

Silvicultural and Fuel Prescriptions Item 14

OBJECTIVE: To determine if site-specific silviculture and fuel prescriptions are being implemented, and if the silvicultural prescription accomplishes stated objectives.

DATA SOURCE: Interdisciplinary team review pre- and post-activity.

FREQUENCY: Annually.

REPORTING PERIOD: 2010-2013

VARIABILITY: Departure from management practice.

EVALUATION:

Forest Service Manual (FSM) Section 2470 requires that a silvicultural prescription be prepared and signed by a certified silviculturist on all vegetation management projects. Vegetation management projects include timber harvest, prescribed burning, mechanical noncommercial thinning and/or slashing, or reforestation projects. Monitoring is designed to evaluate whether:

1. The silvicultural prescription was completed and/or approved by a Certified Silviculturist and updated as needed
2. The prescription was followed through all phases of implementation, and
3. The prescription met the desired conditions as defined in the NEPA document and silvicultural prescription.

The following six projects were evaluated in the field in 2010-2013: 1) Sweeney Creek units 1 and 2; 2) Haacke-Claremont units 1, 2, 3, 6, 9, 10, 13, 28, 3) Lost Trail Sanitation Salvage; 4) Lower West Fork 1, 2, 11, 12, 60; 5) Trapper Bunkhouse, 5, 11, 13, 12, 22, 45, 49, 74, 80, 8; 6) Larry Bass units 1 and 2.

Additionally, the Interdisciplinary Teams also reviewed Sweeney Creek and Haacke Claremont units.

On projects involving timber harvest the EMS Operational Control for Timber Harvest requires several items to be completed by a certified silviculturist to ensure that the direction in Forest Service Manual 2470 is met. These items include having a certified silviculturist 1) complete a diagnosis for stands proposed for action; 2) develop desired stand conditions and 3) complete or review the final silvicultural prescriptions for all areas included in a harvest project; 4) Prepare and discuss marking guides with the marking crew and/or presale forester; and 5) Review timber marking in the field during sale preparation. All EMS requirements were met in 2010-2013.

MONITORING RESULTS:

Review of these six projects listed above, indicates that silvicultural prescriptions are being completed for all projects and the prescriptions met the desired conditions as defined in the NEPA documents.

Sweeney Creek units 1 and 2

This unit was reviewed pre-harvest, during implementation and post-harvest. No problems were identified with the harvest only during thinning of the understory was the prescription amended.

Haacke-Claremont Units 1, 2, 3, 6, 9, 13, and 28

This unit was reviewed pre-harvest, during implementation and post-harvest. No problems were identified.

Lost Trail Sanitation and Salvage

This unit was reviewed pre-harvest, during implementation and post-harvest. Additional suppression treatments such as the use of verbenone (the anti-aggregation pheromone) was added to the prescription before harvest was completed.

Larry Bass Units 1 and 2

This unit was reviewed pre-harvest, during implementation and post-harvest. No problems were identified.

Table 1 – Synopsis of Monitoring for Silvicultural Prescriptions

Project	Planting	Sweeney Creek	Haacke-Claremont	Lost Trail Sanitation	Lower West Fork	Trapper Bunkhouse	Larry Bass
Silvicultural prescription was completed and updated	Y	Y	Y	Y	Y	Y	Y
Prescription was followed through all phases of implementation	Y	Y	Y	Y	Y	Y	Y
Prescription met the desired conditions	Y	Y	Y	Y	Y	Y	Y

¹NA = Not applicable or Not monitored

Y = fully met requirement

N = did not meet requirement

P = partially met requirement

Timber Mortality Item 15

OBJECTIVE: Validation of mortality predictions used in the timber yield tables.

DATA SOURCE: Timber inventory.

FREQUENCY: Five years.

REPORTING PERIOD: 1988 to 2013

VARIABILITY: +/- 20 percent from predictions used in the Forest Plan over a five year period.

EVALUATION:

The Bitterroot Forest Plan recommends that we evaluate the mortality predictions used in the development of the timber yield tables at the end of the first five years of Plan implementation. Prior to the fires of 2000, our overall evaluation was that timber mortality from a combination of fire, insects, and disease had been substantially less than was anticipated in the Forest Plan. This item will be reevaluated after new mortality measurements are completed.

The Forest Plan predicted a certain level of endemic or annual mortality in the growth prognosis models, which were used to develop the timber yield tables. The Plan estimated the mortality to be 34 cubic feet/acre/year. The Forest planned to establish and use permanently marked Forest Measurement "Growth" Plot Stands to evaluate the accuracy of this mortality estimate. We have established 32 of these growths plot stands (some as early as 1979), and have re-measured them at five-year intervals. However, analysis of this data showed very little mortality through 1999. A five to fifteen year monitoring period is not long enough to evaluate mortality trends on this small sample size.

