APPENDIX E
MONITORING PLAN FOR FISH, SOIL, AND WATER

INTRODUCTION

The purpose of this monitoring plan is to provide feedback on the environmental effects of post fire management actions on the soil, water, and fisheries resources in the Big Creek drainage of the North Fork of the Flathead River watershed. The information generated in this monitoring plan will aid in determining trend conditions, project effects, Best Management Practices compliance, and compliance with soil and fisheries standards.

MONITORING PLAN STRUCTURE

Figure 1 is a flowchart depicting the key steps in the Moose Post Fire EIS Monitoring Plan based on guidelines developed for Region 10 of the U.S. Environmental Protection Agency. These guidelines are published in *Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska* (MacDonald, 1991[1]). This step-by-step process identified by MacDonald forms the framework for the Moose Post-Fire EIS Monitoring Plan.

Each key step in the flow chart will be addressed separately. As new information or techniques become available, the feedback loops in the plan will be used to keep the monitoring plan allied with the general and specific monitoring objectives. This means that the monitoring locations, parameters, frequency, and analytic techniques are free to adapt to new information and/or budgetary constraints.

In addition to key steps, the monitoring plan also contains critical feedback loops that are necessary to keep the monitoring plan relevant and linked to the general and specific monitoring objectives. The order in which the steps of the monitoring plan are carried out is less important than the need for each key step to be explicitly addressed in the development and evolution of the monitoring plan.

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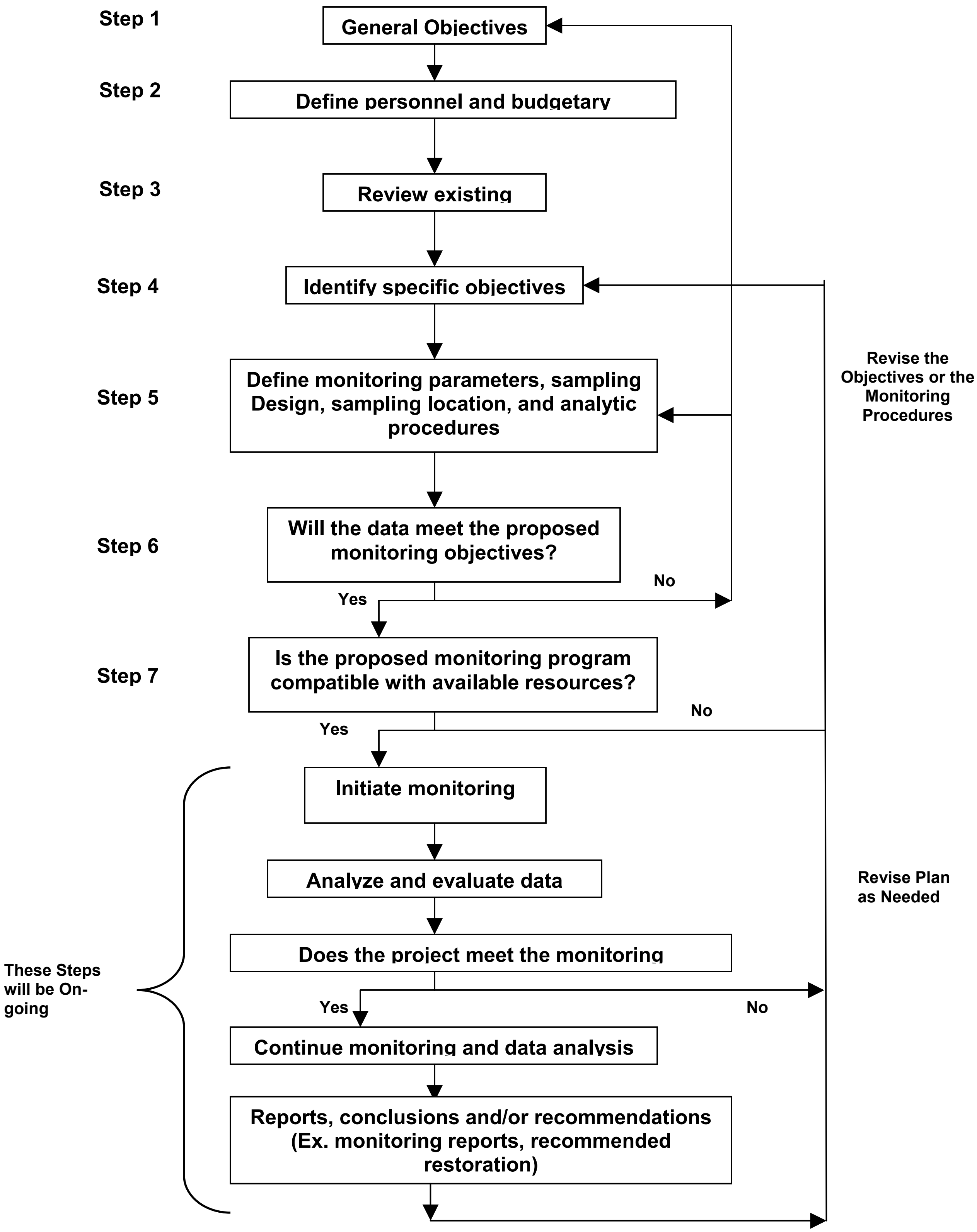
[1] MacDonald, Lee H. 1991. Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska, Guidelines developed for Region 10, Environmental Protection Agency, Seattle, Washington, under EPA Assistance No. CX-816031-01-0.

