White Mountain National Forest

United States
Department of
Agriculture

Forest
Service

Eastern
Region

Monitoring and Evaluation Report

FY 2012

Cover: Lichen inventory. WMNF photo by Ralph Perron.

This document is available in large print. Contact the White Mountain National Forest Supervisor's Office

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Contents

Forest Supervisor's Note

I am pleased to share with you the most recent White Mountain National Forest Monitoring Report, which summarizes many of our most recent monitoring efforts. As always, this report considers how well we are implementing the management direction in the Forest Plan, what effects our management is having on natural, cultural, and social resources, and how those resources are being affected by other factors. We continue to be committed to identifying what is working well in our programs and what isn't, sharing the results, and learning from all that we do.

Our monitoring shows that we are largely implementing the Forest Plan as written and intended. Working with local, state and other Federal agencies and many other partner organizations, we manage all the resources on the White Mountain National Forest in an integrated way, ensuring that meeting objectives in one area doesn't adversely affect another. I am proud of our many successes and confident we will find solutions where monitoring shows a new approach is needed.

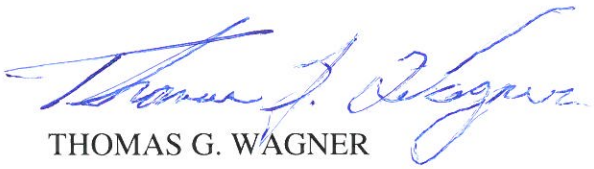
We have continued our work to update out Motor Vehicle Use Map as part of implementing the Travel Management Rule (36 CFR 212), with a goal of reprinting this map in early 2014 for public distribution. The next phase of implementing this rule is to complete a travel analysis process (TAP) for all National Forest System roads. Recommendations from the TAP will help identify our needed versus unneeded roads, with a long-term goal of establishing the recommended minimum road system that can be maintained with expected funding.

Work on the travel analysis process began in 2013 and will be completed by the end of 2015. During that time we will review related information from Forest Plan revision, subsequent project-level decisions, and our watershed condition assessment; consider the natural, social and economic resources affected by our road system; gather input from interested publics; and determine the long-term benefits, risks, and opportunities associated with our existing road network. Recommendations from the process will then be implemented through integrated resource management projects and smaller road and trail projects with available funding. We will monitor our progress toward the TAP recommendations and report on those in future monitoring and evaluation reports.

In the current constrained budget environment we continue to prioritize and focus on the most important work to meet the goals and objectives outlined in the Forest Plan. While some expected projects have not been accomplished or delayed under current funding levels, we have worked hard to maintain our commitment to monitoring by utilizing partnerships, volunteers and other innovative approaches to stretch available resources.

I find that our recent monitoring and this report meets the intent of the Forest Plan (Chapter 4). No need to amend the Forest Plan was identified as a result of our monitoring. In future years we will work with interested partners and individuals to review our monitoring program in light of the recently updated planning regulations (36 CFR 219; http://www.fs.usda.gov/detail/planningrule/home/) and make necessary adjustments.

I appreciate your interest and ongoing commitment to the White Mountain National Forest and look forward to working with you in the future.



THOMAS G. WAGNER

Forest Supervisor

Introduction

Effective monitoring and evaluation helps the Forest Service and the public determine how well a Forest Plan is being implemented, whether Plan implementation is achieving desired outcomes, and whether assumptions made in the planning process are valid. It helps us improve our management and determine when we need to adjust desired conditions, goals, objectives, standards, and guidelines.

The White Mountain National Forest's Monitoring Plan (Chapter 4 of the Forest Plan) describes what we will monitor and what we expect to learn from that monitoring. The Monitoring Plan identifies several types of required monitoring, including monitoring of sustainability, outputs, services, and costs, management indicator species, objective attainment, standard and guideline implementation, and effects of management practices. Our Monitoring Plan also identifies the need to conduct monitoring on a variety of topics or resources to evaluate resource conditions and ecosystem health, and help answer the question "Are we accomplishing the overall goals of the Forest Plan?"

Monitoring is not performed on every activity, nor is most of it expected to meet the statistical rigor of formal research. Some monitoring we do as an integral part of daily activities, such as construction and timber sale contract administration. Some monitoring is conducted weekly or annually, some is done at longer intervals to track changes over time, and other items are monitored when funds and staffing are available.

The monitoring report summarizes and, at scheduled intervals, evaluates monitoring results. It also provides the public and Forest personnel with updated information about Forest Plan and project implementation. Some monitoring leads to immediate conclusions while other topics require a decade or more of data collection to produce informative results. As a result, our monitoring report changes every year and the level of detail provided varies by topic.

Although the Forest Service's budget continues to be constrained in response to national economic concerns, monitoring remains an important part of our annual program of work. We expect to continue funding all the monitoring items identified as required in the monitoring guide, and as many high priority items as budgets allow each year.

We are fortunate to have many partners who are willing to work with us to help maintain our roads, trails, and facilities, develop and implement projects, and monitor the status of our resources and effectiveness of our management. As funding available to the Forest and many of our partners declines, it is critical for us to continue to work together to identify needs and priorities across the landscape and keep important programs and projects moving ahead. We look forward to working with our current partners and developing new relationships in the coming years.

Required Monitoring

Management Indicators Species

The Forest Plan identifies five management indicator species (MIS), each representing a different vegetative habitat condition. Part of our required monitoring is to track the population trends of these species over time to assess the effects of our management on these species. Several monitoring protocols have been established to complete this work. Our permanent plot (or "permaplot") protocol is used specifically to track population trends of the two MIS representing mature forests (scarlet tanager and blackburnian warbler); however, because all bird species heard or seen during the survey are recorded, it provides information on a variety of other species as well.

The protocol includes 240 individual survey points on 16 transects, each made up of 15 points. Transects are laid out in management areas where the emphasis is general forest management (Management Area 2.1) or semi-primitive recreation (Management Area 6.1, 6.2, or 6.3). Surveys consist of a 10-minute bird count at each point, completed three times during the breeding season. This protocol has been run most years since 1992; FY12 marked the 16th time this monitoring was performed.

Almost 120,000 observations have been recorded in the 20-year history of the survey, documenting 126 species. Of this number, data appears to be sufficient to complete trend analysis for 41 species. To analyze the data, observations were sorted to find the highest number of observations for each species at each point for each year. Based on suggestions from Forest Service Research biologists, each point was treated independently rather than grouping the data by transect. For each species at each point, the data were ranked and then a linear regression performed on the ranks. In addition, the mean number of observations by year were plotted to see if the raw data showed obvious visual trends. Trends were assumed to be statistically significant at $p = 0.05$.

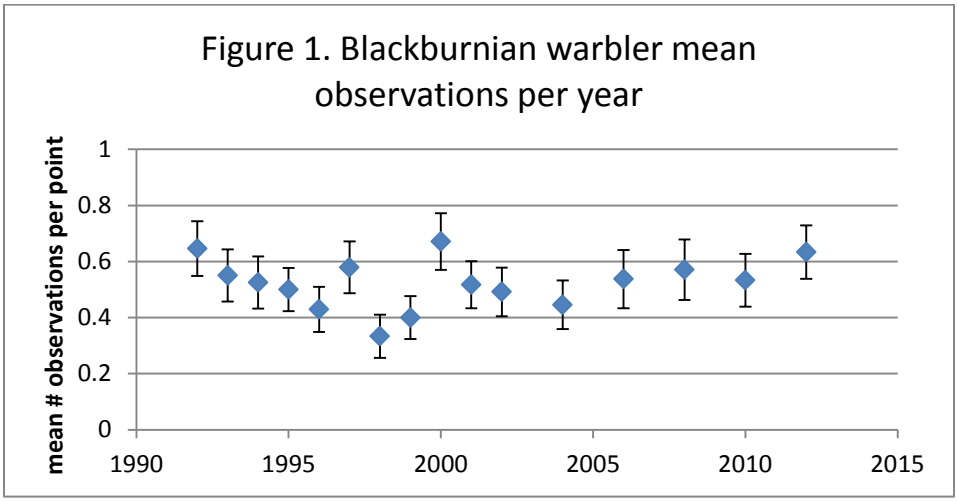
Data for all species showing significant statistical trends is shown in Table 1. Note the blackburnian warbler is not included in this list. Results for this species showed no significant statistical trend, as well as very stable visual data (see Figure 1). This would indicate mature softwood habitats are likely stable as well and providing a similar level of habitat as 20 years ago.

Blackburnian warbler. Photographer unknown.

