White Mountain National Forest

United States Department of Agriculture

Forest Service

Eastern Region

Monitoring and Evaluation Report

FY 2013

Cover: Lichen inventory in the Great Gulf Wilderness. 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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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.

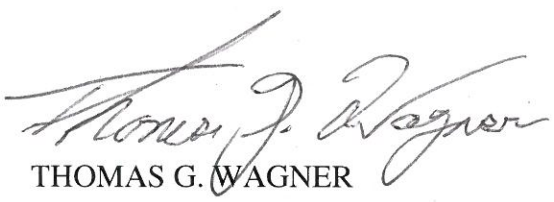
Our monitoring shows that we are largely implementing the Forest Plan as written and intended. Working with local, state and other Federal agencies and many other partner organizations, we manage all the resources on the White Mountain National Forest in an integrated way, ensuring that meeting objectives 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.

In last year's Monitoring and Evaluation report I mentioned that we would soon begin a travel analysis process (TAP) consistent with the Travel Management Rule (36 CFR 212) for all National Forest System roads. Work on the travel analysis process began in 2013 and will be completed by the end of 2015. The effort involves: considering the natural, social and economic resources affected by our road system; gathering input from interested publics; and determining the long-term benefits, risks, and opportunities associated with our existing road network. Recommendations from the TAP will help identify which roads are likely needed or not needed, and will be implemented through integrated resource management projects and smaller road and trail projects with available funding. The Forest's long-term goal is to identify a recommended minimum road system that can be maintained with expected funding.

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 been delayed or have not been accomplished under current funding levels, we continue to keep 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 meet 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 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 adapt our management approaches 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. 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 several Management Indicator Species (MIS) to help evaluate effects of forest management. The chestnut-sided warbler and magnolia warbler are two birds chosen to represent species that use regenerating hardwoods and softwoods, respectively. This habitat is produced primarily by clearcutting and provides distinct structural components not found in mature forest stands. In FY13, biennial monitoring of these species was conducted. This monitoring is designed to help managers determine if timber harvest prescriptions are providing appropriate habitat conditions, and track population trends of these key species. Data for these species is usually analyzed after every 2-3 surveys (4-6 years). It was last reported on in the FY11 Monitoring and Evaluation Report, which indicated a need for additional surveys to determine trends. To increase the likelihood of having sufficient data to determine trends, data for these species will be analyzed again and discussed after the FY15 surveys are completed.

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 1 shows the accomplishment for each measure in FY 2013 and the total for the first eight 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 has typically summarized our success at achieving only those outputs and services identified in Appendix B of the Forest Plan, which are a small part of our work in a given year. This year it includes information on other accomplishments in some program areas. This section will continue to evolve in future reports.

Aquatics

Fish passage was restored along Higgins Brook. The Higgins Brook Road (FR104) had a double culvert crossing that was prone washouts of the road surface and created a fish barrier to brook trout. In 2013, the culverts were removed and the stream was restored as part of the Higgins Brook Timber Sale, after harvesting was completed. The project was paid for with funds from timber sale receipts. The site is no longer a fish barrier and is suitable for temporary bridge crossings in future vegetation management entries.

Higgins Brook site after restoration. WMNF photo by Jay Milot.

Fire Management

The WMNF conducted 10 prescribed burns for a total of 112 acres in 2013. Prescribed fire was used in the NH towns of Albany, Warren, Berlin, Randolph, Gorham, and Stark; and in Gilead, ME. An additional 79 acres was burned through partnerships on Department of Defense land in New Boston, NH and SPNHF land in Freedom, NH. The WMNF used mechanical methods to treat an additional 147 acres.

Management objectives for these activities included fuels reduction, enhancement of blueberry fields, wildlife habitat maintenance, and site prep for restoration of species.

Precribed burn in Albany, NH, and mechnical treatment in Thornton, NH, to maintain open wildlife habitat and reduce hazardous fuels. WMNF photos by John Neely (left) and Jay Milot (right).

Forestry

In FY13, we sold sales that encompassed more than 11 million board feet (MMBF) of timber. Harvest of more than 12 MMBF occurred on more than 1400 acres in timber sales sold previously and this year. These activities included a mix of harvest types designed to improve tree growth, maintain forest health, and meet Forest wildlife habitat objectives.

As in previous years, harvested and sold volumes remain below Forest Plan estimates. 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. 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.

