Monitoring Conducted

Soil Protection

Project Level Monitoring

Pretreatment monitoring for effects on the soil resource occurred in the Norway Timber Sale, (Tomahawk EA), and on the Dunka II, Nira, and Wampus Timber Sales (Dunka EA). Post treatment monitoring will be conducted in 2008 (see Table 2).

Soils Summary Points

- Where fuel loads are high and during extreme drought soil moisture conditions, wildfires are likely to impact soil resources.
- ELT 18 discussions need to progress with the Forest Silviculturalist and the FIDT in 2008.

Fire and fuels. The presence and depth of organic layer (duff) was monitored for effects from mechanical and prescribed fire fuel reduction treatments associated with the Boundary Waters Canoe Area Wilderness Fuel Reduction EIS (2000), as well as wildland fire. Duff is a measure of productivity outlined in R9 Soil Quality Standards (FSH 2509.18, Chapter 2), the Forest Plan (guideline GW-10, 11) and the Minnesota Forest Resource Council (MFRC) Voluntary Guidelines. Wildfire monitoring for soil resources were carried out as part of the Burned Area Emergency Response BAER for the Famine, Redeye, and Ham Lake Fires.

Ecological Land Type 18. Ecological Land Type (ELT) 18 is defined as areas of dense bouldery till on very shallow material underlain by bedrock which are vulnerable to management activities such as logging and fire. Moreover, use of equipment on ELT 18's is difficult. These sites are generally "off limits" to treatment activity.

Interim guidance on ELT 18 was developed for the Echo Trail EIS project and used in the Dunka EA project (Review and Guidance of ELT 18 for Echo Trail EIS; Barb Leuelling, Soil Scientist; 8/25/05 updated 11/30/05). The intent for this direction was to document ELT 18 capability for reforestation within five years as required by the National Forest Management Act. Monitoring on several units with ELT 18 within the Dunka EA project area was initiated prior to harvest (pre-treatment monitoring) to determine organic layer depth and the site's capability as "suitable timber land". Information gathered included 3-4 site index measurements for several tree species. In addition, monitored sites were compared to nearby similar stands (ELT 18) that had previously been treated (prior to the 2004 Forest Plan). Finally, it is necessary to gather stocking survey information from ELT 18's that were reviewed and selected for harvest after the 2004 Forest Plan was signed. These data will be used to inform a decision on whether to conduct harvest in ELT 18 areas for future projects.

Biomass Sites. Post-treatment monitoring was done on the Pitcha (83.1 acres) and Upper Caribou (11.7 acres) sites for the 2006 collaborative effort with the Institute for Agriculture and Trade Policy to research and monitor biomass harvest. All sites had pretreatment monitoring completed. Old Root (42 acres) was not treated; therefore no post-treatment monitoring took place. Biomass from these sites was used to supply energy to the Laurentian Energy Authority (LEA). The LEA is a joint effort by Virginia and Hibbing Public Utilities that converted coal-fired heating boilers to biomass-fueled electric generators which produce steam and electricity. Post treatment visits indicated that both sites were generally undisturbed with no significant rutting/compaction, damage to the forest floor, or erosion (http://www.forestrycenter.org/biomassproject.cfm).

Minnesota Forest Resource Council Biomass Guidelines. The guidelines focus on sustainable harvest of biomass while protecting the soil, water and habitat essential to a healthy and sustainable ecosystem. Soil features addressed were compaction, organic layer (forest floor duff) retention, and other relevant factors. The

published guidelines were made available in October 2007. Training to implement monitoring on the biomass guidelines is scheduled to commence in Spring 2008.

Minnesota Forest Resource Council Voluntary Forest Harvest Guidelines.

No field monitoring for MFRC Forest Harvest guidelines occurred in 2007 because a compilation of 2004-2006 field monitoring data was underway. In 2008, planning will be completed for field monitoring to occur in 2009.

Landscape Level Monitoring

Monitoring Forest wide management treatments throughout the decade at a broad scale will provide a comprehensive view of activities that may have impact on nutrient sensitive sites and wetland ELTs. This will provide data on the type, size and spatial distribution of activities in Land Type Associations across the Forest. Monitoring will be accomplished in year five of Forest Plan implementation when more information is available on which to perform this general analysis. The methodology of spatial analysis has been outlined during 2007. A preliminary Forest wide risk map was developed in 2004 that can be used to interpret spatial concerns.

Restoration

Watershed improvement projects completed in 2007 included erosion reduction measures such as water bars that divert water appropriately, monitoring shorelines and other areas for vegetation condition, and plantings and timber stand improvement practices within riparian areas. Forty two acres were accomplished during 2007.

Table 1. Watershed Improvement Projects, Acres accomplished by year.

Year	2005	2006	2007
Acres	11	53	42

Evaluation and Conclusions

Soil Protection

Project Level Monitoring

Results of post-treatment monitoring will be available after 2008 field season monitoring. Table 2 displays projects where post-treatment monitoring will be conducted in 2008.

Table 2. Soil resource field monitoring –Acres visited 2007

Dunka EA		
	Pre-treatment Visit	Post-treatment Visit
Dunka II Sale	73.5	2008
Nira Sale	197.3	2008
Wampus Sale	103.4	2008
Tomahawk EA		
Norway Sale	191.8	2008

Wildfire

Where fuel loads are high and during extreme drought soil moisture conditions, wildfires are likely to severely impact soil resources. Burned Area Emergency Response soil specialist reports indicated that within the Redeye, Famine, and Ham Lake Fires, there was moderate burn intensity where 95% of the forest floor was consumed, but there was no rill or gully erosion, nor was there any soil water repellency. These wildfires occurred over approximately 77,000 acres.

Wildfires are likely to more severely impact soil resources than prescribed fire, especially on ridgetops and where shallow soils occur. Remaining standing and downed burned trees provide nutrients and wildlife habitat to the site, and provide some soil erosion control.

Ecological Land Type 18

Continued discussion, review and documentation occurred in preparation for a white paper outlining an approach to further understanding ELT 18 and its limitations due to nutrient sensitivity. To date, ELT 18s are normally not candidates for treatment activities. Information being gathered includes 3-4 site index measurements for several tree species, locating a nearby similar stand in ELT 18 that has previously been treated (prior to the 2004 Forest Plan) to help assess regeneration capability, and collecting stocking survey information from ELT 18 stands that were approved for treatment (after the 2004 Forest Plan). These data will be used to inform the decision on whether to implement treatment on ELT 18 stands in the future.

Minnesota Forest Resource Council Voluntary Forest Harvest Guidelines

During 2007, the field monitoring information gathered from 2004 to 2006 was compiled and report writing was underway. The MFRC report on monitoring from 2004 to 2006 will be available in spring 2008.