Soil and Water

Goal

Manage watersheds and soil resources to maintain Forest Plan water quality standards that meet or exceed State and Federal standards. Protect all beneficial uses of water: fisheries, water-based recreation and public supplies. Ensure that soil productivity and stability are maintained.

Strategy

Provide input and direction during management activity planning and implementation. Establish monitoring stations to determine the impacts of past and current management activities. Monitor the application and effectiveness of *Best Management Practices* (BMPs) during and after project implementation. Maintain an inventory of areas needing soil and water restoration. Restoration will be completed as funding allows. Develop cost-effective methods of evaluating sources of soil-productivity damage caused by compaction, displacement and severe burning.

Item No. 8 Water Quality and Stream Condition for Fisheries and Non-Fisheries Beneficial Uses

Frequency of Measurement: Annual
Reporting Period: Annual

Monitoring Action (Non-Fisheries)

This section deals with water quality and stream conditions for non-fisheries beneficial uses. To read about water quality and stream conditions for fisheries, please refer to the FISHERIES section.

The Forest hydrologist will coordinate with District personnel to establish water quality monitoring stations. These stations will collect data so as to monitor water quality to determine trends or impacts of past and/or current road construction, timber harvesting and mining activities.

Accomplishments/Findings

The primary emphasis of Forest water quality monitoring has been to determine the effects of sediment and water yields from timber production and road construction on water quality and fisheries. Baseline monitoring and project water quality monitoring of streams has occurred in the following way. Baseline stations have been located at the mouths of large drainages, generally larger than five square miles. Water level recorders and automatic water samplers have been installed for continuous collection of information. Water level recorders track seasonal fluctuation of stream water levels. This information is calibrated to determine stream discharge. Automatic water samplers have been installed at most baseline stations to collect suspended sediment samples at predetermined intervals.

Project stations have been located downstream from management activities. Control stations (no activity) generally have been established upstream from activities, in a different but similar watershed, or at the same project station but prior to the activity. Project sampling allows the quantification of site-specific impacts, primarily sediment yield from a given activity. Data is collected at each project station with automatic water samplers. Parameters measured are stream flow, suspended sediment, turbidity, and instantaneous water level. Water level recorders and automatic samplers are normally in operation from March through September.

Table 19 shows the Forest's monitoring network by major drainage basin and watershed. The number of years of record and the type of monitoring station is also presented. Additional water temperature monitoring was done during the summer months at approximately 300 stations. Contact the Forest fisheries biologist for water temperature information, or the hydrologist for sediment, turbidity, stream flow, precipitation or SNOTEL information.

Table 1. Water Quality Monitoring Network

Basin	Watershed - Location	Years	Data Type
Palouse River (17060108)	Palouse River (Moscow Mountain)	46	SNOTEL, Precipitation (NRCS)
	Palouse River (Above Laird Park)	19	Suspended Sediment, Discharge
Lochsa River (17060303)	Lochsa River (Near Lowell)	77	Discharge (USGS)
	Pete King Creek (Walde Lookout)	37	Annual Precipitation
	Pete King Creek (Mouth)	28	Discharge, Suspended Sediment
	Canyon Creek (Mouth)	12	Discharge, Suspended Sediment
	Deadman Creek (Mouth)	16	Discharge, Suspended Sediment
	Fish Creek (Mouth)	36	Discharge, Suspended Sediment
	Badger Creek (Mouth)	8	Discharge, Suspended Sediment
	Papoose Creek (Mouth)	8	Discharge, Suspended Sediment
	Crooked Fork (Crooked Fork)	38	Snow Course (FS and NRCS)
	Crooked Fork (Lolo Pass)	47	SNOTEL, Precipitation (NRCS)
	White Sand Creek (Savage Pass)	66	SNOTEL, Precipitation (NRCS)
Clearwater River (17060306)	Potlatch River (Sherwin)	46	SNOTEL, Precipitation (NRCS)
	Potlatch River (Above Little Boulder Creek)	9	Discharge, Suspended Sediment
	Orofino Creek (Pierce R.S.)	52	Snow Course (FS and NRCS)
	Orofino Creek (Shanghi Summit)	65	SNOTEL, Precipitation (NRCS)
	Lolo Creek (Mouth)	24	Discharge (USGS)
	Lolo Creek (Hemlock Butte)	43	SNOTEL, Precipitation (NRCS)
	Lolo (Sec 6)	22	Discharge, Suspended and Bedload Sediment
	Eldorado Creek (Below Linda Creek)	13	Discharge, Suspended Sediment
Upper North Fork Clearwater River (17060307)	North Fork of the Clearwater River (Aquarius Bridge)	37	Discharge (USGS)
	Quartz Creek (Mouth)	20	Discharge, Suspended Sediment
	Quartz Creek (Indian Henry Ridge)	4	Annual Precipitation
	Cold Springs Creek (Mouth)	14	Discharge, Suspended Sediment
	Cold Springs Creek (Cool Creek)	18	SNOTEL, Precipitation (NRCS)
	Long Creek (Hoodoo Basin)[1]	36	SNOTEL, Precipitation (NRCS)
	Cayuse Creek (Cayuse Landing)	37	Annual Precipitation
	Weitas Creek (Doris Butte)	33	Annual Precipitation
	Weitas Creek (Creator Meadows)	40	SNOTEL, Precipitation (NRCS)
Lower North Fork Clearwater River (17060308)	Beaver Creek (Beaver Divide)	33	Annual Precipitation
	Elk Creek (Elk Butte)	40	SNOTEL, Precipitation (NRCS)
	Elk Creek (Road 1705)	23	Discharge, Suspended and Bedload Sediment

[1] Site is located in Montana.

The Forest processed 2,137 suspended sediment, 2,140 turbidity, and 26 bedload samples in 2003. Bedload sediment samples were collected to determine the proportion of sediment moving as suspended and bedload in the watershed. Total sediment load can be determined for the watershed with these measurements. This information is useful for determining the effects of activities and calibrating watershed models. Stream discharge and suspended sediment data is summarized in Table 21 and is available from the Forest hydrologist at the Supervisor's Office.

Table 20 displays the period of record, mean daily discharge through 2002, 2003 mean daily discharge, mean daily suspended sediment through 2002, and mean daily-suspended sediment in 2003. Mean daily discharge is calculated from 12 flow measurements per day and mean daily suspended sediment is a composite of four sediment samples.

Table 2. Water Quality Monitoring Results.