Figure 1. Moose EIS Monitoring Plan Flow Chart and Process Steps



DISCUSSION OF KEY MONITORING STEPS

Step 1 - General Objectives

The first step in the monitoring plan is the identification of the general monitoring objectives. The objectives are done with interdisciplinary and interagency participation. Once the general objectives of water quality monitoring have been established and agreed upon, the remainder of the monitoring effort will continually be measured against these objectives.

The 303d impairment of Big Creek is described as partially supporting the beneficial uses of aquatic life support and cold-water fishery, due to siltation and habitat alteration. Field examination, qualitative, and quantitative stream monitoring confirm that the source of sediments is from a combination of natural and man-caused upland and stream channel erosion.

The long-term goals for improving the current situation in Big Creek are as follows: 1) Reduce sediment levels and improve the fishery habitat in Big Creek, 2) Minimize short-term increases in water yield and promote long-term reductions in water yield, so that the Big Creek stream channel can achieve dynamic equilibrium, and 3) Insure proper revegetation and reforestation occurs within the Moose Fire area.

The proposed indicators for assessment of improvement in fish, soil, and water quality trends are the following:

- The desired condition for cold water fishery habitat, is for interstitial fine sediments not to be a limiting factor to fish reproduction and survival in Big Creek. The key indicator for this objective would be the amount of interstitial fine sediments occurring in the fish spawning habitat, as measured using the McNeil Core methodology.

- The desired condition for surface flow in Big Creek watershed, is for stream channels to be in or approaching equilibrium; i.e., have minimal channel erosion or sediment deposition. The key indicator for this objective would be to measure the same amount of streambank erosion occurring within the impaired sensitive reaches, and in similar non-impaired reaches upstream and downstream. This objective is to determine if stream channels in Big Creek are in, approaching, or receding from equilibrium.

- The desired condition for the upland (ground surface between stream channels) would be to have a vegetation cover (grass, forbs, and brush) or to have a rock surface armoring, thereby not being a sediment source. Minimizing detrimental soil conditions and maintaining soil productivity are desired elements relative to soil resources. The key indicators for these objectives would be identifying and restoring sediment sources and detrimental soil conditions.

GENERAL MONITORING OBJECTIVES FOR THE MOOSE POST-FIRE PROJECT AREA

1) Determine the amount of detrimental soil disturbance from salvage logging activities.

2) Determine the effects of wildfire and salvage logging to fish habitat and INFISH Riparian Management Objectives.

3) Determine whether Best Management Practices (BMPs) were implemented as specified and whether individual BMPs were effective.

4) Determine if stream channels in Big Creek are in, approaching, or receeding from dynamic equilibrium.

Objective 1 - Monitor salvage logging units to measure the amount of detrimental soil disturbance and develop post-salvage soil disturbance restoration plan if detrimental disturbance is equal to or exceeds 15 percent. Detrimental soil disturbance includes soil compaction, displacement, rutting, puddling, and erosion.

Objective 2 – Monitor Big Creek, or portion thereof, to determine the effects of the wildfire and the post-fire salvage to fish habitat and assesses status of INFISH Riparian Management Objectives.

