APPENDIX A
MONITORING PLAN

INTRODUCTION

The following monitoring matrix describes monitoring associated with the Glacier Loon Project and summarizes the purpose, methods, and expected results and uses of the proposed monitoring activities. The Forest Service is currently seeking opportunities for multi-party monitoring of post treatment conditions.

TABLE A-1.
SUMMARY OF MONITORING ACTIVITIES

WHAT	WHERE	WHEN/DURATION	WHY	WHO	EXPECTED RESULTS AND USE
WILDLIFE					
Monitor temporary road reclamation and potential post sale use of temporary roads and skid trails.	Units	POST SALE	To determine if roads and skid trails are left in an adequate condition and to see if they are receiving post sale use.	Wildlife Biologist	Determine if temporary road closure expectations are correct.
INVASIVE PLANTS					
Monitor the contracted spraying along the haul routes after spraying is completed.	Haul Routes	Post Sale	To ensure proper spraying techniques and compliance with the NIWC DN.	COR or Forest Weed Coordinator	Monitor for noxious weed acres of infestation, effectiveness of control, containment, and prevention measures, and spread and existence of new populations of noxious weeds.
FOREST ROADS					
Monitor and oversee temporary road construction.	Temporary roads	Throughout duration of project implementation.	Insure road construction activities comply with contract specifications.	Contracting Officer, Forest Service Representative, and Timber Sale Administrator	Routinely determine compliance with contract specifications.
FOREST VEGETATION					
Review and Document tree marking and prescription compliance.	All or a sample of treatment units	During Sale Preparation	Ensure compliance with NEPA and FS policy	Silviculturist	Assure project implementation complies with the NEPA decision

TABLE A-1.
SUMMARY OF MONITORING ACTIVITIES

WHAT	WHERE	WHEN/DURATION	WHY	WHO	EXPECTED RESULTS AND USE
Develop NEPA to Implementation crosswalk.	SLRD	Prior to contract development	Ensure layout complies with NEPA decision	Presale Forester	Assure layout complies with NEPA decision
Review contract prior to advertisement.	SLRD	Prior to contract advertisement	Ensure contract complies with NEPA decision	TMO, Presale Forester, IDT members, Line Officer, Contracting Officer, TSA, ER	Assure project implementation complies with the NEPA decision
Monitor and oversee vegetation treatments.	All treatment units	Throughout project implementation	Ensure treatment activities comply with contract specifications	CO, FSR, TSA, HI, and Silviculturist	Assure compliance with contract specifications.
Conduct post treatment surveys to monitor changes in forest structure, composition, and insect and disease conditions and to determine in the silvicultural prescription was met.	All treatment units	Immediately following treatment and periodically thereafter as specified in the silvicultural prescription	Determine how well objectives were met and gather data needed to assess possible follow-up treatments	Silviculturist, Culturist, or designated Representative	Determine the effectiveness of treatments, the need to conduct follow-up treatments, and to make future treatment decisions.
Conduct reforestation surveys to determine regeneration success and needs.	All regeneration units	First, third, and fifth year after harvest	Determine regeneration success and needs	Silviculturist, Culturist, or designated Representative	Assure adequate stocking of desired species occurs.

APPENDIX B
BEST MANAGEMENT PRACTICES

INTRODUCTION

Federal agency compliance with pollution control is addressed through Section 313 of the Clean Water Act, EO 12580 (January 23, 1987), National Nonpoint Source Policy (December 12, 1984), USDA Nonpoint Source Water Quality Policy (December 5, 1986) and the EPA in their guidance "Nonpoint Source Controls and Water Quality Standards" (August 19, 1987). In order to comply with State and local non-point pollution controls, the Forest Service will apply BMPs to all possible non-point sources resulting from management activities proposed in this EA. These BMPs are the Soil and Water Conservation Practices described in the FSH 2509.22.

Best Management Practices are the primary mechanism for achievement of water quality standards (EPA 1987). This appendix describes the Forest Service's BMP process in detail, and lists the key Soil and Water Conservation Practices that have been selected to be used in the action alternatives analyzed in this EA.