Station	Period Of Record Used In Analysis	Mean Daily Discharge (Cfs) Through 2002	2003 Mean Daily Discharge (Cfs)	Mean Daily Suspended Sediment Through 2002 (Mg/L)	2003 Mean Daily Suspended Sediment (Mg/L)
Palouse River (Above Laird Park)	1986-2003	95.6	71.1	22.5	5.8
Pete King Creek (Mouth)	1976-2003	45.1	39.3	19.8	6.5
Canyon Creek (Mouth)	1992-2003	45.1	41.9	11.8	3.9
Deadman Creek (Mouth)	1988-2003	43.1	35.7	12.8	3.4
Fish Creek (Mouth)	1958-1966 1976-2003	219	228	9.5[2]	2.9
Badger Creek (Mouth)	1983-1984 1988-1989 2001-2003	17.4	9.3	3.6	5.6
Papoose Creek (Mouth)	1996-2003	64.8	50.4	27.5	Station Discontinued
Potlatch River (Above Little Boulder Creek))	1995-2003	189	122	8.9	4.0
Lolo Creek (Mouth)	1980-2003	326	351	35.3	Station Discontinued
Lolo Creek (Sec 6)	1982-2003	94.3	104	11.7	4.1
Eldorado Creek (Below Linda Creek)	1991-2003	61.9	72.3	8.1	Station Discontinued
Quartz Creek (Mouth)	1982 1984-2003	151	142	12.0	3.7
Cold Springs Creek (Mouth)	1983-1992 2000-2003	33.8	33.3	5.8	3.3
Elk Creek (Road 1705)	1982-2003	79.7	61.5	10.3	5.5

Suspended sediment measurements were dropped at several stations in 2003 due to a decrease in funding. These stations include, Squaw Creek (both discharge and suspended sediment), Papoose Creek, Lolo Creek at mouth, and Eldorado Creek. A Special study at two sites on the Potlatch River, above and below Sheep Creek, was also discontinued. Generally, monitoring of suspended sediment has shown a recovery trend forest-wide from past management practices. Of the 11 water quality stations where suspended sediment measurements were previously collected, only one had sediment levels higher in 2003 than the mean of all previous years. This station was Badger Creek, where the Nez Perce Tribe and Clearwater National Forest are actively obliterating roads. This short-term, small increase in suspended sediment was expected. The road decommissioning should produce a long-term decrease in sediment as the risk of road initiated landslides is reduced. Forest-wide, suspended sediment concentrations tended to be less in 2003 than in the 1980s and 1990s. Much of the recovery is believed to be the result of less land disturbing activities, better

[2] Suspended sediment in Fish Creek is representative of a granitic geology watershed with little or no timber harvesting and roads.

application of BMPs, PACFISH and INFISH buffers, road decommissioning, and better road location and design.

Turbidity has been monitored at 15 to 17 stations before 1991 and after 1997. Results of turbidity monitoring are presented in Table 21.

Table 3. Turbidity Monitoring Results - Period of record, mean daily turbidity through 2002, maximum turbidity period of record, mean daily turbidity in 2003, and maximum turbidity in 2003.

Station	Period of Record	Mean Daily Turbidity (ntu) Through 2002	Maximum Turbidity (ntu) Period of Record	Mean Daily Turbidity (ntu) 2003	Maximum Turbidity (ntu) 2003
Palouse River (Above Laird Park)	1999-2003	4.4	96.7	5.0	32.4
Pete King Creek (Mouth)	1978-1990 1998-2003	3.5	49.9	2.2	30.8
Canyon Creek (Mouth)	1998-2003	2.1	27.0	1.5	9.0
Deadman Creek (Mouth)	1988-1990 1998-2003	2.5	46.9	1.7	7.5
Fish Creek (Mouth)	1998-2003	1.9	26.6	1.4	7.2
Badger Creek (Mouth)	1983-1984 1988-1989 2001-2003	1.2	14.0	0.8	4.4
Potlatch River (Above Little Boulder Creek)	1998-2003	3.8	38.1	2.9	13.4
Lolo Creek (Sec 6)	1985-1988 1990, 1998-2003	3.0	19.0	1.8	7.6
Quartz Creek (Mouth)	1988-1990 1998-2003	2.2	60.5	1.6	7.4
Cold Springs Creek (Mouth)	1983-1986 2000-2003	1.5	17.4	0.9	3.7
Elk Creek (Road 1705)	1982-1987 1990 1998-2003	2.6	87.0	2.8	24.7

In Idaho Water Quality and Waste Treatment (IDAPA 58.01.02) turbidity standards have been set as follows:

> "Turbidity, below any applicable mixing zone set by the Department, shall not exceed background turbidity by more than fifty NTU instantaneously or more than twenty-five NTU for more than ten consecutive days."

At the 11 Clearwater National Forest water quality monitoring stations, 2,140 turbidity samples were collected and analyzed in 2003. All samples meet the above criteria.

Elk Creek Suspended and Bedload Sediment: A total of 152 samples of bedload have been collected at the Elk Creek gaging station between 1978 and 2000. Bedload varied from a high of 11.6%, to a low of 0.0% of the total sediment load in the year 2003. Mean bedload for 2003, based on 15 samples was 48 pounds per day, or 3.5% of the total sediment load. Mean bedload for the period of record was 269 pounds per day, or 6.4% of the total sediment load. In recent years (1997-2003), bedload seems to be declining from historic (1980-1996) averages. This may be due to improving channel substrate conditions, watershed recovery from past landslide and activities and, and application of best management practices.

Table 4. Elk Creek Suspended and Bedload Sediment Data for 1978 through 2003. A comparison of discharge, depth integrated suspended sediment, and bedload sediment.

DATE	Q – cfs	Suspended Sediment Lbs/day	% Suspended Sediment	Bedload Lbs/day	% Bedload	Total Sediment Lbs/day
Mean 1978-1991	84.1 cfs	3,660 Lbs/day	87.1%	303 Lbs/day	12.9%	3,965 Lbs/day
Mean 1997	340 cfs	21,500 Lbs/day	97.9%	451 Lbs/Day	2.1%	21,962 Lbs/day
Mean 1998	97.0 cfs	1,360 Lbs/day	93.7%	92.0 Lbs/Day	6.3%	1,452 Lbs/day
Mean 1999	157 cfs	3,750 Lbs/day	90.4%	294 Lbs/day	9.6%	4,045 Lbs/day
Mean 2000	178 cfs	2,890 Lbs/day	80.6%	697 Lbs/day	19.4%	3,583 Lbs/day
Mean 2001	81.1 cfs	692 Lbs/day	94.4%	41.0 Lbs/day	5.6%	733 Lbs/day
Mean 2002	191 cfs	2,900 Lbs/day	93.2%	48.2 Lbs/day	6.8%	2,940 Lbs/day
Mean 2003	104 cfs	1,344 Lbs/day	96.5%	47.8 Lbs/day	3.5%	1,392 Lbs/day
Mean Period of Record	110 cfs	3,936 Lbs/day	93.6%	269 Lbs/day	6.4%	4,204 Lbs/day

Lolo Creek Suspended and Bedload Sediment: A total of 152 bedload samples have been collected and analyzed at Lolo Creek between 1980 and 2003 (Table 23). Bedload varied from a high of 9.1% to a low of 0.4% of the total sediment load in the year 2003. Mean bedload for 2003, based on 11 samples was 113 pounds per day, or 2.3% of the total sediment load. Mean bedload for the period of record was 2,049 pounds per day, or 18.4% of the total sediment load. In recent years (1998-2003), bedload seems to be declining from historic (1980-1997) averages. This may be due to improving channel substrate conditions, watershed recovery from past activities, and application of best management practices.

Table 5. Lolo Creek Suspended and Bedload Sediment Data for 1980 Through 2003. A comparison of discharge, depth integrated suspended sediment, and bedload sediment.