MONITORING RESULTS:

In 2000 the permanent growth plots were no longer being sampled in R1 due to information from Forest Inventory and Analysis (FIA) program. Currently, the FIA data estimates gross annual growth of growing stock trees on non-reserved forest land is estimated to be about 30.5 million cubic feet and net annual growth is estimated to be over 23.7 million cubic feet. Mortality is about 6.8 million cubic feet, or 22 percent of gross annual growth in growing-stock trees on non-reserved forest land. By comparison, gross annual growth of growing stock trees on suitable lands is estimated to be about 19 million cubic feet and net annual growth is estimated to be over 16.2 million cubic feet. Mortality is about 2.8 million cubic feet or about 15 percent of gross annual growth in growing-stock trees on suitable lands.

In addition the Forest is evaluating an epidemic of mountain pine beetles on the Forest. The populations of bark beetles and their management implications are discussed further in Items 36 and 37.

Management Effects on Soils Item 31

OBJECTIVE: Determine the effects of timber sale activities on soil productivity. The effects monitored include: soil compaction, rutting, displacement, severely burned soil, surface erosion, and soil mass movement as described in the Region 1 Supplement 2500-99-1.

DATA SOURCE: Soil inventory and site inspection prior to and after treatments on activity units.

FREQUENCY: Annually, 25 percent of completed projects per year.

REPORTING PERIOD: 2010-2013

VARIABILITY: More than 15 percent of the activity area detrimentally affected (total accumulation of detrimental compaction, displacement, puddling, and severely burned soil).

INTRODUCTION:

The soil quality evaluations were conducted to determine the effects of management activities on soil productivity as required by the BNF Forest Plan and Region 1 Soil Quality Standards (R1 SQS). To accomplish this task, soils were evaluated against definitions and guidelines provided in the BNF Forest Plan as well as the Forest Service Manual (2550, Amendment No 2500-90-2 and Region 1 Supplement 2500-99-1) and Handbook (2509.18 WO Amendment 2509.18-91-1 and Region 1 Supplement 2509.18-2005-1). Part of the objective was to determine if the unit being monitored exceeds the R1 SQS of 15% aerial extent of Detrimental Soil Disturbance (DSD). It is important to consider the 15% as a trigger point at which more in-depth soil quality evaluations would be conducted and soil amelioration is considered to move toward a net improvement in soil quality.

There are 2 sets of factors to review when evaluating soil quality. The first set is a determination of DSD from management activities. By definition, DSD includes (1) compaction in which the bulk density has increased by 15% above natural conditions; (2) rutting where wheel ruts are at least 2 inches deep in wet soils; (3) displacement with the removal of 1 inch or more of any surface horizon in a continuous area greater than 100 square feet; (4) severely burned soil; (5) surface erosion; and (6) any mass movement. The presence of these factors may indicate site impairment or soil productivity issues.

The second set of factors evaluated includes the site productivity indicators of: soil type, soil horizon thickness, the depth and type of duff and litter, the percent and type of ground-cover, native or non-native vegetation, root density and extension into the soil, soil-water interactions (infiltration rate, hydrophobicity), and stream channel conditions.

Soil quality evaluations were conducted for this report (2010 - 2013) on harvest units using the *Region 1 Approach to Soils NEPA Analysis Regarding Detrimental Soil Disturbance in Forested Areas, A Technical Guide* and also the *Forest Soil Disturbance Monitoring Protocol Volume I: Rapid Assessment*.

EVALUATION – DETERMINE THE EFFECTS OF TIMBER SALE ACTIVITIES ON SOILS

This report provides an evaluation of Bitterroot National Forest projects including:

1. Pre-Activity/Existing Condition Soil Monitoring Surveys;
2. Post Activity Soil Monitoring Surveys;
3. Monitoring Summary

1. Pre-Activity/Existing Condition Soil Surveys

Pre-activity/existing condition soil surveys were conducted to determine baseline soil conditions. The field reconnaissance data is used to assess existing conditions and effected environments during the planning process. Treatment units within the following projects were field reviewed:

- Lake Como EIS (2009-2013);
- Larry Bass EA (2011-2012);
- Lost Trail CE (2010-2011);
- Meadow Vapor EA (2013);
- Sweeney Creek CE (2008-2009);
- Three Saddle EA (2009-2010); and
- Various administrative & recreation Site thinning projects CE's

Pre-activity/existing soil conditions meet R1 SQS in surveyed units. Units are proposed for ground-based and skyline harvest. All units will be required to meet R1 SQS following proposed activities.

