartmouth College on the fate of atmospherically deposited nitrogen absorbed by red spruce canopies. There is also the Forest Decline Project being performed by the Department of Botany at the University of Vermont, and the Forest Health Monitoring effort of the Northeastern Area State and Private Forestry Staff of the Forest Service.

Vegetative Effects

To study the effects of air pollution on vegetation, an ozone monitoring program was initiated in 1987. It is conducted in cooperation with the Appalachian Mountain Club and the University of Massachusetts. Ambient ozone is monitored continuously during the growing season at the Mt. Washington Auto Road site (U. Mass, Bill Manning) and the summit of Mount Washington (AMC - Bruce Hill). General vegetation surveys are conducted by the University of Massachusetts to detect symptoms of ozone damage.

To obtain data showing the relationship between ozone concentrations and injury to vegetation, four "open-top" plant growth chambers were installed at the Auto Road site in 1988. Two of these chambers were filtered, excluding most of the ozone, and two were not filtered. Sensitive plants placed in the unfiltered chambers were injured much more severely than comparable plants in the filtered ones, showing that ambient ozone caused symptoms in the chambers that were identical to those found in the field, and that the degree of injury was commensurate with the degree of exposure. The chambers were also used to screen species of unknown sensitivity. By this means a species of spirea, for example, was found to be sensitive. Later attempts to use the chambers to study long term effects, i.e., on growth, were not successful. Apparently the beneficial effects on growth provided by the chambers obscured the harmful effects of ambient ozone.

Additionally, data obtained from the other monitors, such as the number of hours during which ozone concentrations were 80 ppb or higher or the second highest 1 hour average concentration, correlate well with the data from field surveys. For example, in 1988 the second highest 1 hour average concentration at the Auto Road site was 93 ppb. During this period, 48 percent of the indicator species imported for testing were injured (black cherry trees), and the average injury index was 13.3. In 1989, the corresponding values were 78 ppb, 22 percent injured, and an index of 4.9. A

system of classifying the percentage of leaves injured and the intensity of the injury is used to compute the injury index, with the most severe index possible being 16. The following table shows the ozone parameters recorded 1987-92.

Ozone Concentrations

	Auto Road Site (May/June/July/August)			Summit Mt.Washington (July/August only)
	2nd Highest 1-hr Ave.	# hrs >80 ppb	# hrs >120 ppb	# hrs >120 ppb
1988	93	37	0	13
1989	78	1	0	5
1990	90	14	0	0
1991	98	47	0	0
1992	91	15	0	0

The screening process threshold is 120 ppb ozone for the second highest 1 hr average. Although it has been rare that ozone exceeds 120 ppb, this monitoring effort confirms that ambient ozone is a pervasive and important air pollutant in these wilderness areas during the growing season at concentrations high enough to cause foliar plant injury. Consideration may be given to re-assessing this threshold.

Surveys for symptoms of ozone injury on State listed threatened and endangered alpine plant species, conducted by Forest Health Protection specialists, were begun in 1992. Of the 23 species examined in 1992, nine had symptoms that were possibly results of ozone, but these plants have peculiar characteristics that will require greater understanding before surveyors can adequately evaluate them.

A survey of lichen species was conducted on the Great Gulf and Presidential Range-Dry River Wildernesses in 1988 by Dr. Clifford Wetmore, a lichenologist at the University of Minnesota. Lichens are composite plants, each made up of a fungus and an algae living together in a symbiotic relationship. Some species are known to be sensitive to low levels of sulfur dioxide, nitrogen oxides, and florides, and are therefore good indicator plants for pollution studies. Moreover, lichens have no protective epidermis, allowing the air within them to be freely exchanged with the atmosphere. They can absorb airborne pollutants, and because they are long-lived, they can accummulate the chemical elements making up the pollutants. Therefore, in addition to the survey of lichen flora in 1988, samples of four species were collected and later analyzed in a laboratory for those elements

likely to increase in a polluted atmosphere, such as sulfur, nitrogen, cadmium, and lead.

The maps of the distributions of the more sensitive species that Dr. Wetmore compiled did not show any significant voids that are not due to normal ecological conditions. There was no evidence of damaged or dead lichens in any area where healthy ones were present. The elemental analyses did not show accumulations of polluting elements. Levels of all elements were very similar to those found in the Boundary Waters Canoe Area in Minnesota (a known clean area).

The 1988 survey provided baseline data for future studies. The elemental analyses was repeated in 1993 to determine if any changes have occurred.

Water Quality Effects - Dry River & West Branch Peabody

Beginning in 1990, Dr. David Wright volunteered his services to begin characterizing the water quality of the Dry River and the West Branch of the Peabody River, the principal drainages of the Class I wildernesses on the Forest. The tables below describe this characterization.

DRY RIVER

elev.	year	estimated flow (cfs)	Conductivity	Lab PH	Alkalinity mg/l $CaCO_3$
1350'	1990	60	15	6.1	0.6
	1991	40	16	6.2	1.2
	1992	44	15	6.1	0.8
1930'	1990	50	13	6.1	0.4
	1991	30	14	6.2	1.3
	1992	33	13	6.1	0.7
2840'	1990	15	11	6.1	0.4
	1991	14	12	6.3	1.0
	1992	15	11	6.1	0.6
3150'	1990	9	13	5.8	0.4
	1991	10	11	6.4	1.3
	1992	11	10	6.2	0.6

W.BR.PEABODY

elev.	year	estimated flow (cfs)	Conductivity	Lab PH	Alkalinity mg/l $CaCO_3$
1140'	1990	80	13	6.1	0.7
	1991	24	13	6.3	0.9
	1992	26	13	6.3	0.4
2230'	1990	45	13	6.1	0.6
	1991	18	13	6.4	1.3
	1992	22	13	6.3	0.5
3330'	1990	4	13	5.9	0.2
	1991	4.5	13	6.1	0.6
	1992	5.6	14	6.1	0.9
4230'	1990	3.0	16	5.8	0.2
	1991	1.0	16	6.0	0.6
	1992	3.6	17	5.9	1.0

These water characteristics will be used as a baseline. At this time, very little correlation can be made between the amounts of acid precipitation and the existing water quality.

Final Conclusion

The current condition of the Air Quality Related Values (AQRV's) in the Great Gulf and Presidential Range - Dry River Wilderness Areas have been assessed using the above monitoring information and the procedures set forth in the "Screening Procedure to Evaluate Effects of Air Pollution on Eastern Region Wildernesses Cited as Class I Air Quality Areas" (Adams et al., 1991). The results of this modeling process predict that the terrestrial AQRV's have already been adversely impacted by sulfur deposition, and the aquatic resources have been adversely impacted by both sulfur and nitrogen.

There are currently ten active Prevention of Significant Deterioration permit applications from within the state of Maine and one in New Hampshire.

To advance the air effects monitoring effort, the White Mountain National Forest co-sponsored a Symposium and Workshop on "The Effects of Air Pollution on Terrestrial and Aquatic Ecosystems in New York and New England" in October of 1992. A first of it's kind in New England, this conference brought together many experts in the field to share current research efforts and results. During the workshop, sensitive indicators were identified for the air quality related values within terrestrial and aquatic ecosystems. In addition, an action plan was drafted to increase the information base concerning these indicators and the amount and effects of air pollutants deposited within the Class I Wilderness.

Minerals

by
David Valenzuela, Geologist

There are three types of mineral activity of interest on the Forest: sand and gravel, hardrock minerals, and recreational or hobby mineral collecting. The Forest Plan identifies two items to be monitored relative to minerals: the public interest in minerals as expressed by the number of lease requests received and compliance with operating plans for mineral activities.

Public Interest

As the following table shows, we have issued few sand and gravel permits. When such permits are issued, they are normally to Town or State agencies for the construction and maintenance of roads with the material taken from existing gravel pits.

Sand and Gravel Permits

Year	# permits processed
1986	4
1987	0
1988	0
1989	3
1990	2
1991	2
1992	1

Hardrock minerals include such things as copper, zinc, gold, silver, lead, and uranium. Prior to the Forest Plan, there were nearly 50 applications pending to prospect for hardrock minerals on the Forest. Action on those applications was deferred pending completion of the Plan. About half of the applicants withdrew their applications before they could be acted upon. In 1989, the Regional Forester, following the NEPA process, decided to consent to the issuance of permits for most of the remaining 25 applications with appropriate exceptions and conditions as described in the environmental documents. (Issuance of hardrock leases and permits on the Forest falls under the jurisdiction of the US Department of Interior. The Forest Service role is to decide whether or not to consent to issuance. See Appendix M of the Forest Plan EIS for an explanation of the mineral permitting and leasing process.) The Regional Forester's decision was appealed to the Chief of the Forest Service and the appeal has not yet been resolved. As of now, there are

no hardrock prospecting permits or mining activity on the Forest. Three prospecting permit applications have been received since the Regional Forester's decision but not acted on pending resolution of the appeal.

The collection of mineral specimens for recreational purposes is allowed on the Forest without a permit. In pursuing their hobby, rockhounds are asked to comply with a few basic resource protection measures as outlined in the Forest Plan (page III-24). We have no count of the number of people enjoying this recreational pastime on the Forest but believe there are a great many. Contact with some of them shows that their interest in the activity ranges from casual to intense.

Compliance with Operating Plans

In general, we have had few problems in obtaining compliance with permit terms for any of the sand and gravel operations we have authorized and, as mentioned above, there is no commercial hardrock mining on the Forest.

Hobby collecting continues to be a popular recreational activity on the Forest and there have been few problems with it. There have been a very limited number of cases where individuals were found to be mining specimens for commercial purposes rather than pursuing a recreational activity and we have taken law enforcement action. There are also a few areas where people have dug excessively or irresponsibly and some resource damage has occurred —principally in terms of aesthetics and erosion. These areas are generally small and, when taken in consideration with the number of people who enjoy the activity, the damage has been light. In addition, some collectors have expressed dissatisfaction with the Forest Plan standards and guidelines for the hobby and some have come forward with ideas on how the activity could be made more enjoyable for visitors to the Forest. We have not yet decided how to respond to these concerns and ideas and hope to be able to give more attention to them in the coming year.

Lands

by
Eileen Woodland, Realty Specialist
Susan Cone, Conveyance Examiner

Land acquisitions include the purchase, donation, or exchange of full or partial interest in lands and rights-of-way. These transactions satisfy one or more of the following purposes: to accomplish objectives of public law or regulation, to meet demand for National Forest System resources, to achieve more efficient land ownership patterns, to achieve lower resource management cost, and to obtain needed access to National Forest System lands.

The White Mountain National Forest ownership as of September 30, 1993, is 772,108 acres. The National Forest has acquired 85 percent of the gross acres within the Proclamation and Purchase Unit Boundaries established by Congress when the Forest was created.

Purchases and donations are in fee title, where by all real property rights are acquired, or in the form of a conservation or scenic easements which secure partial interest in land providing permanent protection of the scenic, recreational, ecological, and natural resource values. Exchanges to consolidate National Forest System land patterns or provide access that might otherwise be attainable must clearly be in the public interest and consistent with land management planning objectives. Rights-of-way for roads and trails are acquired as needed to manage National Forest System resources.

Over the last 7 years, the White Mountain National Forest has purchased fee title to 24 tracts totaling 18,751 acres. In addition, two parcels of land were donated which conveyed fee title to another 243 acres, and donations of two conservation easements were received protecting another 159 acres. Five conservation easements protect another 38,745 acres. One exchange conveyed 42 acres to the United States in exchange for 27 acres which resulted in a 15 acre gain and now provides access to portions of the Gordon Pond Brook drainage.

The following table shows acquisitions since 1986.

NAME	ACRES	YEAR	TOWN	TRANSACTION
Darlington	65.70	1986	Rumney	Fee (Donation)
Washburn, Reuben	2,244.00	1986	Lancaster/Stark/ Northumberland	Fee
E. Libby & Sons	4,585.00	1986	Gorham	Fee
McCampbell (Virginia Lake)	1,883.00	1987	Stoneham/Lovell, ME	Fee
Champion International	1,710.00	1987	Stark	Fee
SPNHF (Boothman)	243.00	1987	Randolph	Fee
TPL (Priest)	15.20	1987	Woodstock	Fee
Connor, Anne	243.40	1988	Shelburne	Fee (AT)
State of NH (Diamond)	4,500.00	1988	Carroll/Jefferson Stark/Milan/ Northhumberland	Fee
State of NH (Nash Stream)	38,500.00	1988	Stark/Odell/ Stratford/Columbia	CE
Rust	177.00	1989	Thornton	Fee (Donation)
TPL (Stratton)	30.00	1989	Woodstock	Fee
Murray Clark	14.81	1989	Woodstock	Exchange
SPNHF (Marshall)	100.00	1989	Bethlehem	Fee
SPNHF (Smith)	51.00	1990	Sandwich	Fee
Scrimshaw	119.24	1991	Thornton	CE/Donation
Boston & Maine RR	31.97	1991	Crawford Purchase/ Chandlers Purchase/ Beans Grant	Fee
TPL (Mitchell)	235.00	1991	Campton	Fee
Gordon Steady	230.00	1992	Stark	CE
Littleton, Town of	647.62	1992	Franconia	Fee (AT)
Littleton, Town of	355.29	1992	Bethlehem	Fee
SPNHF	202.00	1992	Stark	Fee
Chadbourne	235.50	1992	Shelburne	Fee (AT)
Wilfong	3.12	1992	Shelburne	CE (AT)
Corrigan	1.73	1992	Shelburne	CE (AT)
Jacob Aldrich	40.00	1992	Benton	Fee
Sawyer	80.00	1992	Rumney	Fee
Reid	210.36	1993	Bethlehem	Fee
Reid	40.00	1993	Bethlehem	CE (Donation)
SPNHF	10.10	1993	Hart's Location	Fee
MCW	180.00	1993	Albany, ME	Fee
Derosia	10.63	1993	Warren	CE (AT)
Berti	62.00	1993	Rumney	Fee
TPL (Glen House)	857.00	1993	Green's Grant	Fee

SPNHF - Society for Protection of New Hampshire Forests
TPL - Trust for Public Land
AT - Appalachian Trail
CE - Conservation Easement

The Forest recently took responsibility for the Appalachian Trail (AT) and corridor lands acquired by the National Park Service in New Hampshire. These tracts include 8,300 acres and protect 54 miles of the AT outside of the Forest's boundary, from the New Hampshire/Vermont state line to Ore Hill in Warren, and from the Forest boundary at Rattle River in Shelburne to the New Hampshire/Maine state line northeast of Mt. Success.

Transportation

by

Bob Goetz, Assistant Forest Engineer

As noted in the Forest Plan Final Environmental Impact Statement (FEIS), the White Mountains contain miles of woods roads, the majority of which were in existence prior to the time the underlying land was acquired for National Forest purposes. Though some new roads have been constructed on these lands after they were added to the National Forest, many of the old roads remain passable to this day. Other old roads can be made usable after repair of surfacing and drainage structures and the removal of trees and brush that grow into a roadway between periods of use. Some of the roads are under Forest Service jurisdiction and some are part of State and Town road systems.

Forest Development Roads (FDR) are roads which are needed for the long term management of a national forest and which are under the jurisdiction of the Forest Service. The FDR system does not include temporary roads which are described in the FEIS as "roads constructed for a single project." Such roads are needed only for the short term.

When the Forest Plan was written, 346 miles of the existing roads on the Forest had been inventoried for inclusion in the FDR system. The Plan provided for construction of a certain amount of new roads and for an estimated amount of restoration or reconstruction on existing roads. The Plan alluded only briefly to the continuing process of inventorying other existing roads not yet part of the FDR system to see if they should be included. The current Forest Transportation Inventory contains 490 miles of FDR's, an increase of 144 miles since the Forest Plan was prepared. Most of this increase resulted from the addition of inventoried existing roads to the FDR system, with only 20.4 miles resulting from new construction. (as discussed below).

Roads are constructed (or reconstructed) to provide access for resource management and use. In the past, the level of these activities has been closely related to the intensity of the timber management program. Current trends in resource management are causing a decrease in roads built for timber management, and an increase in roads constructed and reconstructed in support of developed and dispersed recreation activities.

The Forest Plan describes two overall management goals that pertain to transportation. These are:

* Use existing roads, trails, and utility corridors to the maximum extent possible. Plan and design access to serve multiple management purposes.

* Design and build any new access, regardless of type, according to standards and criteria that focus on minimum impact.

The Forest Plan states that roads will be located, designed and constructed to the minimum standard necessary to meet management objectives for the area served.

Table IV-1 of the Forest Plan requires annual monitoring of the number of miles of Forest Road constructed by Road Type (I, II, III). Table II-5, Section V.

Roads (Access for Resource Management) of the FEIS displays Average Annual Road Construction miles anticipated for each decade by Road Type (I, II, III). These expected miles apply only to road construction, and do not include road reconstruction or restoration miles.

Decade 1 - Anticipated:			
Type I	-	Winter, Intermittent Service	2.4 miles
Type II	-	Seasonal, Intermittent Service	4.0 miles
Type III	-	Three Season, Constant Service	0.6 miles
Total Annual Miles			7.0 miles

Appendix L - Summary of Changes Concerning Roads, under definition of a Forest Development Road, describes a fourth type of road exceeding Type III, herein called Rec/Admin roads, which were not included in the Table II-5 mileage expectations. These roads are usually higher standard than Type III, often paved, open year-round, and include the following categories:

Administrative Site Roads	Town Roads, under coop agreement
Interior Campground Roads	Dispersed and/or Developed ...
Picnic/Wayside Parking Areas	Recreation Site Parking Lots

The following definitions are also given in Appendix L:

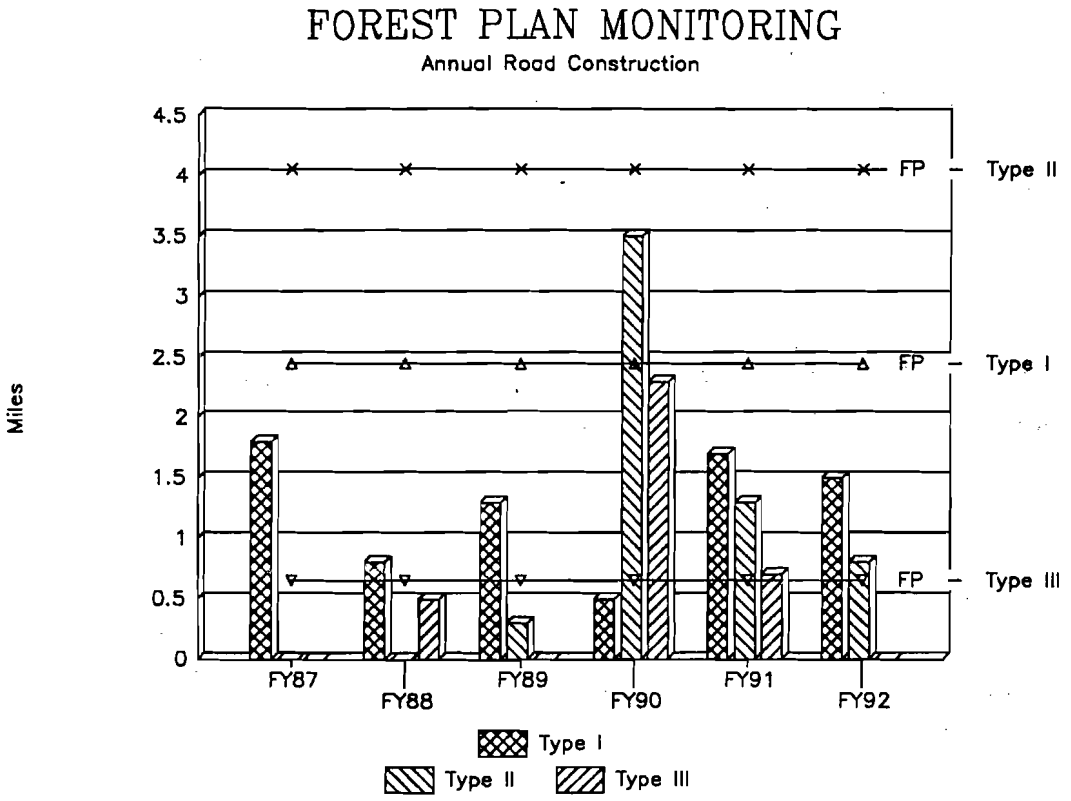
Construction	-	Building a road where a road does not exist.
Reconstruction	-	Rebuilding a road to a higher standard.
Restoration	-	Rebuilding a road to its original standard.

All road construction and reconstruction (including restoration) of Forest Development Roads is tracked annually by engineering personnel through the Project List of the Forest ROADS Report. This data is tabulated with prior year data to evaluate multiyear trends in road construction.

