

# APPENDIX F

## 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 burned areas along the west side of Hungry Horse Reservoir. 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 STRUCTURE

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

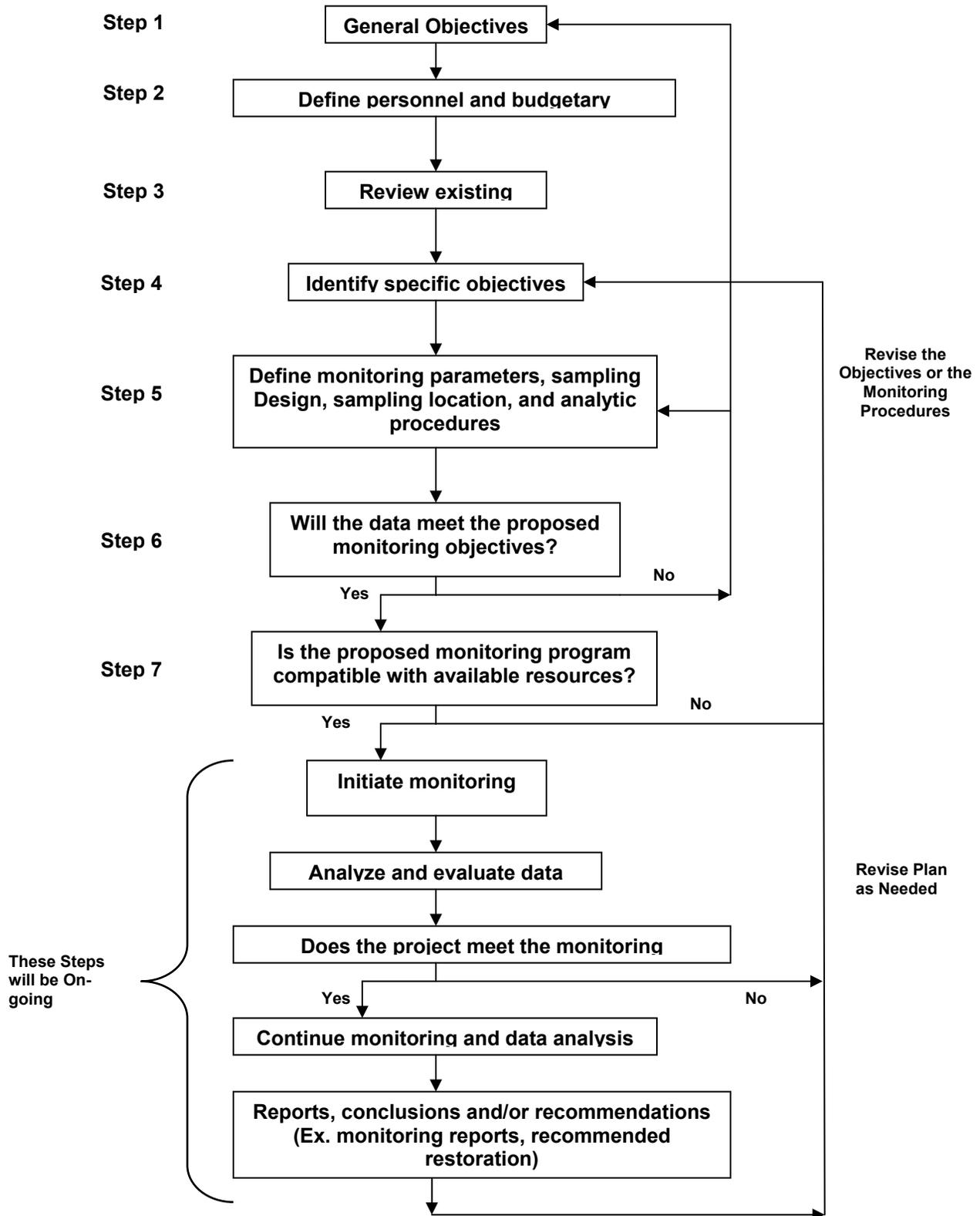
Each key step in the flow chart will be addressed separately. As new information or techniques become available, the feedback loops in the plan will be used to keep the monitoring plan allied with the general and specific monitoring objectives. This means that the monitoring locations, parameters, frequency, 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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<sup>1</sup> 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. Westside Reservoir 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.

Sullivan Creek is on the 1996-303(d) list and was described as partially supporting the beneficial uses of aquatic life and cold-water fishery, due to siltation and habitat alteration. Subsequent review resulted in the stream being moved to Appendix F of the list, a category of streams for which sufficient credible data to make a beneficial use determination did not exist and for which further study was needed. The EPA, in cooperation with the Flathead National Forest, has conducted additional field studies in Sullivan Creek and has recently issued a preliminary finding that Sullivan Creek is fully supporting the aquatic life and cold-water fishery.