Date	Q – cfs	Suspended Sediment Lbs/day	% Suspended Sediment	Bedload Lbs/day	% Bedload	Total Sediment Lbs/day
Mean 1980-1997	164 cfs	10,600 Lbs/day	78.9%	2,840 Lbs/day	21.1%	13,471 Lbs/day
Mean 1998	144 cfs	3,220 Lbs/day	97.0%	96.0 Lbs/Day	3.0%	3,319 Lbs/day
Mean 1999	243 cfs	10,800 Lbs/day	98.0%	159 Lbs/day	2.0%	10,986 Lbs/day
Mean 2000	226 cfs	6,560 Lbs/day	86.0%	1,070 Lbs/day	14.0%	7,624 Lbs/day
Mean 2001	212 cfs	5,410 Lbs/day	96.5%	196 Lbs/day	3.5%	5,604 Lbs/day
Mean 2002	306 cfs	10,300 Lbs/day	97.4%	171 Lbs/day	2.4%	10,500 Lbs/day
Mean 2003	205 cfs	4,497 Lbs/day	97.7%	113 Lbs/day	2.3%	4,610 Lbs/day
Mean Period of Record	174 cfs	9,101 Lbs/day	81.6%	2,049 Lbs/day	18.4%	11,150 Lbs/day

2003 Precipitation Measurements: The Forest maintains five yearly catch precipitation stations for the purpose of assisting the State Climatologist in developing isohyetal maps (maps of equal rainfall areas). The gages are located at Beaver Divide, Cayuse Landing, Doris Creek, Walde Lookout, and Indian Henry Ridge. Precipitation in the 2003 water year (October 1, 2002 – September 30, 2003) was slightly above mean for the period and slightly below the 10-year mean. Records go back to the 1960's in most cases.

Beaver Divide received 50.76 inches in 2003, or 97 percent of the period of record average; Cayuse Landing received 38.31 inches, or 97 percent of average; Doris Creek received 45.62 inches, or 107 percent of average; Walde Lookout received 53.37 inches, or 112 percent of average; and Indian Henry received 54.60 inches, or 101 percent of average. The mean precipitation for the five stations in 2003 was 48.53 inches, or 107 percent of the period of record average and 97 percent of the 10-year mean. Mean precipitation at all stations in the last ten years has been 49.99 inches, or 110 percent of the period of record mean of 45.36 inches.

Frequency of Measurement: Annual
Reporting Period: Five Years

MONITORING ACTION

The Forest hydrologist will coordinate with employees, including timber sale administrators, engineering representatives, contracting officer representatives, the Forest ecologist, the soil scientist, and fire management officers to monitor all projects for compliance with *Best Management Practices* (BMPs). BMPs are actions taken to minimize negative, detrimental or undesirable effects that may result from implementation of management activities and are defined in the Idaho Forest Practices Act. The primary objective of BMPs is the maintenance of water quality.

In addition, the Forest hydrologist will monitor 10% of timber sale units for BMP effectiveness. The Forest soil scientist/ecologist will monitor 100% of all new road construction for BMP implementation and effectiveness. The sale administrator and road contracting officers are responsible for BMP implementation.

ACCOMPLISHMENTS/FINDINGS

The Forest did not conduct an audit of the Idaho Forest Practices Act BMPs in 2003 because of commitments to the fires on the Powell Ranger District. In its place, we have chosen to analyze all the BMP audits from 1990 through 2002.

Table 24 summarizes the 1990-2002 Forest Practices Act Internal Audit and includes the following information by column.

1. FPA# refers to the rule number in Rules Pertaining to the Idaho Forest Practices Act (Title 38, Chapter 13, Idaho Code);
2. description of the FPA rule;
3. the number of BMPs that were observed Forest wide;
4. the number of BMP observations that were in compliance with the FPA rules (Implementation);
5. the percent of BMP compliance;
6. the number of occurrences where sediment or other pollutants were not delivered to a stream or draw (effectiveness); and
7. the percent of BMP effectiveness.

Table 6. 1990-2002 Forest Practices Act Internal Audit.

FPA#	Description	# of Checks	Implemented	% Implemented	Effective	% Effective
030	TIMBER HARVEST					
030.03	SOIL PROTECTION					
a.	Skidding Erosion	75	74	98.7	74	98.7
b.	30% Limitation	70	70	100	70	100
c.1.	Number of Skid Trails	69	67	97.1	69	100
c.2.	Tractor Size Appropriate	72	71	98.6	72	100
d.	Cable Yarding	120	120	100	120	100
030.04	LOCATION LANDINGS/SKIDS					
a.	Locate Landings and Skid Trails out of SPZ	142	142	100	142	100
b.	Size of Landings	150	148	98.7	148	98.7
c.	Landing Fill Stabilization	147	145	98.6	145	98.6
030.05	DRAINAGE SYSTEM					
a.	Drainage Skid Trails	72	72	100	68	94.4
b.	Drainage Landings	144	141	97.9	141	97.9

FPA#	Description	# of Checks	Implemented	% Implemented	Effective	% Effective
030.06	TREATMENT OF WASTE MATERIALS					
a.	Slash out of Class I Streams	45	45	100	45	100
b.	Slash out of Class II Streams	121	119	98.3	121	100
c.	Soil out of SPZ	134	134	100	132	98.5
d.	Oil, Fuel out of SPZ	134	133	99.3	133	99.3
030.07	STREAM PROTECTION					
a.	Lakes - Riparian Management Px					
b.	Skidding, Stream Crossing SPZ	40	40	100	40	100
c.	Skidding in SPZ	9	9	100	9	100
d.	Cable Stream Crossing	88	88	100	87	100
e.1.	Hardwoods, Shrubs, Grasses, Rocks - Shade	47	47	100	47	100
e.2.	Class 1 - 75% Current Shade	49	40	81.6	39	79.6
e.3.	Logging of SPZ	111	107	96.4	105	94.6
e.4-8.	Large Organic Debris	48	47	97.9	47	97.9
030.08	MAINTENANCE OF RELATED VALUES					
c.	Wet Areas	113	112	99.1	113	100
040	ROAD CONSTRUCTION AND MAINTENANCE					
040.02	SPECIFICATIONS AND PLANS					
a.	Minimize Road Construction in SPZ	65	64	98.5	64	98.5
b.1.	Roads No Wider Than Necessary	45	44	97.8	45	100
b.2.	Minimize Cuts and Fills	68	68	100	67	98.5
c.	Disposal on Geologically Stable Areas	38	38	100	38	100
d.	Drainage Planned in Road	75	71	94.7	70	93.3
e.	Relief Culverts and Ditches	67	64	95.5	66	98.5
f.1.	50 Year Culvert Design	20	20	100	20	100
f.2.	Relief Culvert Size	37	37	100	37	100
g.1.	Plan Minimum Stream Crossings	73	71	97.3	69	95.4
g.2.	Plan Culvert Fish Passage	1	1	100	1	100
h.	Variance Procedure Followed					
040.03	ROAD CONSTRUCTION					
a.	Construction Followed Plan	54	54	100	54	100
b.	Debris Cleared From Drainageways	37	37	100	37	100
c.	Stabilize Exposed Areas	57	57	100	56	98.2
d.	Compact and Minimize Soft Material in Fills	59	59	100	58	98.3
e.	Stream Alteration Act	9	9	100	9	100
f.	Remove Berms on Outsloped Roads	70	70	100	70	100
g.	Quarry Drainage	2	2	100	2	100
h.1.	Minimize Erosion of Embankments at Culverts	61	60	98.4	60	98.4
h.2.	Install Drainage Prior to Runoff	34	34	100	34	100
h.3.	Relief Culvert Gradient	45	45	100	45	100
i.	Wet Weather Delays	17	17	100	17	100
040.04	ROAD MAINTENANCE					
a.	Sidecast Out of Streams	94	91	96.8	91	96.8
b.	Stabilize Slumps and Slides	32	30	93.8	26	81.3
c.	ACTIVE ROADS					
c.1.	Culvert and Ditch Function	67	61	91.0	65	97.0
c.2.	Crown and Waterbar	63	62	98.4	62	98.4