Table 1. Estimated Management Practices and Accomplishments

Activity or Product	Unit of Measure	Estimate for First Decade	FY13 Accomp.	FY06-FY13 Accomp.
Aquatics				
Stream habitat restoration	Miles	30	0	13.1
Restore fish passage	Road crossings	10	1	9
Fire Management				
Unplanned wildfire managed for resource benefit (Wildland Fire Use)	Fires	4 – 8	0	1
Forestry				
Volume sawtimber harvested	MMBF	137	5.1	40.7
Volume pulp harvested	MMBF	106	7.2	54.2
Volume of timber sold	MMBF	240	11.5	85.9
Even-aged regeneration harvest	Acres	9,400	260	2,453
Even-Aged Intermediate harvest	Acres	5,600	368	3,650
Uneven-aged harvests	Acres	19,300	841	7,634
Total harvest	Acres	34,300	1469	13,737
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	190.6	601.6
Transportation				
Road construction	Miles	10	0	4.9
Road reconstruction	Miles	70	10.3	57.3
Classification of unclassified roads	Miles	N/A	3.7	16.3
Road decommissioning	Miles	5 - 40	1	2.7
Unclassified road decommissioning	Miles	N/A	1.1	13.1

Recreation

The outputs and services provided across the Forest are not apparent from the numbers presented in Table 1. Every year a great deal of energy and experience goes into maintaining and improving sites and trails, helping and educating visitors, managing Wilderness areas, and working with partners. In FY13, we completed major maintenance projects at several sites, including the replacement of all wood components on the Mt. Carrigain Fire Tower. With the help of partners and volunteers, trail crews completed 404 miles of basic trail maintenance and tackled numerous trail reconstruction and reroutes projects. Extensive work on recovering from Tropical Storm Irene is discussed later in this report. Permanent, seasonal, and volunteer staff maintained and managed day use sites, visitor centers, dispersed campsites, and other developed facilities. The WMNF again hosted several interns and crews of teenagers, working with them to accomplish valuable recreation and Wilderness projects and help them learn leadership skills and how to work as teams. Forest staff administered permits for three alpine and four nordic ski areas, approximately 25 single day recreation events, 160 outfitter/guide permits, AMC huts and other facilities, and concessionaire management of 22 campgrounds.

Working on Mt. Carrigain Tower. WMNF photo.

As for the outputs tracked in Table 1, the Forest has decommissioned more miles of hiking trail and more backcountry and developed campsites than we have constructed, resulting in a net loss of trails, developed campground sites, and backcountry facility capacity across the Forest. Therefore the net increase for each of these, which is what Forest Plan objectives limit, remains at zero.

Soils/Watershed

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 prior to 2012 averaged around 30 acres per year. Improvements were defined 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 Service expanded the definition of a soil or watershed improvement accomplishment to include many road and trail maintenance activities, invasive plant control, and prescribed burning that improves soil productivity. As a result, the Forest's annual accomplishment is now substantially higher than in past years. In FY13, work included improvements to bridges and culverts, improvements to and maintenance of Forest roads, decommissioning of roads, trail maintenance and improvements, invasive plant control, and prescribed burning.

Transportation

All mileages remain within the accomplishments projected in the Forest Plan. As in FY12, the Forest implemented many road reconstruction projects to repair damage to roads and bridges from Tropical Storm Irene. This year, recovery projects also included decommissioning of damaged classified road segments.

In FY13, Forest road crews spent the snow-free months cleaning culverts and ditches so they function properly, grading road surfaces, and mowing brush on roadsides to provide safe visibility and prevent encroachment of vegetation. These types of maintenance activities occurred on about 102 miles of National Forest system roads.

Classification and decommissioning of unclassified roads both involve updating our roads database to either add roads to our official system or identify them as not needed for long-term management. These changes are made following a NEPA analysis and decision. In FY13, these changes were part of the Pemi NW and Province integrated resource project decisions.

As discussed in the Forest Supervisor's note, the Forest began a travel analysis process this year that will result in recommendations for which Forest roads are likely needed in the future and which are likely not needed. In coming years the Forest will share information on the risks and benefits associated with our roads and seek public input on our road system.

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?

During FY13 WMNF staff surveyed 1341 acres of land harvested within the past 3 years on the Forest. All acres surveyed were certified as adequately restocked.

To what extent have destructive insects and disease organisms increased?

The Forest Service, Forest Health Protection (FHP) staff completed an aerial detection survey for the WMNF on June 17 and 18, 2013. Ground truthing efforts were used to validate the flown observations. Approximately 14,377 acres of damage were mapped throughout, and adjacent to, the WMNF. Damage mapped in 2013 was down 6,069 acres from the 20,446 acres mapped in 2012.

Damage included:

- 3,552 acres of white pine needle damage (discoloration),
- 5,641 acres of hail damage,
- 3,389 acres of frost damage,
- 1,406 acres of leaf scorching (damage on the ground appeared abiotic, most likely also related to frost), and

White pine discoloration. USFS photo.

- 389 acres of forest tent caterpillar (FTC, *Malacosoma disstria* Hubner) defoliation in the sugar maple-beech-yellow birch type.

The emerald ash borer (EAB), *Agrilus planipennis*, was discovered in Concord, NH in April 2013 and is considered a pest of concern for the ash resource on the Forest. WMNF staff, in partnership with State and Private Forestry Forest Health Protection and State of NH, established 13 white ash trap trees in and adjacent to campgrounds across the Forest. These locations were chosen because of the amount of firewood typically brought into campgrounds by visiting campers. EAB has somewhat limited flying capacity and is typically transported longer distances through the moving of firewood. Therefore, foresters and entomologists reasoned that the most likely location for an EAB infestation on the WMNF is in or around one of the campgrounds.