***Table 1. WMNF observed statistically significant permaplot bird trends (1992-2012) by management area category*.**

	ALL POINTS COMBINED			FOREST MANAGEMENT ONLY			SEMI-PRIMITIVE RECREATION ONLY		
Species	**slope**	**p**	**visual trend?**	**slope**	**p**	**visual trend?**	**slope**	**p**	**visual trend?**
Alder flycatcher	*-0.02*	*0.0016*	*yes*	*-0.02*	*0.0027*	*yes*	-0.00	0.0984	no
American redstart	*-0.09*	*0.0024*	*yes*	*-0.09*	*0.0077*	*yes*	*-0.10*	*0.0035*	*yes*
Black-throated blue warbler				0.06	0.0179	no			
Blue-headed vireo	*-0.08*	*0.0383*	*yes*	*-0.07*	*0.0331*	*yes*			
Canada warbler	*-0.06*	*7.1E-06*	*yes*	*-0.06*	*0.0001*	*yes*	-0.06	0.0019	no
Cedar waxwing	-0.03	0.0199	no	-0.05	0.0060	no			
Chestnut-sided warbler	*-0.07*	*0.0128*	*yes*	*-0.07*	*0.0461*	*yes*	*-0.06*	*0.0008*	*yes*
Common yellowthroat	-0.04	0.0223	no				-0.03	0.0016	no
Pileated woodpecker	*0.03*	*0.0320*	*yes*				0.03	0.0356	no
Rose-breasted grosbeak				-0.07	0.0118	no			
Red-breasted nuthatch				*-0.07*	*0.0143*	*yes*			
Scarlet tanager	*-0.05*	*0.0384*	*yes*						
Veery	-0.06	0.0006	no	*-0.11*	*0.0001*	*yes*			
Wood thrush	*-0.07*	*0.004*	*yes*	*-0.08*	*0.0077*	*yes*	*-0.05*	*0.0032*	*yes*
White-throated sparrow	*-0.13*	*0.0001*	*yes*	*-0.14*	*0.0008*	*yes*	*-0.11*	*3.8E-05*	*yes*
Yellow-bellied sapsucker							0.08	0.0015	no
Yellow-rumped warbler							-0.07	0.0489	no

Blank cells represent non-significant results; slope = slope of mean rank regression; italicized text in table indicates both significant p and obvious visual trend on unranked data.



When the data was pooled across all points, nine species showed both statistically significant trends (eight declining, one increasing) and matching visual trends:

To elucidate reasons for these trends, data were also separated by management area emphasis. When these data were analyzed, the four species shaded below (American redstart, chestnut-sided warbler, wood thrush, and white-throated sparrow) showed statistically significant declining trends, along with visual trends, in both the general forest and semi-primitive management categories.

Declining trend	**Increasing trend**
Alder flycatcher	Pileated woodpecker
American redstart	
Blue-headed vireo	
Canada warbler	
Chestnut-sided warbler	
Scarlet tanager	
Wood thrush	
White-throated sparrow	

The fact that these species show declines in both management categories implies that trends may be unrelated to Forest Service management or may be part of a larger regional change. In fact, throughout all of New Hampshire and Maine, the North American Breeding Bird Survey results show declining trends of at least 1.4 percent per year for all four species through 2010 (Sauer et al. 2012), with the wood thrush showing the most rapid declines of 3.9 percent (NH) and 6.3 percent (ME) per year.

All four of these species are typically found in hardwood or mixedwood stands in some stage of regeneration after disturbance, either from a natural event such as a windstorm or following timber harvest. Chestnut-sided warblers are the management indicator species for “regeneration” hardwood habitat (0-9 years after disturbance, where most trees are removed and the resulting flush of vegetation provides dense horizontal cover), while the other three are more often found in mid-successional stages. Interestingly, the “State of the Birds” report for New Hampshire (Hunt 2009) includes the same three species as examples of species whose declines are “primarily a result of a statewide trend toward

more mature deciduous forests and less frequent natural disturbance…which in combination have reduced the amount of seedling or sapling size trees both in forest understories and as distinct patches." The report suggests, "Conservation of hardwood forest birds at the statewide scale should focus on preservation of unfragmented blocks in combination with, when appropriate, active forest management intended to create conditions suitable for early and mid-successional species."

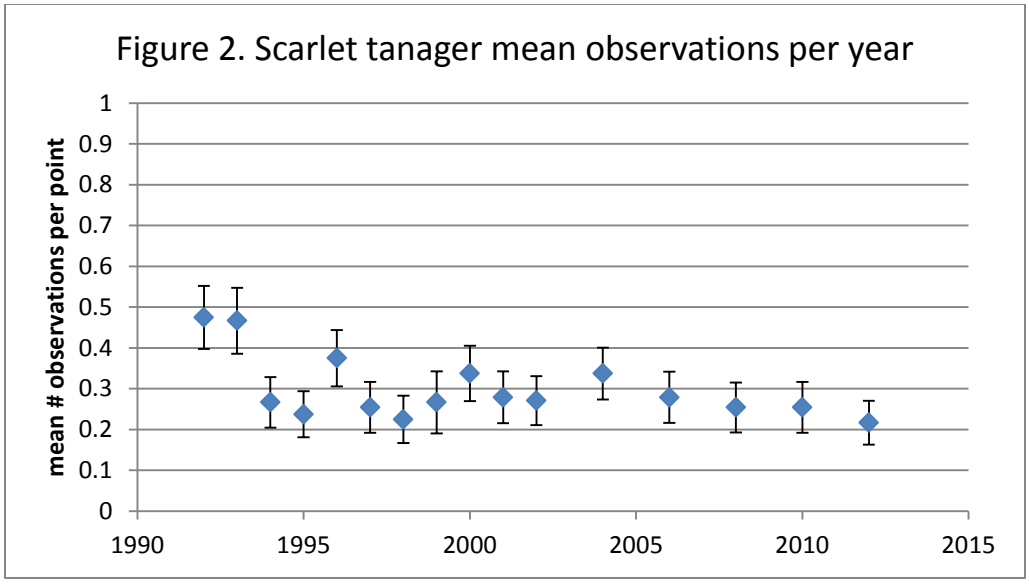
This makes sense for the WMNF. Our stands continue to mature over the majority of the Forest. Even in Management Area 2.1, where timber harvest occurs, regeneration habitat objectives have been below established Forest Plan objectives for many years due to lower than anticipated budgets and a lack of widespread natural disturbance. To confirm that these general habitat trends are reflected in the bird survey areas, changes in vegetation were qualified at each point. Each of the 240 points was assigned a forest type category (e.g., hardwoods, softwoods) and age class (regeneration, young forest, or mature forest) for each year. Although this was not a perfect methodology for quantifying habitat condition, it allowed for a quick assessment of habitat changes over time.

Changes to all forest types except hardwoods were negligible. Of the 240 total points, 15 (6%) had decreases in regeneration hardwood habitat (i.e., clearcut harvests were completed early in, or prior to, the survey period but stands grew up into young forest by the end of the survey). On the other hand, only 5 points (2%) had increases in regeneration hardwood habitat (i.e., clearcuts occurred later in the survey period). An additional 28 points had group cut harvests during the survey period. Group cuts are small (0.1-2 acres) cuts in mature forests to promote more shade-tolerant tree species. The resulting vegetation can provide limited habitat opportunities for birds preferring regeneration habitats but are not ideal.

So the increasing trend identified for pileated woodpecker is reasonable. This is a species that needs large, decaying trees to support its wood-boring insect prey. Conversely, the alder flycatcher and Canada warbler are species of regeneration age habitats like the chestnut-sided warbler. The change in regeneration habitat (4% decrease) within the survey area seems small, but these habitats can support a large number of individuals. Chestnut-sided warblers in particular showed as many as four individuals per point early in the survey period in clearcuts but then dropped to zero at the same points by the end of the survey. So a small loss of habitat may result in a relatively large drop in individuals. There also may be regional population dynamic influences at work and these survey trends are consistent with statewide declines.

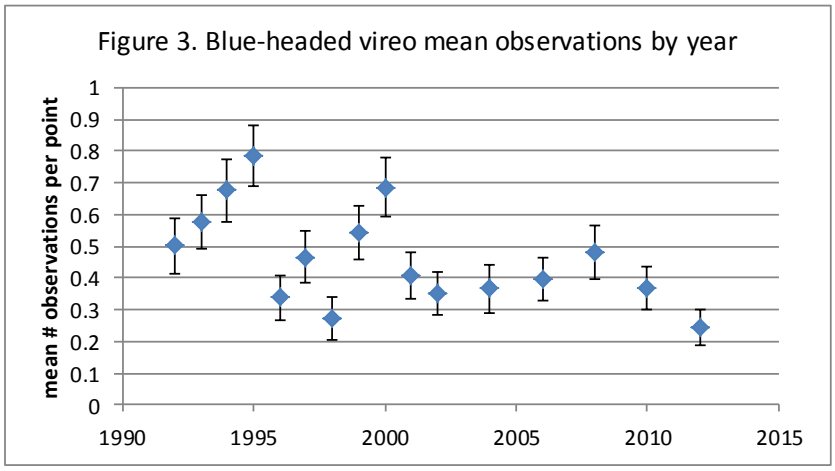
The two species trends that are less clear are the scarlet tanager and blue-headed vireo. The scarlet tanager is the MIS representing mature hardwoods. If the Forest vegetation is maturing in general, habitat for this species should be increasing and therefore, population increases would be expected. But the trend for this species is negative, both on the Forest and statewide in Maine and New Hampshire for similar timeframes (Sauer et al. 2012). The scarlet tanager is an interior forest species, meaning it is especially sensitive to fragmentation and subsequent brood parasitism (e.g., by cowbirds). This has been identified as a possible reason for regional downward trends, but is not likely the reason for WMNF trends. Of the almost 120,000 birds observed in the WMNF survey, only 5 have been cowbirds and none were observed since 1995.

One possible explanation is that unusually high numbers reported early in the survey period are biasing the trend (Figure 2). Without these points, the trend would be considered stable.



Other possible explanations are that the vegetative habitat on the WMNF is suitable, but fragmentation elsewhere, source-sink population dynamics, or a decline in arthropod prey abundance may be influencing local trends (Mowbray 1999). Scarlet tanagers are also long-distance migrants (to Central America and northern South America) where habitat fragmentation may also be influencing populations. Additional years of survey should determine with more certainty if this decline is persistent or if the current results are just a dip in an otherwise stable trend.