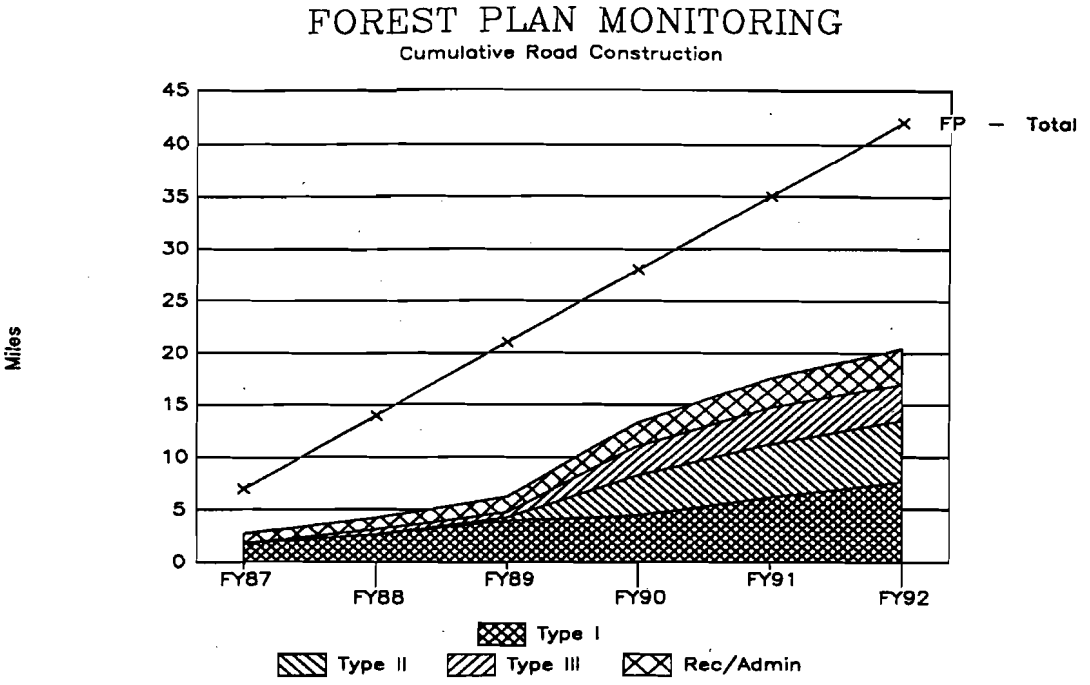
Four charts are presented which display our monitoring results:

Annual Road Construction
Cumulative Road Construction
Annual Road Reconstruction (including restoration)
Cumulative Road Reconstruction (including restoration).

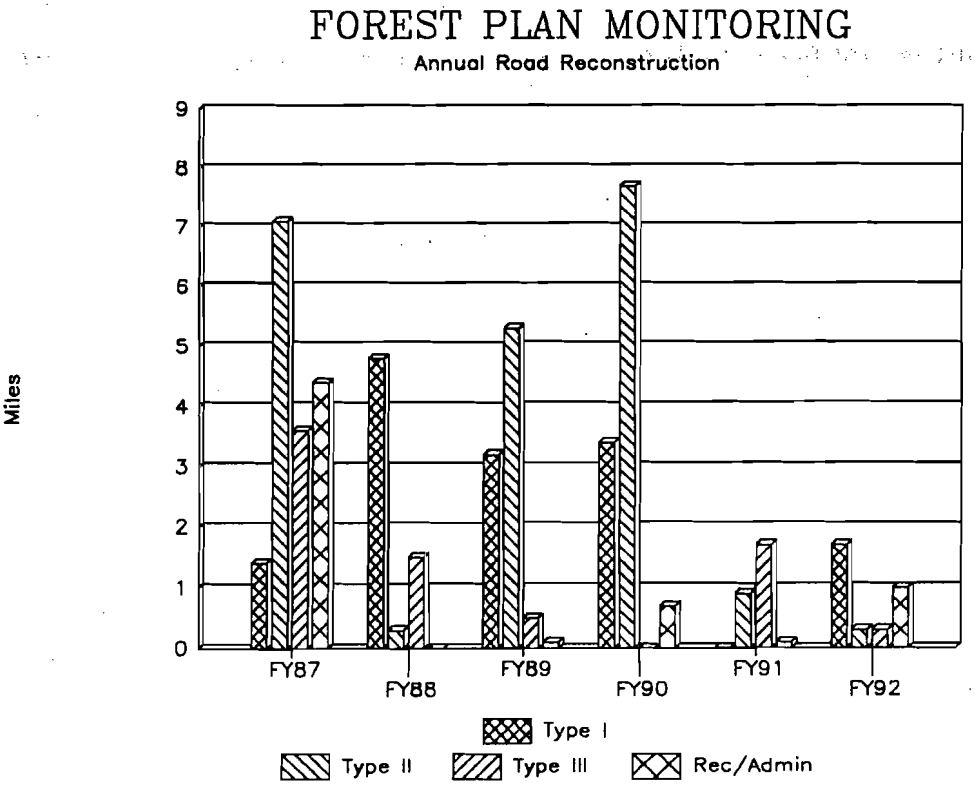
Road Construction charts also include the Forest Plan expectations, taken from Table II-5 of the FEIS.

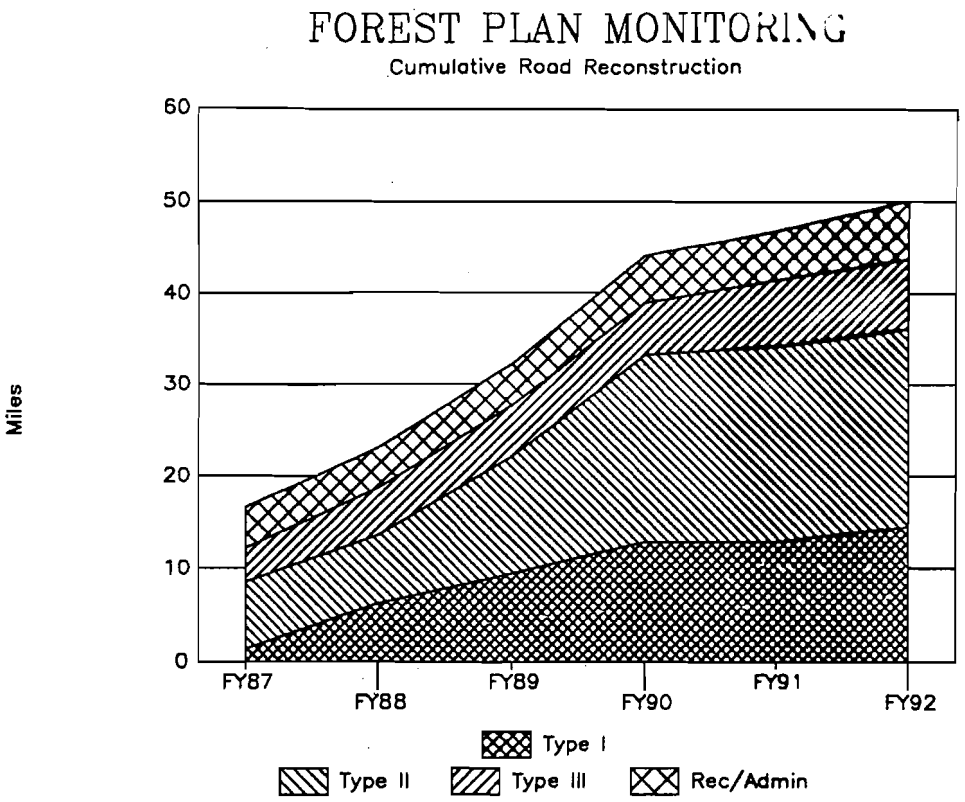


Type I and II road construction are consistently below annual Forest Plan expectations of 2.4 (I) and 4.0 (II) miles, and show a 6 year average of 1.3 (I) and 1.0 (II) miles. Type III road construction has shown wide annual fluctuations; from 0 miles in FY's 87, 89, and 92, to 2.3 miles in FY90. The 6 year Type III average is 0.6 miles, which equals the Forest Plan expectation. Rec/Admin road construction, though not specifically discussed in the Forest Plan, has been occurring at a 6 year average of 0.6 miles.



Cumulative road construction for all road Types (I, II, III, Rec/Admin) is currently 20.4 miles, well below the projected Forest Plan level of 42 miles for this 6 year period. Based on current trends, and estimated projections, we expect total road construction for the first decade to be at or less than 50 percent of what the Forest Plan anticipated.





The average annual road reconstruction for all road types was 8.3 miles with a cumulative total of 50.0 miles during this 6 year period. We expect to see road restoration activities increase as our infrastructure ages, and additions to our road system decrease.

Public vehicular use of Forest Development Roads is regulated by an administrative order issued by the Forest Supervisor. Table II-5, Section V. Roads (Access for Resource Management) of the FEIS, displays Road Mileage Open to Public Vehicular Traffic for each decade. At the time the Plan was written, 150 miles of FDR road were open to public use via conventional motor vehicles and one additional mile was contemplated during the first decade. Currently, 139 miles are open to public use via conventional motor vehicle, some only for limited times (such as during hunting season) or for limited purposes (such as firewood gathering). As discussed in the Forest Plan/FEIS, some Forest Development Roads are also utilized as part of the snow machine trail system during the winter months.

Vegetation Management

by
Tom Brady, Forest Planner
Ed Merski, Timber Program Team Leader

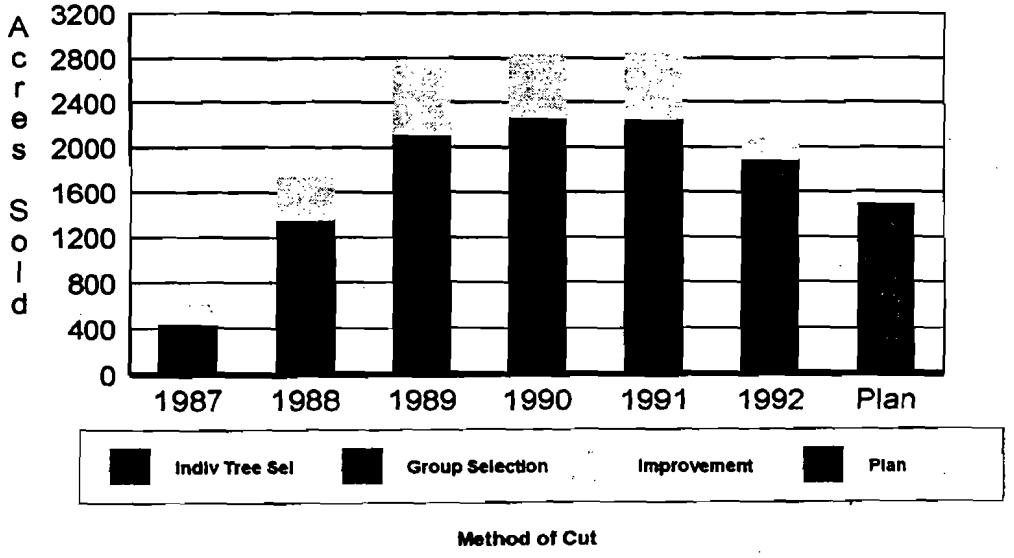
Wood harvesting is the primary method used to meet the Forest vegetative composition objectives as identified in the Forest Plan. These objectives address the need to maintain wildlife habitat diversity as well as a sustainable quantity of high quality sawtimber. Monitoring various aspects of our vegetative management practices is an integral part of the Forest Plan. Chapter IV, page 6, specifies that we will monitor the number of acres treated, while the vegetative management practices table on page VII-L-2 presents Forest Plan annual goals for the first decade.

Acres sold for timber harvesting are compared to Forest Plan goals. Acres sold are those for which a timber sale contract has been awarded in the year specified. It does not necessarily mean that those acres were actually harvested in that year. There is often a lag time of up to 5 years from the time of sale to the time a specific stand is cut. Acres sold are displayed since they are more directly controlled by the Forest.

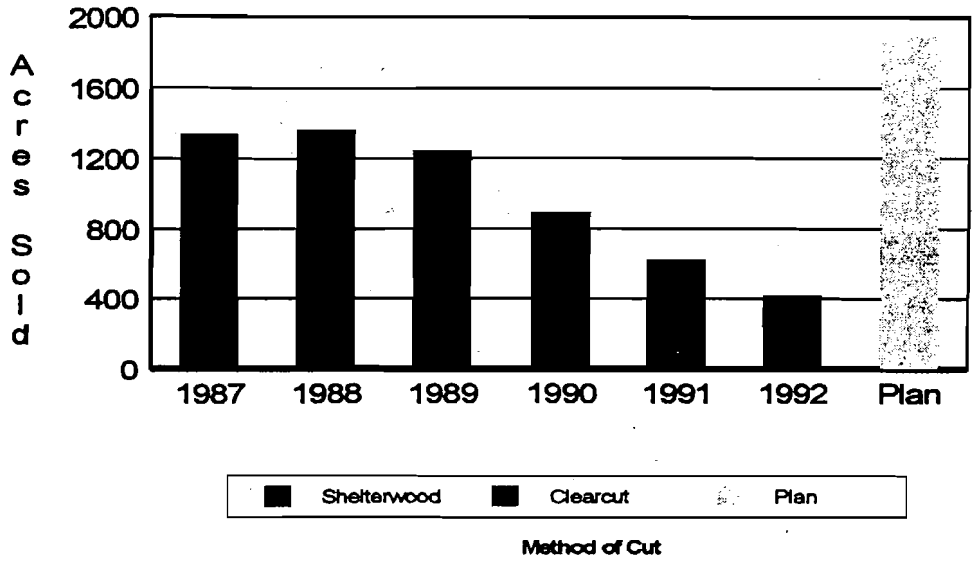
The three bar charts that follow describe acres sold for the period 1987 through 1992 for:

uneven-aged management (selection)
even-aged management - regeneration cuts (clearcut, shelterwood)
even-aged management - intermediate cuts (thinning, overstory removal)

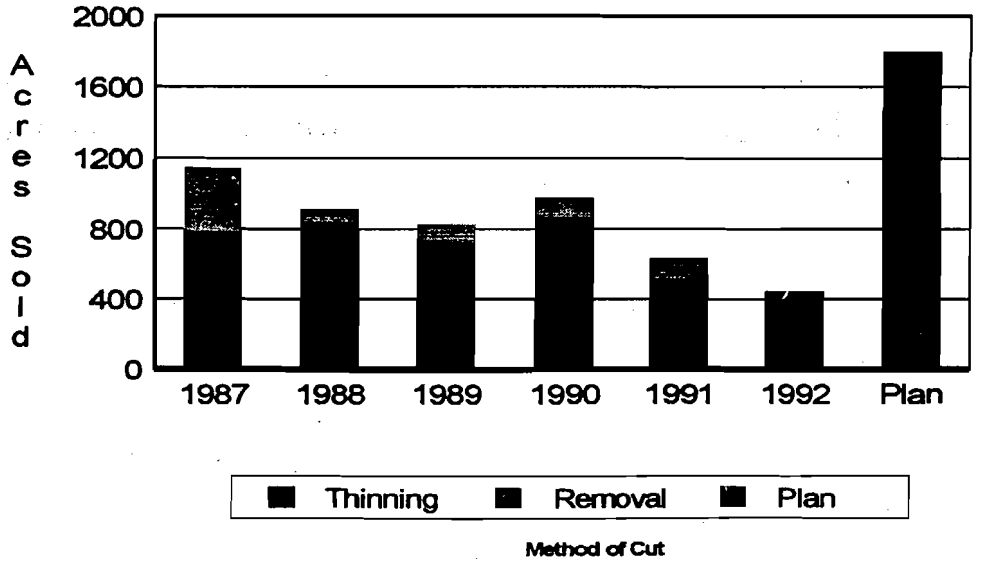
Uneven-Aged Management



Regeneration Harvest



Intermediate Harvest



The charts show some significant trends. Acres of uneven-aged management rose dramatically from 1987-89 and peaked in 1991 at a level that was 90 percent greater than Forest Plan goals. The drop in 1992 from the three previous years is attributed to the appeals of six timber sales. Had these been sold, the upward trend in acres of uneven-aged would have continued.

Acres of even-aged management display equally significant, although opposite, trends. During the peak year of 1988, only 72 percent of the Forest Plan goal for even-aged managment was attained. There was a sharp decline from 1988 to 1992. The 1992 accomplishment was 22 percent of the Forest Plan goal. Because of public concern over clearcutting and sensitivity to visual concerns, uneven-aged is typically being planned on land that in the past may have been managed by even-aged.

The levels of intermediate cuts have also lagged behind plan goals. The largest decline occurred in 1991-92, roughly paralleling the trend for regeneration cuts. In 1992, only 25 percent of the plan goal for intermediate cuts was met.

The trend toward decreasing even-aged management coupled with the large increase in uneven-aged management has important implications regarding wildlife habitat. Ninety percent of the inland wildlife species in New England are dependent on regeneration and young age class habitat during some part of their life cycle. The Forest Plan goals were developed to help maintain this current diversity of species habitat. Research is beginning to assess how these current trends may actually affect various aspects of wildlife diversity. Refer to the wildlife section of this report.

Timber Demand

An indicator of current demand for timber products can be determined by several factors. These include number of bidders per sale, bid price and the amount of bid premium (the amount bid in excess of the advertised rate). When markets are good, almost all sales sell—this is the Forest's elasticity assumption. In a declining market, one can expect some no bids. However, as of the end of FY 92 there remained only one timber sale that was unsold out of almost 70 (from 1989-92) timber sales over $2,000 that were offered under the competitive bidding process (this sale has subsequently sold).

The Forest prepares an Annual Bid Monitoring Plan from which we determine the average number of bidders per sale, the number of sales with multiple bids, and the average bid premium percentage. These figures can be compared to previous years figures and trends can be identified. Any increase over previous years figures indicate a greater interest in the Timber Sale Program. On the other hand, any decreases may indicate a lessening of demand. The bid monitoring trends on the Forest show that the bid premium percentage has steadily increased since monitoring of this item began in 1989. Bid premiums are the amount of a bid that is higher than the advertised rate for that sale.

The Timber Sale Statement of Accounts (TSSA) has a quarterly listing of Uncut Volume Under Contract. The decrease in yearly uncut volumes when compared to previous years on the Forest indicates that demand is increasing. Because of an overall stronger product market, sale purchasers are harvesting and processing wood products soon after a sale is sold rather than wait until prices for finished wood products increase.

The Forest also monitors the amount of volume being purchased by small business. If and when 20 percent of sawtimber volume sold has been purchased by large business (one having more than 500 employees-including its affliliate companies), a small business set-aside program is triggered. The Forest has not had to enter into a set-aside program since 1979. Historically an average of 96 percent of the sawtimber volume sold goes to small business manufacturers.

The trends displayed in the bid monitoring plan as well as in the uncut volume under contract indicate an overall strong demand for timber products on the Forest.

Bid Monitoring Plan
Sales sold under competitive procedures

	1989	1990	1991	1992
Average #bids/sale	2.5	3.6	2.9	2.2
Volume for the period (MBF)	29,253	28,968	22,419	17,818
Average volume/sale (MBF)	1,721	1,609	1,180	1,272
Number of sales for the period	17	18	19	14
Average advertised value/sale ($)	62,532	56,046	41,702	39,974
Average advertised value ($/MBF)	36.33	34.83	35.34	31.30
Average bid value ($/MBF)	44.39	44.27	45.75	41.84
Average bid premium (%)	22.2	27.1	29.5	33.7
Range of bid premiums (%)	.3-67.3	4.9-53.4	0-62.2	0-74
% of volume in Sawtimber/Millwood	32.5	31.0	34.4	35.9
# of different bidders	24	22	24	21

MBF - Thousand Board Feet
MMBF - Million Board Feet

The decline in the volume sold in 1991 and 1992 can be attributed to several factors. In 1991, three sales received no bids. There was a downturn in the economy during this period and the sales receiving no bids had a low sawlog to pulpwood ratio and a high advertised rate. Two of these sales were subsequently re-offered and sold. The third sale was a deficit sale where the cost of the road exceeded the value of the timber by almost $80,000. This sale has been withdrawn from the program.

Six appeals of timber sale Decision Notices were filed in 1992. The volume of these six sales was over 10 MMBF. The sales contained large volumes of high value sawtimber species (white pine, paper birch, yellow birch and sugar maple) which brought the average adverstised rate as well as the average bid value.