Girdling an ash tree to survey for emerald ash borer. WMNF photo by Roger Boyer.

Trap trees were girdled in June of 2013. Girdling, or removing a band of bark and phloem around the trunk of a tree, interrupts the ability of the tree to transport carbohydrates – the food needed by the tree. Girdled trees become increasingly stressed over the summer. As stress increases, the chemicals emitted from the foliage, bark, and wood of the tree change. The wavelengths of light reflected by the leaves also differ between healthy and girdled trees. Beetles are more attracted to stressed trees than to healthier nearby ash trees. Female beetles tend to lay more eggs on stressed trees than on healthy trees. Therefore girdling ash trees is a way to survey an area to determine if EAB are present.

Trap trees were felled, cut into bolts (3’ sections), and peeled in late November 2013. EAB eggs hatch in July and early August, after just a couple weeks in the tree, and the larvae start to feed. As they feed and grow, galleries (chambers or passages in wood tissue made by feeding larvae) are formed under the bark. By September these galleries are visible to the naked eye once the bark is peeled.

No EAB larvae were discovered. The WMNF plans to repeat monitoring efforts through use of trap trees again in 2014.

Peeling ash bolts and looking for EAB. WMNF photo by Deb Boyer.

Objective Attainment

Air Quality

Forest Plan, Page 1-4, Objective 2

Forest Plan, Page 3-12, Wilderness Management Area (5.1), Air Quality G-2

The Interagency Monitoring of Protected Visual Environments (IMPROVE) site at Camp Dodge, or similar technology, is maintained to monitor air quality in Class I airsheds.

Air pollution often has a subtle, but critical, impact on ecosystems and vistas, and can alter ecosystems by harming plants and animals or changing soil or water chemistry. As a result, ecosystems then become more vulnerable to damage from insects and diseases, drought, or invasive species. Additionally, since many visitors value pristine areas with magnificent vistas, air pollution can spoil their experience and lessen their enjoyment of national forests.

One of the most noticeable forms of air pollution is haze, a veil of smog-like pollution that can blur the view of many urban and rural areas. As part of the Clean Air Act, Congress has established a goal to prevent future, and remedy existing visibility impairment, in 156 protected national parks and wilderness areas, known as Class I Areas. Great Gulf and Presidential Range-Dry River Wilderness Areas are protected Class I Areas located on the White Mountain National Forest. Federal rules require state and federal agencies to work together to improve visibility in these Class I Areas. Examples of this collaborative work have been documented in WMNF Monitoring Reports FY08, FY09 and FY10.

The IMPROVE (Interagency Monitoring of Protected Visual Environments) monitoring network collects aerosol samples at monitors throughout the country, which are then analyzed to obtain a complete chemical profile of the airborne particles that are affecting visibility in the area. The data are used to establish baseline visibility conditions and track changes over time, helping scientists understand the causes of haze. An IMPROVE monitor was established at Camp Dodge, south of Gorham, NH, in 1995 to assess visibility impairment at Great Gulf and Presidential Range-Dry River Wilderness Areas. An analysis of the Camp Dodge IMPROVE monitoring data indicates that sulfates are the largest contributor to visibility impairment. Sources of sulfates include coal–fired power plants, diesel engines, industrial boilers, and volcanoes. Regulatory action in the region, and across the US, includes the installation of retrofit technologies on large emissions sources, which has resulted in reduced sulfur emissions.

Computer Generated Approximation of the Visibility Improvement at Great Gulf Wilderness Area. (Source: Briefing paper on Visibility Data Summary: Great Gulf and Presidential Range-Dry River Wildernesses, NH, June 2013. USDA Forest Service Air Program.)

Visibility can be quantified using standard visual range (SVR). SVR is the farthest distance one can see a dark object against a light background. SVR on the worst visibility days improved approximately 30% from 2000 to 2009 at Great Gulf and Presidential Range-Dry River Wildernesses. Some of this improvement is due to reduced amounts of sulfate in the atmosphere. The photo above gives an idea of what this improvement looks like.

Standard and Guideline Implementation

Riparian and Aquatic Habitats / Water Resources

In 2013, the Forest Service began implementing a national Best Management Practices (BMP) program, which includes a National Core BMP Technical Guide and monitoring protocols for various activities. The Forest Service BMPs tier to state BMPs and Forest Plan Standards and Guidelines, allowing these items to be monitored in an integrated fashion. In 2013, the WMNF monitored three timber sales and one trail improvement project to determine whether Forest Plan direction and appropriate BMPs were implemented properly. All Forest Plan standards and guidelines that were evaluated through this monitoring are addressed together in this section.

Forest Plan, Page 2-24 to 2-26, Riparian and Aquatic Habitats

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. Exceptions to this include…

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. Exceptions may apply…

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.

Forest Plan, Page 2-30 to 2-31, Water Resources, 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.