Field surveys of soil conditions for these projects provide the baseline data which help guides project designs and proposed actions. Soil resource protections including Soil and Water Conservation Practices (SWCPs), Montana BMPs, and in some cases mitigations are prescribed to ensure soil resources are protected and maintained within the R1 SQS. Rehabilitation projects are also often derived from these pre-activity surveys.

2. Bitterroot National Forest Post-Activity Soil Quality Monitoring Surveys (2010-2013)

Post-activity soil quality monitoring was conducted to determine the effects of harvest and fuel reduction activities on the soil resource. Soil quality monitoring results from 2010 to 2013 monitoring are displayed in Table 1. Note that the results indicate the amount of new or additional DSD created following an activity, not the cumulative DSD for the units.

Table 1 - BNF Soil Quality Monitoring (2010 –2013) - Post Harvest Percent New DSD in Treatment Units

Harvest/Fuels Treatment Method	Project	Unit Monitored	Year Monitoring Completed	DSD%	Average DSD%
Summer Ground-Based	Haacke Claremont	Unit 2	2010	13%	8%
	Lower West Fork	Unit 34	2012	6%	
	Trapper Bunkhouse	Units 5 & 11	2012	8%	
	Larry Bass	Units 1a, 1b, 2a, 2b, 2c,2d, 2e, 3 & 8a	2013	5%	
Winter Ground-Based	Trapper Bunkhouse	Units 5 & 26	2011	3 - 5%	4%
Summer Cut-to-Length with Forwarder	Elk Bed	Units 2 & 14	2010	3%	4%
	Hayes Creek	Z	2012	5%	
Skyline	Haacke Claremont	Unit 14	2010	4%	3%
	Lower West Fork	Unit 61	2012	3%	
	Swift Creek	Unit 1	2013	2%	
Fuel Reduction - Slashing	Swift Creek	Units 1 & 2	2011/2012	<1%	<1%
Fuel Reduction - Mastication	Swift Creek	Units 1, 2 & 5	2011	<1%	<1%

Harvest/Fuels Treatment Method	Project	Unit Monitored	Year Monitoring Completed	DSD%	Average DSD%
Prescribed Fire	School Point	Units A, B & D	2012	<1%	<1%

Summer Ground-Based Yarding

Summer ground-based yarding created 6% to 13% new DSD (average 8%DSD) on the monitored treatment units. Monitoring details are highlighted below.

Project & Treatment Unit: Haacke Claremont EA- Unit 2

Location: Stevensville Ranger District, Haacke & Claremont Drainages, Sapphire Mountains

Background: The pre-activity soil assessment completed in the summer of 2007 found no pre-existing DSD. The unit covers approximately 38 acres across a south west facing mountain slope in the Sapphire Mountains. The southwest corner of the unit wraps slightly around the nose of a gentle ridge and has approximately 18 acres suitable for ground-based operations. Mitigations recommended by the soil scientist in the EA required that summer ground-based harvest be completed during dry soil conditions to minimize soil impacts. Operations were completed in 2009.

Observations: Harvest in the unit was completed during dry soil conditions in late summer 2009. This monitoring was completed after harvest operations but prior to rehabilitation and sale closure of the unit. Ground-based operations in the unit created 13% DSD due to the high amount of displacement created on main and secondary skid trails. Summer ground-based yarding over the last 10 years has typically created 10% DSD on the Bitterroot NF. DSD was higher on this unit due to shallow and rocky soils that are easily disturbed and also the close spaced skidding network utilized by the operator.

The detrimental soil displacement will be rehabilitated prior to sale closure by placing slash, seeding, and fertilizing areas with bare mineral soils.

Conclusion: The unit is within R1 SQS. Follow-up monitoring of this unit should be completed in several years to determine the effectiveness of rehabilitation and also the level of natural recovery in locations where displacement resulted in DSD during this initial monitoring.

Project & Treatment Unit: Lower West Fork EIS – Unit 34

Location: West Fork Ranger District, Baker Creek drainage

Background: The pre-activity soil assessment completed in the summer of 2008 found no pre-existing DSD. Mitigations recommended by the soil scientist in the EIS required that summer ground-based harvest be completed during dry soil conditions to minimize soil impacts.

Observations: Harvest in the unit was completed during dry soil conditions in summer 2012. This monitoring was completed after harvest operations. Ground-based operations in the unit created 6% DSD due to displacement created at landing sites and also on main skid trails leading to landings. Soil disturbance on main skid trails was the highest near the landing where more passes with the skidder occurred.

Conclusion: The unit is within R1 SQS.