There was a slight increase of the sawtimber to pulpwood ratio in 1991/92. A question one may ask is if the sawtimber volume has increased, why has the average advertised and bid values decreased? One reason is the fact mentioned above that several sales with high value sawtimber volumes did not sell. Another factor is that the sales sold in 1992 contained more rough, rocky terrain and longer skid distances. This tended to drive logging costs up which was subsequently reflected in a decrease in timber values.

Firewood Availability

Alternative energy sources were an issue at the time of Forest Plan development during the early to mid 1980's. At that time, home heating costs for fuel oil, natural gas and electricity were rapidly escalating. Currently, low home heating oil prices have kept the demand for firewood relatively low. Most home firewood users are purchasing wood from commercial firewood processors who are cutting on private lands.

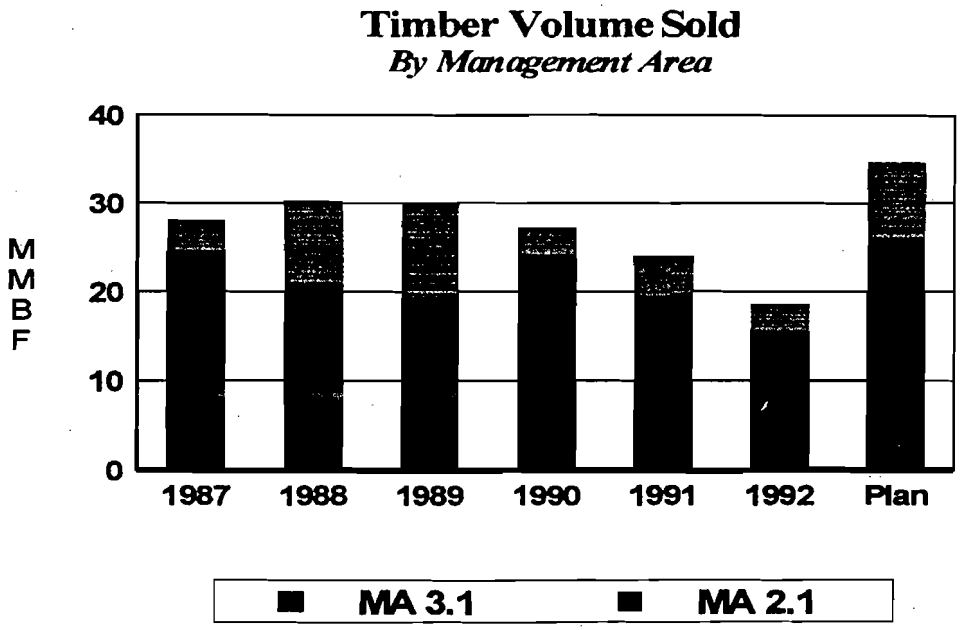
Thirty to thirty-five thousand cords of hardwood pulpwood are offered for sale each year. Some of this wood is utilized for fuelwood, but because we do not monitor for the various products, it is difficult to determine what percentage goes into the commercial firewood and fuelwood chip market. Firewood demand tends to be inversely proportional to heating oil prices.

There was a nation-wide Forest Service policy change in 1991 that eliminated the free, home-use firewood permit. The free use system was replaced by a charge firewood system. These personal use permits now cost $10 for 2 cords of wood. The Forest has sold over 230 permits over the past 2 years.

Timber Volume Sold

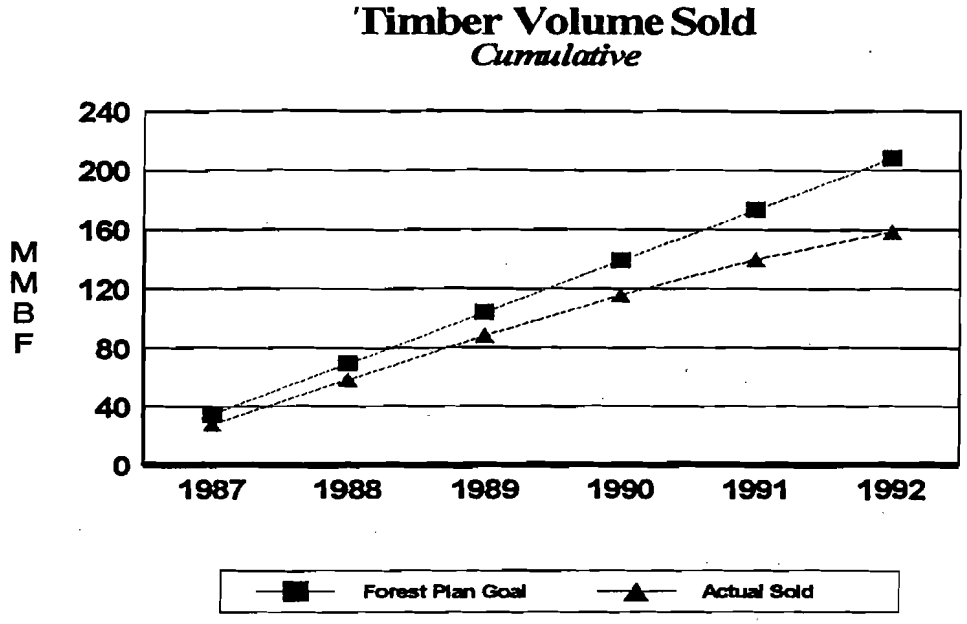
The Forest Plan describes timber production as being a major issue during Plan development and one whose output requires monitoring. The suitable land base consists of approximately 345,000 acres in Management Areas 2.1 and 3.1. MA 2.1 emphasizes visual quality, even-aged and uneven-aged silviculture, long harvest rotations, maintenance of wildlife habitat diversity, and roaded-rural recreation. MA 3.1 emphasizes high quality sawtimber and wildlife habitat diversity, primarily even-aged silviculture with long rotations, and semi-primitive recreation opportunities. Together, these Management Areas can provide a projected long-term sustained yield of 69 million board feet (MMBF) annually. However, the allowable sale quantity for the first decade is about half that capacity, averaging 35 MMBF annually. The Forest has actually been offering an average of 29 MMBF annually because of budget constraints.

Monitoring results are displayed in the two charts that follow.



The bar chart displays the volumes sold each year by Management Area. These are then compared to Forest Plan goals. Results show a downward trend in total volume sold from 1987 to 1992. Even during the peak years of 1988-89, the total sell was about 30 MMBF, or 86 percent of goals. The sharpest decline occurred during 1991-92 and is attributed mostly to appeals of Decision Notices on individual timber sales.

The Plan indicates that 25 percent of the volume should come from MA 2.1 and 75 percent from MA 3.1. Actual accomplishments show the proportion to be 22 percent and 78 percent, respectively.



The line chart shows how the cumulative volume sold compares with the cumulative Forest Plan trend. It indicates that not only is total accomplishment 24 percent below Plan goals but that, if current trends continue, the annual rate of accomplishment will lead us to a greater disparity over time.

Forest Health

by
Jim O'Brien, Forest Health Specialist
Margaret Miller-Weeks, Forest Health Specialist

Forest health describes the resilience and productivity of forest ecosystems, as related to public values and needs. Some traditional measures of forest health are the age and composition of the forest; trends in tree growth and mortality; condition of soil, water, and wildlife; and vulnerability to forest pests. Monitoring forest health on the White Mountain National Forest, including the effects of insects, pathogens, and air pollution, has been underway for many years. Listed below are some issues under investigation and specific programs established in response to public concerns.

National Forest Health Monitoring Program

In 1990 the Forest Service, EPA-Environmental Monitoring Assessment Program, and the National Association of State Foresters established the National Forest Health Monitoring Program in New England. The program includes: detection monitoring, to assess forest condition; evaluation monitoring, to further investigate identified issues and concerns; and, intensive site-ecosystem monitoring, to conduct long-term intensive research.

The detection monitoring includes a network of permanent sample sites where estimates of tree health are made each year. The sample sites located on the White Mountain National Forest are part of the New England regional network where trees are assessed for crown condition and damage. *Forest Health Monitoring - New England Summary Report; Forest Health Monitoring in New England - 1990 Annual Report;* and *Forest Health Monitoring - New England and Mid-Atlantic 1991 and 1992* discuss the results of these studies. The 1991 and 1992 data supports the conclusion drawn in 1990 that there is no evidence of widespread decline (as evidenced by tree crown symptoms) in any tree species in the states under study.

Surveys on off-plot sites are used to assess the impact of various pests and pathogens. Since pests are oblivious to state or federal boundaries, an attempt is being made to standardize survey and reporting methods so that data collected from various state and federal sources is comparable. For example, aerial surveys conducted annually on the Forest are coordinated with surveys done by the New Hampshire Department of Resources and Economic Development on private and state lands surrounding the forest boundary. This is done in order to alert surveyors of pest activities occurring on adjacent lands, so that an area of damage can be accurately mapped and the impact assessed across ownership boundaries.

One of the first intensive sites for research selected in 1992 under the Forest Health Monitoring Program is the Hubbard Brook Experimental Forest located within the Forest near Thornton, NH. This experimental forest, which has been in existence since 1955, is managed by the Northeastern Forest Experiment Station as part of the study on the Dynamics of Atmosphere, Vegetation, Soil and Water in Mature and Harvested Forests in New England. The objectives are to provide detailed, long-term data for ecosystem research to determine causes and rates of change of forest condition, and to identify possible responses.

National Atmospheric Precipitation Program - Spruce-Fir Cooperative

Concerns over possible acid rain led to the establishment of a national monitoring program in the mid 1980s. In the northeast, several areas were selected to assess the condition of spruce-fir forests. Forest Health Protection specialists from USDA Forest Service State and Private Forestry, in cooperation with State Foresters and National Forest personnel, conducted several projects to determine the health of spruce-fir in New England and New York.

Monitoring spruce-fir health included an aerial assessment of 200,000 acres on the Forest using color infrared film. This showed that at higher elevations, in general, there is a greater proportion of standing dead red spruce and balsam fir, some of which have been dead for 10 years. This seems to be due to various pests, pathogens and weather events. Some of the important factors identified include spruce beetle, dwarf mistletoe, root and stem rots, needle diseases, and winter injury. The results of this study are currently being printed.

Another component of these studies was to assess the symptoms of tree decline and possible trends in tree condition. Plots were established at various sites, including the White Mountain National Forest, and were visited annually from 1985 to 1989. Some of the high elevation spruce sites continue to be visited annually to determine long-term trend. Little overall discoloration was noted, outside of the winter tip browning injury that occurs in varying degrees from year to year. Over the years individual trees exhibited deteriorating tree crowns, mainly due to branch dieback and mortality. Only a small number of trees had died recently. Further results from the survey will soon be published.

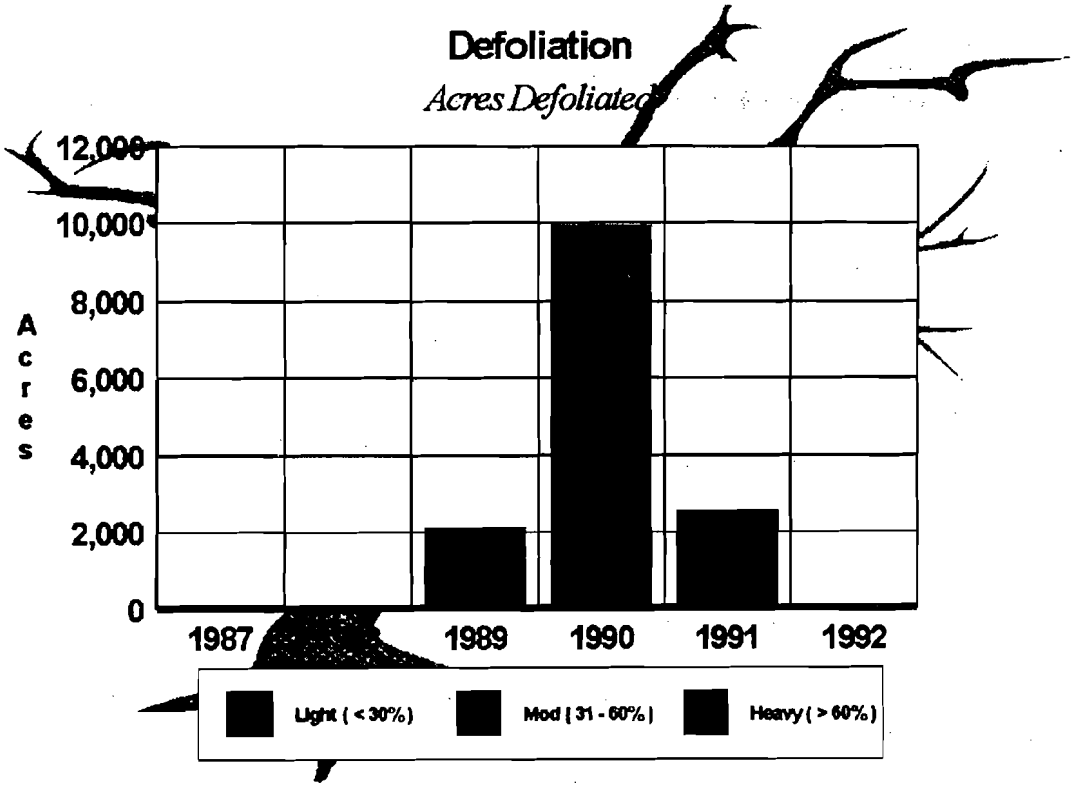
For more information on the major symptoms and known causes associated with declining spruce-fir health see *Damage Agents Associated with Visual Symptoms on Red Spruce and Balsam Fir in the Northeastern United States.*

Insect and Disease Monitoring

Forest vegetation on the White Mountain National Forest has been monitored for insect and disease damage using aerial surveys since the 1960s. The surveys are conducted by Forest Health Protection specialists from the Durham field office of the Forest Service State and Private Forestry. Aerial surveys are followed by ground examinations to determine the cause of any injury detected from the air.

Large-scale defoliation is usually caused by insects, with the most important insect defoliator being the gypsy moth. Although the gypsy moth is an introduced insect, it has been present on the Forest for decades, probably since the 1920s. Gypsy moth populations typically reach high levels every 7 to 10 years and primarily affect oak stands in the southern and western edges of the Forest. The oak stands make up only a small portion of the Forest but are important as shelter and food for wildlife, for shade in some recreation areas, to maintain species diversity and as an economically-valued timber species. Gypsy moth populations last peaked in 1981, when 11,000 acres on the Forest were defoliated. No defoliation was visible from the air from 1984 to 1987.

The acres of defoliation from 1987 to 1992 are shown below:



Aside from the gypsy moth, most tree injury in recent years has been due to the weather. During the winter of 1992-93, for example, "winter injury" (frozen foliage) of spruce occurred on 77,000 acres. No large areas of tree mortality have resulted from winter injury in recent years, but large areas of high elevation spruce died in the 1960s, and winter injury is strongly suspected as a major part of the cause. In addition, frost and hail injury to hardwood foliage occurs sporadically, usually on areas of a few hundred acres.

The monitoring efforts reveal that weather injuries and defoliation by other insects occur sporadically, but only gypsy moth can be expected to appear in a regular, almost predictable manner. Few oaks have been killed by gypsy moth so far, but many were severely injured (i.e., dieback of large branches) in the 1989-91 outbreak.

In spite of the occurrance of localized problem areas from time to time over the last decade or so, overall the forest appears to be in good condition. Most of the oaks that were affected by gypsy moth defoliation are now recovering. In 1993, spots of insect defoliation, 20 to 500 acres in size, occurred in the northern hardwood forest type; however, no serious consequences should result. Some winter injury damage on red spruce occurs almost annually at the higher elevations, but there is no evidence of recent widespread rapid mortality.

Visual Resource

by

Tom Kokx, Visuals and Landscape Program Leader

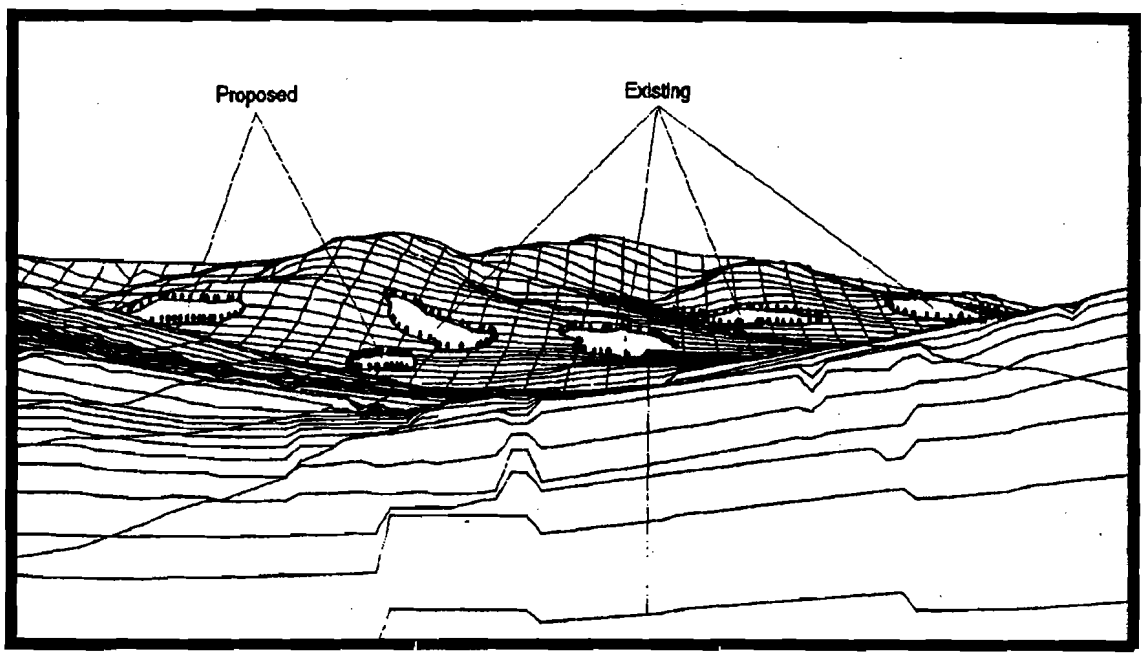
The Forest's goal for the visual resource is to conduct all it's management activities with full recognition of the appearance of the Forest, realizing the importance to society of a natural landscape distinct from the man-made environments otherwise dominant in the East. To help achieve this goal, Visual Quality Objectives (VQO's) were established for the entire Forest during the Forest Planning process. Forest Plan direction also states that VQO's will be met by applying the principles outlined in the National Forest Landscape Management Handbook Series. More specific standards and guidelines were developed for even-aged management practices on the Forest and are included in the appendix of the Plan. There is also a maximum size limit of 30 acres established for clearcuts.

Monitoring Requirements for the visual resource state that the Forest will monitor the effects of management activities with respect to Visual Quality Objectives with the intent of indicating how well VQO's and related standards and guidelines are being met. The monitoring technique is to be through annual evaluation of sample vegetation manipulation as well as other management activities and through monitoring of public response. Threshold for further investigation is when effects of management vary from the intended VQO and does not meet the intended objective and/or public complaints indicate more than personal dissatisfaction with results.

Monitoring of the visual resource and achievement of Visual Quality Objectives is a regular and on-going part of all management activities and project planning. On those projects where the Forest Landscape Architect is included as part of the Interdisciplinary Team or is identified through special request, planning and analysis often include simulation with the use of computer graphics. These computer applications are used on most vegetation management activities to evaluate both the current project proposal and the visual cumulative effects (see illustration). Our ability to evaluate cumulative effects is accomplished by including existing cut units in the simulation models developed for the project.

During project planning, Districts identify new field data that frequently requires updating of the VQO's. Generally, these adjustments relate to identifying additional view points for analysis of the project. This is especially true for those areas that have experienced residential development since completion of the original inventory. Awareness of the concern over clearcutting has lead to reduced clearcut acreage or identification of

alternative prescriptions for many projects. These adjustments often lead to achieving higher standards. In addition, the scoping process allows identification of visual concerns by the public. Visual simulations give us the ability to relate expected effects of projects to the concerned public and frequently lead to an agreed upon alternative solution to project prescriptions.



Timber Harvest Simulation

Visual resource management data (View points, sensitivity levels, variety class, resulting VQO's, and appropriate field information), analysis, and recommendations for individual projects are documented and stored for reference. Final documentation of visual analysis and recommendations is in the project file maintained by the appropriate field unit.

On-going monitoring on a project by project basis indicates that the Forest is achieving the desired Visual Quality Objectives. In some cases, projects related to timber harvesting are being designed to meet even higher standards and guidelines than those outlined for the adopted VQO. Monitoring of past management activity has identified some viewsheds where visual cumulative effects are more significant. In some viewsheds, the cumulative effect is compounded by past timber sales which include clearcut units that were implemented prior to the current Forest Plan and utilized different standards and guidelines. This has created openings that are very observable today and have to be taken into account in assessing total effects within a viewshed. However, these effects will pass out of the picture over time. Viewsheds where significant and visually evident activity is occurring

are Kilkenny Unit, Zealand Valley, east of Hedgehog Mountain, the area between Highway 3 and Garfield Ridge, and the Jefferson Valley area east of Highway 115.