Objective 3 - The most common use of implementation and effectiveness monitoring is to determine whether Best Management Practices (BMPs) were implemented as specified and whether individual BMPs were effective in preventing adverse water quality impacts. As part of BMP monitoring, we would also determine if the applicable Streamside Management Zone (SMZ) rules were implemented.

Objective 4 – To determine if stream channels in Big Creek are in, approaching, or receeding from dynamic equilibrium (erosion/deposition trend).

Step 2 - Personnel and Budgetary Constraints

Once the general objectives have been made (Step 1), the approximate personnel and budgetary constraints must be specified in order to ensure that the subsequent monitoring plan is realistic. Funds for environmental monitoring provided through a variety of sources.

Annual funding allocated to monitoring on the Flathead NF for soil, water, and fisheries programs amounts to approximately sixty-one thousand dollars ($61,000). The following table displays the annual budgetary constraints applicable to these three programs. The third column of the table displays the funding commitments to existing contract agreements with the Montana Fish, Wildlife, and Parks as well as the Flathead Basin Commission. For the sake of the budget/program comparison in Step 7, it is assumed that these agreements and their associated financial contribution would continue as a future obligation. Column 4 provides the remaining level of discretionary funding for annual monitoring activities.

Table E.1: Annual Funding Available for Fish, Soil, and Water Monitoring on the Flathead National Forest

1) Monitoring Program	2) Annual Monitoring Budget	3) Annual Monitoring Contract Commitments	4) Annual Discretionary Monitoring Funds
Soils Monitoring	$7,000	0	$7,000
Hydrology Monitoring	$24,000	$20,000	$4,000
Fisheries Monitoring	$30,000	$18,000	$12,000

The funding available is based on present budget appropriations and Forest-wide priorities. Significant changes within the next 2 years are not expected to occur. Longer term funding levels (2 years +) are less secure and subject to changes in national and regional priorities.

Step 3 - Review of Existing Data

The Big Creek Watershed has been examined through numerous monitoring programs in the past 30 years. This section discusses the relevant stream and water quality data for Big Creek that characterize the existing condition.

Pfankuch Stream Channel Rating

The Pfankuch stream channel rating (Pfankuch 1978), was developed to "systemize measurements and evaluations of the resistive capacity of mountain stream channels to the detachment of bed and bank materials and to provide information about the capacity of streams to adjust and recover from potential changes in flow and/or increases in sediment production" (Pfankuch 1975). This procedure uses a qualitative measurement with associated mathematical values to reflect stream conditions. The rating is based on 15 categories: six related to the bottom of the stream channel (the part of the channel covered by water yearlong), five related to the lower banks (covered by water only during spring runoff), and four related to the upper banks (covered by water only during flood stages). Streams rated *excellent (<38) or good (39-76)* are less likely to erode during high flow than streams in *fair (77-114)* or *poor (115+)* condition. Prime fish habitat usually occurs in streams with a *good* rating; streams in *excellent* condition usually do not have adequate gravels for good spawning habitat.

The rating is evaluated at a spot or reach of stream. Each rating represents one point in time; therefore, a series of ratings must be made over several years to show the trend of stream stability; i.e., whether the stream is headed towards or away from dynamic equilibrium. D. Sirucek reported a statistically significant correlation between the change in Pfankuch stream channel ratings and several measurements of stream health (e.g. McNeil core % fine sediment, water yield increase, nutrient levels and chlorophyll A).

In the late 1970s, stream channels at selected sites in the Big Creek drainage were rated as *good* using the Pfankuch stream channel rating scale. Some of those same areas were rated as *fair* and *poor* in a 1992 survey.

The *good* Pfankuch ratings of the late 1970s did not forecast that sediments that had been generated from road construction associated with timber harvest of the 1960s and 70s were working their way downstream. Had surveys been made occasionally during the 1980s, they would have indicated that the stream was becoming impaired. The *fair* and *poor* ratings of the 1992 survey are a result of sediment moving downstream into areas that had previously been rated as *good*. These same sites will rate *good* again, but it may not be for 10-20 years.

After the Moose Fire during late October and early November, Pfankuch ratings were done on the tributaries and the mainstem of Big Creek within the fire boundary. These ratings would not reflect any changes to the streams due to the fires, rather they were done to be able to measure any changes following post-fire runoff events. The mainstem ratings were all f*air*; and the tributaries ranged from *good* to poor, with the majority being *fair*.