Project & Treatment Unit: Trapper Bunkhouse EIS – Units 5 & 11

Location: Darby Ranger District, Spoon Creek and Hart Bench

Background: The pre-activity soil assessment completed in the summers of 2005 and 2006 identified 5% DSD in unit 5 and 2% DSD in unit 11. Mitigations recommended by the soil scientist in the EIS required that summer ground-based harvest be completed during dry soil conditions to minimize soil impacts. Main skid trails were also proposed for subsoiling to reduce compaction that could lead to reductions in soil productivity and ensure detrimental soil disturbances remained within the R1 SQS. Commercial thinning in Unit 5 was also completed using winter ground-based yarding and is discussed in the winter ground-based yarding section below.

Observations: Harvest in the units were completed during dry soil conditions in summer 2012. This monitoring was completed after harvest operations. Ground-based operations in the unit created 6% DSD due to

displacement created at landing sites and also on main skid trails leading to landings. Soil disturbance on main skid trails was the highest near the landing where more passes with the skidder occurred.

Conclusion: The unit is within R1 SQS.

Project & Treatment Unit: Larry Bass EA – Units 1a, 1b, 2a, 2b, 2c, 2d, 2e, 3, 8a

Location: Stevensville Ranger District, Larry Bass Recreation Area

Background: The pre-activity soil assessment completed in the summer of 2010 found pre-existing DSD (<5%) from past skidding in several units. Mitigations recommended by the soil scientist in the EIS required that summer ground-based harvest be completed during dry soil conditions to minimize soil impacts.

Observations: Harvest in the units was completed during dry soil conditions in summer 2012. The monitoring was completed immediately after harvest operation, before skid trail rehabilitation. Ground-based operations in the unit created 5% DSD due to soil displacement at landing sites and also on main skid trails leading to landings. Soil disturbance on main skid trails was the highest near the landing where more passes with the skidder occurred.

The layout of skid trails did an excellent job of using past trails to minimize new soil disturbances. Rehabilitation of main skid trails was completed in all ground-based units. The rehabilitation involved subsoiling to alleviate compaction followed by the placement/grading of displaced organic materials and topsoil back onto the trails. The monitoring efforts did not include the rehabilitation efforts. Follow up monitoring of these Larry Bass units will be completed within the next several years to determine the effectiveness of the rehabilitation treatments. The rehabilitation followed by several years of natural recovery is expected to reduce the 5% DSD that was identified immediately following the ground-based yarding to <1%.

This project was considered to be highly successful at minimizing new DSD.

Conclusion: The units are within R1 SQS.

Winter Ground-Based Yarding

Winter ground-based yarding created an average of 4% new DSD. Monitoring details are highlighted below.

Project & Treatment Unit: Trapper Bunkhouse EIS – Unit 5

Location: Darby Ranger District, Spoon & McCoy Creek Drainages, Bitterroot Mountains

Background: The pre-activity soil assessment completed in the summer of 2006 found the unit had 5% pre-existing DSD. The ground-based portion of the unit covers 130 acres and is located on gentle slopes averaging less than 20% gradient.

Observations: Operations were completed in late winter 2010. Mitigations recommended by the soil scientist in the EIS required that winter ground-based harvest was completed it was necessary to meet frozen ground/snow requirements. Mitigations also included subsoiling of compacted skid trails if harvest was to be completed in the summer. Harvest was completed during the winter; therefore, subsoiling was not required. DSD from compaction on main skid trails totaled approximately 3% across the unit. The detrimentally disturbed areas were rehabilitated by placing slash on disturbed portions of the skid trails. Native vegetation remained intact and was not affected by winter yarding in most areas. No other detrimental soil conditions were noted off the main skid trail areas.

Conclusion: The unit is within R1 SQS.

Project & Treatment Unit: Trapper Bunkhouse EIS – Unit 26

Location: Darby Ranger District, Tin Cup Drainage, Bitterroot Mountains

Background: Ground based thinning and salvage activities were proposed in Unit 26 where the Tin Cup fire burned through the unit in 2007. The ground based salvage was proposed in low and moderate burn severity areas in Unit 26. The fire effects on soils were minimal across the unit due to the low and moderate burn intensities in most locations. Low and moderate severity burned areas pose minimal concerns to soil productivity and erosion. These areas contained patchy burn characteristics with a mix of live and fire killed trees. Surface organic horizons were partially burned but still provided adequate ground cover to prevent erosion. In addition, needle cast potential was high in many areas where trees were partially scorched. Needle fall in areas where trees were scorched and killed provided 30 to 60 percent ground cover immediately after the fire which helped further minimize potential erosion and replenish organic matter needed for soils.

High severity burn areas were noted only in non-contiguous, small patches - the largest area was less than 2 acres in size. Soils in these high severity burn patches displayed mostly moderate hydrophobicity with small inclusions of high hydrophobicity present 2 inches below the surface. No high severity burn areas were noted adjacent to live streams.