A Management Team review by the Forest in 1989 included a field visit to Middle Sugarloaf Mountain which provides views into Zealand Valley and toward the north to Cherry Mountain and the Dartmouth Range. Results of this review and the observed vegetation management activity raised many questions related to visual cumulative effect and lead to a Forest action item to work with research to help obtain solid data on user preference related to this concern. In 1991 the Forest entered into a research partnership with the North Central Research Station (Chicago) and State University of NY (Syracuse) to work on this issue. The goal of the research project is to help us better understand viewer response to visual cumulative effect and help in the design of multiple unit, multiple timber sale activities that produce opening contrast in the landscape over time. This includes both clearcuts under even-aged management and group cuts under uneven-aged management. It is anticipated that the results of the work, which is still continuing, will lead to more inclusive standards and guidelines for visual cumulative effect than what is currently available. One factor being evaluated is whether the current level of regeneration acreage called for in the Forest Plan can be achieved over several entry cycles while still achieving desired visual effects. Results of the project are expected in the fall of 1994.

Monitoring of visual cumulative effects related to vegetation management projects has led to more in-depth evaluations from identified viewpoints. Field checks have become more frequent as potential effects are identified from graphic simulations. Computer evaluations can show all past units but not necessarily the regrowth that has occurred overtime. Field verification of the simulations provide a good bases for final decisions on prescriptions to be applied to current projects. In some cases, desired clearcut acreage based on habitat analysis has been reduced to achieve visual objectives and to keep the project in line with acceptable cumulative effects.

Based on results of the Visual Cumulative Effects Research Project, there may be a potential need to develop and incorporate into the Forest Plan visual standards and guidelines for vegetation management activity involving multiple units implemented over time.

Monitoring of other than vegetation management projects has related to construction/reconstruction or rehabilitation of recreation projects, expansion of powerline ROW's, placement of electronic relay towers, downhill ski area developments, and road/highway related projects. Overall, Visual Quality Objectives and standards and guidelines as presented in the Forest Plan are being met.

Fisheries/Aquatic Resources Monitoring

By
Kathryn Staley, Fisheries Program Leader

General direction and Standards and Guidelines for management of our fisheries and aquatic resources are identified in the Forest Plan and Fisheries Amendment to the Plan, dated November 7, 1989. The Fisheries/ Aquatic Resources Program of the White Mountain National Forest includes the following areas of emphases: (1) membership and full participation in the New England Atlantic salmon restoration effort, (2) anadromous and inland fish habitat improvement planning and implementation, (3) Forest Plan monitoring, (4) development of opportunities for recreational fishing, aquatic interpretation and education, (5) interagency coordination and cooperation, and (6) support to all other Forest resource programs as needed.

Management objectives for our fisheries/aquatic resources include the following:

1. Protect the quality and quantity of productive fish habitat that currently exists on the White Mountain National Forest.

2. Restore degraded fish habitat (identified during Stream Inventory), especially in streams where native Eastern brook trout populations are known to exist, or juvenile Atlantic salmon are stocked for rearing.

3. Restore Atlantic salmon to the Connecticut, Merrimack, and Saco River basins.

This report summarizes that portion of the Aquatic Resources/Fisheries Program which focuses on Forest Plan Monitoring. A summary of all the components of the Program has previously been documented in the "Annual Report, Fisheries/Aquatic Resources, White Mountain National Forest 1992" available from the Forest Supervisor's Office.

Scope of Work

The land management activities which are most likely to affect fisheries/ aquatic resources are those which affect watershed condition in general and stream/riparian habitat condition in particular. These include location and use of both developed and dispersed recreational sites/activities, timber harvest, vegetation management in riparian zones, road maintenance and construction, habitat improvement projects, and water impoundments or withdrawals. These activities may result in soil compaction, surface erosion

of sediments to streams/ponds, degradation of riparian vegetation, and/or inadequate or sporadic stream discharge. These direct effects lead to additional indirect adverse effects including increased water temperature, decreased dissolved oxygen, substrate embeddedness, channel instability, and decreased habitat complexity.

The fisheries/aquatic resources monitoring program includes (1) stream and pond inventory of baseline data for the determination of present condition of aquatic habitat, (2) habitat condition and fish population monitoring in "control" sites and project sites potentially impacted by various land management activities, and (3) index site monitoring to assess Atlantic salmon fry survival.

Monitoring Activities and Results

1. Current condition of aquatic habitat.

Wetlands. All wetlands on the Forest were inventoried and mapped during 1988-89, and this information is used during project planning and implementation to assure wetlands are protected. Beginning in 1992, the Pemigewasset and Saco Ranger Districts have mapped vernal pools located at or near timber sale projects, in order to afford them adequate protection.

Ponds. Riparian and littoral habitat inventory of ponds was initiated in 1986 and will continue through the cooperative efforts of New Hampshire Fish and Game (NHFG), White Mountain National Forest (WMNF), and New Hampshire Department of Environmental Services (DES). Data collected provides information on current baseline conditions, including tropic status and impacts of acid deposition, long-term trends, water quality compliance, and aquatic plant distributions. These data are reported in "New Hampshire Lakes and Ponds Inventory" volumes, published by DES annually. Beginning this year, we are also assessing condition of riparian habitat of ponds located on the Forest, including recreational impacts, and accessibility.

Streams. Since its initiation in 1987, the stream inventory program of the Forest has evolved from one which provided data specific to Atlantic salmon habitat to one which now provides baseline data on aquatic species habitat and riparian/watershed condition. Stream channel characteristics such as amounts of instream large woody debris, substrate size, degree of substrate embeddedness, channel stability, percent spawning area and ratios of different habitat types (pools, riffles, glides, cascades) must be within certain standards to insure adequate habitat for healthy populations of fish and aquatic macroinvertebrates. These channel characteristics are assessed by the Stream Inventory. Amount of large wood that is potentially "recruitable" to the stream channel is monitored during Interdisciplinary Team project

planning. A summary of stream inventory procedures and reports completed to date follows:

1987 - 1988: Stream Inventory, using Transect Method developed by USFWS, Maine Department of Inland Fisheries and Wildlife, Maine Atlantic Sea-run Salmon Commission. This methodology provided data about Atlantic salmon spawning and rearing habitat in particular. Data and results of these inventories are reported in the following reports, on file in the Forest Supervisor's Office.

> "Atlantic Salmon Habitat Surveys for 15 Streams of the White Mountain National Forest, 1987"
>
> "Atlantic Salmon Habitat Surveys for 12 Streams of the White Mountain National Forest, 1988"
>
> "Atlantic Salmon Habitat Assessment, Saco Ranger District, White Mountain National Forest, 1988"

1989 - present: Beginning in 1989, stream inventories were completed using a basin-wide approach for estimating total habitat area (Hankin and Reeves, 1988). Key habitat parameters measured included pool quality and quantity, and amount of large woody debris. In 1990, amount of hiding cover available was also assessed during the inventories. In 1992, additional parameters such as streambank stability, percent canopy cover, and type of riparian vegetation were added to the inventory.

To date, about half of the approximate 900 miles of fish-bearing streams on the Forest have been inventoried to some degree. Baseline habitat condition data of particular importance to Forest Plan monitoring have been summarized and are available from the Forest Supervisor's Office.

Water temperatures were collected on all streams inventoried in 1992 and 1993. Water temperatures of most streams monitored to date are within Forest Plan standards for Atlantic salmon, and most are within the standards for Eastern Brook trout. Canopy cover in Forest streams is generally high and vegetation management in riparian areas has followed standards and guidelines (as shown in timber sale monitoring reports). Those streams where temperatures may exceed optimum for salmonids include wider rivers such as the East Branch of the Pemigewasset River, mainstream Pemigewasset River, Mad River, Baker River, Wild Ammonoosuc River, Bowen Brook, Deception Brook, and Ammonoosuc River. July maximum temperatures exceeded 75 degrees for at least one day in July in all of these streams.

Stream Inventory data collected to date indicates pool habitat, hiding cover and spawning habitat is limited in many White Mountain National Forest streams. This may be due to a lack of adequate instream large wood which serves to form pools, trap sediments, and provide channel stability. Eastern brook trout require pool habitat for hiding cover, and most importantly for over-winter survival. The resident fisheries/aquatic resources habitat improvement program concentrates on projects which will enhance pool habitat and increase amount of large wood in those streams where these habitat features are lacking and where native brook trout populations are known to be present. Projects which improve Atlantic salmon habitat focus on increasing habitat complexity and juvenile over-wintering habitat areas. Based on stream inventory data compiled to date, it is recommended that habitat improvement projects for both resident and anadromous fish continue to move stream habitat conditions closer to the desired future condition.

Beginning in 1993, data were collected which attempt to quantify degree of substrate embeddedness in potential Brook trout and Atlantic salmon spawning areas of inventoried streams. Prior to this time, embeddedness was assessed only qualitatively. Evaluation and reporting of this data will be completed in the spring of 1994. In addition, collection of benthic macroinvertebrates in selected stream riffles will begin in the fall of 1993. Quantity and diversity of aquatic insects will help us to assess overall stream ecosystem health and trends in aquatic diversity.

In 1992, stream inventory crews initiated monitoring of riparian-dependent amphibian and reptile species on the Saco District. Seven species of frogs/ toads, 5 species of salamanders, and 2 species of aquatic snakes were found to be present in stream corridors and/or adjacent riparian areas. This information has been incorporated into NHFG databases which will serve to provide information regarding trends in overall riparian species diversity.

2. Habitat condition and fish population monitoring.

The Forest Plan lists brook trout (Salvelinus fontinalis) as a management indicator species (MIS). Population monitoring and/or habitat condition monitoring will allow us to evaluate effects of land management activities on Eastern brook trout, and threatened, endangered, or sensitive (TES) species habitat. Sunapee trout (Salvelinus alpinus oquassa) are the only TES species that may potentially inhabit deep, oligotrophic lakes on the Forest. All other fish species on the Forest (e.g., dace, sculpins, suckers) are indirectly monitored for presence and absence, during the course of population monitoring. Fish population monitoring has been and will continue to be a cooperative effort with the U.S. Fish and Wildlife Service (USFWS) and NHFG.

Brook trout distribution surveys have been conducted at several sites on the Forest, including most ponds, Evans Brook, Upper Ammonoosuc River, Slippery Brook, Zealand River, Gale River, and Wild River. This MIS has been found to be present at all streams monitored, including those where Atlantic salmon index sites are located.

Ponds. The only pond/lake within the Forest boundary found suitable for Sunapee trout is Sawyer Pond. This species was originally endemic to New England, preferring deep oligotrophic lakes. Introductions of lake trout eliminated this species through hybridization. Sawyer Pond was the site of introduction of Sunapee trout in 1946-47, and 1953. Fish population sampling by the U.S. Fish and Wildlife Service at Sawyer Pond in 1958, 1968, 1973, and 1979 failed to capture any individuals of this TES species. NHFG surveyed Sawyer Pond for this species in 1990 and found none present. Management objectives for Sawyer Pond include protection and maintenance of habitat suitable for Sunapee trout in the event re-introduction is ever attempted.

In 1988, the Saco Ranger District conducted a Pond population survey on 6 ponds. Healthy populations of Eastern brook trout were found in Lily Pond, Flat Mountain Pond, Falls Pond, Mountain Pond, Sawyer Pond, and Little Sawyer Pond.

In 1993, population surveys were conducted on several ponds located on the Forest, in coordination with NHFG or Maine Division of Inland Fisheries. Results of these surveys will be available in the spring of 1994.

Streams. Population monitoring (to assess age-class structure and trends in population size) for Eastern brook trout was initiated in August 1993 at 10 control or project sites across the Forest. Population surveys at these sites will be conducted annually to establish trends in trout and non-game species population dynamics and to monitor changes in fish assemblages. Initial results of this population monitoring will be reported in 1994.

Water quality parameters such as temperature, pH, and alkalinity, are critical to aquatic ecosystems and the species that inhabit them. Land management activities can directly affect stream temperatures and dissolved oxygen which can lead to habitat deterioration and decreased fish abundance and aquatic species diversity. Stream temperatures are monitored at control and project sites and during stream inventories. As of 1993, other water quality parameters (dissolved oxygen, pH, alkalinity) are monitored at project and control sites in concert with fish population surveys.

3. Index site monitoring - Atlantic salmon.

Atlantic salmon (Salmo salar) index site monitoring of parr abundance is conducted annually in headwaters of the Connecticut and Merrimack Rivers. Data from this effort is used to evaluate year class strength, success of the fry stocking program, and potential smolt production. In addition, monitoring of smolt outmigration is conducted at Ayers Island and Eastman Falls Dam, in coordination with USFWS. Results of these monitoring efforts are reported annually (see McKeon et al., 1993).

Project Monitoring

Monitoring of habitat improvement project success began in 1991 on Slippery Brook, and continued with pre-project monitoring at the Evans Brook and Zealand River Habitat Improvement Projects implemented in the summer of 1993. Structure sites are monitored for changes in pool quality, changes in overall abundance of fish species, and condition of species present.

Slippery Brook Habitat Improvement Project. Channel cross-sections were completed on one of the deflectors installed in Slippery Brook in 1992, and visual assessments of the structures were completed in 1992 and 1993. Project objectives of narrowing the stream channel and increasing pool area are being met at present. Population surveys were completed in 1992 and will be completed in 1993.

Gale River Habitat Improvement Project. Structures constructed in 1989 were monitored for pool quality, including water depth and instream cover. To date, instream cover is still limiting to salmonids, but pool depth has increased slightly.

Upper Ammonoosuc Habitat Improvement Project. Structures constructed in the years 1990-1992 were monitored at photo points only in order to visually assess structure maintenance needs. To date, all structures are intact and functioning to provide additional hiding cover for salmonid species. Population monitoring in 1993 indicates high species diversity (fish species present include Eastern brook trout, slimy sculpin, blacknose dace, longnose dace, white sucker, longnose sucker, chain pickerel, and burbot), but minimal numbers of brook trout.

Evans Brook Habitat Improvement Project. Pre-project monitoring included water temperature monitoring, fish habitat and population monitoring, and cobble embeddedness. Project implementation will begin in late August 1993.

Zealand River Habitat Improvement Project. Pre-project monitoring included water temperature monitoring, habitat and fish population monitoring, cobble embeddedness and benthic macroinvertebrate monitoring. This baseline information will be used to assess success in meeting the objectives of the project

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Program for Endangered and Threatened Species, Wildlife, and Plants

by

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The monitoring and evaluation process for the endangered and threatened species, wildlife, and plant program on the White Mountain National Forest consists of two parts: 1. assessment of habitat requirements and availability and 2. assessment of the current status of selected species using population trend estimates or other measures of a given species' response to habitat parameters. These two components are used to determine the effects of Forest Plan implementation on the viability and diversity of the plant and wildlife communities on the Forest.

The information that must be gathered in order to estimate habitat availability or provide population data is extensive and must be gathered over a long term. Most of the population sampling has been conducted using a protocol developed by the Committee of Scientists. The Committee itself is a partnership composed of representatives from various universities, research facilities, state agencies and private organizations. Additional population data is collected by other state or private organizations and shared with the Forest. The population data is managed under a cooperative project with the New Hampshire Fish and Game Department using a wildlife and habitat data base established by that Agency.

Most of the habitat related information is collected by personnel on the Forest through an ongoing vegetative inventory. Table 1 summarizes the results of this for 1991 and 1993. These are cumulative assessments of forest community types and where appropriate, ages. The 1993 results are current as of this fall. The same information exists for 1984 as a benchmark for the conditions which existed prior to implementation of the Forest Plan. It is not electronically available, and we have not yet summarized it. In the meantime, we have summarized the acres of regeneration age (0-9 years) by community type (e.g., northern hardwood) as they existed in 1984 (See Table 1). We chose to summarize this data because it is immediately relevant to some of the discussion about individual species. In practice, all this inventory information reflects our best estimate of conditions, and it is always subject to some interpretation, or change, as new information becomes available.

The habitat information is supplemented through the use of data compiled by other agencies, including wetland information generated by the US Fish and Wildlife Service combined with site specific wetland data collected through

an earlier partnership with the State of New Hampshire. Habitat inventories are conducted by the States of Maine and New Hampshire wildlife agencies on a cooperative basis. Additional habitat information is accumulated through various ongoing cooperative research projects. Spatial analysis regarding the distribution of ecological capability and habitat potential is being conducted through a cooperative agreement with the University of Vermont. An inventory of rare plants, or vegetative communities, and identification of key habitat requirements for the plants that are of primary concern is being conducted through a cooperative agreement with the Natural Heritage Inventories in Maine and New Hampshire and the Nature Conservancy.

Plant and wildlife monitoring is oriented toward four separate objectives each individually described as follows. The monitoring of an individual management indicator species (MIS) may contribute to more than one of these categories. Following this overview is specific information on monitoring by MIS.

There is monitoring for Federally threatened and endangered species which require close individual attention. This is designed to follow progress toward meeting recovery plan objectives. In this discussion there are some State threatened and endangered, and Region 9 (Eastern Region of the USFS) sensitive species.

There is monitoring of other species considered representative of certain habitats, or communities. This work is designed to provide a basis for determining the trends in species and habitat on the White Mountain National Forest over time so we may evaluate progress toward meeting the standards, guides and objectives of the Forest Plan. It is done on a sampling basis for both species occurrence and habitat availability, and is more general in nature.

There is monitoring aimed at validation of the strategy for wildlife management in the Forest Plan. This seeks to compare managed, unmanaged, and remote areas reflecting different degrees of, and proximity to, planned vegetation management. This is also done on a sample basis and is designed to assess the overall changes in species abundance, and vegetation, in the areas as a whole. This consists primarily of the Scientific Committee work including permanent plots and directed searches. It will provide a statistical evaluation of determining population shifts in given species over time. If an adverse trend is detected, further investigation as to the cause is initiated.

And finally, there is monitoring of the effects of project level implementation on certain management indicator species. Each project analysis contains an

estimation of effects on certain species or their potential habitat. The effects projections need to be validated for a selected group of projects on an annual basis.

Management Indicator Species

The National Forest Management Act and subsequent Secretary's regulations require each Forest Plan to identify MIS. They can be selected from one of five categories. 1. Endangered and threatened plant and animal species identified on State and Federal lists for the planning area. 2. Species with special habitat needs that may be influenced significantly by planned management programs. 3. Species commonly hunted, fished or trapped. 4. Non-game species of special interest, and 5. Additional plant or animal species selected because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality.

The 1986 Forest Plan identifies 22 individual MIS under the above categories. In addition, there are other species which fall in the endangered, threatened and sensitive category and are dealt with in groups. The remainder of this report deals with specific information regarding these species.

Category 1 Management Indicator Species

Identification, management and monitoring of management indicator species is established through the Endangered Species Act, National Forest Management Act, White Mountain National Forest Land and Resource Management Plan, and the states of New Hampshire and Maine, and the Regional Forester (Region 9) Sensitive Species list.

Monitoring activity varies from close observation of individual members of a species, such as peregrine falcon, to the development of predictive habitat models used in broader assessment of communities or other ecological classifications.

Project level monitoring may be as specific as formal scientifically designed studies set up to evaluate project implementation effects or more informal periodic site visits at varying times after project completion. Groups of similar projects may be monitored or evaluated collectively

Peregrine Falcon: Following the Endangered Species Act and the National Forest Management Act directives, monitoring for the peregrine falcon centers around the existing recovery working group's plan through a multi-phase cooperative effort between the US Fish and Wildlife Service, US Forest

Service, Maine Division of Inland Fisheries and Wildlife, New Hampshire Fish and Game Department and the Audubon Societies of New Hampshire and Maine. Each spring, volunteers coordinated by the Audubon Society of New Hampshire monitor approximately 45 potential nest sites for returning adults. Occupied territories are identified and then continuously monitored by a combination of paid observers and volunteers for incubation, hatching, number of young produced and fledging dates. The young are also banded and subsequently monitored through other efforts across the country coordinated by the US Fish and Wildlife Service.

This program has been ongoing since the first hack (release of captive reared birds) site was established on the White Mountain National Forest in 1976. The first pair to successfully nest in NH since the 1950's did so in Franconia Notch in 1981. Since then the number of nesting pairs has increased to eight in New Hampshire and at least two pairs in the vicinity of the Forest in Maine. Eleven young were produced by the pairs in NH in 1993. Two of the nests were on the Forest (3 young) and three others are adjacent to the Forest (Table 2).