S-5 Permanent stream crossings must be designed to pass the bankfull discharge unimpeded.

Timber Sales

Interdisciplinary teams observed portions of the Edwards and Orchard timber sales in the Four Ponds project area in October 2012 after harvest and before final close out. The Forest Service team was accompanied by a representative of the Maine Forest Service to monitor compliance with Maine Best Management Practices (BMP). The State's BMP monitoring protocol was used on a portion of the project. The Orchard Sale was revisited in July 2013 after close out and the National Forest Service BMP monitoring protocol was applied. The Peaked Hill sale (completed in 2007) and Kennison Ridge sale (completed in 2013) were also evaluated after close out.

On streams observed in all sales, no tree cutting or harvest occurred within 25 feet of the bank of mapped perennial streams, as specified in Riparian G-1. An intermittent stream was observed on the Orchard sale. Although not called for in the EA, this stream was buffered because its intermittent status was not evident during marking.

Uneven-aged treatments (or no treatments) were prescribed in the Riparian Management Zone in all cases, meeting Riparian guideline G-2. An intermittent stream adjacent to a clearcut unit was evaluated in detail using the National FS BMP protocol. The unit was delineated to leave a 43 to 150 -foot buffer between the stream and the adjacent cut. This buffer met Maine BMPs which recommend less intense cutting near the stream, and was more than adequate to maintain shoreline stability and prevent sedimentation. No sediment movement or gully erosion was observed in the buffer. The treatment did not remove trees that 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.

Landings were evaluated on the Orchard, Peaked Hill and Kennison Ridge sales. All observed landings were over 100 feet from perennial streams or ponds. A recently closed landing on the Kennison Ridge sale had a ditch in it where seeding had not taken hold and some erosion had occurred. Sediment extended approximately 40 feet into the woods and became dispersed by leaf litter; no sediment reached a buffer zone or water body. Otherwise, no signs of erosion existed on the slope between the landing and water bodies. For all projects, BMPs prevented runoff from landings from reaching streams, in compliance with the Forest Plan.

Seven stream crossings were evaluated for compliance with Water Resources standards S-2 and S-3. As disclosed in environmental analysis documents, stream crossings are areas of high risk of sedimentation, and temporary, localized sediment movement may occur. Four skid trail crossings were observed after crossing structures had been removed. BMPs employed included gradual approaches, water bars on approaches, slash/corduroy on approaches, seeding, and winter operation. Bank disturbance within the width of the skid trail was evident at some sites, but any sediment movement was well within analyzed limits. The three road crossing sites included one permanent bridge and two temporary culvert crossings (previously removed). Similar BMPs were applied on approaches of closed roads, and no ongoing sedimentation was observed. The permanent bridge was constructed as designed and met Forest Plan Water Resources standard S-5, specifying that crossings pass the bankfull discharge unimpeded. Adjacent slopes were stable and the crossing had functioned well to date. In all cases, any sedimentation would be classified as “trace” and was within the limits allowed in the Forest Plan and disclosed in project-level environmental analysis.

Skid trail crossing approx. one year after close out. Noted minor bank disturbance from placement and removal of bridge panels, which could be minimized by placing slash underneath before installing panels. WMNF photo by Sheela Johnson.

Hiking Trail

An interdisciplinary team reviewed the Signal Ridge hiking trail relocation project. Approximately 1.4 miles of hiking trail were relocated after Tropical Storm Irene, which caused stream flow in the trail, slumping, and bank erosion. This trail was randomly selected and evaluated using the National BMP Monitoring Protocol. Prescribed

measures to protect soil and water, such as bog bridging and rock steps, were implemented and were effective in preventing erosion and sedimentation over the majority of the trail. One instance of sedimentation was noted, where the trail climbed up slope from a stream crossing. Minor adjustments to trail location and drainage were proposed to mitigate this condition. During the course of construction, groundwater seepage caused some portions of the trail to be wet. Again, minor adjustments to trail location and drainage were devised to keep foot traffic out of seeps. Impacts from trail construction were very small in comparison to potential impacts on the former trail, and were in compliance with Forest Plan standard S-2 for Water Resources. This review highlighted the value of an adaptive management approach on new or relocated trail segments.

A BMP monitoring team observes the use of rock steps on a new section of trail. WMNF photo by Sheela Johnson.

Wildland Fire

Forest Plan, Page 2-32, Wildland Fire

S-2 All ignitions must receive an appropriate management response (suppression or wildland fire use) according to the Fire Management Plan.

G-2 Fire suppression and prescribed fire impacts should be minimized by implementing Minimum Impact Suppression Tactics as described in the Interagency Standards for Fire and Aviation Operations.

In 2013 the WMNF responded to two wildland fires. Both were human-caused and directly suppressed by WMNF personnel. One was a very small fire in Shelburne, NH. The other was Tuckerman Lip fire, which occurred on May 7 on Mt. Washington and was started by fireworks. The fire burned 0.1 acres of alpine vegetation. Minimum Impact Suppression Tactics were employed by suppression personnel. The location of rare plant species in relation to the fire was also mapped.