FPA#	Description	# of Checks	Implemented	% Implemented	Effective	% Effective
c.3.	Minimize Road Surface Erosion	59	57	96.6	59	100
c.4.	Oil Out of Streams	59	59	100	59	100
d.	INACTIVE ROADS					
d.1.	Culverts and Ditches Cleaned	56	52	92.9	48	85.7
d.2.	Road Closed	59	59	100	59	100
e.	ABANDON ROADS					
e.1.	Outslope, Waterbar, Seed	36	33	91.7	32	88.9
e.2.	Ditches Cleaned	12	12	100	12	100
e.3.	Road Closed	36	30	83.3	36	100
e.4.	Bridges and Culverts Removed	11	10	90.9	10	90.9
040.05	WINTER OPERATIONS					
a.	Adequate Cross Drainage	3	3	100	3	100
b.	Road Maintenance	3	3	100	3	100
	SUMMARY	**3,524**	**3,455**	**98.0%**	**3,447**	**97.8%**

There were 3,524 BMP observations have been conducted in the last 14 years with overall implementation and effectiveness rates of 98.0 and 97.8 percent, respectively. Sediment was observed delivered to streams 77 times during the 3,524 BMP observations. Many BMPs continue to have a 100 percent implementation and effectiveness rate. The following BMP observations warrant additional discussion:

TIMBER HARVEST

030.03.d and 030.07.d: Cable Yarding Systems. Over the past 14 years, the BMP audits have shown that cable yarding systems provide an effective way to remove timber without discharging sediment into streams. Of the 120 observations taken of cable logging units, sediment entering streams has only been observed once. That observation occurred at a cable stream crossing. Where slopes allow the practical use of cable yarding systems, we can expect a continued high rate of BMP implementation and effectiveness.

030.07.e2: Current Shade. As shown in Table 25, overall BMP implementation and effectiveness rates for providing shade have been rather poor on the Clearwater National Forest. However, the last shade effectiveness problem was observed in 1998, on the French Fidelity Timber Sale that was planned in the late 1980s, before INFISH Riparian Habitat Conservation Areas were applied. A 75 foot buffer was designed into Unit 19, however timber blow down occurred lowering shade below 75 percent. There have been no implementation or effectiveness problems observed with riparian buffers since PACFISH and INFISH RHCAs were designed into harvest units.

ROAD MAINTENANCE: Although overall BMP implementation and effectiveness rates have been near 99 percent in recent years, road maintenance is the area where most noncompliance observations occur. This, we believe, is because the Forest has too many roads and insufficient funding to maintain them.

040.04.b: Stabilize Slumps and Slides. Over the years, 32 slumps and slides have been observed on roads during BMP audits with 30 of these corrected and six delivering sediment to streams. The problems seemed to be associated with inadequate Forest resources to cover all the road maintenance needs.

040.04.d1: Culverts and Ditches Cleaned on Inactive Roads. Fifty-six BMP observations of culvert and ditch function have occurred with four non-compliances and eight observances of sediment entering streams. Effectiveness rate is 85.7 percent. These culverts and ditches are on closed or gated roads that often receive little or no maintenance until problems are observed.

040.04.e1: Outslope, Water-bar, Seed and 040.04.e3: Road Closed on Abandon Roads. Abandon roads are generally temporary roads that should be closed, obliterated or outsloped, water-barred, and seeded so the road needs no further maintenance and will not erode

Thirty-six BMP observations of road outsloping, water-barring, and seeding have occurred with three non-compliances and four observances of sediment entering streams. Effectiveness rate is 88.9 percent. On these 36 roads, 30 were observed to be open, a non-compliance of the BMP. It appeared that the roads of-

ten received proper erosion control and closure by the sale administrator, but were opened for site prep and tree planting. It appeared that tree planters who open closed roads seldom had sufficient equipment to replace waterbars or blockades after their project was complete. This is a Forest-wide problem that needs to be addressed.

Item No. 11 – Site Productivity

Frequency of Measurement: Annual
Reporting Period: Five Years

MONITORING ACTION

The Forest Soil Scientist will coordinate with District personnel to monitor soil conditions for compliance with Forest Plan and Regional Standards. Monitoring focuses on the impact of management actions on the soil resource. Specifically, the detrimental soil disturbances reviewed include: compaction, displacement, rutting, severe burning, surface erosion, loss of surface organic matter, and soil mass movement. Monitoring for FY02 and FY03 focused on assessing impacts of past management actions in proposed treatment units in new projects. In addition, reviews were conducted in BAER (burned area emergency response) projects for soil impacts caused by wildfires.

ACCOMPLISHMENTS/FINDINGS

The primary emphasis of site productivity monitoring has been to ensure that site productivity is being maintained by limiting detrimental soil disturbances to less than 15% of activity areas as specified in the Clearwater Forest Plan and the Northern Region Soil Quality Monitoring Supplement ((FSM 2500-99-1). Soil monitoring was conducted in five proposed projects in FY02 and FY03: North Lochsa Face, Middle Black, Dog Marquette, White/White, and Brick Trout.

In each project area, on-the-ground field soil reviews were conducted in each proposed treatment unit (with past management actions) to assess the areal extent of detrimental soil disturbances associated with those past actions. Examination of landtype maps, aerial photos, and project maps was used to determine areas of likely soil impact. The far right column below shows the monitoring results for each project area:

Table 7. Areal Extent of Detrimental Soil Impacts within Proposed North Lochsa Face Treatment Units (Lochsa District).

Unit	Alts Present	Previous Treatment Type and Year[3]	Proposed Activity	Proposed Yarding Method(s)[4]	Primary Landtype(s)	% of Unit with Previous Detrimental Soil Impacts
25	All	SALV-98	RG	T	22K45	1.5%
26	All	SWSC-71 SALV-98	RG	T	22K45 24K45	8%
28	All	SALV-74,95	RG	T	22K45 24K45	5%
29	All	SALV-74,97,98 STFC-98	RG	S	31K20 61S20	2.5%
30	All	SALV-79,98	RG	S	61S20 31K20	1%
38	All	SALV-77	RG	S/T	24G45 24G20	12%
43[5]	2,3,3a,6	SCC-96	RG	H	61S26 61U31	0%

[3] Previous Treatment and Proposed Activity Type Codes: CCR=clearcut with reserves, CT=commercial thinning, LIB=liberation cutting, PCT=pre-commercial thinning, RG=regeneration harvest, SALV=sanitation/salvage, SCC=stand clearcut, ST=seed tree harvest, STFC=seed tree final cut, STSC=seed tree seed cut, SWFC=shelterwood final cut, SWPC=shelterwood preparatory cut, SWRC=shelterwood removal cut, SWSC=shelterwood seed cut, UB=underburn.

[4] Yarding Method Codes: H=helicopter, N=none or prescribed burn, S=skyline, T=tractor.