Riffle Stability Index

The riffle stability index (RSI) is a quantitative methodology used to for assessing stream equilibrium and channel stability. (Kappesser 1993) This technique looks at the relative mobility of streambed material deposited on riffles during bankfull discharge. The largest size particles that are moved during frequent (annual flood events) are measured at a deposition site such as a riffle point bar. That size and all smaller particles are therefore considered mobile. The average size of the largest mobile particle is compared to the total size composition of the riffle to determine the percent of riffle material that is moved during the annual runoff. The resulting percentage of movable particles becomes an index of riffle equilibrium called the riffle stability index (RSI).

It has been suggested that an RSI value of 70 or higher is a warning sign for Idaho's belt geology streams, similar to those found in the Flathead Basin; an RSI value greater than 90 indicates that a watershed is out of equilibrium with respect to the balance between sediment loads and water yields (Kappesser 1993).

During the summer of 1993, riffle stability index measurements were made at nine sites in upper Big Creek from below the Lakalaho Creek junction upstream to within one-half mile of Road #1696 crossing. The RSI values ranged from 65 to 95, with eight sites having RSIs greater than 70, and three sites having RSIs greater than 90. The three sites with RSIs greater than 90 have a relatively high percentage of small particles, suggesting that sediment has accumulated in those areas. Also, the mean size of the largest moving particle for all sites was about 5.5 inches, a further indication that stream energy is high enough to move even large cobbles during annual peak flows. These results suggest that portions of Big Creek's channel is unstable and has a limited capacity to absorb additional water yield increases from hillslope development in the headwater basin.

McNeil Core Sediment Measurements

The McNeil Core samples are collected in the Big Creek drainage annually by Montana Fish, Wildlife, and Parks. This work is part of a long term monitoring effort for bull trout across the Flathead National Forest and is partially funded by the Forest Service.

The size range of the streambed materials is indicative of fish spawning and incubation habitat. Increased fine sediments reduce pool depth; interstitial spaces needed for invertebrate production, and reduce embryonic survival of fry (Everest et al. 1987, Weaver and Fraley 1991). A McNeil corer (McNeil and Ahnell 1964) is used to collect streambed samples which are dried and sieve analyzed to determine the particle size distribution, for materials less than 6.5mm in diameter (fines). As part of the Flathead Basin Forest Practices - Water Quality, and Fisheries Cooperative Research Program, Fraley and Weaver established a correlation between the streambed fines and the bull trout survival, in the Flathead River Basin. A statistically significant correlation was identified, that streambed fines greater than 35% resulted in decreased survival of bull trout (Weaver and Fraley 1991). Base on this research, the Flathead National Forest uses the criteria that streams with greater than 35% fines are considered *threatened,* while a streams with greater than 40% fines are generally considered *impaired*. These threatened and impaired determinations do not necessarily correlate with MDEQ threatened and impaired designations associated with beneficial use support since the MDEQ may use values that can vary when reference conditions imply other numbers would better represent MDEQ guidance for making beneficial use support determinations (Water Quality Assessment Process and Methods, Appendix A of the 2000 303(d) List).

Since 1982 McNeil core samples have been taken in a sampling reach of Big Creek, near the Skookoleel bridge crossing (road # 316E). Table – E.2 reports the results of the McNeil core monitoring program. The increasing trend of fine streambed sediments starting in 1989 is thought to be the movement of the earlier upland erosion sediments through the streambed monitoring reach in lower Big Creek. After the flushing flows in 1992 there has been a decline in the streambed fines in this monitoring reach.

Table – E.2: McNeil Core samples (%fine sediment <6.4mm) in Big Creek.

Year	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
%< 6.4mm	23.8	32.6	28.2	27.8	28.7	21.6	29.1	40.3	48.4	53.4
Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
%< 6.4mm	32.9	37.4	37.2	34.5	32.2	30.0	31.1	32.2	33.1	31.4

Note the samples for year 2001 have been gathered but the data was unavailable to the author at the time of this report.