The blue-headed vireo occupies mature forests, often with a substantial softwood component. Statewide populations in New Hampshire and Maine appear stable or increasing (Sauer et al 2012). In addition to showing a statistically significant decline when all of the WMNF data was pooled (Figure 3), this species' trend was also negative when only the points in management areas allowing forest management were evaluated. A decline in just the forest management emphasis points might imply that timber harvest activity could be the cause, but further examination of individual transect data showed stable trends on two transects that were harvested during the survey period and declines (although not necessarily statistically significant) on all other transects, even those in the semi-primitive emphasis areas where harvest did not occur. Future efforts should place emphasis on determining if negative trends are persistent and, if so, identifying the causes for such a decline.



Finally, five species showed statistically significant and visual trends (all declining) when just the forest management emphasis area data was examined, but not in the semi-primitive emphasis areas:

Forest management emphasis areas only
Alder flycatcher
Canada warbler
Veery
Red-breasted nuthatch
Blue-headed vireo

Alder flycatcher and Canada warbler are species of early successional regeneration habitats. The veery is considered a mature forest bird, but requires considerable disturbance to create shrubby understory conditions. Declines of these three species are likely the result of declines in timber harvest, especially clearcutting, compared to previous decades as discussed above. Declines are consistent with statewide declines.

The red-breasted nuthatch is a species of mature softwood and mixedwood forests. Females excavate their own cavities for nesting and birds forage primarily on arthropods and conifer seeds. Unlike most of the other birds discussed here, the red-breasted nuthatch is a resident species, not a migrant. However, its periodic irruptive movements (Ghalambor and Martin 1999) can confound annual population estimates and trends. The WMNF has ample softwoods throughout the Forest and many silvicultural prescriptions are designed specifically to restore softwoods, which historically were more abundant. Therefore it is unlikely that Forest Service management could be causing a decline in this species, which may just be an artifact from a natural spike in populations early in the survey period. Continued monitoring will help us better understand what is happening with this species.

No species had statistically significant trends and corresponding visual trends when just data in the semi-primitive emphasis area were analyzed. This may make sense, as survey points in these management areas tend to have more static vegetation, but it may also be a result of reduced statistical power from the smaller number of points in this dataset.

In summary, permaplot surveys continue to provide valuable data on MIS and other bird species. Of the 41 species with data sufficient for trend analysis, 11 have shown

statistically significant trends across MA 2.1 or the Forest as a whole. Trends for ten of these species were declining, seven of them likely due to the reduction in even-aged regeneration harvest. Additional monitoring is needed to evaluate the possible causes of apparent population declines for the remaining three species and to help us understand the effects of climate change on these species.

Most of the trends on the WMNF are consistent with larger regional trends. This validation may seem redundant but is important to recognize because the national Breeding Bird Survey routes for the most part only skirt the edge of the WMNF. Habitat throughout the rest of New Hampshire and Maine does not necessarily reflect the conditions on the WMNF. Without the Forest level data, management decisions would be based on the assumption that statewide bird trends reflect Forest population trends, which may be true in some cases and not in others (e.g., the blue-headed vireo).

Outputs and Services

Appendix B of the Forest Plan identifies a specific set of expected outputs and accomplishments for the first decade, as well as some limits. Most of these measures come from the resource goals and objectives in Chapter 1 of the Plan. Table 2 shows the accomplishment for each measure in FY 2012 and the total for the first seven years of Forest Plan implementation. Additional information on the activities and why some accomplishments are different from estimates in Appendix B also is provided.

This section monitors our success at achieving only those outputs and services identified in Appendix B of the Forest Plan, which are a small part of our accomplishments in a given year. In future years, we will try to report on more of our accomplishments in these areas. For FY12, information on recreation projects completed using Recreation Enhancement Act funds (recreation passes) can be found at: http://www.fs.usda.gov/detail/whitemountain/maps-pubs/?cid=STELPRDB5187783.

Aquatics

Woody debris was placed in Wildcat Brook to create pools and cover and protect streambanks. This work was described in the Than Forest Resource Management Project Environmental Analysis.

Fire Management

In 2012 there were no unplanned fires on the National Forest in management areas that allow management of wildfire for resource benefits.

Forestry

Harvested and sold volumes remain below Forest Plan estimates for the allowable sale quantity. Harvested volumes and acreages fluctuate from year to year based on markets for various products and choices by sale purchasers on which units to cut. Due to the way units were logically packaged into timber sales, the Forest sold slightly more volume than we were funded to produce in FY12. Given anticipated agency budgets and national priorities for funding, our forestry and wildlife habitat accomplishments are likely to remain at similar levels in the next few years, though it remains our goal to gradually increase the acres of treatment and volume sold.

Table 2. Estimated Management Practices and Accomplishments

Activity or Product	Unit of Measure	Estimate for First Decade	FY12 Accomp.	FY06-FY12 Accomp.
Aquatics				
Stream habitat restoration	Miles	30	3	13.1
Restore fish passage	Road crossings	10	0	8
Fire Management				
Unplanned wildfire managed for resource benefit (Wildland Fire Use)	Fires	4 – 8	0	1
Forestry				
Volume Sawtimber Harvested	MMBF	137	6.3	35.6
Volume Pulp Harvested	MMBF	106	9.0	47
Volume of Timber Sold	MMBF	240	14.5	74.4
Even-aged regeneration harvest	Acres	9,400	459	2,193
Even-Aged Intermediate harvest	Acres	5,600	707	3,282
Uneven-aged Harvests	Acres	19,300	690	6,793
Total harvest	Acres	34,300	1,856	12,268
Recreation				
Net increase hiking trail construction	Miles	Up to 25	0	0
Net increase snowmobile trail construction	Miles	Up to 20	0	1.4
Net increase developed campground sites	Sites	Up to 32	0	0
Net increase backcountry facility capacity	PAOT	Up to 40	0	0
Soils and Watershed				
Improved Watershed/Soil Conditions	Acres	At least 250	226	411
Transportation				
Road construction	Miles	10	0	4.9
Road reconstruction	Miles	70	11.4	47
Classification of unclassified roads	Miles	N/A	1.5	12.6
Road decommissioning	Miles	5 - 40	0.9	1.73
Unclassified road decommissioning	Miles	N/A	0	12

Recreation

To date, the Forest has decommissioned more miles of hiking trail than we have constructed, resulting in a net loss of trails across the Forest. Therefore the net increase in hiking trails, which is what Forest Plan objectives limit, remains at zero miles.

Similarly, the decommissioning of Resolution Shelter in FY12 resulted in a decrease in backcountry site capacity of eight people at one time. No new sites were created so the net increase in backcountry facility capacity also remains zero.

Soils

The predicted accomplishment of at least 250 acres of watershed and soil improvement work was based on the average annual accomplishment before the revised Forest Plan was signed. It was identified as a minimum to allow for as much of this type of work as is needed and feasible with available funding.

Accomplishments in past years have averaged around 30 acres per year. Improvements were defined fairly narrowly to include installing or fixing drainage on roads and trails, replacing culverts to restore aquatic species passage, and installing bridges to improve species passage and streambank stability. In FY12, the Forest accomplished more than twice the average amount of this type of work, including extensive repairs to roads and trails damaged by Tropical Storm Irene. When this work is added to past accomplishments, the Forest has exceeded the minimum identified in the Forest Plan. In addition, the Forest Service expanded our definition of a soil or watershed improvement accomplishment in 2012 to include many road and trail maintenance activities, invasive plant control, and prescribed burning that improves soil productivity.

Transportation

All mileages remain within the accomplishments projected in the Forest Plan. Road reconstruction was higher in FY12 than in any single year recently as a result of Tropical Storm Irene. As discussed in the FY11 Report, the storm produced intense rains and high flood waters that undermined bridges, overflowed culverts, and washed out segments of roads. In 2012, the Forest Service implemented several road reconstruction projects to repair damaged roads. Monitoring of recovery efforts resulting from Tropical Storm Irene is discussed later in this report.

Recreation

Off-road vehicle (ORV) effects

Monitoring of ORVs is required by regulation. Our Monitoring Guide requires us to monitor the “effects of ORV use on snowmobile trails during early and late winter on soil, water, vegetation, fish and wildlife, forest visitors, and cultural and historic resources.” The results of this monitoring will help determine if there are problems in the ‘shoulder’ seasons, when there is higher risk of damage, and whether management action is needed to reduce impacts.

In 2012 we initiated our ORV monitoring. Every year, employees from each District spend three days traveling identified snowmobiles trails, looking for resource concerns or damage from ORV use during the shoulder seasons. We found many trails where snowmobile use was not causing any resource damage and a few where riding early or late in the season resulted in a small amount of soil disturbance that needs to be address at the site-specific level. We will continue this monitoring in future years, looking for "hot spots" or trends, and will summarize our findings periodically in this report.

Berry Farm Snowmobile Trail in late winter. WMNF photo by Tom Giles.

Sustainability

This section addresses topics in Table 4-02 of the Forest Plan. This year's report considers the two annual items, restocking success and insect and disease levels.

Are lands adequately restocked following harvest?

Within five years following regeneration harvests such as clearcut, shelterwood seed cut, single tree or group selection cut, we must certify that we expect an adequate number of seedlings to be established to restock the stand. Typically, our tree species and temperate climate ensure adequate restocking after regeneration harvests.

About three years after harvest, a field survey is conducted by Forest staff. Surveyors establish several sample plots and make visual observations as they walk throughout the area to see if desirable seedling species are present. In 2012, 595 acres were surveyed and all were certified as having adequate stocking.

To what extent have destructive insects and disease organisms increased?

Monitoring destructive insects and disease organisms is required annually to track trends and identify concerns as early as possible. The results can be used to determine when management action may be appropriate to control an outbreak.