Best Management Practices include, but are not limited to, structural, and non-structural controls, operations, and maintenance procedures. Best Management Practices can be applied before, during, or after pollution-producing activities to reduce or eliminate the introduction of pollutants into the receiving watershed (40 CFR 130.2, EPA Water Quality Standards Regulation). Best Management Practices are usually applied as a system of practices rather than a single practice. They are selected based on site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

The Flathead National Forest emphasizes the application of BMPs “to protect or improve the quality of the water resource” (Forest Plan, page II-40). Practices compiled from the Flathead Drainage 208 Project (May 1980), Flathead National Forest Hydrologic Guidelines (1980), and other sources are listed in the Water and Soils Sections of Chapter II, Forest-Wide Standards portion of the Flathead Forest Plan (pp. II-40 thru II-46). Additional BMPs are listed with the descriptions of individual management areas and in Appendix Q, Landtype Guidelines (pp. Q-1 through Q-9). The Water Standards section further states: “Water quality limits listed in the State Water Quality Standards are coordinated with BMPs” (p. II-40).

ROAD MAINTENANCE ASSOCIATED WITH THE GLACIER LOON PROJECT

Best Management Practices would be applied on **37.7 miles** of haul routes prior to the beginning of logging activities. Completion of BMPs would be required the first season during dry operating conditions. All BMPs required under the Timber Sale Contract would be met following completion of sale activities.

As summarized in the following table, road maintenance (application BMPs) would occur on specified road used for haul of commercial products.

TABLE B-1.
ROAD MAINTENANCE ASSOCIATED WITH THE GLACIER LOON PROJECT

ROAD NUMBER	MILES
79	7.80
561	1.28
9500	0.06
9552	1.00
9575	0.41
9578	4.18
9579	0.69
9591	2.70
9598	0.37
9773	0.64
9780	0.04
10563	0.48
10566	0.22
10567	1.31
10728	1.27
10732	1.81
10733	0.47
10734	0.17

TABLE B-1.
ROAD MAINTENANCE ASSOCIATED WITH THE GLACIER LOON PROJECT

ROAD NUMBER	MILES
10741	0.91
11648	0.18
90240	0.74
90242	0.45
90244	1.80
91239	0.71
91240	0.39
91241	1.59
91242	0.46
91305	0.78
91306	0.54
10157Y	0.16
11648B	0.75
79A	0.33
79C	0.70
79L	0.43
9579C	1.90
Total BMPS	37.7

STATE REQUIREMENTS FOR PROTECTION OF WATER QUALITY

Montana State Water Quality Standards require the use of reasonable land, soil, and water conservation practices (similar to BMPs) as the controlling mechanism for non-point pollution. The use of BMPs is also required in the MOU between the Forest Service and the State of Montana as part of the agency's responsibility as the designated water quality management agency on NFS lands.

BEST MANAGEMENT PRACTICES IMPLEMENTATION PROCESS

In cooperation with the State, the Forest Service's primary strategy for the control of non-point sources of pollution is based on the implementation of preventive practices (i.e., BMPs). The BMPs have been designed and selected to protect the identified beneficial uses of the watershed.

The Forest Service non-point source management system consists of the following steps:

BMP SELECTION AND DESIGN

Water quality goals are identified in the Forest Plan. These goals meet or exceed applicable legal requirements including State water quality regulations, the Clean Water Act, and the NEPA. Environmental assessments for projects are tiered to Forest Plans using the NEPA process. The appropriate BMPs are selected for each project by an ID Team. In each new location, there is flexibility to design different BMPs depending on local conditions and values and downstream

beneficial uses of water. The BMP selection and design are dictated by the proposed activity, water quality objectives, soils, topography, geology, vegetation, and climate. Environmental impacts and water quality protection options are evaluated, and alternative mixes of practices are considered. A final collection of practices is selected that not only protect water quality, but also meet other resource needs. These final selected practices constitute the BMPs for the project.