Modeled Water Yield Increase

R1WATSED is a computer model used to predict water yield increase from forest vegetation manipulation. The model has evolved from the procedure discussed in Forest Hydrology, Hydrologic Effects of Vegetation Manipulation, Part II (U.S. Forest Service 1978), and WATBAL a model developed on the Clearwater National Forest (Patten 1989).

It should be noted that R1WATSED calculates the estimated water yield over a fully forested condition. This is not the true natural condition for the headwaters area in Big Creek that have areas of rock outcrop, and wetlands. Results from R1WATSED are that the estimated percent water yield over natural conditions is 9% or less for the five subwatersheds of Big Creek as well as the entire Big Creek drainage (Big Mountain Ski and summer Resort EIS, 1995). Once modeled water yield increase approaches 10% then field examination, Pfankuch stream stability ratings, cross-sections, Wolman Peeble Counts, and RSI data are used to assess a stream channel's ability carry additional water yield increase without major stream erosion.

Wolman Pebble Counts/ Stream Cross-sections

Wolman pebble counts (Wolman 1954) is a quantitative field procedure for determining particle size distribution of the stream bed materials. This procedure however takes all size materials into consideration as compared to the McNeil core methodology. In 1997 two stream reaches in Big Creek were sampled using this procedure. At the same time a stream cross-section was done at the same location. A high width to depth ratio and lack of pools is symptomatic of an unstable stream channel, and in some cases a large amount of bedload in the drainage. There has not been reference reach data for Wolman pebble counts and stream cross-sections of comparable stream size developed yet, to compare with Big Creek data. However, the initial Big Creek data can be used as part of the initial monitoring data set that is proposed later in this report. Following the Moose Fire eight additional stream reaches in Big Creek were sampled using these two procedures.

Forest Plan Monitoring

A water quality-monitoring site (FL7012) was located at the Lookout Bridge, about two miles upstream from the mouth of Big Creek. Starting in 1986, Big Creek was one of the watersheds where suspended sediments and bedload sediments were measured to validate sediment yield assumptions made in the forest plan. Table - 3 displays the results of the suspended sediment monitoring data for seven years.

Table E.3: Annual Suspended Sediment Yield for Big Creek at Lookout Bridge in tons/square mile/year.

Monitoring Year	1986	1987	1988	1989	1990	1991	1992
Annual Sediment Yield (Tons/Mile Square/Year)	199.8	134.4	8.4	23.7	41.3	81.3	81.5

At this monitoring site, annual sediment yield is variable, as streamflow increases, suspended and bedload sediment loads increase. Sediment pulses occasionally move downstream after a mass failure or other major sediment producing action occurs upstream. However, it is during the annual snowmelt peak discharge that sediment transport rates are predictably high and the duration of high sediment transport rates seems to be a function of the duration of bankfull and higher streamflow.

Suspended sediment/discharge samples were also collected at monitoring site (FL7007) located in the upper reaches of Big Creek, about one-half mile above Nicola Creek. Between 1979 and 1981 a total of 10 samples were gathered. Suspended sediment concentration was not significantly correlated with discharge from these data (Anderson 1988).

Soils

Existing soils data for the Big Creek area is sparse because little management has occurred recently. Soil monitoring is typically done after management activities to determine how much of an activity area has detrimental soil disturbance. However, numerous cutting units have been monitored across the Flathead National Forest on soil similar to those in the Moose Fire Area. The information from that monitoring would be applicable to the activities on the Moose Fire area. The results are summarized in the Land and Resource Management Plan Annual Monitoring Reports.

Other Existing Data for Big Creek Watershed

Bull Trout Population Trend Monitoring

In addition to the McNeil Core samples Montana Fish, Wildlife, and Parks collects information pertaining to bull trout population trends as part of the overall bull trout monitoring program partially funded by the Forest Service. Bull trout redd counts are completed annually in the vicinity of the McNeil Core samples and numbers of juvenile bull trout in these areas are also documented. This bull trout trend monitoring is expected to continue and will provide additional important information to help assess conditions in the watershed.

Table E.4 Summary of Big Creek bull trout redd counts inventories compared to the trends throughout the Flathead Basin from 1980-2001 in the stream sections monitored annually.