The Forest Health Protection Office of the State and Private Forestry branch of the Forest Service, in Durham, New Hampshire, conducts an aerial detection survey over the WMNF annually. The 2012 survey detected more than 18,000 acres of defoliation in many small areas across the Forest in New Hampshire and about 65 acres on the Forest in Maine. More than 11,000 acres of defoliation on the Forest was from eastern white pine needlecast. Approximately 5,600 acres were from hail damage. Tent caterpillars affected about 1,500 acres of aspen and other species.

Objective Attainment

Recreation

Forest Plan, Page 1-13, Developed Recreation

Allow for a net increase of up to 32 new campground sites

Recreation use in the White Mountains predates the creation of the National Forest, and clearly played a role in its establishment. Since the early 1900s, use levels have steadily increased, and there have been many changes in the types of use over time.

The White Mountain National Forest has many recreation facilities, including campgrounds, cabins, interpretative sites, trails, and backcountry facilities. The Forest Plan calls for limited expansion of these so the Forest will continue to provide a mix of recreational opportunities at levels that can be properly managed and maintained. It is expected that where demand outpaces the capability of existing facilities, additional facilities will be provided on private or other public lands.

The Forest Service currently oversees 20 family campgrounds and two group campgrounds, with a total capacity of 819 family campsites and 22 group campsites. The individual campgrounds range in size from 7 to 177 campsites. The campgrounds offer a variety of development levels and amenities.

In 2012 the closure of Campton Group Campground resulted in a reduction of 15 campsites. This campground was damaged in Tropical Storm Irene and based on the history of and potential for flooding, the recurring cost of infrastructure maintenance in this area, and the concern for public safety, the site was closed to overnight use. It is currently being redesigned to accommodate day use visitors. We are looking at other opportunities to accommodate group use on the west side of the Forest, which could eventually balance the loss of campsites from the Campton Group Campground closure. Rehabilitation discussions in other campgrounds across the Forest may result in an increase in campsites at some campgrounds and a decrease in sites in others in coming years, but current funding levels will limit these changes in the near future.

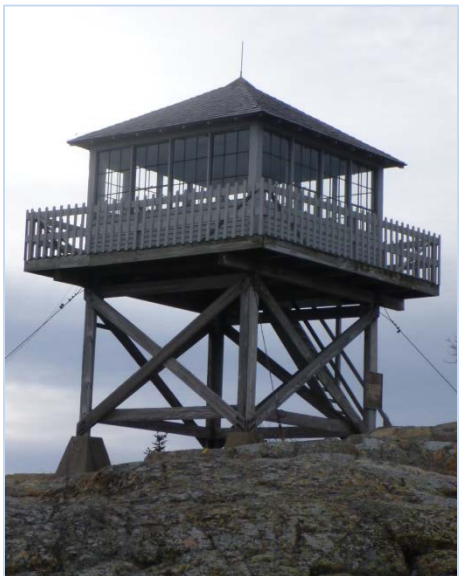
Campers enjoying a WMNF campground. WMNF photo.

Standard and Guideline Implementation

Heritage

Forest Plan, Page 2-7

G-1 Heritage resources should be evaluated to determine their eligibility for listing in the National Register of Historic Places. Priority should be placed on situations where resources are most at risk or management options are limited.



Kearsarge North Firetower. WMNF photo by Sarah Jordan.

An integral element of cultural resource management is the determination of National Register of Historic Places (NRHP) eligibility for cultural sites on the Forest. It is this evaluation of significance and a site's status as an "historic property" that guides the management strategy for each site.

In advance of proposed rehabilitation projects during FY12, two historic picnic pavilions built by the Civilian Conservation Corps (CCC) in the 1930s were evaluated and determined eligible for listing in the NRHP. The Kearsarge North Firetower, built in 1948, was also evaluated and determined eligible. Rehabilitation projects were designed to preserve the historic integrity of these structures. Ongoing large-scale evaluation efforts include the evaluation of all of the lean-to recreation shelters across the Forest, and the evaluation and listing on the NRHP of the Thornton Gore Historic District.

Recreation

Forest Plan, Page 2-17, General, Recreation Management Approaches

S-1 Use will be focused on trails or at backcountry facilities in the backcountry. Use will be focused on roads or developed sites in the frontcountry.

S-2 Current development levels in the backcountry will be maintained or lowered where appropriate.

S-3 Current low use areas and facilities will be managed to meet visitor needs and resource requirements through educations and management controls, where necessary.

G-1 Current high use areas and facilities should be managed for high use to meet visitor needs. Appropriate mitigation should be provided to manage the effects of high use to ensure that they can be sustained in high use areas.

G-2 The Forest Service should collaborate with partner organizations to provide recreational opportunities, conservation education, and visitor information programs.

The recreation management approaches provide the overarching philosophies the WMNF uses in deciding whether or how to take on a project. These approaches include requirements that development in the backcountry not be allowed to increase and that the Forest maintain low-use areas as such. Perhaps most importantly, we will not disperse use from high-use to low-use areas through our management actions. In 2012, the

recreation team made a conscious effort to look at these management approaches and how we have used them in guiding our projects over the last seven years. We found that:

- Implemented projects have resulted in either maintaining or decreasing the development level in the backcountry;
- We have consciously looked at whether an action has the potential to increase or disperse use and made management decisions accordingly;
- Having the approaches in the Forest Plan keeps these philosophies front and center and has influenced our actions.

Our partnership opportunities for collaboration and conservation education continue to grow, limited only by our capacity to be involved. In 2012 collaborative efforts included: numerous conservation education opportunities such as the Teacher-Ranger-Teacher program with the National Park Service, campground interpretive programs and living history at the Russell-Colbath house in partnership with the White Mountain Interpretive Association, the Artist-in-Residence program started in 2011 with the Arts Alliance of Northern New Hampshire, an intern program with the Appalachian Mountain Club to open doors to outdoor career paths for Coos County youth, and work with the NH Fish and Game Department on the hikeSafe program and black bear safety education posters.

Riparian and Aquatic Habitats

Forest Plan, Pages 2-24 to 2-26

G-1 Tree cutting and harvest should not occur within 25 feet of the bank of mapped perennial streams, the high water mark of a pond, or natural vernal pool, unless prescribed to benefit hydrological or ecological function of the associated stream, pond, or riparian area. …

G-2 Uneven-aged silvicultural practices should be used within the Riparian Management Zone (RMZ) along all perennial streams, lakes, ponds, and vernal pools. Cuts should be should be designed to maintain a relatively continuous forest canopy for the protection and maintenance of water quality, dead wood recruitment, hydrologic function, wildlife habitat, and scenic values. Regeneration group cuts should be limited to less than one acre in size.

G-6 New timber log landings, developed campsites, and permanent facilities should not be located within 100 feet of a perennial stream or the high water mark of a pond. If they need to be located within 100 feet, additional measures to prevent direct runoff into surface waters and to minimize sedimentation should be taken.

G-15 Trees that directly provide structure to the streambanks and channels of intermittent streams should be retained.

Implementation of these guidelines was evaluated for two sales in the Kanc 7 project area. The Forest hydrologist observed the Kanc 7 East sale in August 2011, after the close-out activities were completed. An interdisciplinary team observed portions of the Eight Point timber sale in July 2012, also after close-out. A draft Forest Service Best Management Practices monitoring protocol was used to select areas and parameters monitored during this trip.

Three-stripe delineating a 25-foot no cut buffer on a perennial stream, with uneven age harvest outside (right of striped tree). WMNF photo by Sheela Johnson.

On both sales, no tree cutting or harvest occurred within 25 feet of the bank of mapped perennial streams. The riparian area observed on the Kanc 7 East sale did not meet the Forest Plan definition of a "mapped perennial stream" but still received this protection. Uneven-aged treatments were prescribed in the Riparian Management Zone in all cases, meeting guideline G-2.

An intermittent stream in a single tree selection unit in the Kanc 7 East sale was evaluated. Trees were cut within 25 feet of the stream, as allowed by the Forest Plan. However, none of these trees directly provided structure to streambanks or the channel, in compliance with G-15. The forest floor was protected adequately to retain a layer of organic matter and leaves at the surface, with no active erosion apparent.

For both sales, best management practices prevented any runoff from landings from reaching streams. Due to a bend in a stream, the distance between a landing in unit 12 of the Kanc 7 East sale and the stream ranges from 35 feet for a short distance to over 100 feet for most of the landing. The slope of this landing caused all potential runoff to move away from the stream. No signs of erosion existed on the slope between the landing and stream, nor were there differences in turbidity or temperature in the stream above and below the landing. This indicates that the "additional measures to prevent direct runoff into surface waters and to minimize sedimentation" were adequate to meet guideline G-6. All other landings were over 100 feet from water bodies.

Edge of log landing near stream, showing slope and revegetation. Channel is to the right of boulders in the lower right corner. WMNF photo by Sheela Johnson.

Water Resources

Forest Plan, Page 2-30, Soil and Water Conservation Practices

S-2 Water quality must be maintained and protected, except that some discharges may be allowed if they are of limited extent and duration and result in no more than temporary and short term changes in water quality. Such activities shall not permanently degrade water quality or result at any time in water quality lower than that necessary to protect the existing and designated uses. Such temporary and short term degradation is only allowed when all practical and appropriate Soil and Water Conservation Practices are used to reduce impacts to water quality.

S-3 Effective, proven methods (e.g., silt fencing) to reduce concentrated runoff and erosion from construction activities must be used.