Observations: Operations were completed in 2010. Harvest in the unit followed the soil scientist's recommended mitigations for winter operations to protect soils impacted by low and moderate severity fire. High severity burned areas were avoided completely. Surface recovery of soils across the Tin Cup which included regrowth of native vegetation and thick moss layer provided excellent protection for soils during winter-based yarding operations. DSD and compaction on main skid trails was noted at approximately 5% across the unit during monitoring. The detrimentally disturbed areas were rehabilitated by subsoiling and placing slash on disturbed portions of the skid trails. Native vegetation remained intact and was not affected by winter yarding in most areas. No other detrimental soil conditions were noted off the main skid trail areas.

Conclusion: The unit is within R1 SQS.

Summer Cut-To-Length Yarding

Summer cut-to-length with log forwarder yarding operations only created 3 - 5% DSD on the three monitored units. Monitoring details are highlighted below.

Project & Treatment Unit: Elk Bed Timber Sale – Units 2 & 14

Location: Darby Ranger District, Near Lake Como, Bitterroot Mountains

Background: Units 2 and 14 were reviewed in the Elk Bed Timber Sale on August 16, 2010. These units were prescribed for cut-to-length with forwarder yarding to minimize soil disturbance as part of the Seed Area Production project. The thinning in these units was completed in June 2010 as recommended with the cut-to-length and forwarder logging system.

Observations: Forwarding operations in these units provided excellent protection for soil resources. Detrimental soil disturbance was noted on less than 2% of these units from the operations. Compaction and soil displacement was noted only on the main forwarder trail primarily in locations where the slash mat was thin or was not present. No DSD was noted on secondary forwarder trails. Slopes are very gentle across the unit. Steeper slopes would have likely increased the amount of DSD in the unit but not likely beyond 5%. Adequate woody debris was maintained for future soil development. The activities and cumulative effects in these units are well within the Region 1 SQS.

Conclusion: The forwarding operations did an excellent job at minimizing new DSD in the units. These units are within Region 1 SQS.

Project & Treatment Unit: Hayes Creek Timber Sale – Unit Z

Location: Darby Ranger District, Hayes Creek & Coyote Coulee, Bitterroot Mountains

Background: Unit Z was reviewed in the Hayes Creek Timber Sale in July 2011. This unit was prescribed for cut-to-length with forwarder yarding to minimize soil disturbance. The thinning was completed in 2011.

Observations: Forwarding operations in these units provided excellent protection for soil resources. Detrimental soil disturbance was noted on less than 5% of these units from the operations. Compaction and soil displacement was noted only on the main forwarder trail primarily in locations where the slash mat was thin or was not present. No DSD was noted on secondary forwarder trails. Slopes are very gentle across the unit. Adequate woody debris was maintained for future soil development. The activities and cumulative effects in these units are well within the Region 1 SQS.

Conclusion: The forwarding operations did an excellent job at minimizing new DSD in the unit. This unit is within Region 1 SQS.

Skyline Yarding

Skyline yarding created an average of 4% new DSD. Monitoring details are highlighted below.

Project & Treatment Unit: Haacke Claremont Timber Sale – Unit 14

Location: Stevensville Ranger District, Haacke & Claremont Drainages, Sapphire Mountains

Background: The pre-activity soil assessment completed in the summer of 2007 found no pre-existing DSD. The entire unit covers approximately 222 acres with slopes suitable for both ground-based and skyline yarding. The unit extends across a long mountain slope and includes the several ridgelines and drainages. Steep slopes suitable for skyline yarding are located in the northern half of the unit. This portion of the unit covers approximately 130 acres. Skyline operations were completed in 2009. No soil mitigations were listed for skyline operations in the unit other than placing slash on skid trails to discourage illegal OHV use and also to not yard unmerchantable material greater than 15 inches in diameter where coarse woody debris does not meet standard.

Observations: Skyline harvest in unit 14 was completed in the winter 2009. Soil displacement was noted on skyline corridors near landing sites and totaled less than 4% DSD across the unit. The detrimentally disturbed areas were rehabilitated by placing slash on disturbed portions of the corridors and also seeding and fertilizing areas of bare soil.

Conclusion: The unit is within R1 SQS.

Project & Treatment Unit: Lower West Fork EIS – Unit 34

Location: West Fork Ranger District, Lloyd and Christisen Drainages

Background: The pre-activity soil assessment completed in the summer of 2008 found no pre-existing DSD. Mitigations recommended by the soil scientist in the EIS required that skyline harvest be completed during dry soil conditions to minimize soil impacts.

Observations: Harvest in the unit was completed during dry soil conditions in summer 2012. This monitoring was completed after harvest operations. Skyline operations in the unit created 3% DSD due to soil displacement created in skyline corridors near the landing sites.