Part of the area burned by the Tuckerman Lip fire. WMNF photo by Nate Peters.

Effects of Management Practices

Air Quality

There are two primary methods of monitoring the effects of prescribed burning and resulting smoke on air quality: visual photographic documentation and monitoring particulate matter in the atmosphere near the prescribed fire. The WMNF has access to portable smoke monitoring equipment that includes a nephelometer, which measures light scatter. The 33-acre White's Brook wildlife opening was burned on April 22, 2013. The smoke monitoring equipment was set up at the Russell Colbath House on NH Route 112 to monitor particulate matter resulting from the burn, which was about one mile away. Throughout the entire prescribed fire event, particulate matter concentrations measured by the smoke monitor remained at background levels, far below levels that generate human health concerns.

Smoke monitoring equipment at the Russell Colbath House. WMNF photo by Ralph Perron.

Photographic documentation of impacts to air quality from this prescribed fire was collected at two locations along NH Route 112: the Sugar Hill scenic vista and at the Livermore/Albany town line, a point where drivers heading east are facing directly toward the wildlife opening. Smoke was seen rising in the distance from both locations, but appeared to disperse well throughout the duration of the fire. Anecdotally, the person conducting the monitoring noticed no smoke impacts along NH Route 112 during multiple trips between the smoke monitor at the Russell Colbath House and the Sugar Hill Scenic Vista, locations in opposite directions from the burn site.

Prescribed burn as viewed from Sugar Hill vista. WMNF photo by Ralph Perron.

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 2013 included Campton Campground and Loon Mountain Ski Area.

Moody Brook runs adjacent to the western boundary of Campton Campground. The majority of the brook is upstream on private land then crosses onto the National Forest shortly before it enters Campton Pond. Moody Brook was sampled above and below the campground on three occasions between July and September 2013 (Figure 1).

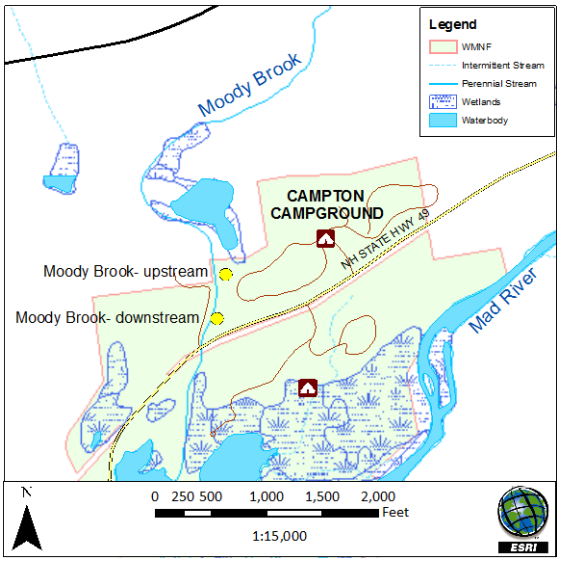


Figure 1. Moody Brook sampling sites.

Turbidity was slightly higher than what would be expected to occur naturally (see Table 2). Upstream and downstream samples were similar, indicating that activities at the campground are not contributing to suspended sediment during typical flow conditions. Conductivity is a measure of charged particles in the water, and values greater than 100 µS may indicate pollution due to road salt, septic systems or other chemicals. Although higher than typical WMNF streams, Moody Brook conductivity values ranged from 55 to 72 µS at all sites, and did not increase downstream of the campground.

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. Both sites were below this threshold.

Nitrate concentrations were comparable to reference sites. Other nutrient levels, such as phosphorus and ammonia, were higher than typical WMNF streams, but not at potential nuisance concentrations (Table 2). Phosphorus can indicate the presence of natural wetlands and atmospheric deposition, or road and construction erosion, sewage, or fertilizers, among other pollutants. Increased phosphorus levels can increase algal blooms and plant growth which can lead to decreased dissolved oxygen levels, which is consistent with higher levels of ammonia. Levels did not increase downstream of the campground

Although some water quality parameters were outside what is typical for WMNF streams, all samples from Moody Brook were within the Class B NH Surface Water Quality Standards[1]. Levels did not increase from the sampling location above the campground to the one below it, indicating that activities in the campground were not negatively influencing the water quality of Moody Brook. Thus, the lower water quality of Moody Brook is likely due to influences from upstream naturally occurring wetlands and management activities on private land.

[1] New Hampshire Volunteer River Assessment Program. 2008. Interpreting VRAP Water Quality Monitoring Parameters. New Hampshire Department of Environmental Services. Accessed April 13, 2011 at http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/vrap_parameters.pdf

Table 2. Average water quality values for 2013 from Campton Campground (CG) and the Loon Mountain Ski Area.