Peregrine falcons have been gradually increasing across all of New England and the Northeast. The members of the Northeastern recovery subgroup believe that there will continue to be a gradual increase and that the status of this species will eventually be downlisted to "threatened."

Any proposed projects that are planned within the boundaries of the Forest are evaluated for possible effects, positive or negative, on potential or occupied peregrine falcon nesting sites. If any effects are identified, informal consultation with the US Fish and Wildlife Service is initiated according to Section 6 of the Endangered Species Act. Formal consultation was requested and conducted on the implementation effects of the current Management Plan for the Forest.

Dwarf Cinquefoil: Following the directives in the Endangered Species Act and the National Forest Management Act, primary direction for the dwarf cinquefoil comes from an established recovery plan developed for this federally listed endangered species. Various aspects of monitoring this plant population have been ongoing since the late 1960's.

The natural habitat for this species occurs in a few locales above timberline on the Forest. The main habitat location lies under a Forest Supervisor's Closure Order. The area is patrolled by enforcement personnel under the direction of the District Ranger, Ammonoosuc Ranger District, and anyone without a valid entry permit is denied access.

Other monitoring tasks outlined in the recovery plan are being carried out through a cooperative agreement with the US Fish and Wildlife Service and the Appalachian Mountain Club. These include periodic counts of individual plants in the existing colonies along with a count of juvenile plants and seed production estimates in order to evaluate reproductive success. There is also a project underway using greenhouse reared plants grown from seed collected at the existing colonies. Once transplanted, these plants are monitored periodically to determine the projects success and to evaluate various transplanting techniques.

These efforts show that the core population is stable or slightly increasing. Results from the transplant project is variable with some sites responding well, and others not. It is probably too early in the life of this part of the project to make an accurate determination of its success. (Full progress reports are available for review at the Supervisor's Office).

Small Whorled Pogonia: Primary monitoring direction for the small whorled pogonia will come from the existing recovery plan developed for this federally listed endangered species following directives in the Endangered Species Act and the National Forest Management Act.

The small whorled pogonia was discovered on the Forest in 1993. The discovery was one of the results from a cooperative project with the New Hampshire Natural Heritage Inventory, now in its third year. The project was designed to survey the Forest for rare plants and communities and develop predictive models for them. At present there has been no monitoring activity for this plant since it was not known to be present. We are currently screening the Forest for any areas containing the habitat parameters described in an existing habitat model for this species. Site specific searches will be conducted in all the identified sites. All projects currently in operation that include sites with the identified habitat parameters have been suspended until searches can be made. Searches have been made on several projects to date.

There are no monitoring results to date. The habitat for this species as described by the existing model is not extensive on the Forest.

Once the site specific searches have been completed, a more complete evaluation of the potential situation for this plant can be made.

Canada Lynx: The Canada Lynx is listed as Endangered in the State of New Hampshire and is on Regional Forester's Sensitive Species list. It is of particular concern because it is the only species identified in the Forest Plan whose viability is at risk on the Forest.

Monitoring activity takes place in two ways. First, we identified the "core lynx habitat zone" in the Forest Plan. We then set up a management standard which requires that we do not exceed three quarters of a mile of trail per square mile of habitat in the core area. This is intended to keep human disturbance levels at or below the levels when lynx were known to use the area. We also designated the snowshoe hare, the primary food source for lynx, as a Management Indicator Species and set vegetative composition objectives within Management Areas 2.1 and 3.1 to provide habitat for the snowshoe hare. Standards and guidelines pertaining to vegetative composition objectives are tracked through our vegetative data base. Trail densities within the core area are monitored by assessing the effect of any proposed trail addition within the core area. If the additional trail exceeds the three quarter mile rule it will not be built.

Second, we also are attempting to monitor the animal itself and have conducted two directed searches in the core habitat within the past 5 years. The first search was a cooperative project with the NH Fish and Game Department and the University of New Hampshire. The second was a different cooperative project with Syracuse University and the NH Fish and Game Department. The project with Syracuse was in conjunction with their efforts to introduce and monitor lynx in the Adirondack Mountains in New York State. As part of that project, survey techniques were designed for the Forest. We also developed a report form for lynx sightings that was, and still is, distributed at various winter visitor contact stations across the state. We are also, in conjunction with our Scientific Committee wildlife monitoring project, conducting annual winter track censuses in portions of the core lynx area (Table 3).

Neither of the two cooperative winter tracking projects nor the Scientific Committee track census work have located a lynx. Five report forms for lynx have been received in the last 4 years. None have been verified; however, at least one of these reports is considered to be a valid sighting. Snowshoe hare populations in high elevation areas were assessed as part of the Syracuse study. The supply of hares was judged as adequate to sustain a lynx population. Hare populations also occur in varying numbers in the vegetatively managed portion of the Forest. See the MIS report for snowshoe hare for more details. Trail density remains at or below three quarters of a mile per square mile of core habitat. Vegetative composition for hare habitat is progressing slowly toward management objectives (Table 1).

Lynx are probably no longer continuously present on the Forest, nor do we believe that there is a breeding population. The conclusion that the Syracuse report came to was that there is probably an occasional wanderer passing through the area. The Syracuse report also suggests that the Forest might not be, or never was, a large enough area to sustain a lynx population

independently (report available for review at Supervisor's Office). At present, the Forest is continuing to hold to its standards and guides until a final determination can be made as to the advisability of maintaining lynx habitat in the future. An attempt to form a lynx group with members from the Northeast and Atlantic Provinces to determine what the future may hold for lynx is ongoing.

State Threatened or Endangered and Region 9 Sensitive Vertebrates

Listed here are vertebrate species that have not been covered individually in this report but have been identified as endangered or threatened at the State level or are included in the Regional Forester's Sensitive Species list and are thought to occur on the Forest (list is available for review at Supervisor's Office).

Monitoring activities include the following:

1. Directed searches in specified habitats using the Scientific Committee protocol or other accepted methods. These searches may be conducted by volunteers coordinated by the Forest Service and the Audubon Society of New Hampshire; by seasonal biologists while conducting searches for small mammals, reptiles, amphibians or birds in wetlands, high elevations and other specified areas under the Scientific Committee monitoring project, or while conducting winter track surveys (Tables 2,3,4,5).

2. Data collected by the States of New Hampshire and Maine or by projects directed by other agencies or groups. This would include furbearer data, census route information and breeding bird or Christmas counts.

3. Data relative to the available habitats for these species is contained in the vegetative information data base.

4. Applicable research projects conducted on or in the vicinity of the Forest. These can be either cooperative projects or independent work. Two such projects are associated with bats. There are currently two Masters degree candidates investigating the species of bats that occur on the Forest and their habitat preferences. We expect to determine whether any of the special concern bats use the Forest, and if so, what habitat is being used by them as a result of this work.

At this point in our monitoring process we are still in the mode of establishing baseline data concerning the habitat availability for each species and their distribution and relative abundance within their preferred habitats. Trends identification will be based on longer term data than the 2 years currently available for species such as bats.

It is too early in the process to begin to evaluate trends in these species. Our vegetative data base is not yet detailed enough to make accurate thorough searches in the data base for potential habitat required by each species. We have established the necessary data gathering protocol and are beginning to implement it. We are collecting species occurrence data by means of our small mammal, reptile and amphibian sampling and our winter track census work. We have found in past research efforts that the degree of rarity in some species may be more related to difficulty in capturing the animal rather than the animal being truly rare. We expect to find other species for which the phenomenon holds true as we refine our capture techniques.

All proposed projects are screened for any possible effects on the potential habitat for these species. The habitat parameters are described for each species in a species/habitat relationship publication written by DeGraaf et.al. The title is *"New England Wildlife: Habitat, Natural History and Distribution.,"* General Technical Report NE 108, Northeastern Forest Experiment Station, USDA, 1986 Forest Service. There is also information in *New England Wildlife: Management of Forested Habitats.* General Technical Report NE-144, 1992. Many of the species/habitat relationships described in this publication were derived from research work conducted on the Forest. As part of each project review, habitat elements required by these species are routinely looked for, and if found, adverse effects are mitigated during the project formulation process. In addition, management standards and guidelines have been established by vegetative community (habitat) and by management practice in the Forest Plan. The standards and guides for wildlife habitat elements were designed to protect or provide habitat elements for the above species. Project reviews routinely include the verification of adherence to the standards and guides.

State Threatened and Endangered and Region 9 Sensitive Plants

These are the plant species identified under the Regional Forester's Sensitive Species list or as Endangered or Threatened in the States of Maine or New Hampshire that are thought to occur on the Forest. (list available for review at Supervisor's Office).

The primary monitoring of these species consists of verifying their presence, documenting their present locations and identifying their habitat requirements. This is currently being done primarily through working agreements with the Nature Conservancy and the Maine and New Hampshire Natural Heritage Inventory groups. The agreements include verification of site documentation and searches for new sites combined with the development of predictive models based on habitat parameters. Once the models have been completed and tested, we should be able to screen our ecological and vegetative data bases for potential habitat or plant locations

affected by proposed projects. If a potential habitat is identified, site specific searches can be scheduled and conducted to coincide with the easiest time to find the plant, which is usually while it is flowering. The Forest has an informal relationship with the New England Wildflower Society which allows the exchange of pertinent botanical information including some knowledge of species trends. The Forest has been historically heavily botanized and there are numerous professional and amateur botanists who spend time on the Forest pursuing their interest. We receive reports from these sources on an informal basis. Baseline vegetative inventories, conducted throughout the growing season, have been completed on three of our Research Natural Areas. This work is being accomplished through the Northeastern Forest Experiment Station. An assessment of the alpine plants has been completed. (Storks and Crow, 1978).

While the cooperative projects with Maine and New Hampshire are not yet completed, interim reports have provided site specific information regarding possible effects on plants or plant habitat in proposed project areas. No species habitat models have been developed yet, with the exception of the one described in the section pertaining to Small Whorled Pogonia.

The status of the alpine plants and their habitat has been described. The cooperative work on plants on the Forest is ongoing and will be, when completed, an effective tool for monitoring.

The cooperative work with Maine and New Hampshire Natural Heritage Inventory programs has resulted in several site specific searches in areas with proposed projects. Documentation regarding plant occurrence or potential habitat has been included in the effects analysis of many projects. Projects have been modified or appropriate mitigation measures have been taken as a result of these analyses.

Category 2-5 Management Indicator Species

The following Management Indicator Species include the remaining categories of species with special habitat needs that may be influenced significantly by planned management programs; species that are commonly hunted, fished or trapped; non-game species of special interest; and additional plant or animal species selected because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality. The Forest Plan identifies 20 management indicator species which fall in the remaining four categories. Each of these species is representative of a particular community or community component, the sum of which represents the desired diversity mix in the Plan.

Monitoring for these species includes habitat availability assessments and population trend assessments. The habitat availability assessments are based on specific vegetative and ecological parameters, such as forest type, age class and Ecological land type or habitat, that are identified in the Forest vegetative data protocol. Habitat suitability analyses for game species is also collected on a cooperative basis with Maine and New Hampshire wildlife agencies and other cooperators.

Population trend information comes from a variety of sources. The Forest has been working with a Committee of Scientists to develop and implement a protocol for determining population trends in selected species. The methodology includes point counts for avian species, directed searches for rare species, winter track counts and sampling for small mammals, reptiles and amphibians. (Copy of the protocol available for review at Supervisor's Office). In addition, data on game species population trends is routinely collected and shared by the Maine and New Hampshire wildlife agencies. Other groups routinely monitor species such as the common loon, osprey or other special interest species. (Copies available for review at Supervisor's Office). This data is also incorporated into the species assessment work. Research projects on the Forest are also being conducted on a variety of species or habitat preferences. Often these projects contain information on the presence, abundance or distribution of one or more of the Management Indicator Species. Other projects such as Christmas Bird Counts, Breeding Bird Surveys or recently completed Atlases also are an information source as well as incidental or informal sighting reports.

The Scientific Committee began its work in 1988 and the resulting protocol has been in place since June of 1992. We are currently in the second year of point counts and have completed one round of winter tracking and small mammal, reptile and amphibian sampling (Tables 2,3,4,5). Many of the cooperative efforts have been ongoing for many years and trend data for certain species is better documented. Habitat and ecological information has been collected to a variety of standards over the years. Vegetative trends are trackable in some cases but not uniformly so, making the assessment of habitat availability difficult in some cases.

The results for each management indicator species will be discussed in more detail in the individual accounts. Species and habitat evaluations will be discussed on a case by case basis in this report. An overall assessment of the situation regarding population trends in the selected management indicator species can be summed up as follows.

In general, the species that require early successional habitat or young forest conditions are decreasing in number as the habitat availability decreases. The change in habitat availability is partly reflected in Table 1 where

between 1991 and 1993 the total acres of regeneration age class is beginning to decline depicting a changing emphasis toward uneven-aged silvicultural practices which does not create the above mentioned habitat. Some species affected by these changes, which are discussed in detail in the remaining part of this report, include chestnut-sided warbler, mourning warbler and ruffed grouse.

Forest fragmentation does not appear to be a significant problem. In the past 2 years, a total of six cowbirds were detected during the point counts and wetland inventories. Cowbirds are usually used as an indicator of forest fragmentation. Conversely, ovenbirds were found on over 90 percent of the point count plots. Ovenbirds are commonly regarded as a forest interior species. The conclusions of several current or recent research projects support the Scientific Committee monitoring data. These include: 1. *"Wildlife Use of Log Landings in the White Mountain National Forest,"* Tucker, J. W. Jr. MS Thesis, Univ. of New Hampshire, 1992. 2. *"Bird Species Diversity and Composition in Managed and Unmanaged Tracts of Northern Hardwoods in New Hampshire,"* Welsh, J.E.C., Phd. Thesis, Univ. of Massachusetts, 1992. 3. *"Determination of Land Use Practices Responsible for the Presence of the Brown-Headed Cowbird on the White Mountain National Forest in New Hampshire,"* McLellan, T., MS Thesis, Univ. of New Hampshire, 1993. 4. *"Bird Species Richness in Group Cut and Clearcut Harvested Stands on the White Mountain National Forest,"* Costello, C., in progress, and 5. *"The Effect of Clearcutting on Habitat Use and Reproductive Success of The Ovenbird* (Seiurus aurocapillus)," Fahl-King, D.I., Phd. Thesis. Univ. of Massachusetts, in progress. It should be noted that the cowbird/ovenbird proportions reflect a longer history (20 years or more) of more intense even-aged management over a larger area than that presently allowed in the 1986 Forest Plan.

In general, the species that were expected to be present in various habitats within the White Mountain National Forest were present and their populations and distribution appear to reflect the overall habitat availability and distribution across the Forest.

These relationships will be discussed more fully in the following individual accounts.

Osprey: The osprey was identified in Appendix VII-B, Forest Plan as a special concern Management Indicator Species (MIS).

This species is monitored cooperatively through a volunteer program coordinated by the Audubon Society of New Hampshire since the early 1970's. No nesting pairs have been located on the Forest. Ospreys do use some streams and water bodies on the Forest for foraging. Audubon reports are appended to this section (Table 6).

The majority of the nesting habitat available is marginal. Their foraging habitat, consisting of large shallow water bodies or marshes, is also marginal. There is no expectation of significant numbers of nesting ospreys, although a few pairs may establish themselves as the overall osprey population continues to increase throughout its range.

Projects involving wetlands are routinely investigated relative to positive or negative effects on potential osprey habitat, and mitigation is devised as necessary.

Common Loon: The Common Loon is a species identified in Appendix VII-B of the Forest Plan as a special concern Management Indicator Species.

This species is monitored cooperatively through the Loon Preservation Committee in New Hampshire. All water bodies on the Forest that are considered to be potential habitat are monitored annually for territorial or nesting pairs.

The Forest has had one territorial pair for the past several years. Nesting attempts by the pair have failed annually. The cause for nesting failure is unknown. There are annual stopovers by loons on other water bodies in the Forest but no other nesting attempts have been recorded. Loon Preservation Committee reports are appended to this section.

The Forest apparently has marginal habitat for loons. Some of the water bodies on the Forest are of suitable size but may not contain ample forage. The loon population in New England is increasing gradually and more pairs may attempt to nest in the future.

Projects involving water bodies which may have loon nesting potential are routinely investigated relative to their effects on potential loon habitat; and, mitigation is applied as necessary.

Pine Marten: The pine marten is a species identified in Appendix VII-B of the Forest Plan as a special concern Management Indicator Species.

This species is monitored cooperatively through the Maine and New Hampshire wildlife agencies (reports available from these agencies) and through the winter track census prescribed by the Committee of Scientists as part of the Forest wildlife monitoring program. There are also informal reports of sightings by visitors.

The winter track census routes identified four sets of marten tracks (Table 3). Reports from the Maine and New Hampshire wildlife agencies indicate that

there are marten populations north and east of the Forest. Incidental reports are infrequent but help verify the presence of pine marten on the Forest.

The winter track census routes have only been run for one winter. However, the information from that census coupled with the reports from the cooperating agencies and incidental reports, indicate that a small population of pine marten exists on the Forest. This population may have become established due to re-introduction efforts in the mid 1970's or animals may have immigrated from outside the Forest. In either case, it is suspected that the population is slowly increasing.

No project level monitoring is taking place at present.

White Tailed Deer: The white tailed deer is the Management Indicator Species selected for the hemlock community. It fits in the categories of being hunted, fished or trapped, and a species whose population changes are believed to indicate the effects of management activities.

Monitoring activities include winter habitat availability assessments conducted by the Forest Service and the States of Maine and New Hampshire and assessments on population parameters.

Habitat assessments stem from on-site visits by State and Forest Service personnel, and vegetative information collected on the Forest which is used to evaluate habitat suitability and availability. Population parameters are derived from measurements taken from hunter killed animals, accidental kills, on-site estimates and estimates derived from hunter surveys. Winter track census routes conducted in conjunction with the Forest wildlife monitoring project will also be used, once we have several years of data. The track census in the winter of 1992/1993 showed 42 sets of deer tracks out of 3,949 total individual track sets of all 20 species encountered. (Table 3). Population data is routinely collected by both the States of Maine and New Hampshire and is used to set future regulations. Information gained from related research projects is also used as a check on other monitoring information. Two such recent projects conducted by the University of New Hampshire and funded cooperatively by the New Hampshire Fish and Wildlife Department and the Forest Service are: 1. *"Moose Impacts on Browse in New Hampshire Deer Wintering Areas,"* Pruss, M.T., MS Thesis, Univ. of New Hampshire, 1991; and, 2. *"Winter Activity Budgets and Food Consumption of Released White-Tailed Deer in Northern New Hampshire,"* Bock, B.A., MS Thesis, Univ. of New Hampshire, 1993.

In general, based on the existing habitat availability surveys, habitat on the Forest is capable of sustaining a higher deer population than is currently present. Therefore the management strategy has been designed to reduce

hunting pressure and maintain the current habitat distribution with emphasis on winter habitat availability.

Hunting pressure has declined and winter habitat is currently available. The deer herd is slowly increasing, but at a lower rate than expected. Other factors which may have a role in the slower than expected increase may be related to a high predation rate or other unknown entities.

All proposed projects are evaluated according to management standards and guidelines established in the Forest Plan relative to deer wintering areas and wintering populations.

Snowshoe Hare: The snowshoe hare is the Management Indicator Species selected for the regenerating and young portion of the spruce/fir community. It is a hunted species and it is a species whose population changes are believed to indicate the effects of management activities.

Monitoring activities include habitat availability assessments, winter track counts, hunter surveys and incidental observations.

Population estimates based on hunter questionnaires have been made by both the States of Maine and New Hampshire. Both States indicate an upward population trend from a low in 1990. There were 698 sets of hare tracks recorded in the winter track cēnsūs, out of a total of 3,949 sets of tracks made by 20 species. Young and regenerating spruce/fir habitat is probably stable or increasing due to group selection harvesting in softwood stands. The krumholz area of the Forest is stable and provides extensive high elevation habitat for hare. This habitat was evaluated for hare populations in conjunction with the Supervisor's Office habitat assessment for Canada Lynx. Hare populations were found to be adequate for lynx in krumholz areas.

Hare populations are increasing and habitat availability may also be increasing particularly where the Forest is receiving vegetative management. Hares are a species whose populations tend to cycle on about 7 year intervals. Habitat availability can affect the cyclic behavior, reducing the extremity of each cycle if the habitat quality and quantity remains high. The winter track census and hunter survey information should provide enough data to determine the extent of the cycle, and thus the habitat quality, after several more years of collection. High hare populations are important to most of the predators on the Forest since hare are their main food source.

Proposed projects involving the vegetative treatment of spruce/fir stands are evaluated against the management standards and guides developed in the Forest Plan. Projects not meeting the standards and guides are modified or mitigated.