Conclusion: The unit is within R1 SQS.

Project & Treatment Unit: Swift Creek – Unit 1

Location: Sula Ranger District, Swift Creek Drainage, Sapphire Mountains

Background: The pre-activity soil assessment was completed in 2008. The unit is terraced. The soils on the terrace benches are excessively compacted. This is typical of most terrace benches due to the method of construction and planting. Growth of native vegetation is good across on the majority of the terrace unit. The risers (slopes between benches) show no compaction but do have some minor slumping. Slopes above Road 73599 are the most gentle in the unit; and slopes below the road are greater than 30%.

Observations: Skyline yarding operations were completed on the steeper slopes below Road 73599 in 2010. Mitigations for the skyline operations included placing slashed materials on terrace benches and skid trails at a rate of 10 to 15 tons/acre to provide organic matter for soil recovery. Increased woody debris on the soil surface will increase soil moisture, improve soil biological activity, and accelerate natural soil recovery processes to alleviate compaction where subsoiling cannot be completed.

The skyline yarding was completed successfully and slashed materials were placed on the terrace benches at 10 to 15 tons/ac. The skyline yarding created approximately 2% new DSD in the unit but the slashing operations are intended to speed recovery on the terrace benches.

Conclusion: The unit is within R1 SQS.

Fuel Reduction – Slashing & Mastication

Fuel reduction treatments involving slashing and mastication both created less than 1% new DSD. Monitoring details are highlighted below.

Project & Treatment Unit: Swift Creek Fuel Reduction (Slashing) – Unit 1

Location: Sula Ranger District, Swift Creek Drainage, Sapphire Mountains

Background: The pre-activity soil assessment was completed in 2008. The unit is terraced. The soils on the terrace benches are excessively compacted. This is typical of most terrace benches due to the method of construction and planting. Growth of native vegetation is good across on the majority of the terrace unit. The risers (slopes between benches) show no compaction but do have some minor slumping. Slopes above Road 73599 are the most gentle in the unit; some areas below the road are greater than 30%.

Observations: Operations were completed in 2010. Mitigations recommended by the soil scientist required that skyline harvest maintain 10 to 15 tons/acre of woody debris on terrace benches with slashing activities. Increased woody debris on the soil surface will increase soil moisture and improve soil biological activity. The woody debris will accelerate natural soil recovery processes to alleviate compaction where subsoiling cannot be completed due to safety and the potential for excessive soil disturbance.

The skyline harvest resulted in less than 1% DSD and the slashing on terrace benches was successfully achieved. Long-term monitoring of the terrace benches should be completed to better understand the effects of coarse woody debris and recovery of soil compaction.

Conclusion: The unit is within R1 SQS.

Project & Treatment Unit: Swift Creek Fuel Reduction (Mastication) – Unit 5

Location: Sula Ranger District, Swift Creek Drainage, Sapphire Mountains

Background: The pre-activity soil assessment was completed in 2008. The majority of unit has not been heavily impacted by past harvest. DSD was observed at 1% for the unit and consisted of limited rutting with some root limiting compaction. The vegetation displayed that soil nutrients are suitable and are high in organic matter. Slope is generally moderate across the unit (less 20%).

Observations: Operations were completed in 2010. Mitigations recommended by the soil scientist in the EIS required that mastication treatments be completed during dry soil conditions to minimize soil impacts. Mitigations also included subsoiling compacted historic skid trails. Native vegetation remained intact and was not affected by mastication and subsoiling in the unit. Compacted soil conditions noted prior to treatment were rehabilitated by the subsoiling treatments. Mastication created less than 1% new DSD in the unit.

Conclusion: The unit is within R1 SQS.

Prescribed Fire

Monitoring details are highlighted below.

Project & Treatment Unit: School Point Ecoburn – Units A, B, & D

Location: West Fork Ranger District, School Point, Bitterroot Mountains

Background: The pre-activity soil assessments were completed in 2008 as part of the Lower West Fork EIS. Minimal evidence of past activities were present across the unit. No DSD was identified in the burn unit.

Observations: Prescribe under burning was completed in spring 2011 and 2012. Mitigations recommended by the soil scientist in the EIS required that upon completion of prescribed fire or maintenance burning, at least 70 percent ground cover should be maintained to prevent detrimental accelerated erosion and loss of soil productivity. In those cases where ground cover is less than 70 percent prior to burning, consumption and loss of ground cover should not exceed 15 percent. Ground cover includes duff, organic soil horizons, basal area of vegetation, fine woody debris, coarse woody debris, and surface coarse fragments. Prescribed fire prescriptions were designed to meet these soil protection requirements.