Location	Site Name	Turbidity (NTU)	Conduct-ivity (uS)	E. coli (counts/ 100ml)	Nitrate (as Nitrogen) (ppm)	Phos-phorus (ppm)	Ammonia (as Nitrogen) (ppm)
Campton CG	Moody Brook above CG	6.0	63.3	20.3	0.00	0.03	0.06
	Moody Brook below CG	4.9	61.5	34	0.00	0.03	0.05
Loon Mountain Ski Area	EB Pemi R above Loon	0.1	24.6	-	0.18	0.00	0.01
	Boyle Brook	0.2	31.6	-	0.31	0.01	0.00
	Loon Pond Brook	0.1	16.3	-	0.06	0.02	0.00
	EB Pemi R at South Mountain	0.1	32.9	-	0.18	0.01	0.00
	EB Pemi R at Lincoln	0.3	46.7	-	0.25	0.01	0.16

The Loon Mountain Ski Area was also sampled to monitor for effects of recreation on water quality. The East Branch of the Pemigewasset River (EB Pemi) flows from East to West past the ski area. We sampled the EB Pemi above the ski area, below the ski area at South Mountain, and further downstream at the White Mountain Visitors Center (see Figure 2, "At Lincoln"), we also sampled the two perennial streams that run through the ski area, Boyle Brook and Loon Pond Brook. Sampling took place on three occasions in 2013, January 14th, March, 12th, and July 13th.

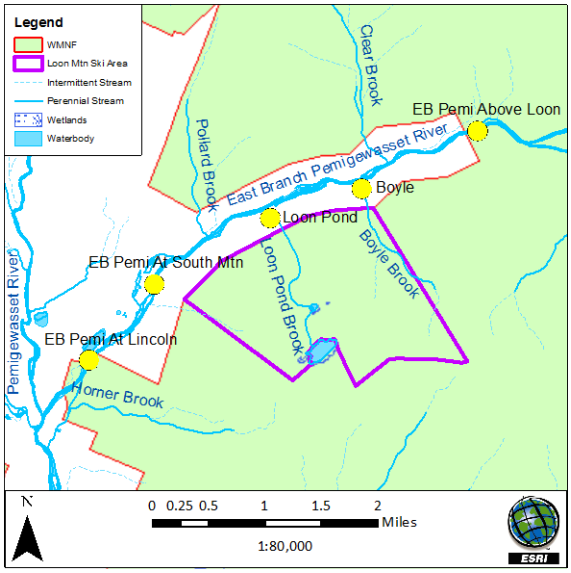


Figure 2. Loon Mountain sampling sites.

Turbidity was at or near the lower detection limit at all sites (Table 2), indicating that activities at these sites are not contributing to suspended sediment during typical flow conditions. Conductivity values were well below 100 µS at all sites. The highest readings were captured during spring runoff and ranged from 37 - 55 µS. Boyle Brook typically had higher conductivity than the EB Pemi above the ski area. This could be influencing the conductivity of EB Pemi below the ski area, but the increase is minimal and well below Class B NH Surface Water Quality Standards1. Loon Pond Brook's conductivity levels were lower than those of the main stem.

In general, nutrient concentrations at all sites, including nitrate, ammonia, and phosphorus, were comparable to reference sites on the WMNF, though nitrate levels were slightly above average for typical WMNF streams (Table 2). There were negligible increases in nutrients from above the ski area to the sample point at South Mountain, which would capture the majority of runoff from the ski area. Larger, yet still relatively minor, increases in nutrients were found between the South Mountain sample site and the sample site at Lincoln. These increases are more likely due to influences from development and activities on private land than any activities happening within the ski area. All samples were within the Class B NH Surface Water Quality Standards[1].

Soil Productivity

Every year monitoring occurs while activities are being implemented on the ground to see whether Forest Plan standard and guidelines to minimize soil movement are being followed and to track the effectiveness of best management practices (BMPs). In 2013, monitoring took place on two active timber sales: Millstone (Androscoggin Ranger District) and Douglas (Saco Ranger District). Post implementation monitoring occurred on at least one sale on each Ranger District: Hogsback (Pemigewasset), Eight Point (Saco), and Kennison Ridge and Orchard sales on the Androscoggin District.

On all monitored sales, Forest Plan standards and guidelines were being followed as proposed in the applicable project analysis.

Selecting the right operating season for the ground is a best management practice for minimizing impacts to soil and water resources. As discussed in the 2012 Monitoring Report, climate change predictions indicate that the feasibility of winter logging may eventually decline on the WMNF. Effects of harvest on soils were monitored to determine whether adverse impacts occurred due to the season of operation. Based on the active sales looked at in FY13, impacts matched what was analyzed for in project environmental assessments and were not detrimental. No change to the Forest's operating seasons is needed at this time.

Monitoring showed that other BMP's, such as water bars and slash in the trails to prevent compaction, erosion, and puddling, were being implemented on harvesting operations when appropriate. BMP's are designed for "the control and dispersal of water collecting on truck haul roads, skid trails, and log landings to minimize erosion and reduce sediment and temperature changes in streams." (New Hampshire Best Management Practices A Pocket Field Guide, 2004) On the WMNF, these practices appear to be successful in meeting that objective. None of the monitored sales had any active detrimental erosion occurring where water bars were in place. Where slash was placed in the skid trails, there was no active detrimental rutting that would lead to compaction.