Unit	Alts Present	Previous Treatment Type and Year[3]	Proposed Activity	Proposed Yarding Method(s)[4]	Primary Landtype(s)	% of Unit with Previous Detrimental Soil Impacts
46	All	SALV-95	RG	H	61S10	<1%
48	All	SALV-95,96	RG	S	31S20 24S10 24A01	3%
50	All	SALV-98	ST	T	22K45	<1%
52	All	SWRC-73, SWFC-90	ST	S	31K10 24K10	5%
56	2,3,3a,4,5	SALV-97,98 SCC-89,93	ST	S	31G20 22K00	1%
59	All	SALV-98	RG	T	31K20 24K20 24K45	<1%
60	All	SALV-97	ST	T	61S20 61S10 24S20	2.5%
61	All	SALV-99	ST	S/T	24K10 22K00	1%
66	All	SALV-98 CCR-90	ST	S/T	24K20 22K00	1%
68	All	SALV-93	ST	T	61S26 31S20	2%
69	2,3,3a,4,5	SALV-99	ST	T	24G20	2%
70	2,3,3a,4,5	SALV-83	ST	T	22K00	1%
71	2,3,3a,4,5	SALV-83 CCR-94	ST	S	31G10 61G20	1.5%
74	All	SALV-96	ST	S	61S26 61G20	1%
84	All	SALV-95	ST	S	31S10 63S26	3.5%
85	All	SALV-95	ST	T	24S10	2%
89[1]	All	CCR-99	CT	S	61S26 31S20	0%
101	All	SWSC-71	PCT	N	24G95 22K45	3%
102	All	SCC-66	PCT	N	22K00	18%
103	All	SCC-65	PCT	N	22K00	12%
104	All	SCC-73	PCT	N	22K00	18%
105	All	SCC-78	PCT	N	22K00	18%
106	All	STSC-77 STFC-99	PCT	N	22K00	15%
107	All	SCC-72	PCT	N	24G20 22K00 24G10	5%
109	All	SALV-77	SALV	S	50 24G20 61G20 24G10	1%
184	2,3a,4,5,6	SALV-95	RG	T	24G20 31K20	<1%
232	All	CT-86	CT	S	24S20 22G00	8%
247	All	SALV-95	UB	N	61S26	1%

[5] These units are listed as having previous activities, but the portions with previous actions will be excluded since they are not in need of treatment at this time.

Unit	Alts Present	Previous Treatment Type and Year[3]	Proposed Activity	Proposed Yarding Method(s)[4]	Primary Landtype(s)	% of Unit with Previous Detrimental Soil Impacts
248	All	SALV-95	UB	N	31S`10	<1%
253	All	SALV-77	SALV	S/T	24G45 31G20 24G10	1.5%
255	2,3a,4,5,6	SALV-67	RG	S	31S20 31S45	3%
256	2,3a,4,5,6	SALV-68	RG	S	31S20 31S45	4%
261	All	SCC-79	PCT	N	24G10 31G10	8%
262	All	SCC-77	PCT	N	24G20 22G00	20%
263	All	LIB-76	PCT	N	24S10 31S10 24S20	12%
264	All	LIB-76	PCT	N	31S10 61S10 24S10	15%
265	All	LIB-67	PCT	N	22S00 24S10	8%
266	All	LIB-76	PCT	N	22A01	10%
269	All	SWPC-60 SWFC-77	PCT	N	22A01 24A01	12%
271	All	LIB-60	PCT	N	24A01 22A01	5%
272	All	SCC-64 LIB-74	PCT	N	24S10 31Q20	6%

Table 8. Areal Extent of Detrimental Soil Impacts within Proposed Middle-Black Treatment Units (North Fork District).

Area	Alts Present	Previous Treatment Type and Year	Proposed Treatment Type	Proposed Yarding Method (s)	Primary Land-type(s)	% of Unit with Previous Detrimental Soil Impacts
1	2,3,4,5	SALV-98	TH	H	61S20 61S26	<1 %
2	2,3,4,5	SCC-86	TH	H	61S26 50	0%[6]
24	2,3,4,5	SCC-87	TH	S	31S20	0%[3]
68	2,3,4,5	SCC-67	RSBP	N	61U26	15%
69	2,3,4,5	SCC-67 SWPC-83	TH	S	61U26	2.5%
70	2,3,4,5	SCC-77	RSBP	N	32U66 61U26 36U92	8%
71	2,3,4,5	SCC-77	RSBP	N	31G10	10%
80	2,3,4,5	SALV-72 STSC-88	BSP	N	31R10	20%
81	2,3,4,5	SALV-72 STSC-85 SWPC-87	BSP	N	31R10 61R10	8%

[6] Past impact area excluded from proposed treatment unit.

Area	Alts Present	Previous Treatment Type and Year	Proposed Treatment Type	Proposed Yarding Method (s)	Primary Land-type(s)	% of Unit with Previous Detrimental Soil Impacts
82	2,3,4,5	SALV-73,74,83 SWSC-78,85 CCR-88 STSC-85 SWPC-87 SWFC-78 PCC-88	BSP	N	31R10 61R10	10%
83	2,3,4,5	SALV-73,83 PCC-88 SWPC-87 STSC-85	BSP	N	31R10	13%
84	2,3,4,5	SCC-77 SWPC-80	TH	H/S	61R10	2%
85	2,3,4,5	SCC-77 SWPC-80	TH	H/S	61R10	2%
89	2,3,4,5	STSC-54	TH	H/S	61R20 60U26	2%
91	2,3,4,5	SALV-54 SWSC-72 STSC-54,78,81,82 SWFC-91 CCR-92	BSP	N	61R10 61R20	10%
92	2,3,4,5	SWFC-78,81,83 CCR-78 SCC-83 SALV-78	BSP	N	15U00 61Q10 60Q20	11%
93	2,3,4,5	SWSC-74,78 SALV-78	BSP	N	32U95 31Q10	10%
94	2,3,4,5	SALV-60 SWFC-77,78 SCC-78	BSP	N	60Q10	12%
95	2,3,4,5	SWSC-60 SWFC-77,79 SALV-78 CCR-78	BSP	N	32U6 60Q20	17%
96	2,3,4,5	SWFC-78	BSP	N	32U60	10%
97	2,3,4,5	SWSC-60 SCC-60 CCR-60 SWFC-60,78 SALV-74	BSP	N	61Q10 32U61 60Q20	15%
98	2,3,4,5	SCC-60,77,83 STSC74 SWFC-83	BSP	N	60Q20	8%
99	2,3,4,5	SELS-77 SALV-88 CCR-88 SWSC-88	BSP	N	32U95	15%

Table 9. Areal Extent of Detrimental Soil Impacts within Proposed Dog Marquette Treatment Units (North Fork District).

Unit	Previous Treatment Type and Year	Proposed Treatment Type	Proposed Yarding Method (s)	Primary Land-type(s)	% of Unit with Previous Detrimental Soil Impacts
1	SALV-80, 81	CCR	T	24S45	3%
2	SEL-80	CCR	S	61S20	<1%
3	SEL-80	CCR	S	61S20 24S45	<1%
4	SEL-80 81	CCR	S	31S20 24S20	<1%
6a	SCC-66, SEL-80	CCR	T	24S20	1%
6b	SCC-66, 92 SEL-80 SALV-95	CCR	T	24S45 61S20	7%
7	SALV-89, 95, 98	CCR	S/T	60S26 50	<1%

Table 10. Areal Extent of Detrimental Soil Impacts within Proposed WhiteWhite Treatment Units (Lochsa District).