BMP APPLICATION

The BMPs are translated into contract provisions, special use permit requirements, project plan specifications, and so forth. This ensures that the operator or person responsible for applying the BMPs actually is required to do so. Site-specific BMP prescriptions are taken from plan-to-ground by a combination of project layout and Resource Specialists (hydrology, fisheries, soils, etc.). This is when final adjustments to fit BMP prescriptions to the site are made.

BMP MONITORING

When the resource activity begins (e.g., timber harvest or road building), Timber Sale Administrators, Engineering Representatives, Resource Specialists, and others ensure the BMPs are implemented according to plan. Best Management Practices implementation monitoring is done before, during, and after resource activity implementation. This monitoring answers the question: Did we do what we said we were going to do? Once BMPs have been implemented, further monitoring is done to evaluate if the BMPs are effective in meeting management objectives and protecting beneficial uses. If monitoring indicates that water quality standards are not being met or beneficial uses are not being protected, corrective action will consider the following:

1. Is the BMP technically sound? Is it really best or is there a better practice that is technically sound and feasible to implement?
2. Was the BMP applied entirely as designated? Was it only partially implemented? Were personnel, equipment, funds, or training lacking which resulted in inadequate or incomplete implementation?
3. Do the parameters and criteria that constitute water quality standards adequately reflect human-induced changes to water quality and beneficial uses?

FEEDBACK

Feedback on the results of BMP evaluation is both short and long term in nature. Where corrective action is needed, immediate response will be undertaken. This action may include modification of the BMP, modification of the activity, ceasing the activity, or possibly modification of the State Water Quality Standard. Cumulative effects over the long term may also lead to the need for possible corrective actions. Effectiveness of BMPs is based on audit results. Audit results specific to the Swan Lake Ranger District of the Flathead National Forest are on file at the District Office.

BEST MANAGEMENT PRACTICES EFFECTIVENESS

In looking at the effectiveness of BMPs for the Flathead National Forest, it is reasonable to group BMP audit results for the Kootenai and Flathead National Forests together since they have similar soils. Both Forests are dominated by soils formed in the glacial till formed in material weathered from Belt rocks. This material is topped with wind blown volcanic ash from west coast eruptions up to 6000 years ago.

Best Management Practice audits have occurred on the Flathead and Kootenai National Forests since 1988. Audits are done to determine if BMPs were properly applied and, if so, if they were effective at maintaining soil and water quality. Since 1988, individual BMPs have been audited or monitored 2232 times on the Flathead and Kootenai National Forests. They were effective 2211 times.

In order to analyze the results of the BMP audits, they were grouped according to the soil type on which they occurred. The simplest way is to group them by two classes:

1. Residual soils that formed from the underlying bedrock, or
2. Soils formed from glacial till.

Looking at these soil criteria, BMPs were effective when properly applied on glacial soils 1585 times out of 1596 applications. Best Management Practices were effective when properly applied on residual soils 154 out of 156 applications. An additional 480 BMPs were monitored without reference to the soil types on which they are applied. Of these, 472 were effective at protecting soil and water quality.

In summary, BMPs were effective 99.3 percent of the time they were properly applied on glacial till soils. Lumping the entire audit results together regardless of their soil types and including the earliest audits that were not specific to soil type, BMPs were effective 99 percent of the time that they were properly applied on the Flathead and Kootenai National Forests.

ITEMS COMMON TO ALL SOIL AND WATER CONSERVATION PRACTICES

RESPONSIBILITY FOR IMPLEMENTATION

The Swan Lake District Ranger is responsible for ensuring that all applicable SWCPs are applied and implemented. The Timber Management Assistant is responsible for ensuring that the objectives of the SWCPs identified in this appendix are incorporated into the Timber Sale Contract by use of the appropriate Timber Sale Contract CT provisions. The Timber Sale Administrator and Engineering Representative/Contracting Officer's Representative (ER/COR) is responsible for ensuring that contract provisions are properly administered on the ground.