Monitoring of the prescribe burn units was completed by the soil scientist in the fall of 2012. The burning operations were highly successful at minimizing losses of ground cover and protecting topsoil. The only areas of high severity burns were located where stumps and large roots were consumed. No other areas of exposed mineral soils were located across the burn units. DSD was not identified other than the few areas where stumps burned out. DSD overall was less than <1%.

Conclusion: The units are within R1 SQS.

3. Summary: Bitterroot National Forest Post-Activity Soil Quality Monitoring Surveys

The following table (Table 2) is a summary of the 2010 post-activity soil quality surveys conducted on the BNF.

Table 2 - Percent New DSD by Harvest/Fuels Treatment Method.

Harvest/Fuels Treatment Method	Summer Ground-Based	Winter Ground-Based	Summer Cut-to-Length with Forwarder	Skyline	Fuel Reduction - Slashing	Fuel Reduction - Mastication	Prescribed Fire
Average DSD %	8%	4%	4%	3%	<1%	<1%	<1%

The 2010 - 2013 BNF soil monitoring has shown that:

- **Summer ground-based** yarding created an average of 8% DSD. This amount of DSD is slightly less than the average DSD identified over the last 10 years (10%) on the Bitterroot NF.
- **Winter ground-based** yarding created an average of 4% DSD. This amount of DSD is in line with DSD measured over the last 10 years (4%) on the Bitterroot NF.
- **Summer Cut-to-Length with Forwarder** yarding created an average of 4% DSD. This amount of DSD is in line with DSD measured over the last 10 years (5%) on the Bitterroot NF.
- **Skyline** yarding resulted in 3% DSD which is in line with DSD measured over the last 10 years on the Bitterroot NF.
- **Cut-to-Length/Forwarder** yarding resulted in 3% DSD which is in line with DSD measured over the last 10 years on the Bitterroot NF. Slash levels were not great enough to provide complete coverage and adequate depth on forwarder trails; however, the partially slash covered trails were still quite effective at minimizing DSD.
- **Fuel Reduction (Slashing & Mastication)** resulted in <1% DSD which is in line with DSD measured over the last 10 years on the Bitterroot NF.
- **Prescribed Fire** resulted in <1% DSD which is in line with DSD measured over the last 10 years on the Bitterroot NF.

Lands Adequately Restocked Item 33

OBJECTIVE: To determine if lands are being adequately restocked and if the intent of the National Forest Management Act (NFMA) is being met.

DATA SOURCE: Forest Activity Tracking System (FACTS) database. A fact replaces the Timber Stand Management Record System (TSMRS) which was used in previous reports to monitor this item. The Regional Regeneration Indices Report, also used in previous reports, is currently unavailable.

FREQUENCY: Annually.

REPORTING PERIOD: 5 years as required by Forest Plan although this report will cover the period from 2000 to 2006 (7 years)

VARIABILITY: +/- five percent over a five-year period.

EVALUATION:

The National Forest Management Act (NFMA) requires that *“all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans”*. It also states *“that timber will be harvested from National Forest System lands only where there is assurance that such lands can be adequately restocked within five years after harvest.”*

The reforestation program on the Bitterroot National Forest is tied primarily to the wildfires of 2000 and includes an annual tree planting program as well as monitoring burned areas for the presence of natural regeneration. Areas that are planted or monitored for natural regeneration are certified when sufficient numbers of trees are present to meet management objectives as specified in a silvicultural prescription. After the fires of 2000, the Forest estimated that it would take a full decade to reforest the lands burned in the fires. Eleven years after the fires of 2000, program highlights include:

1. 19,500 acres, and over 7 and a half million trees, have been planted. Almost all this planting was accomplished on lands burned in the fires of 2000. Ponderosa pine was the primary species planted, but included Douglas-fir, lodgepole pine, and some Engelmann spruce.
2. There are approximately 17,617 acres still in need of planting or where surveys are needed to determine whether natural regeneration is sufficient to certify stands as reforested. In six years, approximately half of the planting and monitoring workload identified in 2001 has been completed. Of the original 116,000 acres identified for natural regeneration, approximately 77,000 acres are still being monitored. Many of these sites require multiple surveys before they can be certified as reforested.
3. Reforestation surveys have been completed on almost 119,000 burned acres and since 2000, just over 25,000 acres have been certified as fully reforested. About two thirds, or 9,882 acres that have been planted since 2000 are now certified and 18,000 acres have been certified as naturally regenerating.
4. Field reviews and reassessment of burned lands using newer aerial photography has resulted in the reforestation need being removed from over 40,000 acres. These lands have sufficient trees to meet management objectives without planting or further monitoring.
5. Harvest after the burn is nearly completed and associated fuels and regeneration activities are progressing well.