Ruffed Grouse: The ruffed grouse is the Management Indicator Species selected for the aspen community and the regenerating/young stage of the paper birch community. It is hunted species and it is a species whose population changes are believed to indicate the effects of management activities.

Monitoring activities include habitat availability assessments made from the vegetative data base, winter track counts, hunter surveys and incidental observations. Point counts at permanent plots, wetlands and at high elevations will also be used help determine trends as data accumulates.

Population estimates made by the State of Maine and New Hampshire indicate a general increase since 1990. Winter track counts from the 1992/ 1993 winter census routes found 41 sets of ruffed grouse tracks out of 3,949 track sets made by 20 species (Table 3). Available habitat is decreasing proportionally to the decrease in the acres of regeneration currently being established and the gradual conversion of old aspen to other forest types due to succession.

Ruffed grouse populations on the Forest are expected to decline over the next several years if the Forest's current vegetative management practices continue. This is primarily due to the reduction of even-aged management and loss of existing habitat due to aging and succession. Since ruffed grouse are a primary food source for the northern goshawk and are preyed upon by many other species, overall habitat quality for these predators is also expected to decline over time.

Forest Plan standards and guides include a vegetative management strategy which delineates vegetative community distribution based on area and the type of management prescription. The establishment and maintenance of the aspen and paper birch communities depend primarily on even-aged management prescriptions. All proposed vegetative management projects are screened to evaluate their potential to provide these communities from an ecological capability and community composition objectives. Prescription options are then prepared. In many cases, the option that meets the composition objective is not selected due to public opposition to even-aged management or for other management related reasons.

Grey Squirrel: The grey squirrel is the Management Indicator Species for the mature and over mature component of the oak and oak/pine communities. It is a hunted species and it is a species whose population changes are believed to indicate the effects of management activities.

Habitat availability assessments can be made from the vegetative and ecological data bases across the Forest. We are currently generating

Ecological Land Type maps for habitats containing an oak component for a rare plant survey. These maps will serve to help delineate the grey squirrel potential habitat distribution as well.

Little or no recent population estimates have been made for this species. Potential available habitat maps will be available upon completion of the above project. There are no other results to report.

There is a grey squirrel monitoring protocol outlined in the Scientific Committee wildlife monitoring program. This has not been initiated to date. Squirrel densities are currently unknown. There is little or no State data available.

Forest Plan standards and guidelines governing the retention of cavity trees and extended rotation components are in place. All proposed vegetative management projects are screened for compliance with these standards and guidelines.

Northern Goshawk: The Northern goshawk is the Management Indicator Species for the mature and overmature component of the northern hardwood community. It is a non-game species of special interest.

Nesting pairs are searched for using directed search techniques established in the Scientific Committee protocol. Searches are conducted by trained volunteers coordinated by the Audubon Society of New Hampshire (Table 2, 1993 Data and Table 4). Observations of individuals are recorded on the fixed plots, wetland surveys, high elevation plots and as incidental sightings. Nest sites are recorded as part of any vegetative surveys conducted after the leaves fall and during the winter. Habitat availability assessments can be made from the vegetative and ecological data bases across the Forest.

The summer of 1993 was the first time that a coordinated directed search was made. Vocalization broadcasts were used along walking and driving routes across the Forest. There were 18 goshawk responses to broadcasts at 481 points along 233.5 miles of driving and walking routes. Five additional observations of birds that did not respond to calls were made and five additional birds were verified from reports by other observers not on the established routes. Sixteen occupied territories were documented. There were no observations of individuals at the fixed, wetland and high elevation plots in either 1992 or 1993.

Specific habitat availability assessments were not completed.

The Northern goshawk is a species which is a candidate for listing as Threatened or Endangered nationally. Thus it is important to identify as

many occupied territories and individuals as possible, 1993 was the first attempt at doing so, but since the survey technique was still in the test stage, not all potential habitat has been covered. Future years will broaden the search and the ensuing data will be used to establish trends. The numbers found in 1993 seemed surprisingly high to some of the experienced observers. Since some known occupied territories have yet to be documented by the search, the actual number of these birds is higher than presently documented.

Starting with the 1993 nesting season, all proposed projects which contain potential goshawk nesting habitat have been or will be screened for existing nests and searched using the vocalization technique. This work is being accomplished using a combination of Forest Service personnel and volunteers under the direction of the Audubon Society of New Hampshire.

Black Duck: The black duck is the Management Indicator Species for the wetland communities. It is a hunted species and a species of concern in that its populations in the Northeast have been in a gradual decline for the past 20 years.

Wetlands have been mapped and classified on the Forest. This was accomplished using a partnership agreement with the New Hampshire Fish and Game Department. A cross section of these (96 in 1992 and 69 in 1993) were selected to be sampled. Point count sampling was used at each wetland. The purpose was to detect all avian species including black ducks at each wetland. There is also an ongoing effort conducted through the Northern Atlantic Flyway Waterfowl Breeding Survey conducted from New Hampshire to Virginia on an annual basis which includes black ducks. The survey results for the overall area and for New Hampshire can be used to evaluate the data collected on the Forest. The State of Maine tracks black ducks independently.

In 1992, 20 black ducks were recorded on 15 wetlands and in 1993, 10 black ducks were recorded in 6 wetlands (Table 4, Black Duck) on the White Mountain National Forest. The Northern Atlantic Waterfowl Survey results show a decrease from 43,015 pairs in 1992 to 36,933 in 1993 and the New Hampshire data from strata 27 and 28 (including the Forest) show a decline from 7,606 pairs in 1992 to 7,288 pairs in 1993.

The sample size on the Forest is small and the reduction in the wetlands sampled from 1992 to 1993 may account for some of the decrease in black ducks. However, when compared to larger sample sizes, there does appear to be a slight downward trend on the Forest. It remains to be seen, after several more years of sampling, whether the decline is going to be consistent and whether it will consistently mimic the regional trends.

Bicknell's Thrush: The Bicknell's thrush (formerly the grey-cheeked thrush) is one of the Management Indicator Species for the older and taller phases of the high elevation spruce/fir/birch and krummholtz communities where relatively high levels of human activity is expected. It is a non-game species of special interest and one those population changes may reflect management activities.

Point counts have been conducted on routes in the high elevation spruce/fir habitats in 1992 and 1993. These are directed searches and were conducted as part of the Scientific Committee wildlife monitoring project. Observations of this species were also recorded at the permanent plot point counts (Table 3 and 4). This work is the result of the Forest Service and the Audubon Society of New Hampshire cooperative effort to implement the Scientific Committee monitoring project.

In recent years there has been concern over the possible decline of the Bicknell's thrush in the Northeast. Speculations about the cause ranged from loss of summer or winter habitat to possible inadequate sampling.

In 1992 there were 701 point counts conducted on high elevation routes at which 142 observations of the thrush were made. In 1993, 644 points were surveyed and 147 individuals were recorded. An additional individual was recorded at one of the permanent plots in 1993.

The number of recorded individuals exceeded everyone's expectations. It is, of course, too early in the information collecting phase to determine what the long term trend is for this species. However, the suspicion is that the previous sampling techniques, consisting primarily of Breeding Bird Survey data, did not adequately sample the inaccessible habitat of this species and that the species may be more abundant than formerly thought. The Forest Service data will play an important role in resolving this problem.

Blackpoll Warbler: The blackpoll warbler is the other Management Indicator Species for the high elevation spruce/fir/krummholtz communities. It represents the younger or shorter component of these communities. It is a non-game species of special interest as well as one whose population changes may reflect management activities, in this case related to human use levels

Point counts have been conducted on routes in the high elevation spruce/fir habitats in 1992 and 1993. These are directed searches and are conducted as part of the wildlife monitoring project of the Scientific Committee. The species was also recorded when observed during the permanent plot point counts (Tables 3 and 4).

In 1992, there were 506 individuals recorded on 701 points. In 1993 there were 417 individuals on 644 points. In addition there were six individuals recorded on the permanent plots in 1992 and 18 in 1993.

The data indicates that this species is abundant throughout the spruce/fir high elevation habitat. The number of observations almost equals the number of plots in both years, with a slight decline in 1993. The occurrence of the individuals at the permanent plots may indicate the ability of this species to use a slightly broader habitat spectrum than the Bicknell's thrush. If the data confirms the abundance and distribution of this bird over time, we may decide to drop it as a Management Indicator Species.

Chestnut-side warbler: The chestnut-sided warbler is the Management Indicator Species for the regenerating stage of the northern hardwood community. It is a species whose population changes are believed to indicate the effects of management activities on other species of selected major biological communities.

Monitoring consists of tracking the changes in available habitat over time and by tracking the population trend of the species over time. The changes in habitat can be measured by identifying the amount of the northern hardwood community that is between the ages of zero to 10 years during at any given time. The species population is tracked using the Scientific Committee protocol for permanent plot point sampling. Three hundred and sixty permanent plots have been established across the Forest. One hundred and fifty of these have been located in areas currently under vegetative management (MANAGED), a similar number have been located in areas that are adjacent to the managed areas but are not currently under vegetative management (ADJACENT) and 60 plots have been established in areas that are as far from the first two as possible (REMOTE). The common denominator for all three groups is that they must be ecologically similar. The lower number of plots in the REMOTE areas reflect the lower availability of ecologically similar lands. Since 150 plots are 2.5 times 60, observations of individuals in REMOTE areas have been adjusted by a factor of 2.5.

The point counts on these plots have been conducted for 2 years, 1992 and 1993. The counts are done during the period of between early June and early July in three replicates spaced every other week. All point are visited in the same week. The observers and recorders are selected and coordinated by the Audubon Society of New Hampshire and are given a week of intensive training and orientation prior to the monitoring dates. This is part of the cooperative wildlife monitoring project with the Supervisor's Office (Tables 2 and 4).

Two years worth of data is not enough to determine a trend. However, these data do demonstrate a preference by this species for the MANAGED portion of the Forest. This makes sense in that this species prefers regenerating hardwood forest for breeding. The ADJACENT and REMOTE areas do not contain significant amounts of the required habitat.

DATE	MANAGED	ADJACENT	REMOTE
1992	117	27	40
1993	126	21	3

The habitat availability analysis (Table 1) indicates a distinct decline in hardwood regeneration acres over the past several years. The plot data indicates that chestnut-sided warblers are still relatively abundant in the MANAGED plots. The population is likely to decrease as the currently available habitat grows older and less new habitat is created. This corresponds to the overall decline in these warblers due to increasing amounts and maturity of the forests in New England shown by current research such as: *"Influence of Historic Land Use on Temporal Patterns of Diversity Among Forest Vertabrates,"* Litvaitis, J.A., Professor, Wildlife Program, Dept. of Natural Resources, Univ. of New Hampshire, 1992. In press.

Project level monitoring consists primarily of screening proposed vegetative management project to evaluate how they meet established management standards and guidelines established in the Forest Plan. Vegetative composition standards pertaining to even-aged management were developed under the preferred alternative in the Forest Plan. They are designed to provide enough continuously available regenerating habitat to maintain chestnut-sided warbler viability. The habitat availability level set in Forest plan is relatively low and is predicted to maintain populations at low levels. (Appendix VII-B-2)

Broad-winged hawk: The broad-winged hawk is the Management Indicator Species for the mature and overmature component of the aspen and paper birch communities. It is a species whose population changes are believed to indicate the effects of management activities.

Monitoring consists of tracking the changes in available habitat over time and by tracking the population trend of the species. The aspen and paper birch communities are delineated using available vegetative information collected on each Ranger District. Habitat potential can be delineated using Ecological Land Type maps. Population data has been collected using the permanent plot point counts described in Chestnut-sided warbler.

In 1992, two broad winged hawks were recorded in the MANAGED areas and one in the ADJACENT areas. In 1993, three were recorded in the MANAGED areas and two in the ADJACENT areas. None were recorded in the REMOTE areas in either year (Table 2).

The broad-winged hawk is one of the more abundant raptors in New England. The low numbers recorded here could the result of a number of factors. 1. The sample points do not occur in broad-winged hawk habitat. 2. Habitat suitability and availability is generally low. 3. A habitat component is missing. 4. This is a normal distribution. 5. Some other unknown factor is coming into play. The purpose of selecting an Indicator species and monitoring it and its habitat is to identify circumstances when further investigation is needed. This is one of those cases. The reason for the low representation of this species will require further investigation. It is interesting to note that no broad-winged hawks were found in the REMOTE areas. These areas contain significant proportions of mature paper birch. This phenomena could be attributed to the lack of woods roads described as being part of their preferred nesting habitat. (Degraaf et al 1986)

Project level monitoring consists primarily of making sure that all proposed vegetative management projects meet the standards and guides designed to provide the communities and habitat conditions necessary for the breeding success of this species.

Rufous-sided towhee: The rufous-sided towhee is the Management Indicator Species for the regenerating and young component of the oak community. It is a species whose population changes are believed to indicate the effects of management activities.

Monitoring consists of tracking the changes in available habitat over time and by tracking the population trend of the species. Oak communities are delineated using available vegetative information collected on each Ranger District. Habitat potential can be delineated using Ecological Land Type maps which can be generated from a GIS data base formed under a cooperative project with the University of Vermont. Population data has been collected using the permanent plot point counts described in the Chestnut-sided warbler section.

No rufous-sided towhees were recorded in 1992 and two were recorded in the MANAGED areas in 1993. No others were recorded. While the oak community exists on the Forest, there is little existing oak regeneration, however.

One of the main criteria for the selection of the permanent plots was that they had to be ecologically similar. The ecological conditions that allow the

development of oak communities on the Forest are uncommon. Thus the distribution of the permanent plots do not cover the oak communities. This was overlooked in 1992 and 1993. The oak type will be the subject of a directed search for this species in the future.

Project level monitoring consists of screening all proposed vegetative management projects for conformity with Forest Plan composition objectives for the oak community.

Pine Warbler: The pine warbler is the Management Indicator Species for the mature and overmature white pine community. It is a species whose population changes are believed to indicate the effects of management activities.

Monitoring consists of tracking the changes in habitat availability over time and by tracking the population trend of the species. Pine communities are delineated using available vegetative information collected on each Ranger District. Habitat potential can be delineated using Ecological Land Type maps. Population data has been collected using the permanent plot point counts described in the Chestnut-sided warbler section.

No pine warblers were recorded in 1992 or 1993. White pine stands do occur on the Forest and there is potential for more (Table 4).

The current distribution of the permanent plots do not cover the pine communities due to their rarity. Pine communities will be the subject of directed searches in the future.

Project level monitoring consists of screening all proposed vegetative management projects for conformity with Forest Plan composition objectives for the pine community.

Northern Junco: The Northern junco is the Management Indicator Species selected for the regenerating and young stages of the white pine community. It is a species whose population changes are believed to indicate the effects of management activities.

Monitoring consists of tracking the changes in habitat availability over time and by tracking the population trend of the species. Regenerating and young age classes in pine communities are delineated using available vegetative information collected on each Ranger District. Habitat potential can be delineated using Ecological Land Type maps. Population data has been collected using the permanent plot point count method described in the chestnut-sided warbler section (Table 2).

DATE	MANAGED	ADJACENT	REMOTE
1992	17	55	30
1993	25	63	47

The permanent plots do not cover the pine community, yet the data indicates junco occurs often in other communities; therefore, it appears junco is not a good management indicator species for the pine community. It is too ubiquitous. A new indicator for the pine community will be selected after conducting directed searches in the pine communities and determining which species may represent the community component more closely.

Project level monitoring consists of screening all proposed vegetative management projects for conformity with Forest Plan composition objectives for the pine community.

Cape May Warbler: The Cape May warbler is the Management Indicator Species selected for the mature and over mature component of the spruce/fir community. It is a species whose population changes are believed to indicate the effects of management activities.

Monitoring consists of tracking the changes in habitat availability over time and by tracking the population trend of the species. The spruce/fir community and its mature and over mature components are delineated using available vegetative information collected on each Ranger District. Habitat potential can be delineated using Ecological Land Type maps. Population data has been collected using the permanent plot point count method described in the chestnut-sided warbler section.

No Cape May warblers were recorded in 1992 or 1993. The spruce/fir community components are available (Table 4).

The cause for the lack of Cape May warblers is unknown at present. Only one observation of this species was made on the high elevation plots so it does not appear to be an elevational distribution problem. There is a possibility that the Forest lies slightly south of its preferred breeding range. The species' population apparently is closely tied to spruce budworm populations and since the budworm population is low the expectation is that the species numbers are also low. More investigation will take place and the mystery will be solved in the near future.

Project level monitoring consists of screening all proposed vegetative management projects for conformity with Forest Plan composition objectives for the spruce/fir community.

Eastern Kingbird/Bluebird: The Eastern kingbird and the bluebird are the Management Indicator Species to represent the ecotone between open (including larger wetland edges and zero to 2 year old clearcuts), or agricultural (recently abandoned or active) lands and forested areas. They are species whose population changes are believed to indicate the effects of management activities.

Monitoring consists of tracking the changes in habitat availability over time and by tracking the species' population trends. The ecotone community can be delineated by using the available vegetative information collected on each Ranger District in combination with Forest-wide wetland data and land use maps generated by the State Planning Offices. Population data has been collected using the permanent plot point count method combined with point counts in wetlands. Additional data on these species is available from supplemental sources such as the Breeding Bird Survey data.

No Eastern bluebirds were recorded using either point count method. Two Eastern kingbirds were recorded in the MANAGED areas in 1993 and there were 30 kingbirds recorded on 28 wetlands in 1992 and 16 individuals observed in 13 wetlands in 1993. Overall habitat availability for these species is limited.

Since the community components for these species are rare, decreasing and are not uniformly represented across the Forest, neither the permanent plot or the wetland surveys adequately sample the existing habitat. Directed searches in representative samples of these communities will be conducted in the future. Searches will include forest/agricultural opening ecotones and zero to 2 year old clearcuts that occur off the established permanent plot routes.

Project level monitoring consists primarily of screening all proposed vegetative management projects for opportunities to maintain recently abandoned agricultural lands in their open state.

Mourning Warbler: The morning warbler is the Management Indicator species for the shrub/forest ecotone. It is a species whose population changes are believed to indicate the effects of management activities.

Monitoring consists of tracking the changes in habitat availability over time and by tracking the population trend of the species. The shrub/forest ecotone can be delineated using the available vegetative information collected on each Ranger District in combination with Forest-wide wetland classification data.

Habitat availability is somewhat limited on the Forest, although there are 12,606 acres of hardwood regeneration from 3 to 5 years in age adjacent to more mature forested stands.

DATE	MANAGED	ADJACENT	REMOTE
1992	19	3	0
1993	28	3	0

There were two mourning warblers recorded in the 1992 wetland point counts on two wetlands and five were recorded on four wetlands in 1993.

This species represents all those which are closely tied to a community which specifically included a combination of shrub/regenerating forest with older forest. The comparatively low numbers of this species may well be due to the corresponding decrease in the 3 to 5 year old regenerating age class in hardwoods.

Project level monitoring consists primarily of screening all proposed vegetative management projects for their contribution to the desired Forest Plan composition objectives which would supply the necessary habitat components for this species.

TABLE 1

Comparison of Even-aged Acres by Community Type and Age for 1984, 1991, 1993

Habitat/ Community		Regeneration	Young	Mature	Overmature
N.Hardwood	('84)	9,844			
	('91)	14,597	37,472	110,700	26,012
	('93)	12,606	37,185	109,506	26,439
P.Birch	('84)	158			
	('91)	1,058	514	4,238	3,666
	('93)	821	868	4,320	4,152
Aspen	('84)	70			
	('91)	429	1,491	1,016	1,988
	('93)	1,046	1,548	1,241	3,003
Spruce/Fir	('84)	547			
	('91)	415	1,420	2,999	3,126
	('93)	414	1,748	4,630	3,583
Oak/Pine	('84)	119			
	('91)	132	290	2,063	1,087
	('93)	258	317	2,218	1,536
Totals	('84)	10,932			
	('91)	16,631	41,184	121,016	35,879
	('93)	15,145	41,666	121,915	38,713

Comparison of Uneven-aged Acres by Community Type for 1991, 1993

Habitat/ Community	Total Acres
N. Hardwood	('91) 79,499
	('93) 75,414
Spruce/Fir	('91) 25,326
	('93) 20,580
Hemlock	('91) 6,553
	('93) 4,405
Oak/Pine	('91) 2,177
	('93) 1,638

* The separation of even and uneven-aged tables reflects the fact that different Forest Plan standards and guides described in the Habitat Composition Objectives apply to each silvicultural system. See Appendix B of the Plan for a complete description.