Three skid trail crossings and one road crossing on streams in the Kanc7 East and Eight Point sales were evaluated for compliance with these standards. As disclosed in environmental analysis documents, stream crossings are areas of high risk of sedimentation, and temporary, localized sediment movement may occur. The skid trail crossings were observed after crossing structures had been pulled from the intermittent streams they crossed. In all cases, close-out procedures sufficiently used water bars, spread slash, and seeded to prevent sediment from the crossing approaches from entering water bodies. Bank disturbance at the crossing site within the width of a skid trail was evident, but any sediment movement was well within analyzed limits.

A bridge crossing on a road in the Eight Point sale was used during winter, when flat, snow-covered approaches rendered additional erosion control unnecessary. This bridge was pulled out and the approaches were revegetating by the following summer. The lack of evident erosion on the ground or fine sediment in the stream indicated that any sedimentation was within analyzed and disclosed limits.

Bridge adjacent to unit 33 in the Eight Point sale during use. WMNF photo by Sheela Johnson.

Effects of Management Practices

Prescribed Burning

Monitoring reports from recent years have summarized the acres of fuels treatments and the apparent effectiveness of prescribed burns at meeting specific goals. These reports also have chronicled the efforts of the fire specialists on the Forest to develop a new monitoring approach that will provide a more consistent, measurable, and feasible way to assess treatment effectiveness. As part of that effort, an improved protocol for monitoring prescribed burns was developed in 2012.

The new procedure balances the need for specific and measureable objectives with consideration of the efficiency and practicality of implementing monitoring activities. The plan outlines a tiered approach to monitoring that allows monitoring for a given

project to vary depending on certain elements in the planning process and the availability of funding and labor. From simplest to most complex, options include:

- Ocular observations and estimates of consumptions will be recorded for every burn.
- When possible, photo points will be established and periodically revisited for documenting stages in vegetative development post burn.
- When desired and practical, certain measurements can be used to measure the success of specific objectives.
- The continuation of more inclusive plot data (such as the use of FIREMON or FFI) for particular sites will be necessary to provide a more complete assessment of the effects of our burns.

While photo points are an excellent way to document changes through time and treatments, more in depth measurements such as plot data are also needed to help determine success and analyze effects for future projects. The time, labor, and cost to monitor at this level is a challenge. WMNF staff met with researchers to discuss getting assistance in implementing the more intensive data collection.

Both managers and researchers expressed interest in working together to obtain these data. In the future, these groups will work together to define objectives and identify appropriate measurements for individual burn projects. Based on that, hopefully researchers will develop scientifically sound, project-specific protocols and coordinate data collection and analysis by staff from both groups.

In June, fire, wildlife, and forestry personnel met to look at the effects of prescribed burns in 2003 on Harriman Brook units, including pre/post-fire vegetation structure and composition and severity or intensity of burn. Regeneration in the project varies, but was considered desirable, moving the area toward the objective. There are some areas with a lot of hemlock; oak is well distributed but not abundant. There is some pine regeneration with a variety of hardwoods coming into the understory. The initial shelterwood treatment may not have been heavy enough to get optimal pine regeneration.

Specialists also discussed how results of this project can be applied to future burns. The WMNF is proposing more underburns and landscape-scale prescribed fire than we have in the past, and specialists are evaluating how they will analyze effects of these proposals on resources. Results from projects such as Harriman Brook can help with identifying likely effects for future projects.

Effects of Recreation on Water Resources

Forest staff monitor water bodies near a number of recreation sites each year to determine whether recreation use is impacting water quality. A few sites are selected to represent different types of recreational use, and water samples are taken upstream and downstream of the site when possible. The sites monitored in 2012 included Wildcat Ski Area, Loon Mountain Ski Area, Hastings Campground, Wild River Campground, and a dispersed camping area on Great Brook.

Turbidity is a measure of the relative clarity of water. Turbidity values were at or near the lower detection limits at all sites, indicating that activities at these sites are not contributing to suspended sediment during typical flow conditions. Nutrient concentrations, including nitrate, ammonia, and phosphorus, were comparable to

reference sites on the WMNF for all sites. These nutrient concentrations also met all applicable water quality standards.

E. coli bacteria counts are indicators of contamination by human and animal waste. The applicable New Hampshire State standard for Class B waters is less than 406 counts/100 mL in a single sample or 126 counts/100 mL geometric mean value. All sites were below this threshold.

Conductivity is a measure of charged particles in the water; values greater than 100 µS may indicate pollution due to road salt, septic systems, or other chemicals. Conductivity values were below 100 µS at all sites except those on the Peabody River at the Wildcat Ski Area. There are three monitoring sites on the Peabody River associated with Wildcat Ski Area: Peabody River above Wildcat, Peabody River at Wildcat, and Peabody River below Wildcat (see map, left). The Peabody River flows under a major road, Route 16, about 150 feet upstream of the monitoring site above the ski area. It then flows through the ski area, staying within approximately 600 feet of the road, for approximately 0.75 miles to the monitoring site below the ski area.

In 2012, the Wildcat Ski Area was sampled in February during spring run-off (Table 3). The relatively high conductivity values were likely due to winter road salts entering the Peabody River from adjacent impervious surfaces such as NH-16 and salt storage areas. This is supported by elevated sodium and chloride concentrations at these sites, though all sites met water quality standards for these substances. Conductivity was highest at the most upstream site, above the ski area and just downstream from the Route 16 crossing, and declined as it crossed through the ski area to the site below. The same upper and lower sites were sampled in August 2011 during base flow. These values were far below the 100 µS threshold and suggest that the river has the resilience to recover from the annual influx of winter road salt pollution. These monitoring results do not indicate that the ski area itself is having a measurable impact on water quality.

Table 3. Conductivity in the Peabody River near Wildcat Ski Area

WMNF Site Name	Conductivity (µS)	
	February 2012	August 2011
Peabody River above Wildcat	259.0	48.3
Peabody River at Wildcat	204.0	-
Peabody River below Wildcat	148.4	39.4

Road and Trail Maintenance Effects on Heritage Resources

As in many parts of the eastern United States, the modern transportation system on the WMNF (highways, roads, snowmobile trails) often overlaps with a transportation system that has been used for over 200 years. Often modern roads and trails occupy the same routes as the roads that once connected historic farm sites and communities. In many cases the historic (more than 50 year-old) elements of the road are considered historically significant.

Project surveys and resource monitoring have helped us realize that maintenance of currently used roads and trails may affect their historic features, and historic sites located adjacent to them. Heritage specialists are working with maintenance crews and leaders (Forest employees and partners) to ensure historic values are considered as maintenance plans are developed and implemented. On the Hogsback Sale on the Pemigewasset District, an historic road lined with stone walls is being used as a logging road. The heritage, engineering, and forestry programs worked together to make the road accessible for modern logging equipment while protecting the integrity of the historic features of the road. Monitoring in FY12 showed that this coordinated effort was a success.

Soil Productivity

Since Forest Plan revision was completed in 2005, extensive monitoring of soil productivity has occurred on a variety of management activities including timber sales, prescribe burns, and recreation projects, and at ski areas and along snowmobile trails. Monitoring has looked at soil erosion, compaction, soil nutrients, and climate change. Monitoring to evaluate compaction and erosion has consisted of soil test pits to see if the soil is compacted and if there has been a loss of soil depth from erosion. Long term soil reference plots were established to look at soil nutrients and climate change.

Overall, the Forest is meeting the objectives put forth in the Forest Plan for soil productivity. As documented in previous monitoring reports dating back to 2005, Forest-wide best management practices (BMPs) have been implemented and have proven effective on vegetation management, winter sports management, and recreation management projects across the Forest. Because BMPs are working as expected, the impacts to soils are within those effects described in the Forest Plan EIS and project NEPA analyses.

Recent monitoring has focused on the possible effects of climate change on soil productivity. Currently, over half of the timber harvest activities on the Forest occur in the winter months under frozen ground conditions to minimize adverse effects on other resources. In coming decades, climate change could warm the ground temperatures and reduce the window of frozen conditions. Current science suggests this could lead to greater concerns for compaction and erosion because soil conditions may change more rapidly than they do now, requiring prompt changes in activity to minimize negative impacts. It should be possible to develop a monitoring or research project to track the effects of climate change and help address this concern by placing temperature probes in various locations across the Forest, measuring soil temperature during management activities, and monitoring the effects to soils associated with different temperatures and temperature shifts. We hope to work on such an effort in coming years.

Wild River Trail damage from T.S. Irene. WMNF photo by Chris Mattrick.

The Forest has experienced some severe weather events in the last few years, such as Tropical Storm Irene, which has accelerated the amount of erosion along some recreation trails. Although the trails affected had BMPs such as waterbars and culverts implemented on them, budget levels for trail maintenance left some of these trails in need of routine maintenance of these structures. This need for maintenance, combined with the level of rain some of the trails received during the storm events, resulted in more erosion than normal. Climate change models predict increased frequency of severe storm events, suggesting a need to evaluate trails across the Forest to identify those in need of critical maintenance, additional drainage structures, or even relocation to reduce the risk of erosion in the future.

The use of biomass as a sustainable alternative energy source is expected to increase in New England in the future. Whole tree harvesting has been one approach for removing biomass from the forest environment. Currently the Forest has taken a conservative approach to the use of whole tree harvesting in our forestry operations while we review the state of science on possible effects on soil nutrients especially in calcium depleted soils. The Forest is currently collaborating with the research community and other partners to host a panel to address the state of the science on effects to soil nutrients from whole tree harvesting and possible mitigations to address any areas of concern. If whole tree harvesting occurs on the Forest more often in the future, it will be important to monitor soil nutrient productivity for any effects.