MONITORING

The Timber Sale Administrator, ER/COR, Forest Soil Scientist, and Forest Hydrologist, as needed, will monitor the effectiveness of the applied SWCPs. If the practice is not effective in meeting State or Forest Plan Standards, the practice or project activity will be redesigned, rescheduled, or dropped. Feedback of the results of the site-specific SWCP monitoring to the Forest Soil Scientist will ensure that the best practices are incorporated into all projects impacting water quality. This requirement conforms to the objectives of Practice 11.02 - Soil and Water Resource Monitoring and Evaluation.

SITE-SPECIFIC BEST MANAGEMENT PRACTICES

Description of the soil and water conservation practices from the Forest Service Soil and Water Conservation Handbook (FSH 2509.22) will be applied in all alternatives. The location where the practices will be applied is specified in the table below. For a more detailed description of a specific BMP refer to the Soil and Water Conservation Handbook.

Abbreviations used in this table:

COR = Contracting Officer's Representative
EA = Environmental Assessment
ER = Engineering Representative
FMO = Fire Management Officer
FNF = Flathead National Forest
IDT = Interdisciplinary Team
INFISH = Inland Native Fish Strategy
PSF = Pre Sale Forester
RHCA = Riparian Habitat Conservation Area
SAM = Sale Area Map
SMZ = Streamside Management Zone
SPS = Special Project Specification
SWCP = Soil and Water Conservation Practice
TSA = Timber Sale Administrator
TSC = Timber Sale Contract

SWCP	MT BMP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	STANDARD CONTRACT PROVISIONS	STEWARDSHIP CONTRACT PROVISIONS
14.01	IV. A-C	TIMBER SALE PLANNING - To incorporate soil and water resource considerations into Timber Sale Planning	All Activities	1. Unit design, mitigation, and effects analysis was done by IDT. 2. TSC will be prepared by PSF that will include management constraints and Design Criteria from EA. 3. Use standard interim RHCA widths unless modified through watershed analysis. 4. Use exiting skid trails where feasible.	IDT has evaluated watershed characteristics and estimated response to proposed activities. EA identifies Design Criteria to protect soil and water resources. Timber sale contracts will include provisions to meet water quality, soils, and other resources as directed by the Decision.	IDT, PSF	N/A	N/A

SWCP	MT BMP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	STANDARD CONTRACT PROVISIONS	STEWARDSHIP CONTRACT PROVISIONS
14.02	IV. A	TIMBER HARVEST UNIT DESIGN - To insure that timber harvest unit design will secure favorable conditions of water flow, maintain water quality and soil productivity, and reduce soil erosion and sedimentation.	All Activities	1. Cumulative effects analysis and unit design were performed by IDT. 2. The prescriptions and unit design are consistent with direction outlined in the considerations for BMPs. 3. Use standard interim RHCA widths unless modified through watershed analysis. 4. Use exiting skid trails where feasible.	Proposed activities were evaluated to estimate the potential watershed response. Prescriptions will be designed to assure an acceptable level of protection for soil and water resources. Management will protect soil/water values by avoiding sensitive areas, adjusting unit boundaries, adding specific BMPs to meet specific SWCPs, applying mitigation, and applying implementation/effectiveness monitoring.	IDT	N/A	N/A
14.03	N/A	USE OF SALE AREA MAPS (SAMs) FOR DESIGNATING SOIL AND WATER PROTECTION NEEDS - To delineate the location of protected areas and available water sources and insure their recognition, proper consideration, and protection on the ground.	All Activities	1. Water courses identified and protected using SMZ buffers as a minimum. 2. Skidding on soil when moisture is <18%. 3. Use designated skid trails agreed to by TSA. 4. Use standard interim RHCA widths unless modified through watershed analysis.	The IDT will identify water courses to be protected, unit boundaries, and other features. Ground verification and preparation of SAMs to be included in TSC will be done by PSF. TSA reviews areas of concern with purchaser before operations.	IDT, PSF, TSA	B(T)1.1 B(T)6.5 C(T)6.50# C(T)6.4#	B.1 G.5 K-G.5.0# K-G.4#