Drainage: Stream	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Big Creek	20	18	41	22	9	9	12	22	19	24	25
North Fork Totals	130	217	406	280	227	168[b/]	184	277	269	244	228
Middle Fork Total	142	83	194	156	134	173[b/]	167	149	160	158	77
Flathead Drainage Monitoring Count Totals	272[a/]	300[a/]	600	436	361	341[b/]	351	426	429	402	305
Drainage: Stream	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Big Creek	24	16	2	11	14	6	13	30	34	32	22
North Fork Totals	146	61	71	64	83	52	44	101	111	145	126
Middle Fork Total	97	62	51	51	78	31	70	86	104	106	104
Flathead Drainage Monitoring Count Totals	243	123	122	115	161	83	114	187	215	251	230

[a/]Counts may be low due to complete survey.
[b/]High flows may have obliterated some redds.

Step 4 - Specific Objectives

This step involved participation of both managers and technical staff in order to ensure that the specific objectives are technically and financially feasible. Specific objectives were carefully identified and described. Previous monitoring efforts as well as the likely impacts of the management actions were assessed.

The site specific objectives for this plan are given in the following table:

Table E.5 Specific Monitoring Objectives

Monitoring Parameter	Objectives
Soils – Soil Quality Monitoring	Measure the amount and location of detrimental soil disturbance in representative salvage units. Emphasis will be placed on proposed units that would be managed a second time with ground based harvest equipment.
Soils – BMP Implementation Monitoring	Evaluate the implementation and effectiveness of BMPs including the application of Streamside Management Zone rules.
Water Channel Condition Monitoring	Track the geomorphic conditions(erosion/deposition) at representative stable and unstable reaches.
Fisheries - Habitat R1/R4 Stream Inventory	Track the geomorphic conditions at representative reaches.
McNeil Core Substrate Monitoring	Track condition of key fishery habitat.

Step 5 - Sampling Locations, Monitoring Parameters, Sampling Frequency, and Analytic Procedures

This step involves identifying specific techniques, locations, and analysis tools to meet both the specific (Step 4) and general (Step 1) monitoring objectives.

This step would involve the Montana Fish Wildlife and Parks, the U.S. Fish and Wildlife Service , and the U.S. Environmental Protection Agency.

Various techniques are proposed to monitor the condition of soil, water, and fisheries in Big Creek:

- The McNeil Core procedure would be used to measure amounts of fine sediments in the stream. This monitoring procedure is currently being done annually on sampling reaches in Big Creek near Skookoleel and Hallowat, by the Montana Department of Fish, Wildlife and Parks. The Forest Service would continue to support this effort on an annual basis.

- A combination of channel cross-sections, Wolman peeble counts, Bank Erosion Index, and bank profile monitoring (using bank erosion pins per the Rosgen technique) would be used to quantify the amount of streambank erosion occurring in the most sensitive reaches of Big Creek. Monitoring sites would be located above, below, and within sensitive stream reaches. The Forest Service would monitor these sites on an annual basis.

- The R1/R4 stream inventory procedure follows a standardized protocol developed at the Forest Service's Intermountain Research Station. The data gathered using this protocol "………helps the user observe and contrast fish population and habitat status and condition across multiple landscape scales." The R1/R4 inventory data provides Forest Service fisheries biologists a comprehensive record of stream condition and fish habitat availability, potentially encompassing the entire length of a given stream.

- R1/R4 inventories include information on pool size and abundance, the amount of large woody debris, substrate size, and channel stability, as well as numerous other aspects of stream structure. This procedure also provides estimates of fish population size and composition. Because it is a comprehensive inventory, it is the best source of information available to fisheries biologist to determine the status of fish habitat relative to INFISH Riparian Management Objectives (RMOs).

- A R1/R4 survey will be completed in at least 2-3 miles of the most sensitive stream reaches. These reaches will be resurveyed every 3-4 years with each site being surveyed at least 3 times to document changes occurring in the watershed. Past R1/R4 data has been collected but it is spotty and mostly located in the headwater streams of Big Creek. The initial R1/R4 surveys completed under this monitoring plan will establish the baseline for future comparisons.

- The effectiveness of the BMP/erosion control practices would be reviewed by the Forest Service during the second year following implementation of the control practices. Additional monitoring of Streamside Management Zones and INFISH RHCA buffers would also be completed as a portion of the BMP audits. In addition, if the Moose Post-Fire Project is implemented it would be eligible to be selected for inclusion in the State BMP audits in the Summer of 2004.