Project Reviews

Bee Line Trail Relocation

In 2008, a section of this trail was relocated to improve stability and reduce erosion. The relocation was designed with input from a wide variety of specialists. When designing new trail we try to construct it in a way that will not require drainage structures or other stabilizing structures by keeping grades low, being mindful of soil types and vegetation, and capitalizing on stabilizing features such as large rocks, trees, and ledge. For most of this trail, that approach proved effective. However there were a few sections where a choice had to be made between constructing on a steeper slope than is ideal or creating a longer trail and crossing wet ground. In each case, the decision was made to construct on the steeper slope and try to minimize the erosion. The project was monitored in 2012 to determine if the new location is holding up and whether or not there are erosion issues.

Bee Line Trail Relocation. WMNF photo.

The new trail location is stable and a vast improvement over the previous location atop a steep bank that was being steadily eroded by the adjacent stream. The old trail area was heavily impacts by Hurricane Irene, so this relocation prevented additional damage to our trail system from that storm.

The steepest part of the relocation is where it leaves the existing trail. This segment is showing more wear than sections that were constructed using bench construction methods with lesser grades that follow the contour. Additional erosion control structures such as rock steps will be needed on the steep segment in the near future. Otherwise, the trail is performing well.

Berry Farm Snowmobile Trail Relocation

This relocation was constructed by the local snowmobile club during the fall of 2011. During trail design and construction, Forest Service employees from several resource areas visited the site to ensure the new trail would be located well and was constructed properly. In December, 2011, specialists in recreation, trails, and hydrology visited the project to confirm that the relocation was suitable for use when snow arrived.

This December review identified several concerns, including an insufficient number of waterbars on some steep slopes, waterbar outflows that were blocked by excessive debris, and shallow waterbars. These concerns were articulated to the snowmobile club doing the work in writing. Later monitoring trips indicated these concerns were properly addressed by the club prior to the start of the snowmobile season.

There was not enough time to install a bridge at the southernmost water crossing along this relocation prior to the 2011-2012 (FY12) snowmobile season. On the December field trip, specialists determined it would be acceptable to place wooden pallets across the stream to create a snow bridge once there was a snowpack. The club constructed this snow bridge and it was used for the FY12 snowmobiling season. A 28-foot permanent bridge was constructed prior to the FY13 snowmobile season.

Spruce Brook Shelter Removal

In 2006, the New England Wilderness Act created the Wild River Wilderness Area on the Androscoggin Ranger District; the act did not include special provisions enabling the retention of any nonconforming structures. In 2008 a decision was made to remove the Spruce Brook shelter and associated structures, install tent pads of native materials to accommodate continuing overnight use, and repair resource damage that had resulted from long-term recreational use to bring the area into compliance with the Wilderness designation. As part of that decision-making process, the State Historic Preservation Officer concurred that this shelter was not eligible for listing on the National Register of Historic Places. Demolition of the shelter and associated infrastructure, rehabilitation of the area, and tent pad construction were completed in the summer of 2011.

The site was visited in 2012 to evaluate how well the area is recovering, whether the tent pads are working as intended, if the change from a shelter to tent pads has resulted in use dispersal, and whether the removal of the outhouse has resulted in an increase in human waste in the area. This review showed that the project has been successful.

Rocks placed in the previous shelter area are still there and have limited the potential for camping. Soil compaction of the area seems to have lessened and it can be expected that grasses and other small plants will grow in the future. Some young trees that were

transplanted to the site died but others have survived. Site rehabilitation will take time, but at this early stage it can be considered successful.

Native material used to fill the new tent pads has hardened and now provides a suitable tent platform. Water on the pads seems to drain properly. There was evidence that tent pads are being used and no evidence of overnight use beyond the tent platforms. Construction of tent platforms in the Spruce Brook Shelter area has helped concentrate continuing use in the area.

During the site visit there was no sign of human waste within the area. Therefore users are apparently disposing of their waste properly and removal of the outhouse did not result in adverse effects from human waste.

Tent Boulder Trail Stabilization

The Moat Mountain Trail System Project was a collaborative effort to evaluate existing travel corridors in the Moat Mountain area of the Saco Ranger District that had been used as mountain bike trails for many years. The existing mountain biking trail network had evolved without planning or coordination with other resource specialists, which resulted in some unintended and undesired effects on the physical resources and the social experiences in the area. Working with local partners, the Forest Service identified a network of trails that were well-suited to mountain bike use. The decision in 2010 was to incorporate several miles of existing travel corridors, including the Tent Boulder Trail, into the National Forest trail system with mountain biking as a designated use and upgrade those trails as needed to meet current trail standards and provide a sustainable trail system with minimal impacts to other resources.

The original route of the Tent Boulder Trail had an unsustainable pitch and a segment that was negatively impacting a stream bank. The trail needed several switchbacks and short relocations to address erosion issues and improve a stream crossing. In 2012, volunteers from the New England Mountain Bike Association's White Mountain chapter (NEMBA) upgraded the trail to meet required standards and provide a more sustainable trail that is enjoyable to ride.

Volunteers install rock armouring. WMNF photo.

Forest Service employees visited the project site several times during the summer to assist the volunteers and ensure the trail repairs would meet agency standards. Field visits with NEMBA members helped assure proper alignment of trail features that were being installed during the construction phase. These trips resulted in conversations about agency trail standards and how they compare to standard mountain bike trail designs from the International Mountain Bike Association (IMBA). In the future, the WMNF may want to consider adopting the IMBA designs as mountain bike trail standards.

The Forest Service will continue to monitor impacts associated with use to determine the long-term effectiveness of the trail work. The NEMBA will maintain this trail in the future to keep the trail functioning properly.

Edwards Timber Sale

Member of the Forestry staff from across the Forest spent a day looking at this sale and discussing layout, marking, contract development, and implementation of this sale and of sales on the Forest in general. The group identified several ways of doing the sale layout, marking, and cruising work more efficiently, consistently, and accurately. In addition, they discussed a wide array of topics, including whether or when to limit harvest equipment in a sale contract, when to lay out skid trails, and factors to consider in establishing reserve areas for protection of wildlife, cultural, or other resources.

On the Edwards sale, the contractor was required to use a forwarder to minimize damage to existing softwood regeneration. While successful in meeting this goal, the equipment caused some root shear and rutting on skid trails. The effects were within what was disclosed during the environmental analysis, but might not be appropriate in other locations on the Forest. The forestry staff discussed the pros and cons of specifying equipment in the contract, which will help inform project development in the future.

Similarly, there are advantages and disadvantages to identifying the location of skid trails on the ground before awarding the sale. For a variety of reasons, Forest Service timber sale contracts leave the final decision on skid trail location to the purchaser, with approval of the timber sale administrator. The forestry staff agreed that if there are multiple ways to get harvested wood to identified landings without adverse resource impacts, skid trails should not be laid out in advance.

The Forest Plan requires reserve areas in even-aged regeneration harvests for wildlife habitat. Individual environmental analyses often include additional reserve areas to protect cultural resources, rare plants, or other unique features. Discussions highlighted the importance of including these areas in contracts, if they are seasonal, and on maps where appropriate. Consulting a specialist in the protected resource prior to marking the area on the ground is critical to ensure resource objectives are met without impacting sale operations more than is necessary. On the Edwards sale, for example, heritage resource staff determined it would be preferable to use an existing skid trail adjacent to a foundation rather than disturbing more ground in the surrounding area to establish a new skid trail.

Trestle Timber Sale

This monitoring review focused on accommodating concurrent timber sale activity and recreation use. The Trestle timber sale involved harvest and hauling of logs along the Zealand Road, North Sugarloaf Road, and the surrounding area. Recreation use in the area includes snowmobiling, hiking, snowshoeing, XC skiing, and trailhead parking.

A primary goal during project development was to enable recreation uses to continue while timber harvest occurred in the area in a way that was safe for both recreationists and those involved in the logging. Those who were involved with implementing the project agree this goal was met. The monitoring trip identified several factors that made that success possible.

A snowmobile trail bypass was constructed to limit dual use by snowmobilers and log trucks on the North Sugarloaf Road/Corridor 11 snowmobile trail. This bypass substantially reduced the potential for interactions between snowmobiles and logging trucks. The location of the bypass wasn’t always ideal, requiring tight turns by groomers and snowmobiles and a section of dual use on the road to avoid constructing two stream

crossings along the bypass, but it substantially reduced the amount of concurrent use. In addition to the bypass, trucking was contractually prohibited on weekends and Federal holidays, when recreation use is highest. The field review concluded that the bypass was in the best available location, was used by snowmobilers, and was much better than dual use along the entire road.

A skid trail crossed the Spruce Goose Nordic Trail. After logging, slash was disposed of within 50 feet on either side of the trail and the area was seeded and mulched. Reviewers agreed that the ski trail looks good and the effects of the skidding would be barely noticeable once snow is on the ground.

Lots of signs were needed along the snowmobile bypass, roads, and area Nordic trails to guide recreationists and ensure everyone was aware of the potential dangers. The field review noted that all signs were removed after the sale.

A final factor in the success of extensive use by both loggers and recreationists was coordination with the Appalachian Mountain Club so they could share safety information with their guests, who often use this area, and answer questions about recreation use and timber sale activities.

Tropical Storm Irene Recovery

On August 28, 2011, Tropical Storm Irene arrived in New England. The storm brought less than an inch of rain to some areas; to others it brought more than 10 inches within a couple hours. Three nearby USGS rain gauges showed that the discharge of water at these sites was above the 100 year flood estimate.