** The four even-aged age classes vary by community type. Regeneration is always 0-9 years. By community type other ages in years spanned are as follows: NH 10-59;60-119;120+ Aspen 10-39;40-59;60+ PB 10-49;50-79;80+ Sp/Fir 10-39;40-89;90+ Oak/Pine 10-59; 60-99;100+

Table 2

WHITE MOUNTAIN NATIONAL FOREST

WILDLIFE MONITORING PROGRAM

BIRD MONITORING ACTIVITIES

1992

Permaplot surveys

360 points in transects of 15 points
- 150 on managed areas of Forest
- 150 on unmanaged areas adjacent to managed areas
- 60 on remote areas

points surveyed 3 times, 2 weeks apart

10 minute point counts, beginning at sunrise, ending by 9:30 am

83 species detected
- 73 on managed areas
- 65 on unmanaged adjacent areas
- 56 on remote areas

6369 individuals detected
- 19.66/pt on managed areas
- 16.97/pt on unmanaged adjacent areas
- 14.57/pt on remote areas

Long distance (neotropical) migrants (traveling to South America)
- 42 species detected
  - 39 on managed areas
  - 30 on unmanaged adjacent areas
  - 31 on remote areas
  - 24 on all three

Short distance migrants (traveling to southeast US, Mexico, Central America)
- 19 species detected
  - 15 on managed areas
  - 14 on unmanaged adjacent areas
  - 10 on remote areas
  - 6 on all three

Residents (staying here all year)
- 22 species detected
  - 19 on managed areas
  - 21 on unmanaged adjacent areas
  - 15 on remote areas
  - 13 on all three

Directed search surveys

Birds of high elevation spruce-fir forests (pilot study)
spruce/fir forests above 2700 ft elevation
5 minute point counts conducted between 5:30 am and 7:00 pm
701 points surveyed on hiking routes (all day survey)
325 points surveyed between 6 and 11 am

47 species detected (all points)
45 species detected (6-11 am points)

3342 individuals detected (all points)
1910 individuals detected (6-11 am points)

4.77 indiv/pt (all points)
5.88 indiv/pt (6-11 am pts)

Long distance (neotropical) migrants
23 species detected (all points)
22 species detected (6-11 am points)
Residents
18 species detected (all points)
17 species detected (6-11 am points)

Wetland birds
Open water, emergent, and scrub-shrub wetlands
10 minute point counts (vegetated sites)
30 minute point counts (open water sites)

96 wetlands surveyed
168 points surveyed
59 10 minute point counts
109 30 minute point counts

95 species detected
16 wetland dependent species
16 wetland associated species
63 upland species (67%)

3421 individuals detected
377 wetland dependent species (11%)
754 wetland associated species (22%)
2290 upland species (67%)

Peregrine Falcon

cliffs
fixed point observations
29 sites surveyed (17 on Forest, 12 adjacent)
5 sites monitored (2 on Forest, 3 adjacent)

peregrines
sightings documented at 13 sites (5 on Forest, 8 adjacent)
nesting confirmed at 5 sites (2 on Forest, 3 adjacent)
nesting successful at 2 sites (1 on Forest, 1 adjacent)
3 young produced (1 on Forest, 2 adjacent)

ravens
sightings documented at 21 sites (12 on Forest, 9 adjacent)
nesting confirmed at 12 sites (5 on Forest, 1 adjacent)

Red-shouldered Hawk

hardwood and mixed forest below 2500 ft elevation
habitat assessment (primary focus of survey)
vocalization broadcast surveys
continuous observation surveys

27 areas surveyed for habitat suitability
- 2 areas rated excellent
- 4 areas rated good-excellent
- 7 areas rated good
- 4 areas rated fair-good
- 8 areas rated fair
- 1 area rated fair

86 broadcast points on the 27 areas
- 1 Red-shouldered Hawk response detected

4 Red-shouldered Hawks detected during other surveys

American Pipit

alpine habitat above 5000 ft elevation on Mt. Washington
continuous observation surveys
incidental reports solicited

4 hiking routes surveyed
12 incidental reports verified

35 sightings documented
11 areas of activity identified

primary area of activity: north slope of Mt. Washington from vicinity of Westside Trail north and east to vicinity of 6 mile post on Auto Road

Whip-poor-will
open woods below 1500 ft elevation
3 minute point counts beginning at sunset
295 points surveyed on 14 driving routes

whip-poor-wills detected at 13 stops on 4 routes
16 whip-poor-wills detected

1993

Permaplot surveys
360 points in transects of 15 points
150 on managed areas of Forest
150 on unmanaged areas adjacent to managed areas
60 on remote areas
points surveyed 3 times, 2 weeks apart
10 minute point counts, beginning at sunrise, ending by 9:30 am

83 species detected
76 on managed areas
68 on unmanaged adjacent areas
51 on remote areas
6494 individuals detected
21.17/pt on managed areas
15.60/pt on unmanaged adjacent areas
16.32/pt on remote areas

Long distance (neotropical) migrants
41 species detected
40 on managed areas
35 on unmanaged adjacent areas
26 on remote areas
26 on all three
Short distance migrants
18 species detected (22%)
16 on managed areas
12 on unmanaged adjacent areas
11 on remote areas
8 on all three

Residents
24 species detected (29%)
20 on managed areas
21 on unmanaged adjacent areas
14 on remote areas
13 on all three

Directed search surveys

Birds of high elevation spruce/fir forests (pilot study)
spruce/fir forests above 2700 ft elevation
5 minute point counts conducted between 5:30 am and 7:00 pm
644 points surveyed on hiking routes (all day survey)

44 species detected
3665 individuals detected

Long distance (neotropical) migrants
17 species detected (39%)
1473 individuals detected (41%)
Residents
19 species detected (43%)
697 individuals detected (19%)

Wetland birds
Open water, emergent, and scrub-shrub wetlands
10 minute point counts (vegetated sites)
30 minute point counts (open water sites)
broadcast surveys for secretive wetland species

69 wetlands surveyed
143 points surveyed
65 10 minute point counts
67 30 minute point counts
29 broadcast surveys

98 species detected
20 wetland dependent (20%)
16 wetland associated (16%)
62 upland (64%)

3099 individuals detected
487 wetland dependent (16%)
664 wetland associated (21%)
1948 upland (64%)

Peregrine Falcon

cliffs
fixed point observations
37 sites surveyed (24 on Forest, 13 adjacent)
6 sites monitored (2 on Forest, 4 adjacent)

peregrines
sightings documented at 9 sites (2 on Forest, 7 adjacent)
nesting confirmed at 5 sites (2 on Forest, 3 adjacent)
nesting successful at 3 sites (1 on Forest, 2 adjacent)
7 young produced (3 on Forest, 4 adjacent)

ravens
sightings documented at 28 sites (16 on Forest, 12 adjacent)
nesting confirmed at 11 sites (7 on Forest, 4 adjacent)

red-tailed hawks
sightings documented at 9 sites (3 on Forest, 6 adjacent)
nesting confirmed at 2 sites (2 on Forest, 0 adjacent)

Northern Goshawk

mature and overmature northern hardwood and mixed forest
vocalization broadcast surveys on walking and driving routes
investigation of reported sightings

372 broadcast points surveyed on driving routes (178 mi)
109 broadcast points surveyed on walking routes (55.5 mi)

18 goshawk responses to broadcasts detected
5 incidental goshawk observations documented during surveys
5 additional reports verified

16 occupied territories documented

Red-shouldered Hawk

mature and overmature hardwood and mixed forest
verification of reported sightings

5 active territories verified

American Pipit

alpine habitat above 5000 ft elevation on Mt. Washington
continuous observation surveys
4 hiking routes surveyed

21 sightings documented
9 areas of activity identified

primary area of activity: north, west and south slopes of Mt. Washington, from vicinities of Lion Head and Westside trails north and east to vicinity of Nelson Crag

Whip-poor-will

open woods below 1500 ft elevation
3 minute point counts beginning at sunset
218 points surveyed on 10 driving routes

whip-poor-wills detected at 3 stops on 3 routes
4 whip-poor-wills detected

Table 3

Track Survey 1992-1993
From Cooperative Data Base: NH Fish & Game Department

1) 15 Transects done
13 done 3 times
2 done 4 times
Total of 933 sections

2) 20 Species found

3949 Individual Tracks

Bobcat	27	Moose	140
Chipmunk	1	Mouse	691
Coyote	59	Otter	1
Deer	42	Porcupine	7
Fisher	137	Raccoon	1
Fox	172	Shrew	10
Grouse	41	Skunk	1
Hare	698	Squrrels	1824
Marten	4	Vole	1
Mink	4	Weasel	13

Table 4

SELECTED SPECIES RESULTS FROM WMNF MONITORING

	1992			1993		
SPECIES*	MANAGED	ADJACENT	REMOTE	MANAGED	ADJACENT	REMOTE
BLPW	1	5	0	3	13	2(5)
GCTH	0	0	0	0	1	0
CSWA	117	27	4(10)**	126	21	1(2)
BWHA	2	1	0	3	2	0
RUGR	8	9	9(22)	13	17	11(27)
RSTO	0	0	0	2	0	0
PIWA	0	0	0	2	0	0
SCJU	17	55	12(30)	25	63	19(47)
CMWA	0	0	0	0	0	0
EAKI	0	0	0	2	0	0
EABL	0	0	0	0	0	0
MOWA	19	3	0	28	3	0
NOGO	0	0	0	0	0	0

BLPW = Warbler, Black Polled
CSWA = Warbler, Chestnut-sided
RUGR = Grouse, Ruffed
PIWA = Warbler, Pine
CMWA = Warbler, Cape May
EABL = Bluebird, Eastern
NOGO = Goshawk, Northern

GCTH = Thrush, Gray cheeked
BWHA = Hawk, Broadwing
RSTO = Towhee, Rufous-sided
SCJU = Junco, Slate-colored
EAKI = Kingbird, Eastern
MOWA = Warbler, Mourning

High Elevation	1992	1993
GCTH	142	147
BLPW	506	417
CMWA	0	1

Black Duck -
1992 - found in 6 wetlands - total of 10 ducks
1993 - found in 15 wetlands - total of 20 ducks

Wetlands
Kingbird:
1992 - 28 wetlands - 30 obs.
1993 - 13 wetlands - 16 obs.
Mourning Warbler:
1992 - 2 wetlands - 2 birds
1993 - 4 wetlands - 5 birds

** Since there are 60 plots in REMOTE, the number of sightings has been increased by a factor of 2.5 to balance the other areas

Table 5

Small Mammals, Amphibians and Reptile Sampling

Amphibians and Reptiles

From Cooperative Data Base:NH Fish and Game Department

33 species detected on the White Mountain National Forest

400 Observations
- 159 Literature and Museum Records
- 169 WMNF Personnel
- 88 RAARP Reports from towns in forest

- 9 species of salamander
- 10 species of frogs
- 5 species of turtles
- 9 species of snakes

We have sighting records for all species that should be on the Forest.

	Literature & Museum	WMNF Personnel	Other
Salamander	7	6	8
Frog	9	9	8
Turtle	1	2	4
Snake	7	5	6

Small Mammals

White Mountain National Forest Small Mammal
Identification and Collection Report-1992

The Committee of Scientists' Monitoring Strategy recommended a general sampling procedure for small mammals and a specific directed searching procedure for four species not normally found with the general sampling procedure: long-tailed shrew (Sorex dispar), rock vole (Microtus chrotorrhinus), northern bog lemming (Synaptomys borealis), and southern bog lemming (S. cooperi). The 1992 district trapping sampled two transects on the Androscoggin and Saco Ranger Districts according to the general small mammal procedures presented in the Committee of Scientists' report (1991). Crews used two types of general sampling procedures along bird monitoring routes along Mill Brook and Meserve Brook: a) a Y-shaped array of 10 pitfall traps and drift fence; and b) a 5m x 5m grid of 25 mouse traps.

Trapping occurred in Mill Brook on 2 or three consecutive nights (08/19-21/92) with a new moon as recommended for maximum trapping darkness. Trapping occurred in Mill Brook on 2 or three consecutive nights (06/24-26/92) prior to a new moon. Field crews bagged, tagged, and froze specimens as soon as possible.

Methods

M. Yamasaki and K. Carver, RWU-4102 in Durham, NH, identified specimens during January 1993. Keys from Godin (1977), van Zyll de Jong (1983), Baker (1983), and Burt (1957) aided in shrew identification. We assigned as accession number to each individual as identified. Careful recording of data in the field minimizes the time needed to complete the analysis portion of this process. Much of the data had to be reconstructed from other information sources to produce he trapping data in the following report. There are differences in the quality of data collected which may be attributed to differences in trapping success between both areas based on trapping ability and care of the trap sites.

Results

Trapping crews caught 157 individuals; 60 in Mill Brook (Androscoggin RD) and 97 in Meserve Brook (Saco RD). Pitfall grids yielded 75 individuals; snap grids yielded 82 individuals (Appendix A). Pitfall traps yielded 27.8 individuals per 100 trap-nights. Snap traps yielded 14.9 individuals per 100 trap-nights, slightly more than half the catch per unit effort of pitfall traps (Table 1). Pitfall traps have a higher catch per unit effort due to the continuous catching potential, as opposed to snap traps (1 catch per snap trap per night).

Ten small mammal species were trapped: star nosed mole (Condylura cristata), short-tailed shrew (Blarina brevicauda), masked shrew (Sorex cinereus), smoky shrew (S. fumeus), pygmy shrew (S. hoyi), red-backed vole (Cleithrionomys gapperi), woodland jumping mouse (Napeozapus insignis), white-footed mouse (Peromyscus leucopus), deer mouse (P. maniculatus), red squirrel (Tamiasciurus hudsonicus), and one unrecognizable carcass.

Each location was trapped for one, three-consecutive night period; however, Mill Brook specimens were collected in less than a full three-night period (pit plots 1 and 5 and snap plot 2 were trapped for three nights; pit plots 22, 25, and 30 and snap plots 21 and 29 were trapped for two nights only). Three species, masked shrew, and the two Peromyscus sp. accounted for 64 percent of the sample and were collected in both locations (Table 2). Two additional species, woodland jumping mouse and red-backed vole accounted for another 21 percent of the sample and also were collected in both locations. The

remaining five species, star-nosed mole, short-tailed shrew, two Sorex sp., and red squirrel were collected from either one or the other location.

Discussion

Catch per unit effort are compared with data collected (Table 3) on the WMNF in other studies (Hill 1982); Tucker 1992; and Yamasaki unpubl.). Hill's (1982) data are a combination of snap trap and pitfall trap results in a trapping ratio of 4:1 over a two year period. Tucker also had pitfall trap results but due to NF users' disturbing pitfall sets, numerical data are missing. Yamasaki's data are four year trap results and display the year-to-year variability in catch data. Snyder (Committee of Scientists' small mammal expert) describes a natural 10 factor fluctuation in populations within a five year period without any apparent habitat disturbance. Local populations appear to fluctuate independently, so that any sampling procedure would have to adequately cover the cyclic variability across the managed and unmanaged portions of the forest.

Pitfall trap grids should produce larger catch per unit effort estimates and will collect most smaller shrews that are difficult to trap in snap grids. Snap grids appear to sample short-tailed shrews and masked shrews; but only when snap grids are open longer (due to lower abundance of other mice and voles, inferred from smaller catch per unit effort estimates).

Trapping personnel need to possess comparable trapping skills and techniques. Sampling methods ought to consider rotating trappers throughout the trapping locations; otherwise data gathered in a manner that separates trapping grids by trapper will bias the results dramatically. Saco RD personnel responsible for collecting small mammal data were more consistent in their trapping skills, apparent from specimens collected and adherence to the sampling procedure. Pitfall traps need to be carefully installed otherwise trap results will be poor. Snap trap catchability depends on location of traps, degree of trap sensitivity and the care used in setting traps. All these influence catch per unit effort estimates.

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Submitted by:

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March 26, 1993

Table 5a. 1992 Trapping results of Mill Brook and Meserve Brook, WMNF, NH by species and type of trap.

	Mill Brook		Meserve Brook		Total		Captures/100TN		Combined	
Species	Pitfall grids	Snap grids	Pitfall grids	Snap grids	Pitfall grids	Snap grids	Pitfall grids	Snap grids	Total grids	Captured grids
COCR	1	0	0	0	1	0	0.4	0	1	0.1
BLBR	0	0	5	9	5	9	1.85	1.6	14	1.7
SOCI	39	0	3	1	42	1	15.55	0.2	43	5.2
SOFU	2	0	1	1	3	1	1.1	0.2	4	0.5
SOHO	2	0	0	0	2	0	0.7	0	2	0.2
CLGA	2	0	4	8	6	8	2.2	1.45	14	1.7
NAIN	6	3	5	5	11	8	2.2	1.45	19	2.3
PELE	0	1	4	36	4	37	1.5	6.7	41	5.0
PEMA	1	2	0	14	1	16	0.4	2.9	17	2.1
TAHU	0	1	0	0	0	1	0	0.2	1	0.1
UNKN	0	0	0	1	0	1	0	0.2	1	0.1
Sp. Totals(10)	7	4	6	8	9					
No. Captures	53	7	22	75	75	82	27.8	14.9	157	19.14
No. Trap Nights	120	175	150	375	270	550			820	?

COCR = Star Nosed mole
SOCI = masked shrew
SOHO = Pygmy shrew
NAIN = Woodland jumping mouse
PEMA = Deer mouse
UNKN = unknown

BLBR = Short-tailed shrew
SOFU = Smoky shrew
CLGA = Red-backed vole
PELE = White footed mouse
TAHU = Red squirrel

Table 5b. 1992 trapping results for Mill Brook and Meserve Brook, by species and date, WMNF, NH.

	Mill Brook			Meserve Brook			
Species	6/24/92	6/25/92	6/26/92	8/19/92	8/20/92	8/21/92	Total
BLBR	0	0	0	6	2	6	14
CLGA	0	2	0	6	2	4	14
COCR	0	1	0	0	0	0	1
NAIN	3	4	2	5	3	2	19
PELE	0	0	1	13	13	14	41
PEMA	0	1	2	6	5	3	17
SOCI	6	25	8	2	1	1	43
SOFU	0	2	0	0	0	1	4
TAHU	0	1	0	0	0	0	1
UNKN	0	0	0	0	0	0	1
Total	9	38	13	39	26	32	157

COCR = Star Nosed mole
SOCI = masked shrew
SOHO = Pygmy shrew
NAIN = Woodland jumping mouse
PEMA = Deer mouse
UNKN = Unknown
BLBR = Short-tailed shrew
SOFU = Smoky shrew
CLGA = Red-backed vole
PELE = White footed mouse
TAHU = Red squirrel

Table 5c. 1992 WMNF snap trap/100 TN comparisons with other WMNF small mammal studies. Data from Hill (1982) are 2 year combined snap trap and pitfall results at a ratio of 4:1; Tucker;s (1992) data are 2 years of snap trap results; Yamasaki (unpubl.) data are 4 years of snap trap results. Pitfall catch per unit effort estimates are usually larger than snap trap results.

SPECIES	WMNF	Hill (1982) (1992)	Tucker (1992)	Yamasaki (unpubl.)
SOCI	0.2	1.57	0	0.1 - 1.88
SOPA		0.02		
SOFU	0.2	0.67	0 - 0.3	0 - 0.1
SOHO	0	0.21	0	0 - 0.08
BLBR	1.6	0.91	0.3 - 0.47	0.1 - 3.99
PABR		<.01		
COCR	0	<.01	0	
LEAM		<.01		
TAST		<.01		0 - 0.1
TAHU	0.2	0.02		0 - 0.1
GLVO				0 - 0.1
GLSA		0.01		0 - 0.2
PESP			0.87 - 1.39	4.7 - 19.0
PELE	6.7			
PEMA	2.9	1.62		
CLGA	1.45	0.89	1.19 - 2.18	2.4 - 13.9
MIPE		<.01	0.2 - 0.3	0 - 0.2
MICH		<0.1		
MIPI				0 - 0.1
SYCO		<.01	0 - 0.08	
ZAHU			0 - 0.08	
NAIN	1.45	1.65	0.63 - 0.95	3.6 - 8.0
Total #/100TN	14.9	7.5	3.2 - 5.0	15.0 - 37.4

SOCI = Masked shrew
SOPA = Water shrew
SOFU = Smoky shrew
SOHO = Pygmy shrew
BLBR = short tailed shrew
COCR = Star-nosed mole
TAST = E. chipmunk
TAHU = Red squirrel
GLVE = S. flying squirrel
GLSA = N. flying squirrel
LEAM = Snowshoe hare
PABR = Hairy-tailed mole
PESP = Peromyscus sp.
PELE = White-footed mouse
PEMA = Deer mouse
CLGA = Red-backed vole
MIPE = Meadow vole
MICH = Rock vole
MIPI = Woodland vole
SYCO = S. bog lemming
ZAHU = Meadow jumping mouse
NAIN = Woodland jumping mouse.