Main skid trail. Orchard Timber Sale. Androscroggin Ranger District. WMNF photo by Andy Colter.

Project Reviews

Nancy Pond Trail Relocation

In 2013 a one-half mile long trail relocation was constructed to mitigate a destabilized segment of trail on a very steep slope that was undercut and degraded by Tropical Storm Irene in 2011. The treadway and previously installed trail structures adjacent to Nancy Brook held up to the storm in their original location; however, the collapse of the trail was determined to be imminent and likely during a future heavy rain event. This trail segment slid in the late 1990s and was repaired in 2002 by the Saco Trail Crew by installing substantial rock cribbing to support the trail.

Rather than try to re-establish the trail on a slope that has now slid twice, we looked on both sides of the brook for an alternative. The ground on the far side of Nancy Brook posed several challenges and the relocation would have been well over a mile in length. The ground on the same side of the brook was not ideal due to the extremely steep slope, but was the best option available. A route was identified and constructed to bypass the slope with the greatest slide potential, on which the original trail sits. This required significant 'bench cutting' of the trail to cut a wide enough treadway into the steep slope, as well as constructing modified 'switchbacks', and rock/log steps and drainage structures. The trail is no longer directly adjacent to the brook, removing the potential for high water to undercut the trail in the future.

New segment of trail. WMNF photo.

Softwood Monitoring

A Forest silviculturist, Forest Service wildlife biologists, and a biologist from the NH Fish and Game Department visited three harvested timber sales to evaluate how well specific stand prescriptions met project and Forest Plan goals to increase softwoods within stands and on the landscape.

Softwood regeneration in a group selection harvest. WMNF photo by Lesley Rowse

The stands visited were harvested using three different treatment types: group selection, a combination of individual tree selection and group selection, and shelterwood removal to about 40 basal area. Harvest occurred in both fall and winter, depending on the stand. Groups ranged from 0.1 to 0.5 acres in size.

The reviewers agreed that all harvest treatments were successful at protecting and releasing existing softwood regeneration, thereby meeting the project softwood management objectives and

contributing to Forest habitat objectives. No pre-commercial treatment of hardwoods was deemed necessary in the visited stands. The review indicated that fall harvest, which results in soil scarification, can be an effective tool for increasing softwoods if soil conditions are suitable for fall harvest and existing softwood regeneration can be protected.

There was a discussion about the width of harvest equipment, which has increased over the years. Wider equipment can result in large openings and lots of residual damage in softwood stands. The District has placed equipment width restrictions in softwood stands in some sale areas to maintain stand density and softwood cover. Although there were no equipment restrictions on the sales visited, relatively narrow equipment was used. It would be beneficial to have a monitoring trip that evaluates the effects of treatments with different types of equipment, especially in treatments with a goal of protecting existing regeneration.

A tract of land recently acquired by the Forest Service also was visited to look at how well softwoods fared after a clearcut treatment. Most likely the stand was similar to adjacent National Forest lands, with patches of softwoods intermixed with northern hardwoods. The clearcut area is regenerating as a mixedwood stand, with both softwood and northern hardwoods species. It is not a dense softwood thicket but biologists felt it provides favorable habitat for species that rely on regenerating softwoods. The group agreed that even-age silvicultural treatments could be used successfully on soils that favor softwood habitats.

Swan's Way Trail

The Swan's Way trail, which is part of the Waterville Valley nordic trail system and used by mountain bikers, was relocated in summer 2010 to get the trail out of a low, wet spot near a beaver dam and into a more sustainable location. As described in the FY2010 Monitoring and Evaluation Report, soil and water best management practices were applied during project implementation and the old trail was closed out properly, removing undersized culverts and providing appropriate drainage.

In FY13, the permit administrator visited the old and new trail locations. He found extensive beaver activity along the old trail route, including nearby dams, ponds, and lodges. The relocated section of trail was high and dry with no evident resource damage or trail stability concerns after three years of use. The decision to move the trail clearly resulted in a more sustainable trail network, and happy beavers!

Beaver habitat along old Swan's Way Trail. WMNF photo by Tom Paquette.

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. The intensity of the rain and resulting high flows in streams caused extensive damage to roads, trails, bridges, and other infrastructure across the Forest. In 2012 we repaired many sites, developed plans to address damage in other locations, and continued to find more damage as we explored areas throughout the summer.

19-Mile Trail, damaged by Tropical Storm Irene. WMNF photo.

Recovery from Tropical Storm Irene, and from Hurricane Sandy in fall 2012, continued to be a focus across the Forest in 2013. Repair work was completed on the Hales Location and Rocky Branch Roads. Planning and design work continued on several other Forest Roads, including East Branch, Eastside, Livermore, Slippery Brook, and Tunnel Brook roads.