Unit	Alts Present	Previous Treatment Type and Year	Proposed Treatment Type	Proposed Yarding Method (s)	Primary Land-type(s)	% of Unit with Previous Detrimental Soil Impacts
1	4	IMP-83,84,85 SALV-98 SCC-83 STSC-84 SWRC-85	RG	S	24G20 24A01 31G20	7%
2	3,4	SALV-98	RG	S (T-5 ac)	24G20 22G00 31G20	12%
3	3,4,5	IMP-84 SALV-98	RG (alt 3,4) JB (alt 5)	S (T-5 ac) N	24G20 24A01	15%
4	3,4,5	IMP-84,85 SALV-98	RG (alt 3,4) JB (alt 5)	T N	24G20 24A01	3.5%
5	3,4	IMP-84 SALV-98 STSC-84 SWSC-85	RG	T	24A01	6%
6	3,4	IMP-84 SALV-85,98 SCC-83	RG	T	24A01	7%
7	3,4	IMP-84, SALV-98	RG	T	24G20	4%
8	3,4	IMP-83,SALV-98	RG	S	24A01	5%
9	3,4,5	IMP-83,84 SALV-98 SCC-84	RG (alt 3,4) JB (alt 5)	S N	24A01	5%
10	3,4,5	SALV-98	RG (alt 3,4) JB (alt 5)	S N	24A01	1%
11	3,4,5	IMP-92 SALV-81,98	RG (alt 3,4) JB (alt 5)	S N	24A01 24G20	5%
14	3,4,5	IMP-60 SALV-99 SCC-94 STSC-81	CT	S	24G20 24G10	1%
15	3,4,5	IMP-60 SCC-94 STSC-81	CT	S (T-100 ac)	24G10 24G20 31G20	2%
19	4,5	SALV-84 STFC-83 STSC-74	CT	S	24G10 22G00	<1%
20	3,4,5	STSC—82 SWFC-91,92 SWSC-77	JB	N	22G00 24G10	7.5%
21	3,4,5	SWSC-77	JB	N	24G10 22G00	2%
23	3,4,5	IMP-77	JB	N	24G10	1.5%
24	4	SALV-77,81	RG	S	22A01 60G10	3%
27	3,4,5	SALV-85	CT	T	24G10	<1%
28	4	SWFC-92 SWSC-77	RG	T	24A01	15%
29	3,4,5	IMP-60 STFC-91 STSC-81,82	JB	N	24G10	5%
30	3,4	IMP-85	RG	S	22G00 24G10	2%
31	4	SCC-93	RG	S (T-10 ac)	24A01 22G00	<1%
32	4	SWFC-83 SWSC-73	RG	S (T-30 ac)	22G00 24A01	2%
35	4,5	SALV-84	CT	S (T-10 ac)	24G10 22G00	<1%

Unit	Alts Present	Previous Treatment Type and Year	Proposed Treatment Type	Proposed Yarding Method (s)	Primary Land-type(s)	% of Unit with Previous Detrimental Soil Impacts
36	4	IMP-65 SALV-81 STFC-83 STSC-74	RG	S	24G10 22G00	<1%
37	4,5	SALV-84 STFC-83 STSC-74	CT	S	24G10 22G00	<1%
38	3,4,5	SALV-67,85	CT	S (T-10 ac)	24G10 22A01 24A01 31G20	1%
39	3,4	SALV-85	RG	S	22A01 24A01 31G10	2%
43	3,4	SALV-99	RG	S	24G20 24G10	<1%
46	3,4	IMP-77	RG	S (T-5 ac)	24G10 22A01	1%
47	3,4,5	IMP-79	CT	T	22G00	1%
48	3,4,5	SALV-85	CT	S	31G10 31G20 24A01 31U26	1%
49	4,5	SALV-84	CT	S	24G10	1%
50	4,5	STFC-83 STSC-74	CT	S	24G10 22G00 31G20	<1%
51	3,4	IMP-84,85 SALV-98	RG	S	24G20	2.5%
53	3,4,5	SWFC-92 SWSC-77	JB	N	22G00 24G10	2%
55	4	SALV-77,81	RG	S	22A01	1%

Mitigation measures, including decompaction with a ripper, forest cultivator, grapple rake, or similar equipment, placement of large woody materials, etc. may be applied in these units to improve soil conditions.

Table 11. Areal Extent of Detrimental Soil Impacts within Proposed Brick Trout Treatment Units (Lochsa District).

Unit	Alts Present	Previous Treatment Type and Year	Proposed Activity	Proposed Yarding Method (s)	Primary Land-type(s)	% of Unit with Previous Detrimental Soil Impacts
5	3,4,5	CT-72	CCR	S	22S00 24S45	3%
6	3,4,5	CT-72	FR	T	10A40 24S45 31S10	6.8%
11	4,5	STSC-74,SALV-98	CCR	S	22S00 24S10 31S10	2%
12	3,4,5	STSC-75,SALV-98 STFC-98, CCR-98	CCR	S	22A01 24S10	0.8%
13	4,5	SALV-98	STSC	S	24S10 24S20 31S20	1%
14	3,4,5	SCC-75,STSC-75 SALV-98	CCR	S	24S10 31S20	2%
15	3,4,5	SCC-75,SALV-98	CCR	S	24S10	2%
23	4,5	STSC-2003	CCR	S	24S10 24S20	0%

Unit	Alts Present	Previous Treatment Type and Year	Proposed Activity	Proposed Yarding Method (s)	Primary Land-type(s)	% of Unit with Previous Detrimental Soil Impacts
27	3,4,5	SCC-92,CCR-95, SALV-92,98	CCR	S	24S10	2%
30	4,5	SALV-98	CCR	S	24S10 24S20	1%
31	3,4,5	STSC-79,SCC-90, STFC-94,SALV-98	CCR	S	22G00 24G10 24G20 24S10	1%
32	4	SALV-2003	CCR	S	22G00 24A10 24G20	0%
38	3,4	SWSC-81	CCR	S	22G00	10%
43	3,4,5	SALV-98	CCR	S	24G20	1%
45	3,4	SALV-98	CCR	S	24G10 31G20	1%
53	3,4,5	IMP-77	CCR	S	31G10	1%
54	3,4,5	IMP-77	CCR	S	24G10 31G10	1.4%
55	3,4	IMP-77	STFC	T	22G00 24G10	12.2%
56	3,4	STSC-78	STFC	T	24G10 31G20	1%
57	3,4,5	IMP-77,STSC-78	CCR	S	24G45 31G10	1%
69	3,4	SWSC-98,SALV-98	STFC	T	24G10 24G20 31U26	11%
70	3,4	SWSC-79,CT-98,SALV-98	CCR	S	24G10 24G20 31G20 31U26	7.8%

A number of wildfires occurred on the Clearwater National Forest in 2003. BAER assessments were conducted on all wildfires greater than 300 acres to determine the need for rehab treatments. During the BAER surveys, burn severity/intensity impacts to the soil/vegetation were assessed. The following table shows the burn severities/intensities for the fires that BAER assessments were conducted in 2003.

Table 12. Burn Severity/Intensity of 2003 Clearwater NF Wildfires (Powell District) as Developed from Satellite Imagery and Field Reviews.