In areas that received heavy rains, streams swelled. The massive movement of water carried with it woody debris, boulders, and sediment. This shift of materials created new pools, changing and creating fish habitat. Streams are wider or in a new alignment in some places. Rocks, logs, and soil caught up in the high waters created debris jams, clogged culverts, and backed up behind bridges, causing bridges to fail, rivers to divert, and flooding in areas that are normally high and dry. Streams flowed down adjacent roads and trails, washing away soil, destroying pavement, and leaving piles of debris where hikers, vehicles, and campers used to go. Bridge abutments were exposed and undermined, leaving potentially unstable and unsafe crossings.

In some places, just the intensity of the rain caused extensive erosion. Roads and trails were washed away, leaving behind gaping holes in the path. Erosion in rock staircases along trails loosened stones and created unstable footing for hikers. Trail tread and road prisms slumped and sinkholes appeared. Whole sections of roads and trails gave way to the massive flow of water.

Dry River Trail, damaged by Tropical Storm Irene. WMNF photo.

In FY12, damage assessments continued as we explored more trails and areas of the Forest. Specialists from all resource areas worked together to determine the best way to repair damaged areas and minimize the risk of more damage in the future. Our full-time employees, seasonal workforce, partners, and volunteers repaired many trails, roads, and recreation sites. Contracts for additional work were awarded and work got underway. Repairs will continue across the Forest and we will evaluate ways to maintain access to parts of the Forest where repairs may not be feasible.

In 2012, the White Mountain National Forest was selected by the National Forest Foundation to participate in their Treasured Landscapes campaign. Through this campaign the NFF has committed to raising $1 million of private funds to assist restoration efforts on the WMNF. Work on some projects associated with this effort have begun in 2013.

As all of this happens, the Forest Service is monitoring. We continue to look at the impacts of the storm, the effectiveness of standards and guidelines in reducing damage, and the implementation and effectiveness of repairs. In the future, this section of the Forest's monitoring report will discuss our findings.

In the meantime, people can help us by having patience, sharing our story with others, and getting directly involved in our restoration efforts (visit our website and NFF's site: http://www.fs.usda.gov/whitemountain and www.nationalforests.org).

Other Monitoring

Air Quality

As mentioned in the FY11 report, the WMNF is working with the Northern Research Station and others to increase our understanding of the on-going effects of acid deposition on terrestrial and aquatic systems. This information will enhance our efforts to protect Air Quality Related Values in Class 1 airsheds and resources across the Forest.

Lichens are among the most sensitive biological indicators for nitrogen and sulfur deposition in terrestrial ecosystems. In 2011, the WMNF began a two year lichen monitoring study. In August 2012, three locations in the Presidential Range - Dry River Wilderness Area were visited to accomplish several objectives:

- Establish permanent plots in forested environments for measuring diversity and abundance of lichens and bryophytes;
- Provide a sound baseline of lichen and bryophyte diversity and abundance for comparison to future assessments to allow for long-term monitoring;
- Complete a chemical analysis of two lichen and two bryophyte species to evaluate their exposure to air pollutants; and

- Revisit a selection of locations and review lichen data collected in the WMNF by Clifford Wetmore in 1988 to determine whether this earlier information is comparable enough to be incorporated into the results of the current study.

Surveys were conducted according to the Forest Inventory and Analysis (FIA) plot methodology for lichen indicators, making the quality of collected data equivalent to FIA lichen data. Our lichen data will be available to the Northern Research Station for inclusion in the FIA program as appropriate. Initial results show that percent sulfur and nitrogen in lichens has decreased since the 1988 sampling by Clifford Wetmore. These initial results are consistent with declines in acid deposition in the northeast.

Lichen survey crew at work. WMNF photo by Ralph Perron.

In addition to establishing permanent plots and gathering baseline data on lichens and bryophytes, data on the abundance and health of calicioid lichens and fungi are being collected for a companion investigation of ecological integrity. These species, also known as "stubble lichens," consist of both lichenized and non-lichenized fungi. Because they are particularly sensitive to air pollution, stubble lichens can be used to assess the degree to which pollution is affecting an ecosystem by analyzing their abundance and certain morphological and anatomical characteristics.

Heritage Resources

A new Heritage program measure requires the monitoring of Priority Heritage Assets (PHAs) every five years. Priority Heritage Assets are defined as cultural sites that: have a distinct public value and are listed in the NRHP; have prior investment in preservation, interpretation, or use; or exhibit critical deferred maintenance. If a historic property meets the criteria for a PHA, then it should have a current documented condition assessment and a recommended management use to realize its agency and public benefit(s). The WMNF currently has thirty-two PHAs identified, eleven of which were up-to-date at the end of FY11. In 2012, additional funding from the regional level and hiring of a seasonal archaeological technician allowed the WMNF to address the backlog of PHAs lacking current condition assessments. Nineteen PHAs were monitored, assessed, and recorded.

Wilderness

Water Quality

As discussed in the FY11 Monitoring Report, the WMNF is working with the Appalachian Mountain Club and Northern Research Station to assess the impact of acid deposition on designated wilderness areas. Previous and ongoing work on this project has included air and water monitoring in two Class I wilderness areas (Great Gulf and Presidential-Dry River), lichen monitoring (see Air Quality above), and the development of an air quality value plan describing regional air quality and watershed characteristics for all six wilderness areas on the Forest.

In FY12, we hired a graduate student to help expand water quality studies in the four designated wilderness areas that lacked baseline data (Sandwich, Pemigewasset, Wild River, and Caribou-Speckled). Accomplishments included developing a sampling design for these areas, characterizing sites, collecting water samples and field data, and analyzing that data. We also expanded work with existing partners to increase the number of sampling sites and assure sampling will continue until we have a complete baseline dataset. Work in coming years will include reporting on trends in the water chemistry of the two wildernesses with sufficient data collected to date.

Water sampling in Bickford Brook, Caribou-Speckled Wilderness. WMNF photo by Seta Chorbajian.

Dispersed Campsites

The FY10 Monitoring and Evaluation Report identified a need for more consistent and reliable protocols for monitoring dispersed campsites in Wilderness. Since then, the Wilderness campsite monitoring protocols were adjusted to better meet the Forest Plan monitoring guide. Each campsite is now rated on ground disturbance, tree damage, and disturbed area. These assessments are easier to complete and the new protocol eliminates the potential for vast variances due to measuring techniques. In FY 2012 we beta tested the new condition rating system with positive results and will continue to gather this information in coming years. In the short-term, data will describe the current condition of campsites. Over time, the information gathered should give us an indication of whether there are increasing or decreasing impacts from backcountry camping in Wilderness.

Woodland Bat Acoustic Surveys

There are eight bat species that use the WMNF. During the winter, three of these species (the hoary bat, silver-haired bat, and red bat) migrate to more southern areas in the same way many birds fly south for part of the year. The remaining five species (big brown, little brown, northern long-eared, eastern small-footed, and tri-colored bats) spend the winter hibernating in caves or old mines. Only these five hibernating species are affected by white-nose syndrome, a disease that has caused the death of millions of bats in the eastern U.S. since 2006.

Following the identification of white-nose syndrome in 2007, Forest Service biologists worked to collect data on local bat populations in order to better track the effects of this new disease. Efforts focused on bat activity during the non-hibernation season (approximately May through September). Beginning in 2009 and every summer since, data on general woodland bat occurrence has been collected using ultrasonic bat detectors. Data analysis and results are explained in detail in Prout (2012) and summarized here.

The WMNF participates in a large, multi-agency, regional survey covering the eastern U.S. The protocol consists of placing a bat detector on the roof of a vehicle with the microphone pointing straight up and driving a fixed route at 20 mph. Preliminary research indicates that 20 mph is slow enough to pick up diagnostic bat calls, but

sufficiently fast that individual bats are unlikely to be detected more than once on a route (E. Britzke, pers. com.). Routes were selected to maximize route length and coverage through suitable bat habitat. Safety risks from driving a slow-moving vehicle at night were also considered as part of route selection. Surveys begin 30 minutes after sunset on days when weather conditions are dry and not windy. Each route is driven once during each of three summer time periods (replicates): June 1-15, June 16-30, and July 1-15. Consensus among bat biologists is that most local bat pups will not yet be able to fly before July 15. Therefore, population numbers will be based only on adults and not be biased by young of the year.

Driving surveys are performed annually. A total of five routes were established in 2009 (the initial year for the regional survey). The following year, the WMNF added four more survey routes, including two routes located completely off-Forest to be used as comparison to WMNF habitats. Table 4 displays a list of driving survey routes. On the WMNF, all acoustic bat detectors used on driving surveys are Anabat SD-1 or SD-2 models (Titley Scientific Inc., Ballina, Australia).

Table 4. WMNF Woodland Bat Driving Acoustic Survey Locations.

District	Route Name	Starting County	Distance (miles)	Starting year
Androscoggin	Bog Dam Loop	Coos, NH	19.7	2009
Androscoggin	Greenwood[1]	Oxford, ME	25.1	2010
Pemigewasset	Tripoli Road	Grafton, NH	20.1	2009
Pemigewasset	Stinson Lake Road	Grafton, NH	22.1	2009
Pemigewasset	Canterbury[1]	Belknap, NH	27.2	2010
Pemigewasset	Base Rd/Jefferson Notch	Coos, NH	34.2	2010
Saco	Highway 113	Oxford, ME	28.2	2009
Saco	Kancamagus Hwy	Grafton, NH	21.7	2009
Saco	Rob Brook Road	Carroll, NH	23.7	2010

[1] *These routes are located off of the WMNF*

Following the survey, each call was evaluated using AnalookW, a proprietary software program developed by the creators of the Anabat system. Each call was compared visually to a reference library of known bat calls in order to categorize the call as close to species as possible. In order to perform a complete analysis using all of the data (including calls that could not be identified to species), calls were categorized into three groups based on minimum characteristic frequencies: low, medium, and high. The low frequency group included the hoary bat, the silver-haired bat, and the big brown bat, as well as any calls with characteristic minimum frequencies that fell below 30kH. Within this group, only the big brown bat is affected by white-nose syndrome, but with mortality rates that have been much lower than the other four affected species.