Trail project planning continued in the Presidential-Dry River Wilderness, Wild River area, Presidential area, and the Greeley Ponds area. We began implementation on projects on the 19-Mile Brook Trail and Greeley Ponds Trail, worked with a contractor to replace the Hastings Trail Bridge, and completed work on the Lincoln Woods and Sabbaday Falls trails. Employees on the Saco district performed reconnaissance of the Presidential-Dry River Wilderness trails, held an informal public meeting with interested parties and refined a proposed action for analysis.

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. In FY13, we worked with NFF to complete the first project on the Forest under the “Treasured Landscapes” campaign, the Nancy Pond project. NFF and other Forest partners relocated about 1 mile of storm damaged trail to a more sustainable location. This trail provides access to Nancy cascades, Nancy and Norcross ponds and the Pemigewasset Wilderness.

Other Monitoring

Air Quality

The WMNF continues to work 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 2013, the WMNF concluded a three year lichen monitoring study in the Class I Areas to accomplish several objectives:

- Establish permanent plots in forested environments for measuring diversity and abundance of lichens and bryophytes
- Provide a sound baseline for lichen and bryophyte diversity and abundance, as well as completing a chemical analysis of two lichen and two bryophyte species to evaluate their exposure to air pollutants and for comparison to future assessments to allow for long-term monitoring
- Revisit a selection of locations, and review lichen data collected by Clifford Wetmore in 1988, in the WMNF, to determine whether this earlier information is comparable enough to be incorporated into the results of this study

The field work has been completed for this lichen monitoring project (see cover photo for this report) and the data is currently being analyzed and will be summarized in next year's monitoring report.

Forestry Photo Monitoring

In FY13, Forest staff continued photo monitoring a sampling of clearcut, group selection, and salvage treatment areas. Monitoring of 16 locations across the forest began in 2012. The primary intent of the monitoring is to provide a visual display of the various stages of natural regeneration/revegetation of clearcuts over time on the White Mountain National Forest. The intended viewing audience is any member of the general public who may not be familiar with natural regeneration of stands following clearcutting. Many folks are familiar with what a clearcut looks like at year one, but are less familiar with what the same piece of ground looks like after three, five, ten, or twenty years of growth.

One of the forestry photo points in 2013. WMNF photo by Steve Jones.

Monitoring Visitor Experience

The White Mountain National Forest is host to an estimated 5-7 million visitors annually, and is considered a premier recreation destination in the northeastern United States. The Forest places great emphasis on providing a quality recreation experience to the public. To help meet that goal, the Forest Plan and Monitoring Guide identified a need to periodically evaluate both the perceived quality of the recreation experience and perception of crowding among Forest visitors. In 2013, we reached out to the Park Studies Laboratory, Rubenstein School of Environment and Natural Resources at the University of Vermont for assistance with this recreation monitoring.

We discussed the two items in the WMNF Monitoring and Evaluation Guide related to visitor experience and perception of crowding:

- Recreation: Perceived quality of experience and perception of crowding among forest visitors
- Wilderness: Satisfaction of Wilderness visitors (quality of experience and perception of crowding)

Because the Forest has an interest in conducting this monitoring and the Park Studies Laboratory has an interest in providing hands-on training and practicum experience for graduate and undergraduate students and staff, we entered into an agreement with the University. Under this agreement the Park Studies Laboratory will conduct site scoping of the WMNF and literature and data reviews, and they will prepare a monitoring protocol to help us gauge the quantity of visitors on the Forest and the perceived quality of experience and perception of crowding amongst both general Forest visitors and Wilderness visitors in particular.

Wilderness

Water quality monitoring in WMNF wilderness areas is gaining an increased focus as part of a national Forest Service program (10 Year Wilderness Stewardship Plan). For wildernesses that contain headwater streams, water is usually the first air quality value to be measured because stream water condition is a great indicator of impacts from acid deposition to the water and soil of a watershed. Water chemistry can be used to characterize the level of acidification and associated biological effects, ranging from no impacts to complete loss of populations.

As part of the national 10 Year Wilderness Stewardship Plan, the WMNF designated water as the recommended air quality related value to be monitored for long term trend analysis in the Forest's six wilderness areas. Stream water data is already available in many areas, and where it is lacking the Forest has a plan to collect baseline data and develop trends. The WMNF is collaborating with the Appalachian Mountain Club and the Northern Research Station to collect and analyze stream water samples. In 2013, all the WMNF wilderness areas had at least 2 consecutive years of stream water data. After a third consecutive year of data is collected in FY14, results will be summarized and reported in the annual monitoring report.

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 FY13, research considered the effects of wind turbines on nesting peregrine falcons, how climate change may affect vegetation phenology, the impacts of glaciation and variable erosion rates on the WMNF landscape, wind effects on foraging bumblebees, tree survival and growth following ice storm injury, and acid deposition and soil calcium depletion, among other topics. All proposals for non-Forest Service research and monitoring on the Forest are reviewed by appropriate specialists before a permit is issued. 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 will have access to any information that could help us in our management.