Fire	Burn Severity/Intensity				Area (acres)
	% Unburned or Underburned	% Low	% Moderate	% High	
Beaver Lake	22.9%	43.8%	23.3%	9.9%	12464
Siah Lake	12.3%	53.2%	25.7%	8.7%	598
Hopeful 2	31.7%	35.5%	18.4%	14.4%	3511
Wendover	10.9%	46.6%	32.8%	9.7%	3441
Bear's Oil	32.3%	51.2%	12.6%	3.9%	884
Pleasant	16.5%	43.3%	23.5%	16.8%	3866
Rhodes	32.6%	46.7%	12.2%	8.5%	718
Fish Lake	51.6%	25.9%	17.1%	5.4%	3166
Eagle Creek East	19.8%	38.9%	35.4%	6.0%	317
Total BAER fires	**25.1%**	**41.6%**	**22.8%**	**10.5%**	**28964**

The relationship between burn severity (soil impacts) and burn intensity (vegetation impacts) is not necessarily a direct one. In areas where there is naturally little forest vegetation (meadows, rocky slopes, talus fields, etc.), the burn impacts picked up by satellite imagery will likely more reflect burn severity. Conversely, in areas with well developed forest canopies, satellite imagery may more accurately depict changes in vegetation caused by the fire. In developing the burn impact (severity/intensity) maps for the 2003 Clearwater NF fires, the classifications developed are interpreted as follows:

- Unburned/underburned: Low severity, low intensity. The fire did not actually burn through this class or burned at such low levels that there were minimal impacts to either the vegetation or the soil.
- Low: Low severity/low to moderate intensity. The fire generally burned in a mosaic pattern throughout these areas with low impacts to the soil and tree mortality was generally less than 25%.
- Moderate: Generally low to moderate soil impacts (severity), moderate to high vegetation impacts (intensity). The fire created a mosaic condition of varying intensity and severity. Tree mortality is moderate to high ranging from 50-100%, averaging 70-80%.
- High: Moderate to high soil impacts (severity), high vegetation impacts (intensity). Soil impacts can be high if sufficient surface fuels are present, but vegetation mortality is usually complete.

The Walton Fire, which burned in 2001 was reviewed to assess the effectiveness of the BAER treatments that were implemented after the burn. Log erosion barriers and tree planting were accomplished on a steep slope above Walton Creek to reduce the probability of both surface erosion and mass soil movements into the creek, which could detrimentally impact the State of Idaho fish rearing facility downstream. Field review showed no significant mass movements and low amounts of surface erosion. The log erosion barriers were capturing some sediment, but due to the steep slopes, some soil material was moving downslope. The sites will be reviewed again in 2004.

TIMBER

GOAL

Provide a sustained yield of timber and other forest products to help support the economic structure of local communities and provide regional and national needs. Select on the ground those silvicultural systems that will be the most beneficial to long-term timber production, but modified as necessary to meet other resource and management area direction. Continue to work toward achieving the desired future condition identified in the Forest Plan.

STRATEGY

The Forest will continue to manage the timber program to provide for the long-term health, diversity and productivity of the Forest. Complete site-specific analysis of the land base will be used to design the timber sale program. Silvicultural systems will be selected to build biological diversity and maintain ecological processes. The timber sale program will provide for a wide range of sale sizes and product types. An appropriate mix of logging systems will be specified. The Forest will make every effort to respond to the needs of the local communities that depend upon the Forest for their economic survival by continuing to pursue and develop new timber sale opportunities.

TIMBER STAND INVENTORY

The compartment inventory program, initiated in FY85, produces a comprehensive inventory and database representing all timber stands on the Forest. The compartment inventory looks at a geographic unit (average unit size is 10,000 acres) in three phases.

- In the first phase, aerial photographs are examined to identify areas that are relatively alike in size, tree density and species. Phase one has been completed; all stands on the Forest have been mapped and identified for suitability and management area.
- The second phase involves field stand examination of randomly selected stands. Phase two has been completed on approximately 82 percent of the 173 Forest compartments. No additional compartments were field sampled in FY03; however, approximately 23,500 acres of stand exams were accomplished, thereby increasing the number of stands with current field inventories as well as adding to the pool of stand exams from which to match to unsampled stands.
- The third phase involves data compilation, then application of the data to unsampled stands. The introduction in FY93 of the "*Most Similar Neighbor Estimation Procedure*" allowed the Forest to initially complete phase three on most of the timbered strata. This procedure matches sampled stands to unsampled stands using photo-interpreted and physical characteristics of the stands. It results in timely, statistically unbiased estimates of the important characteristics for every stand on the Forest. Testing and validation of this process is complete and a vegetation inventory database has been established to store the generated data.
- Now that the compartment field sampling has been completed and the "*Most Similar Neighbor*" programs are operational, the inventory program shifts to a maintenance and updating phase. The inventory compilation programs are periodically rerun, new project stand exams are added, especially for stands that have experienced changes due to harvest, wildfire, and insect outbreaks, and the photo interpretation data is selectively update for the stand that have notably changed.

FOREST PRODUCT SALES AND ASQ

In FY03, the Forest offered a variety of products including sawlogs, cedar products, firewood, Christmas trees and fence posts. These products were sold through six timber sales, 947 firewood permits, 646 Christmas tree permits, and 18 miscellaneous collection permits. A total volume of 30.8 million board feet (MMBF) was sold. The annual volumes offered, sold, harvested and under contract since FY98 are shown below.

Annual Timber Volume Offered, Sold, Cut and Under Contract (MMBF)

	FY99	FY00	FY01	FY02	FY03
Offer	23.9	8.1	20.1	5.8	30.8
Sold	11.2	17.3	18.1	5.8	29.8
Cut	16.3	9.4	15.3	15.9	25.2
Contract	58.4	55.5	57.4	49.3	36.6

The total acres of timber sold by harvest method during the past five years are shown in the graphic below.

Total Acres of Timber Sold on the Forest by Harvest Method

	FY99	FY00	FY01	FY02	FY03
Clearcut and Clearcut with Reserves	315	79	113	192	472
Shelterwood and Seed Tree	738	521	348	94	472
Final Removal	606	0	10	0	16
Selection	8	743	46	0	0
Intermediate Harvest	1,936	435	602	158	271

The volume of timber sold for the roaded and unroaded components of the Forest is shown below.

Roaded and Unroaded Timber Sold

Year	Roaded Sawtimber	Roaded NIC*	Roaded Total	Unroaded Sawtimber	Unroaded NIC*	Unroaded Total	Forest Total
99	8.6	2.6	**11.2**	0	0	**0**	**11.2**
00	14.7	2.6	**17.3**	0	0	**0**	**17.3**
01	13.9	4.2	**18.1**	0	0	**0**	**18.1**
02	5.8	0	**5.8**	0	0	**0**	**5.8**
03	28.6	1.2	**29.8**	0	0	**0**	**29.8**

*NIC = non-interchangeable component

The next graphic compares the projected annual acres and volumes used to derive the annual ASQ, with the number of actual acres and volumes sold, by management area as defined in the Forest Plan.

Comparison of Forest Plan Projections with Annual Acreage of Timber Sales, 1988-2003

Management Area	Forest Plan Acres	Forest Plan Volume Mmbf	Timber Sale Average Acres	Timber Sale Average Volume Mmbf
Timber Production	**3,497**	**81.2**	**2596**	**40.6**
Road/Trail Corridors	**125**	**.8**	**33**	**.7**
Big-Game Summer Range	**3,099**	**62.5**	**29**	**.6**
Big-Game Winter Range	**1,007**	**23.6**	**390**	**6.7**
Riparian Areas	**3,516**	**5.2**	**57**	**1.1**
Middle Fork Clearwater Scenic Corridor	**0**	**0**	**18**	**.5**

The difference between planned ASQ volume and the average annual volume sold shown above (Roaded and Unroaded Timber Sold) is mainly due to not harvesting in the unroaded portion of the Forest.