MONITORING RESULTS:

In 2001 the burned area reforestation plan estimated that there were over 40,000 acres on the Forest in need of planting and more than 116,000 acres that needed to be monitored for natural regeneration. Fires in subsequent years since 2006 increased the number of acres where natural seeding or planting was needed. Table 1 below shows the Forest's progress on reforesting these burned lands and the current reforestation need. The year

2004, 2006, 2007, 2008, 2010 and 2011 are included as a comparison, since 2004 and 2009 was the last year this item was documented in the monitoring report.

Table 1 - Reforestation Needs and Accomplishments 2001 to 2011

Year	Acres Planted	Acres Certified as Successfully Reforested	Estimated Acres in Need of Planting
2001			43,746
2004	10,419	10,963	16,252
2006	14,500	20,032	8,400
2007	1,492	7,422	36,405
2008	1,141	5,678	36,405
2009	1,349	3,646	42,242
2010	483	5,689	24,694
2011	487	5,119	17,617

Planted areas are monitored after the first, third and fifth growing season and the status of each site recorded in the FACTS database. Of the 14,500 acres planted approximately 93 percent of these stands are either certified or are progressing satisfactorily and we anticipate that they will be certified. Areas where tree survival was less than what the silvicultural prescription required will be evaluated for replanting.

Priority for planting has been in areas where salvage logging occurred with the emphasis on ensuring salvage areas are reforested within 5 years. As fire plays an increasing role in managing ecosystems for sustainability, regeneration of adequately stocked forest lands will continue to be an important part of forest management. Planting and natural regeneration will both be important methods of achieving desired conditions. The Forest intends to work with the Regional Office to improve the Forest's management activity data and the functionality of standard reports. This will improve the Forest's ability to monitor this item in the future.



Size Limit for Harvest Areas Item 35

OBJECTIVE: Evaluate maximum size limits for harvest areas.

DATA SOURCE: Forest Service Activity Tracking System (FACTS) database, environmental analyses, and timber sale folders.

FREQUENCY: Annually

REPORTING PERIOD: 1989 to 2013

VARIABILITY: Any deviation from regulations.

EVALUATION & MONITORING RESULTS:

No harvest openings in excess of 40 acres were proposed or created from 2010-2013.

With some exceptions, the Forest Plan specifies that 40 acres is the maximum size for clearcuts and other even-aged harvest methods that create openings. Historical data show patch sizes within some landscapes to be naturally larger than 40 acres and recent fire activity on the Forest supports the concept that patch sizes can vary from an acre or less to over a thousand acres. Application of fire in conjunction with harvest treatments is part of the overall effort to move toward the historical condition of larger patch sizes on the landscape. While clearcuts do not entirely mimic these openings and events, we have proposed some regeneration harvests in the past that were larger than 40 acres, to approximate historical patch sizes. The Regional Forester approved openings over 40 acres in size for the Beaverwoods Timber Sale in 1995, and the Tolan Creek Timber Sale in 1993.

Since 2000, almost all openings created through timber harvesting on the Forest have been from salvage of dead and dying trees from the wildfires of 2000, the Douglas-fir bark beetle epidemic, and currently the mountain pine beetle outbreak. The National Forest Management Act (NFMA) contains a specific exception (219.27(d)(2)(iii)) that established size limits will not apply to areas harvested as a result of natural catastrophic conditions, such as fire, insect and disease attack, or windstorm." Many of the areas salvaged after the fires of 2000 and in subsequent projects where salvage of beetle mortality occurred contained harvest areas in excess of 40 acres.

Future planning efforts will likely continue to consider openings that approximate the historical, naturally occurring patch size. Where openings greater than 40 acres are proposed, outside of salvage treatments, approval from the Regional Forester will be requested prior to project approval.



Visual Quality Item 4

OBJECTIVE: Assure meeting visual quality objectives in implementing activities.

DATA SOURCE: Interdisciplinary team review of altered landscapes.

FREQUENCY: One project per District per year.

REPORTING PERIOD: 2010-2013

VARIABILITY: Failure to meet visual quality objectives.

EVALUATION:

Fires continue to be the major change in the forest view-shed, followed by insect mortality. Fires and insect caused mortality are natural occurrences and tend to maintain the appearance of a natural, although altered landscape. Over time vegetation recovery will gradually reduce the effect of these disturbances on the landscape.

MONITORING RESULTS:

Overall effects on scenery were assessed in the various projects and reported in environmental analysis documents including:

- Como FHP
- Haacke Claremont Fuel Reduction
- Access Across Running Creek on Selway River Trail #4
- Lake Como Recreation Area Hazard Tree Removal Project
- Lost Horse Quarry Project
- Lower West Fork Project