The medium frequency group included calls generally ranging from 30-35kH. This would include most red bat calls, but could also potentially include little brown bats or (less likely) silver-haired or big brown bats calling at higher than typical minimum frequencies.

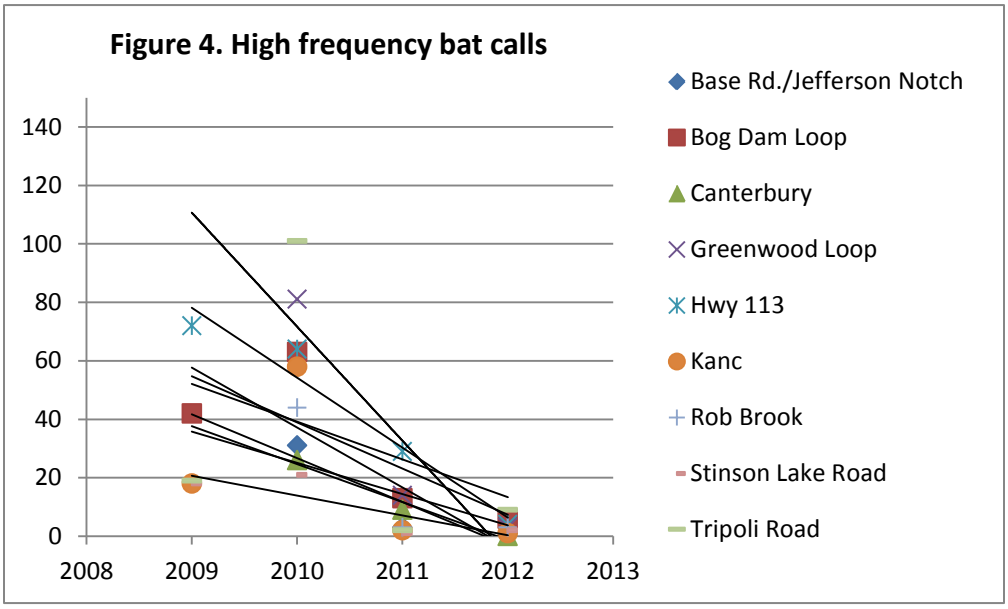
All of the bats in the high frequency group are species affected by white-nose syndrome, so it is this category that is most useful for evaluating changes as a result of the disease.

In addition, some red bat calls may be included if these bats were navigating around a lot of clutter.

A total of 4809 bat calls were collected over four years of driving surveys. Of these, approximately 4% were categorized as unknown (generally call fragments) and not used in the analysis. For analysis purposes, the replicate with the highest number of calls for each frequency category was used (see Table 5 and Figure 4 for a summary of data results).

Table 5. WMNF Bat Driving Survey Results

High Frequency (40kH+) only					
	2009	**2010**	**2011**	**2012**	**Percent change**
Base Rd./Jefferson Notch		31	3	1	-96.8%
Bog Dam Loop	42	63	13	6	-85.7%
Canterbury		26	9	0	-100.0%
Greenwood Loop		81	14	3	-96.3%
Highway 113	72	64	29	4	-94.4%
Kancamagus Highway	18	58	2	1	-94.4%
Rob Brook Road		44	3	3	-93.2%
Stinson Lake Road	18	21	1	2	-88.9%
Tripoli Road	19	101	2	9	-52.6%
Total Calls / Average Change		**489**	**76**	**26**	**-89.2%**



All of the driving routes had declining populations of high frequency bats with an average decline of 89.2% over the time period. One transect off the Forest (Canterbury) declined 100% over its three-year survey period. Of the remaining transects, seven of the eight had rates of decline over 85%. The Tripoli Road route only declined 52.6% and had a large increase (>400%) in 2010. Interestingly, four of the five transects that were surveyed in 2009 had higher numbers (most substantially so) in 2010, which is not reflected in the overall percent change.

For comparison, data from low and medium frequency calls were also analyzed in a similar way. On average, low frequency bats increased 217.1% over the same survey period. Of the nine survey transects, seven had overall increasing trends of low frequency bats, while two had declining trends. Like the high frequency bats, more bat calls were collected in 2010 compared to 2009 on four of five transects. However, visual examination of the plotted data indicates fairly stable trends for all but one transect, Highway 113.

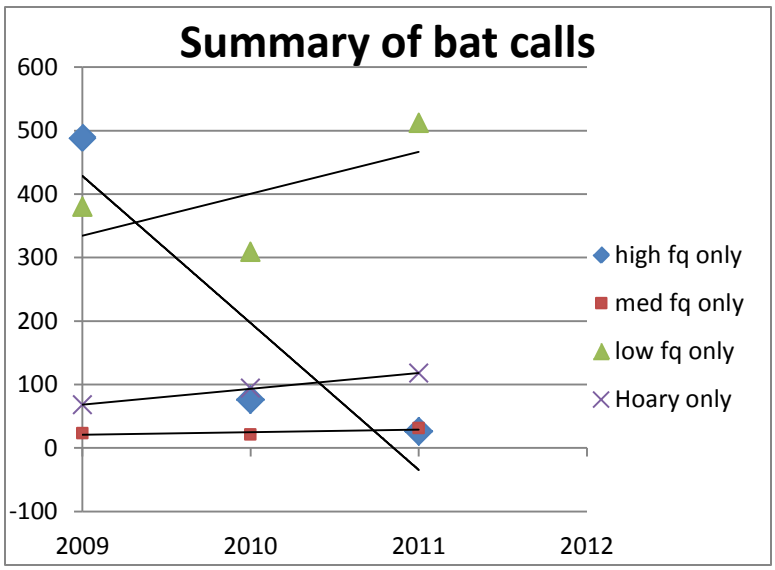
Similarly, medium frequency bats increased 171% on average, five with increasing trends, three with declining trends, and one unchanged. However, caution should be used when evaluating the percent change in the medium category, as it is based on fairly small absolute numbers. For example, the Base Rd/Jefferson Notch transect showed a percent change of -100%, but this is based on only two individuals. Unlike the low frequency bats, visual examination of this data shows a range of trend patterns, both upwards and downwards; given the small number of calls, trends are likely stable.

Because there may be some overlap of species calls between the above analysis categories, a separate analysis was completed for the hoary bat. The calls of this species are perhaps the most readily identifiable (i.e., hoary bat calls are unlikely to be confused with any other species) so analysis might illustrate population trends of a species that is unaffected by white-nose syndrome.

Interestingly, transect trends were quite variable for the hoary bat, ranging from an 80% decline on the Kancamagus Highway to a 1900% increase on the nearby Rob Brook Road transect. Visually, the 80% decline seems to be an anomaly. Five transects had increases greater than 100%; the remainder appear fairly stable.

Discussion

Results are clear that local populations of at least four of the five bat species affected by white-nose syndrome have declined considerably in the last four years, which is consistent with population declines reported by a number of other parties. Survey data show a shift in proportions of high frequency to low frequency bats. On the positive side, high frequency species were still detected in 2012 on eight of nine driving transects; the driving transect that recorded no high frequency bats was located off-Forest. Results from the hoary bat analysis indicate that populations may fluctuate considerably from year to year, which is probably true of the other bat species as well. Further monitoring will help determine if populations stabilize or if further losses from white-nose syndrome continue to occur.



Annual Updates

There are many resources and activities that are monitored every year on the Forest. Some of these are reported on periodically when enough data has been collected to show trends or when a change in conditions is noted. The Monitoring Guide recommends reporting on others annually because the resource can change rapidly or questions on the topic arise regularly from the public. This section provides a brief summary for the annually-reported items. Periodically a more thorough evaluation of each of these topics will be presented under a different heading in the monitoring report.

Candidate Research Natural Area Establishment

During Forest Plan revision, the Forest identified eight areas as candidate Research Natural Areas (cRNAs; MA 9.3). In 2010, a region-wide analysis of cRNAs was conducted that resulted in a decision to move forward with establishment of five of the WMNF cRNAs: Gibbs Brook, Mountain Pond, the Bowl Extension, Shingle Pond, and Peabody Mountain. In FY11, the Forest updated the draft establishment record for the Bowl Extension cRNA to incorporate new information and make it consistent with current requirements. A revised draft establishment record was submitted for required reviews. Work to finalize the record for this cRNA continued in FY12, but is not yet completed.

Monitoring and Research by Partners and Cooperators

A wide variety of short- and long-term inventory, monitoring, and research studies are conducted every year on the White Mountain National Forest by individuals, organizations, and universities. In FY12, research considered mercury accumulation and mobility in soil and vegetation, the potential impacts of hemlock woolly adelgid infestations, the long-term conservation of fragrant fern (*Dryopteris fragrans var. remotiuscula*) evolutionary diversity and the prediction of this species' response to climate change, the relationships between microlichens and coexisting vascular plants and bryophytes, and the phenophases of vegetation communities related to climate change, among other topics. All proposals for non-Forest Service research and monitoring on the Forest are reviewed by appropriate specialists before a permit or authorization is given. Often limitations are placed on the location, type of activity, or intensity of work that can occur on the WMNF to ensure that resources are protected and Forest Plan direction is applied. Project proponents are expected to provide a summary of work done or copies of any reports generated by activities on the WMNF so the Forest and public will have access to any information that could help us in our management.

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