The long-term goals for maintaining and improving the current water quality and aquatic habitat condition in Sullivan Creek and the other streams within the project area are as follows:

1. Reduce anthropogenic sediment delivery
2. Minimize alterations to the normal patterns of water yield by addressing increased drainage density attributable to the road network and past silvicultural activities.
3. Insure proper revegetation and reforestation occurs within the Westside Reservoir 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 impair fish reproduction and survival in any project-area stream. Of particular importance are the bull trout spawning streams, which are Sullivan (including Quintonkon Creek) and Wounded Buck Creeks. The key indicator for this objective would be the amount of interstitial fine sediments occurring in fish spawning habitat, as measured using the McNeil Core methodology.
- The desired condition for surface flow in project area streams 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 conduct stream stability and substrate particle size distribution surveys in Sullivan Creek and compare results to similar wilderness or unmanaged reference streams. This objective is to determine if

stream channels within watersheds that suffered moderate to high burn severity are in, approaching, or receding from equilibrium.

- The desired condition for the upland (ground surface between stream channels) would be to have vegetation cover (grass, forbs, shrubs, and forest, or to have a rock surface armoring, thereby preventing surface erosion sediment sources. 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 WESTSIDE RESERVOIR 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 on bull trout priority streams.
- 3) Determine whether Best Management Practices (BMPs) were implemented as specified and whether individual BMPs were effective.

*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, puddle formation, and erosion.

*Objective 2* - Monitor Sullivan and Wounded Buck Creeks to determine the impacts of wildfire and the post-fire salvage on important bull trout streams.

*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.

## **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 is provided through a variety of sources.

Annual funding allocated to monitoring on the Flathead NF for soil, water, and fisheries programs amounts to approximately twenty-two thousand dollars (\$22,000). The following table displays the budgetary constraints of discretionary funding for annual monitoring activities of these three programs.

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

<b>1) Monitoring Program</b>	<b>2) Annual Discretionary Monitoring Funds</b>
Soils Monitoring	\$5,000
Hydrology Monitoring	\$2,000
Fisheries Monitoring	\$15,000

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 larger streams affected by the Westside Reservoir Post-Fire Project have generally received some level of aquatic survey efforts in the past, but relatively little information exists regarding the many smaller streams within the project area. In general, the bull trout streams have been studied more intensively than the non-bull trout streams as part of efforts to assess and protect the threatened species.

The existing surveys are described in detail in the Soils, Hydrology, and Fisheries sections of the EIS, and are summarized below.

#### **Stream Channel Monitoring**

Stream channel stability surveys have been conducted in many project-area streams employing both Pfankuch and R1/R4 Fish Habitat Inventory methodologies. Many of the surveys took place in the 1970's and 1980's, and may not reflect current conditions. However, very little timber harvest has occurred in the project area since that era, and it likely that current conditions are similar or better than they were at the time the surveys were carried out. All stream reaches surveyed using the Pfankuch method received either a "good" or "fair" rating, consistent with results of surveys on unmanaged wilderness streams on the Flathead National Forest. Streams surveyed using the R1/R4 method were rated as 80-97% stable.

Large woody debris inventories have been completed in recent years on some stream reaches as part of the R1/R4 surveys. An adequate supply and distribution of LWD is important for the creation of pool habitat and control of stream power. Large woody debris in all surveyed reaches averaged greater than 200 pieces per mile, well above the INFISH standard of 20.

Fine sediment levels are a key component of fish habitat because of their potential to negatively affect spawning and rearing. Surface fines above 20% are considered to be cause for concern, while levels above 30% likely are impairing fish and macroinvertebrate

populations. Surface fines at surveyed sites within the project area ranged from 4-16%; however, surveys have only been conducted on a few of the project- area streams.

### Bull Trout Habitat Monitoring

Montana Fish, Wildlife, and Parks annually collects McNeil Core samples in Wounded Buck Creek as part of the overall bull trout-monitoring program that is partially funded by the Forest Service. Fine sediment in Wounded Buck Creek as measured in McNeil core samples has not exceeded 33% during the period of record.

Bull trout redd counts are completed annually in Sullivan and Wounded Buck Creeks. Redd counts in these streams are considered stable, and the bull trout population in the South Fork Flathead River and Hungry Horse Reservoir is increasing. A limited bull trout fishery in the watershed has recently been inaugurated.

### Soils Monitoring

Both timber harvesting and its associated road system have altered soils in the analysis area. In order to provide an indication of the extent of these activities and their effect on soils we do an analysis of the timber stand database and the roads database. This information along with literature and personnel observations of the effects of management on soils provides an indication or estimate of the amount of soil with reduced soil productivity.

