

GREEN MOUNTAIN NATIONAL FOREST – SOIL ASSESSMENT

EXECUTIVE SUMMARY

This assessment of soil conditions and available soil information for the Green Mountain National Forest (GMNF) provides information needed for revision of the National Forest Land and Resource Management Plan (Forest Plan). The assessment provides a historical context for soil conditions and establishes information to enable the Forest Service (USFS) to effectively respond to emerging issues and close information gaps. This Executive Summary provides an overview of the contents of the soil assessment for GMNF; it is focused on information that is most relevant to future management direction.

Historical information and current soils data provide a foundation for future management of the soils of the GMNF. This assessment outlines the legal and administrative framework (Section 2) for soil management, from the 1897 Organic Act that established the National Forest System, to contemporary laws, regulations, and directives that require the Forest Plan and establish goals and standards for resource management. This legal and administrative framework is the foundation of soil management goals (Section 3) that are included in the existing Forest Plan.

Managing soils, like managing habitats, requires knowledge of past “disturbances,” current conditions, and the structure and composition of the resource. This information about the soils of the GMNF is summarized in Sections 4 through 6 of the assessment. Actions toward soil management goals, issues and concerns that affect future management, assessment conclusions, and information needs are summarized below. They are discussed in more detail in Sections 7 through 10 of the assessment.

ACTIONS TOWARD GOALS

Current actions toward soil management goals include the following:

- Application of Standards & Guidelines (S&Gs)-- Potential impacts of each planned project are assessed, and Forest Plan S&Gs are applied to minimize or eliminate the impacts. Mitigation measures are recorded in decision memoranda and notices.
- Monitoring-- The GMNF monitors the application and effectiveness of S&Gs, and cooperates with other organizations in long-term studies toward development of monitoring tools, such as acid sensitivity maps and/or till source models.
- Soil Resource improvement-- The GMNF, with help from partners, implements 10 to 12 projects per year to control erosion and improve soil quality on degraded areas.

KEY ISSUES AND CONCERNS

Key issues and concerns that affect future management action and revision of the Forest Plan are identified in the assessment and are briefly summarized in the following paragraphs.

Maintaining long-term soil productivity: Long-term soil productivity is the largest issue and concern, and most interrelated with the other issues and concerns. Soil impacts that can affect productivity include (1) physical impacts such as erosion and compaction, and (2) chemical impacts such as acidification and nutrient depletion.

- **Physical Impacts:** Monitoring indicates that the physical impacts are mitigated to large degree by application of S&Gs. Updating the S&Gs, developing and applying Soil Quality Standards (SQS), and continuing monitoring will ensure that forest management activities will not result in physical impacts that reduce soil quality and productivity.
- **Chemical Impacts:** Nutrients can potentially be depleted by acid deposition and, to a much lesser extent, timber harvesting.
 1. *Acid Deposition:* The most complex aspect of the long-term soil productivity maintenance issue involves assessing and mitigating the effects of acid deposition. Studies of these effects since the 1970s cumulatively indicate that acid deposition may reduce soil quality and soil productivity on sensitive sites. However, conclusive evidence that soil productivity has thus far been affected by acid deposition is lacking.

Soil acidification from acid deposition also has secondary effects, which have negative implications for both terrestrial and aquatic ecosystems.
 2. *Timber Harvesting:* Nutrient losses from GMNF soils due to timber harvesting can reasonably be expected to be small due to low-intensity harvest operations, small selective acreage of impacted land, and application of S&Gs.

Update Forest Plan direction for protection and enhancement of soils: The current soil quality S&Gs do not fully reflect the latest management direction and scientific knowledge. Recommendations for updating the S&Gs are provided in the assessment.

Identify and improve areas where soil quality is impaired: The Soil Improvement Needs inventory should be completed and maintained so that improvement projects can be effectively directed toward the highest priority areas.

Further Develop and Improve the Terrestrial Ecological Classification and Inventory System: The Terrestrial Ecological Classification and Inventory system needs to be updated to (1) incorporate current concepts, link Land Type Associations (LTAs) to Ecological Land Types (ELTs), and improve vegetative predictability; and (2) identify, prioritize, and fulfill Ecological Land Type Phase (ELTP) mapping needs for project and intensive use areas.

- Update the ELTs, and link ELTs to LTAs: The GMNF ELTs and LTAs do not link well together because they were developed during different decades, and exist at different levels in the evolution of the science of ecological land classification. It is suggested that the Forest Plan revision should provide direction for updating the ELTs, and ensuring their hierarchical integration with the LTAs and ELTPs.
- Identify, prioritize, and fulfill ELTP mapping needs: The Forest Plan revision should include direction for identifying and prioritizing ELTP needs, and for developing and mapping ELTPs, where needed.

Emerging Issues: The following issues may soon become important to the GMNF, and should be addressed in the Forest Plan revision:

- Terrestrial large woody debris
- Carbon sequestration
- Soil floral and faunal communities
- Protection of uncommon landform/geologic/soil types
- Protection of example sites of representative ecological types from anthropogenic disturbances

Future Monitoring and Research Needs: The following future monitoring and research efforts would help ensure maintenance of long-term soil productivity, as well as address the other issues and concerns:

- Develop SQSs and incorporate them into updated S&Gs.
- Develop an ecological monitoring strategy that incorporates the S&Gs (including the SQSs).

- Continue involvement in the cooperative long-term soil monitoring study.
- Update the ELTs so that they more accurately reflect vegetative potential, and conform to the boundaries of the LTAs.
- Improve identification of acid deposition-sensitive areas and sites.
- Identify better ways to define and measure soil productivity.

CONCLUSIONS AND CRITICAL INFORMATION NEEDS

Conclusions of the assessment include the following:

- The general health of the soils of the GMNF today is good. Exceptions include small areas consisting primarily of landslides, eroding stream banks, old gravel pits or borrow areas, minor skid trails, dispersed campsites, and areas frequently used (illegally) by all-terrain vehicles.
- The USFS is generally capable of addressing the key issues and concerns over the next several years. The rate at which the goals and recommendations are achieved will be highly dependent on future funding levels.

Revision of the GMNF Forest Plan provides an opportunity for the USFS to focus on the following critical information needs:

- Establish SQSs to provide a basis to monitor changes in soil properties of the LTAs, ELTs, and ELTPs that are identified on the GMNF.
- Map ELTPs on all parts of the GMNF where intensive management is planned.
- Evaluate ELT mapping to ensure it reflects current concepts and meshes with the LTA mapping.
- Obtain more definitive information on the chemical aspects of soil productivity, including calcium dynamics, buffering capacity, and effects of acid deposition. This work is ongoing through USFS Research and GMNF work with the Vermont Monitoring Cooperative. The USFS should continue to conduct monitoring and research throughout the next 10 to 15 years to address these information needs.
- Adopt an ecological monitoring strategy that incorporates SQSs and is flexible enough to incorporate new information as it becomes available