- The amount of detrimental soil disturbance would be determined by following the procedures outlined in the Proposed Soil Resource Condition Assessment by Steve Howes, located in the project record exhibit N-22. This process was used to determine the existing condition of proposed units that had undergone previous management activities.

- Two helicopter units and 2 cable harvest units would be monitored. All literature indicates that these logging systems have low impact on soils as supported by past monitoring on the Flathead National Forest. These logging systems are low priority for monitoring. Therefore, a representative sample of units would be monitored.

- All units proposed for ground-based logging that were previously managed would be monitored. These units have the greatest risk of exceeding 15 percent detrimental soil disturbance. Therefore, we will monitor all of them.

- Four units logged in winter with ground-based equipment would be monitored and four units logged with slash mats and ground based equipment would be monitored. Past monitoring on the Flathead National Forest indicate these logging systems protect the soil if conditions are right. Therefore, we will sample them to see if they meet the 15 percent guideline. If any of the sample does not meet the 15 percent guide we will look at the rest of the units to determine their condition.

- Monitoring would occur once following complete implementation of the project. During implementation, the sale administrator would monitor site and soil characteristics to ensure that the terms of the contract are met as it relates to design features that protect soil quality.

- The monitoring data would be used to determine the extent of detrimental soil disturbance within the completed cutting units.

As an additional margin of safety to ensure full support of beneficial uses, the MDEQ will also do macroinvertabrate and periphyton sampling once every five years to ensure that there are not any other indicators of aquatic life support problems associated with sediment. Also, Montana Fish, Wildlife and Parks will continue to do annual bull trout redd counts and juvenile abundance estimates within the index reaches of the Big Creek watershed.

Other ongoing monitoring includes the Post-Fire Emergency Revegetation monitoring in the Moose Fire area as well as the Erosion Control Revegetation Monitoring in Upper Big Creek.

It is also expected that some of the State of Montana BMP audits on the Flathead National Forest will include timber sales included in the Moose Post-Fire Project.

Tiering to the general and specific monitoring objects for the Big Creek watersheds and the potential threats to water quality, specific monitoring parameters were selected and are displayed in Table E.6.

Table E.6 Monitoring Parameters, Frequency, and Costs

Monitoring Parameter	Number of Sites/WS	Frequency/Yr	Program Costs	Equip/labor/analysis Costs/Yr (Discretionary Funds)
Soils – Soil Quality Monitoring	All Salvage Harvest Units	Post-harvest - once	Soils – 100%	$5500
Soils – BMP Implementation Monitoring	10-15 % of harvest units & roads accessing units	Post-harvest – once (with possible State audits in addition)	Soils – 33% Hydro – 33% Fish – 33%	$3000
Water – Channel Condition Monitoring	5	Once per year 8-10 year duration	Hydro – 100%	$3000
Fishery Habitat - R1/R4 Stream Inventory Procedures	2-3 Miles Selected Reaches	Once every 3-4 years 10-12 year duration	Fish – 100%	$5000
McNeil Core Substrate Sampling	2 Sites	Once per year Long term duration 10+ years	Fish – 100%	$0 ($2500 funded per year in committed funding to MDFWP)

Steps 6 and 7- Comparing Monitoring Plan with Objectives and Budget

To meet the general and specific objectives of this monitoring plan, the following data collection costs are anticipated. Comparing the proposed monitoring parameters and their associated costs with the personnel and budget constraints lends the following comparison:

Table E.7 Budget Comparison

Monitoring Program	Proposed Plan	Discretionary Monitoring Budget Constraints
Soils Monitoring	$6500	$7000
Hydrology Monitoring	$4000	$4,000
Fisheries Monitoring	$6000	$12,000

This budget comparison indicates that the proposed budget of $23,000/year of discretionary monitoring funding would be sufficient to cover the costs of this $16,500 monitoring plan.

The Flathead National Forest has had a commitment for over two decades to monitor the effects of management activities on soil, water, and fish resources in Big Creek, and there have been tens of thousands of dollars spent toward that goal. A common interest and commitment to continue with monitoring in Big Creek exists and is expected to receive emphasis in the allocation of outyear budgets to accomplish this workload.

The scope of this proposed plan is appropriately designed to accomplish the monitoring objectives in a realistic and efficient manner. The budget comparison reveals that all items can be accomplished within available personnel and budget constraints.