Item No. 18: Harvested Land Restocked Within Five Years

Frequency of Measurement: Annual
Reporting Period: Five Years

MONITORING ACTION

The Forest silviculturist will prepare a report showing the percentage of stands and acres meeting the five-year regeneration standard. Data obtained from the Timber Stand Management Records System will provide the basis for determining the percentage of successfully regenerated stands.

ACCOMPLISHMENTS/FINDINGS

The National Forest Management Act of 1976 requires that when trees are cut to achieve timber production objectives, the cuttings shall be made in such a way as to ensure that the technology and knowledge exist to adequately restock the land within five years after final harvest. Reforestation records pertaining to regeneration harvests that occurred in 1997 were compiled and the required percentages calculated. The data presented in Table 5 is based on the status of regeneration at the end of 2002. The time elapsed since harvest is five years. Seedtree cuts are not considered final harvests but because seedtree cutting initiates stand regeneration, the Forest monitors restocking success on the same basis as with the final harvests.

1998 Regeneration Harvests Adequately Restocked in Five Years

	Clearcut	Seedcut	Final	Selection	TOTAL
Number of Stands	18	25	19	1	**63**
Number of Acres	220	362	569	25	**1166**
Stand Success %	94%	96%	100%	100%	**97%**
Acres Success %	98%	97%	100%	100%	**99%**

Of the 63 stands that received regeneration harvesting in 1998, one clearcut and one seedtree cut were not adequately restocked after five years. The initial planting failed to meet stocking standards in the clearcuts due to the lack of adequate site preparation. These stands are scheduled to be replanted in 2003. The lack of adequate stocking in the remaining clearcuts and seedtree cuts is due to delays in carrying out the prescription for site preparation. This unit was slashed in 2003, will be burned in 2004 and replanted in 2005. The seedcut unit planting failed to meet stocking standards due to drought. This unit is scheduled for replanting in 2004.

Item No. 19 – Unsuited Timberlands Examined to Determine if they have Become Suitable

Frequency of Measurement: Annual
Reporting Period: Ten Years

MONITORING ACTION

Timberlands classified as unsuitable during development of the Forest Plan will be examined, using more exacting methods, to determine if they should be reclassified as suitable.

ACCOMPLISHMENTS/FINDINGS

All timberlands, both suitable and unsuitable are currently being inventoried as part of the Forest's compartment inventory program. Occasionally, unsuitable timberlands may also be examined in association with an analysis of a proposed project. Both types of examinations are directed at confirming and refining the suitability determinations made in the Forest Plan.

Item No. 20 – Validate Maximum Size Limits for Harvest Areas

Frequency of Measurement: Annual
Reporting Period: Annual

MONITORING ACTION

The Forest silviculturist will prepare a table displaying the number of stands harvested by harvest type, meeting the 40-acre maximum harvest size standard compared to the number of stands exceeding this standard.

ACCOMPLISHMENTS/FINDINGS

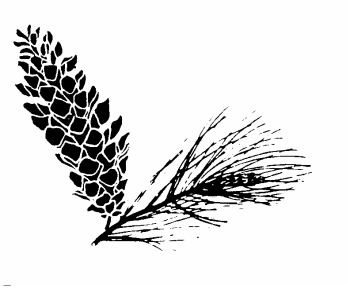
The maximum size of harvest openings created by even-aged regeneration harvesting (a method of harvest that results in a regenerated stand of similar age) should normally be less than 40 acres. Harvest opening size may exceed 40 acres when certain exceptional conditions apply such as insect outbreaks that threaten surrounding stands, catastrophic blowdown or for final removal of shelterwood trees in order to protect established regeneration in existing shelterwood and seedtree areas. The acres reported in the stand database for FY03 are shown below.

FY03 Even-aged Regeneration Harvests by Harvest Type and Size Category

District	Clearcut & Clearcut with Reserves		Seedtree & Shelterwood		Final Removal	
	#Stands <40 Acres	# Stands > 40 Acres	#Stands < 40 Acres	# Stands > 40 Acres	# Stands < 40 Acres	# Stands > 40 Acres
Pierce	8	0	17	3	0	0
Palouse	15	2	12	0	0	0
North Fork	0	0	1	0	0	0
Lochsa	0	0	0	0	0	0
Powell	0	0	0	0	0	0
TOTAL	23	2	30	3	0	0
Average Size	13 Acres	67 Acres	13 Acres	47 Acres	0 Acres	0 Acres

Item No. 21 – Insect and Disease Status as a Result of Activities

Frequency of Measurement: Annual
Reporting Period: Five Years



MONITORING ACTION

Insect and disease status is evaluated during post-treatment stand exams. Silviculturists will use these exams in the preparation of silvicultural prescriptions to deal with identified insect and disease problems. Additionally, annual aerial detection surveys are used to identify the extent of widespread insect and disease problems.

FINDINGS

Post-harvest stand exams and routine monitoring of harvest units show that reserve trees in regeneration harvest units and residual trees in salvage harvest units are experiencing high levels of mortality. This mortality is primarily being caused by root diseases, windthrow and Douglas-fir bark beetle attack. It is probable that the harvest cutting did not directly promote an increase in the casual agents of mortality, but

rather that the reserve trees were already infected or at high risk of succumbing. However, slash burning which results in tree scorch does elevate the risk of bark beetle attack.

Annual aerial detection surveys are used to assess current levels of insect and disease activity on the Forest. Areas with active insect outbreaks and recent forest fires are mapped and summarized. Many types of forest disease mortality, however, are not apparent from the aerial surveys and are not recorded. Because of this, reported losses from disease are not complete.

Regular aerial detection surveys were conducted on the Forest in FY03. Mapping of current tree mortality and damage occurred on the Palouse and North Fork Districts, but large portions of the Lochsa and Powell Districts were not flown due to the smoke from numerous wildfires.

Tree mortality caused by the Douglas-fir beetle seemed to remain about the same in FY03 as in the previous year. Grand fir tree mortality caused by the fir engraver bark beetle increased dramatically throughout the Clearwater region. Drought stress, overcrowding, and root disease will likely promote further increases in fir engraver beetle activity.

There was a significant increase in the mountain pine beetle infestation of lodgepole pine stands in FY03, particularly in the upper reaches of the North Fork river drainage. Approximately 3,200 acres of lodgepole pine stands were mapped containing some 4,750 recently killed trees.

There appeared to be little change in the areas infested with balsam wooly adelgid in FY03. The cumulative area infested is about 7,500 acres. The number of subalpine fir trees killed by this insect was not estimated this year. Tree mortality remains widespread throughout the western portion of the Forest in low-lying creek bottom situations and at higher elevations across the eastern part of the Forest.

The western balsam bark beetle outbreaks in subalpine fir have remained static or slightly increased over last year. The cumulative area infested is about 3,000 acres including some 4,500 recently killed trees.

The area of defoliation on grand fir and Douglas-fir caused by the Douglas-fir tussock moth outbreak on the Palouse Ranger District completely disappeared in FY03.

The hemlock looper, another defoliator that feeds on mountain hemlock, grand fir, and subalpine fir, reached its peak area of infestation last year, at about 25,000 acres. As expected this outbreak has died out with only 24 acres of defoliation being observed in FY03.

The decline of mature and old western redcedar caused by what is believed to be Armillaria root disease continues, resulting in trees with dead tops, dead branches, severely constricted tree crowns, and sporadic tree mortality. Monitoring will continue on this disease that continues to intensify.