Table 6

Osprey nesting success in the Androscoggin River watershed in New Hampshire, 1980-92 breeding seasons.

Year	Occupied Nests	Active Nests	Successful Nests	Chicks Fledged	Chicks per Active Nest
1980	?	3	1	2	0.67
1981	6	3	0	0	0.00
1982	10	8	4	6	0.75
1983	14	11	4	7	0.64
1984	11	9	3	7	0.77
1985	11	9	5	8	0.89
1986	14	11	7	11	1.00
1987	13	10	7	16	1.60
1988	18	14	10	18	1.29
1989	21	18	13	20	1.11
1990	22	19	12	22	1.16
1991	19	16	9	21	1.31
1992	21	16	10	15	0.94

Occupied nest = nest building and/or adult pair present at nest
Active nest = evidence indicates eggs laid/incubated
Successful nest = at least one young raised to near-fledging age

From: Audubon Society of NH

Costs

by

Bill Eley, Management Analyst

The Forest Service budget process for any Fiscal Year begins 3 years in advance. At that time, the White Mountain National Forest prepares up to five alternative budget levels for submission to the regional, and then national office where they are combined with all other national forest units to reflect alternative budgets for the entire agency. Following Presidential direction, a single budget request for the agency is prepared and included in the President's budget request to Congress. Once the appropriation act is passed, the money allocated to the agency is dispersed among the National Forests.

One of the alternative budgets prepared by every national forest reflects the full cost of implementing its forest plan (although national direction sometimes constrains even this alternative). The White Mountain National Forest has never been funded at the Forest Plan level—actual budget allocations have been at about 60 percent of this amount.

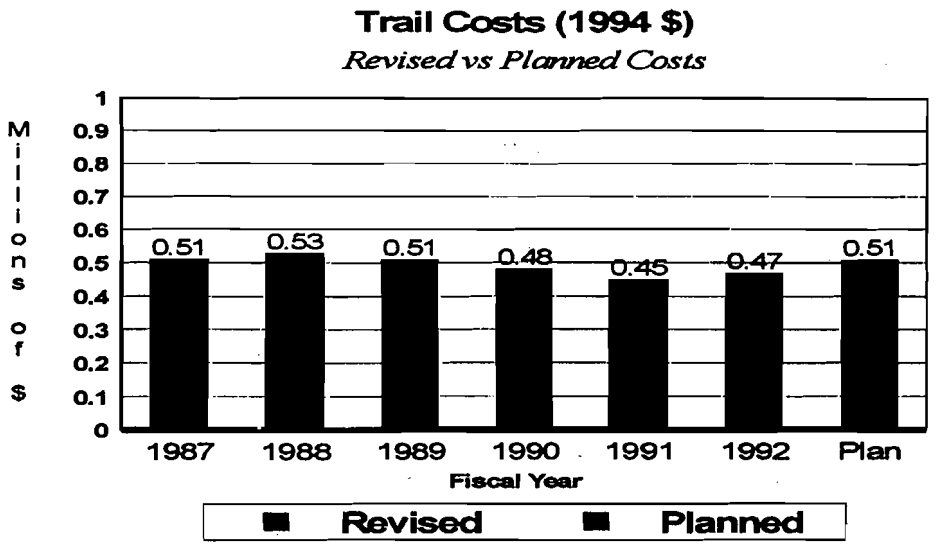
We prepare our alternative budget requests by what we call "program areas"; the wildlife management program, the developed and dispersed recreation programs, the timber management program, etc. The estimated cost for a program area includes the cost of the numerous activities of which it is comprised. For example, the cost of the developed recreation program would include the costs of such things as campground administration, refuse disposal, sewage treatment, supplies, normal maintenance, monitoring plan implementation, and so on, for a given intensity of management. The intensity of management generally varies by budget alternative.

Although we revise our Forest Plan level budget alternative each year, we have never been funded at that level and so have no actual experience in implementing the Forest Plan at that level of intensity. Therefore, we can not validate our cost estimates with a record of actual expenditures. Instead, we use our experience with actual costs at different levels of activity to estimate the cost of full implementation of the Forest Plan.

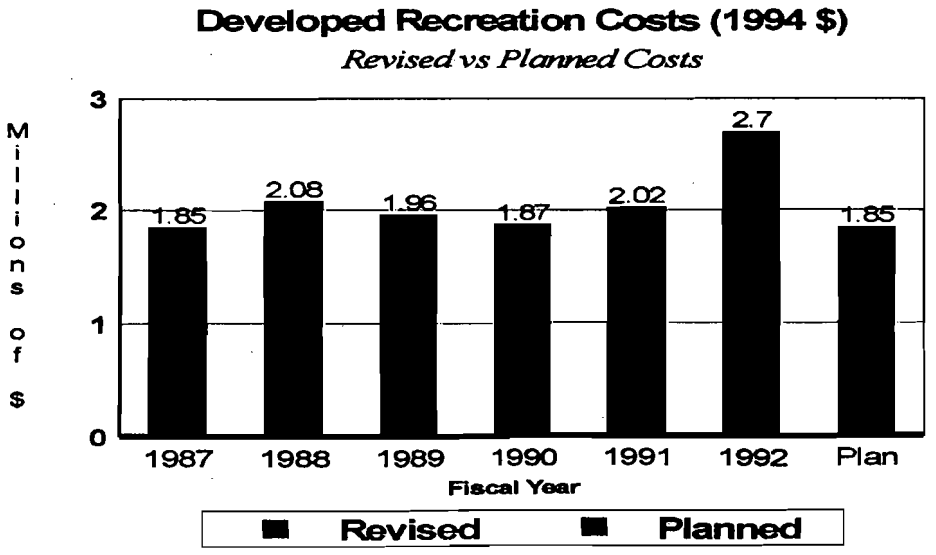
The charts on the following pages provide the information for the individual program areas that we identified in the monitoring section of the Forest Plan: dispersed (trail management) and developed recreation, timber, wilderness, roads, and cultural resources.

Costs have been converted to constant FY 94 dollars so as to allow direct comparisons.

Dispersed Recreation: Revised Trail cost estimations have about equaled initial plan estimates during the period. Slight variations are not significant.

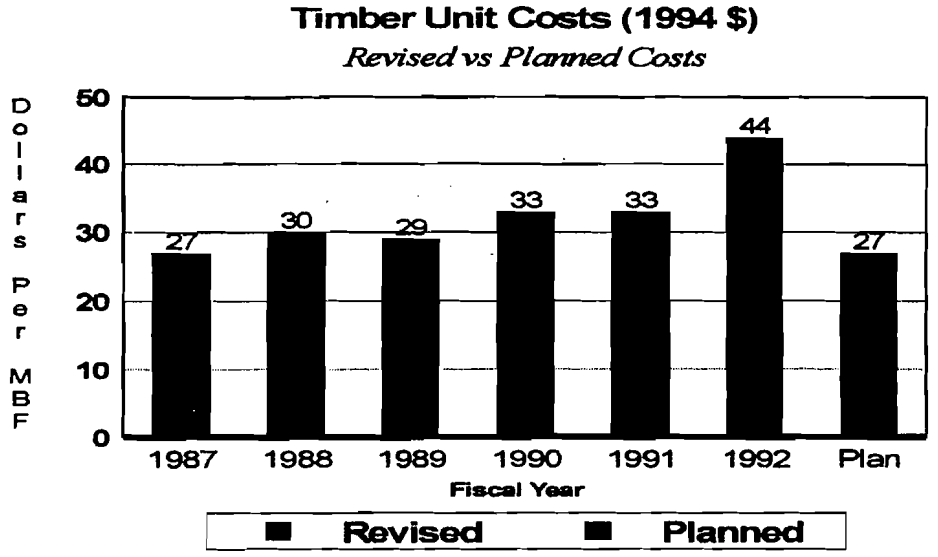


Developed Recreation: Revised developed recreation cost estimations generally equaled initial plan estimates during the period until FY 92. The cost increases for that year resulted from a general increase in facility maintenance needs—due to greater occupancy rates than expected in the Plan, revised plan for periodic replacement of expensive infrastructure components, the expansion of facilities to allow better access, etc. The slight annual variations prior to FY 92 are not significant.

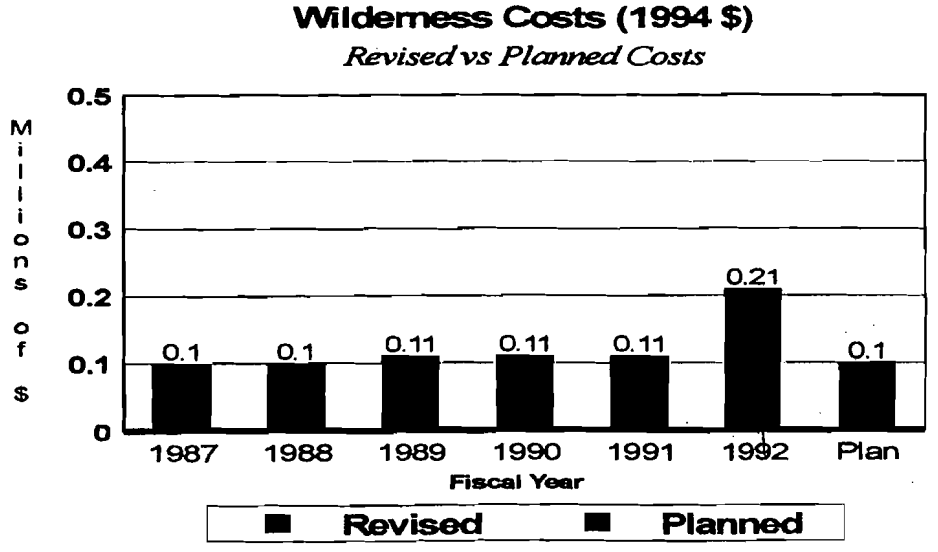


Timber: The timber chart compares our planned unit cost for timber (amount of timber to be prepared divided by the needed timber appropriation) with our revised estimate. Increases in FY 92 timber unit costs probably reflect the Forest's evolving emphasis on uneven-aged harvest over even-aged, the higher costs of doing better NEPA decision making, and the cost of responding to a greater number of appeals.

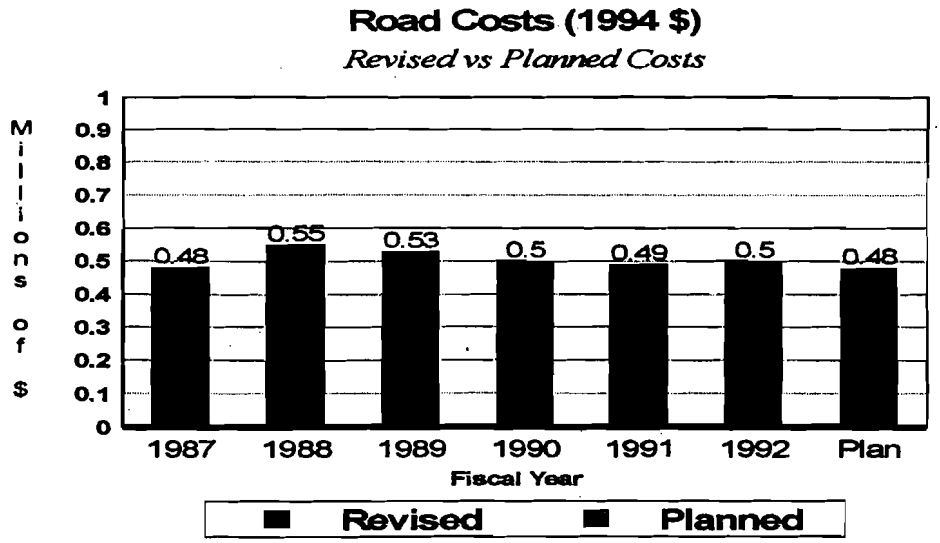
For information on the latest Timber Sale Information Reporting System (TSPIRS) costs, refer to the 1992 TSPIRS report distributed to the public in March of 1993.



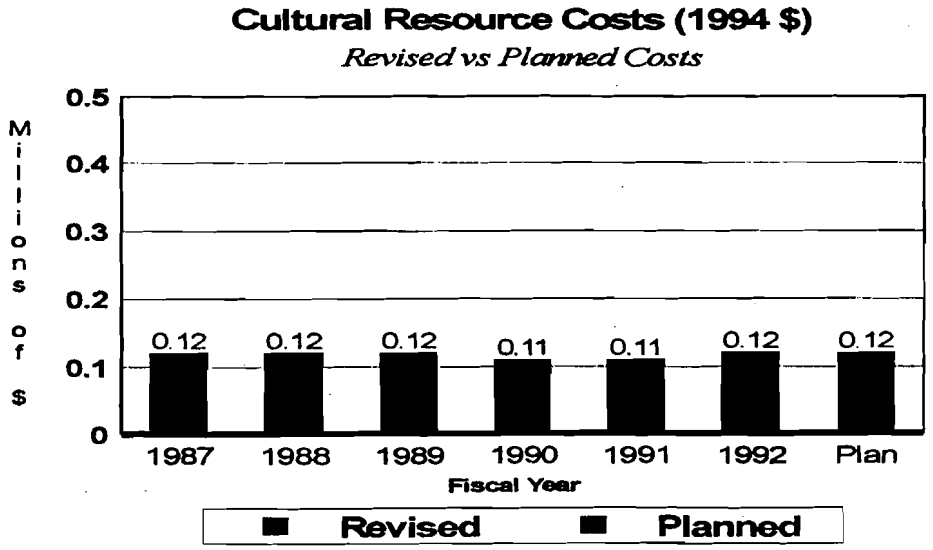
Wilderness: Increased costs in FY92 reflect the designation of Caribou Speckled Wilderness, and the agency's increased emphasis on upgrading Wilderness plans.



Roads: Revised cost estimations have about equaled initial plan estimates during the period. Slight variations are not significant. Road costs are expected to remain constant or decrease due to agency direction to downsize road investments.



Cultural Resources: Revised cost estimations have about equaled initial Plan estimates during the period. Slight variations are not significant. Revised costs for cultural resources are expected to increase in the future due to higher levels of interpretation and higher costs of maintaining heavily-visited facilities.



There can be many reasons for cost changes from year to year, including such things as experience based on monitoring the costs of specific on-the-ground expenses, internal agency direction, new means of estimating costs, corrected errors and ommissions, and new public expectations that will dramatically affect costs, but which do not necessitate a change in basic plan direction or decisions. Often these factors act together, making it difficult to attibute cost changes to specific events.

Though agency cost information describing revised cost estimates is generally available, written rationale documenting the reasons for revising those costs were generally not available—requiring us to rely upon the recollections of people who were involved with the revisions at the time.

Payments to Local Governments

by

Wayne Knipping, Budget and Accounting Officer

Management activities on the National Forest result in some direct monetary returns to local governments. These include yield taxes paid by loggers who purchase National Forest timber, a share of the gross receipts received by the United States from activities on the Forest, and payments in lieu of taxes. Payments are either made directly to the towns or to the states for dispersal to the Towns.

Twenty-five percent of the gross receipts (known as "the 25% fund") from the National Forest are returned to the towns for use in their road and school programs. Receipts are principally from the sale of timber products and the fees paid by special use permittees such as alpine ski areas. The receipts are pro-rated among the towns based on the amount of National Forest System land within each town.

Payments in lieu of taxes (PILT), together with the 25% fund, are designed to insure that local governments, over time, receive at least $0.75 per acre of National Forest System lands (with minor exceptions) within their boundaries. Here's how it works: The PILT payment in any one year is whichever is greater, either 10 cents per acre or 75 cents per acre minus the prior year's payment from the 25% fund. There is a ceiling for such payments to any Town based on its population. PILT can be used for any governmental purpose.

The following table shows these three types of payments:

New Hampshire 10% Yield Tax

		1987	1988	1989	1991	1991	1992
		$85,000	$130,000	$102,000	$110,000	$121,000	$93,000
State	County						**25 Percent Fund**
		1987	1988	1989	1990	1991	1992
NH	Carroll	$105,714	$ 80,405	$114,021	$107,909	$110,263	$ 96,672
	Coos	$151,173	$115,108	$166,579	$157,594	$161,031	$141,479
	Grafton	$235,752	$179,318	$254,443	$240,800	$246,221	$216,454
NH		$492,639	$374,831	$535,043	$506,303	$517,515	$454,605
ME	Oxford	$ 33,892	$ 25,778	$ 36,556	$ 33,638	$ 35,338	$ 30,983
Total 25% Fund		*$526,531*	*$400,609*	*$571,599*	*$539,941*	*$552,853*	*$485,588*

State	Town/County	Payments in Lieu of Taxes					
		1987	1988	1989	1990	1991	1992
NH	Albany	$4,059	$4,092	$4,092	$5,795	$4,092	$4,092
	Bartlett	$2,900	$5,788	$2,923	$6,611	$2,923	$2,923
	Benton	$2,337	$2,995	$2,356	$2,659	$2,356	$2,356
	Berlin	$1,610	$3,215	$1,623	$3,672	$1,623	$1,623
	Bethlehem	$3,004	$5,996	$3,028	$6,848	$3,038	$3,038
	Campton	$212	$423	$214	$483	$214	$278
	Carroll County	$908	$915	$915	$1,184	$1,184	$158
	Carroll Town	$1,505	$3,004	$1,517	$3,431	$1,517	$1,517
	Center Conway	$0	$71	$0	$0	$0	$0
	Chatham	$2,849	$2,872	$2,872	$2,872	$2,872	$2,872
	Coos County	$99,339	$100,475	$100,167	$100,241	$99,939	$13,397
	Easton	$1,304	$1,314	$1,314	$1,616	$1,314	$1,314
	Ellsworth	$1,142	$1,151	$1,151	$1,151	$1,151	$1,151
	Franconia	$2,585	$5,161	$2,606	$5,895	$2,606	$2,606
	Gorham	$123	$3,684	$582	$1,317	$582	$587
	Grafton County	$31,441	$31,704	$31,693	$31,707	$31,689	$4,233
	Harts Location	$364	$367	$367	$367	$437	$511
	Jackson	$3,138	$6,264	$3,163	$7,154	$3,163	$3,163
	Jefferson	$424	$845	$427	$965	$427	$427
	Lancaster	$100	$618	$157	$356	$157	$157
	Landaff	$425	$718	$428	$854	$428	$428
	Lincoln	$7,212	$14,223	$7,270	$16,279	$7,271	$7,271
	Milan	$408	$813	$2,231	$929	$411	$411
	Randolph	$979	$2,136	$1,011	$2,287	$1,011	$1,011
	Rumney	$1,124	$2,294	$1,139	$2,578	$1,139	$1,139
	Sandwich	$1,674	$3,341	$1,687	$3,815	$1,692	$1,692
	Shelburne	$6,131	$4,115	$2,455	$4,722	$11,871	$2,411
	Stark	$1,161	$4,530	$1,465	$3,314	$1,465	$1,465
	Tamworth	$1,533	$45	$0	$52	$23	$0
	Thornton	$1,556	$3,060	$1,545	$3,628	$1,563	$1,563
	Warren	$4,098	$3,351	$1,569	$3,781	$1,569	$1,569
	Waterville V.	$808	$4,131	$4,131	$4,131	$4,131	$4,131
	Wentworth	$380	$800	$383	$906	$383	$383
	Woodstock	$2,806	$5,602	$2,830	$6,426	$2,833	$2,833
NH Total		*$189,639*	*$230,113*	*$189,311*	*$238,026*	*$197,074*	*$72,710*
ME	Alfred	$1,354	$1,365	$1,365	$1,357	$1,365	$1,365
	Bethel	$0	$1	$0	$8	$1	$0
	Dayton	$0	$41	$0	$41	$41	$0
	Gilead	$218	$437	$220	$451	$220	$220
	Hollis	$0	$18	$0	$18	$18	$0
	Lovell	$0	$49	$0	$50	$12	$0
	Lyman	$1,328	$1,339	$1,339	$1,339	$1,339	$1,339
	Oxford	$13,513	$14,568	$13,095	$14,689	$16,149	$16,096
	Stoneham	$1,054	$2,143	$1,246	$3,213	$1,246	$1,246
	Stow	$357	$713	$360	$736	$360	$360
Maine Total		*$17,824*	*$20,674*	*$17,625*	*$21,902*	*$20,751*	*$20,626*
Total Forest PILT		**$207,463**	**$250,787**	**$206,936**	**$259,928**	**$217,825**	**$93,336**

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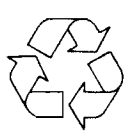

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