The following table provides this information for the 173,347 acres soil analysis area consisting of the West Side Watersheds. This table shows the existing soil disturbances that resulted from road construction, past timber harvest since the 1950s and the disturbances associated with the West Side Fire suppression activities including the removal of hazard trees. It is important to note that there are no Forest or Regional soil quality standards for an analysis area.

**Table 2: Existing Soil Disturbance in the Soils Analysis Area**

<b>Acres of Skid Trails and Landings that have Reduced Soil Productivity from past Timber Harvest</b>	<b>Acres of Land in Roads and homesites</b>	<b>Acres of Land Disturbed by Fire Suppression including Hazard Tree Removal</b>	<b>Land occupied by the Trail System</b>	<b>Acres/Percent of Soil Analysis Area with Detrimental Disturbance</b>
4257	1846	39	15	6157/3.6%

### 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 3. 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.
BMP Implementation Monitoring	Evaluate the implementation and effectiveness of BMPs including the application of Streamside Management Zone rules.
Stream Channel Stability Monitoring in Sullivan Creek	Track the geomorphic conditions (erosion/deposition) in Sullivan Creek, by establishing a permanent cross-section within the stream. Cross-section monitoring should include Pfankuch stream stability, Wolman Pebble Count and Riffle Stability Index data.
McNeil Core Substrate Monitoring	Track condition of key bull trout spawning habitat in Wounded Buck Creek.

### **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 the Westside Reservoir Post-Fire Project area:

- The McNeil Core procedure would be used to measure amounts of fine sediments in the stream. The Montana Department of Fish, Wildlife and Parks is currently doing this monitoring annually on sampling reaches in Wounded Buck Creek. The Forest Service would continue to support this effort on an annual basis.
- A combination of channel cross-section, Wolman pebble count, Riffle Stability Index, and Pfankuch stream stability surveys would be used to quantify the amount of streambank erosion occurring in the most severely burned reach of Sullivan Creek. The monitoring site would be located above the confluence of Quintonkon Creek and below the confluence with Branch Creek. The Forest Service would monitor this site on a bi-annual basis.
- The Forest Service would review the effectiveness of the BMP/erosion control practices 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 Westside Reservoir Post-

Fire Project is implemented it would be eligible to be selected for inclusion in the State BMP audits in the summer of 2006.

- The amount of detrimental soil disturbance would be determined by following the procedures outlined in the Proposed Soil Resource Condition Assessment by Steve Howes (2001). This process was used to determine the existing condition of proposed units that had undergone previous management activities.
  - Two helicopter units and two 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.
  - Two units logged in winter with ground-based equipment would be monitored and all 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
  - 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.
- 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 Westside Reservoir Post-Fire Project.

Tiering to the general and specific monitoring objects for the Westside Reservoir watersheds and the potential threats to water quality, specific monitoring parameters were selected and are displayed in Table 3.

**Table 4. Monitoring Parameters, Frequency, and Costs**

<b>Monitoring Parameter</b>	<b>Number of Sites</b>	<b>Frequency/Yr</b>	<b>Program Costs</b>	<b>Equip/labor/analysis Costs/Yr (Discretionary Funds)</b>
Soils – Soil Quality Monitoring	10-15 sites	Post-harvest - once	Soils – 100%	\$3000
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%	\$1500
Stream Channel Stability Monitoring	1 site in Sullivan Creek	Once every other year 8-10 year duration	Hydro – 50% Fish – 50%	\$700
McNeil Core Substrate Sampling	1 Site in Wounded Buck Creek	Once per year Long term duration 10+ years	Fish – 100%	\$1500 (funded per year in committed funding to MDFWP)

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

The monitoring plan outlined above will provide important information regarding the condition of soils, streams, roads, and fish habitat within the project area. The data collected will enable specialists to assess the need for additional monitoring and/or restoration work related to past management, the fires of 2003, and post-fire management along the west side of Hungry Horse Reservoir.

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

**Table 5. Budget Comparison**

<b>Monitoring Program</b>	<b>Proposed Plan</b>	<b>Discretionary Monitoring Budget Constraints</b>
Soils Monitoring	\$3500	\$5000
Hydrology Monitoring	\$ 850	\$2000
Fisheries Monitoring	\$2350	\$15000

This budget comparison indicates that the proposed budget of \$22,000/year of discretionary monitoring funding would be sufficient to cover the costs of this \$6700 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 the South Fork Flathead River watershed, and there have been tens of thousands of dollars spent toward that goal. A common interest and commitment to continue with monitoring exists and is expected to receive emphasis in the allocation of out-year 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, based upon current projections.

*References*

Howes, S.W. 2001. Proposed Soil Resource Condition Assessment. Wallowa-Whitman National Forest. Baker City, OR. 9p.