SWCP	MT BMP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	STANDARD CONTRACT PROVISIONS	STEWARDSHIP CONTRACT PROVISIONS
14.04	IV. A-2, B-1,2 VI. A	LIMITING THE OPERATION PERIOD OF TIMBER SALE ACTIVITIES - To minimize soil erosion, sedimentation, and a loss in soil productivity by insuring that the purchaser conducts his/her operations in a timely manner.	All Activities	1. Units located on soils sensitive to compaction and/or displacement have been identified. 2. Designate units needing harvest on frozen or snow covered ground. 3. All other ground disturbing activities will occur during dry, frozen, or snow-covered conditions. 4. Be prepared to suspend operations if conditions change rapidly and when the erosion hazard becomes high. 5. Consult with operators experienced with winter logging techniques. 6. In wet unfrozen soil areas, use tractors or skidders ro compact the snow for skid road locations only when adequate snow depth exists. Avoid steeper areas where frozen skid trails be may subject to erosion next spring.	If limited operating periods are identified and recommended during the analysis by the IDT, the PSF will prepare a contract that includes appropriate provisions.	IDT, PSF, TSA	B(T)6.31 B(T)6.311 B(T)6.6 C(T)6.6 C(T)6.316# C(T)6.4#	G.3.1 G.3.1.1 G.6 K-G.6 K-G.3.1.6# K-G.4#
14.05	IV. A-B III A-2-4	PROTECTION OF UNSTABLE AREAS - To protect unstable areas and avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.	All Activities	1. Unstable landtypes will be identified during the planning process. 2. Units found to need further protection will use alternative yarding techniques, seasonal restrictions, and/or unit boundary adjustments.	If the NEPA analysis concluded that soils/geology in the area were unstable, BMPs would be designed to prevent irreversible soil and water effects.	IDT, PSF, TSA	C(T)6.316# C(T)6.4#	K-G.3.1.6# K-G.4#

SWCP	MT BMP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	STANDARD CONTRACT PROVISIONS	STEWARDSHIP CONTRACT PROVISIONS
14.06	II	RIPARIAN AREA DESIGNATION - To minimize the adverse effects on riparian areas with prescriptions that manage nearby logging and related land disturbance activities.	All Activities	1. Identify areas with or adjacent to wet areas. 2. Default RHCA widths will be adhered to unless modified through watershed analysis. SMZ widths will be used as a minimum if modification is proposed. 4. Areas found during sale layout will be reported to the Hydrologist and afforded the same protections as those identified earlier.	All streams and wetlands in the project area will comply with FNF Forest Plan as amended by INFISH. The width of the riparian areas will be decided upon by the IDT. These widths will be included on the SAM, marked on the ground and included in the TSC.	IDT, PSF	B(T)1.1 B(T)6.5, C(T)6.4# C(T)6.41# C(T)6.50#	B.1 G.5 K-G.4# K-G.4.1# K-G.5.0#
14.07	IV. A-2 B-1	DETERMINING TRACTOR-LOGGABLE GROUND - To protect water quality from degradation caused by tractor logging ground disturbance.	All Activities	1. Tractor loggable units have been identified during the planning process. 2. Those areas found not to be tractor loggable were designated as alternative logging systems or were dropped form the unit.	IDT has identified tractor-loggable ground (in conjunction with personnel from timber operations) during transportation and timber sale planning process. The results have been used to determine intensity of and restrictions for land disturbance activities. TSC and SAM indicate areas and conditions under which tractors can operate.	IDT, PSF	B(T)1.1 B(T)6.42 C(T)6.4# C(T)6.316#	B.1 G.4.2 K-G.4# K-G.3.1.6#
14.08	IV. A-B	TRACTOR SKIDDING DESIGN - To minimize erosion and protect soil productivity by designing skidding patterns to best fit the terrain.	All Activities	1. Identify units with designated or dispersed skid trails. 2. TSA and purchaser agree on proposed locations before operation.	IDT has identified sensitive areas during the planning process. The TSA will execute the plan on the ground by locating the skid trails with the timber purchaser or by agreeing to the purchaser's proposed locations prior to operation.	IDT; TSA	B(T)6.422 C(T)6.4#	G.4.2 K-G.4#

SWCP	MT BMP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	STANDARD CONTRACT PROVISIONS	STEWARDSHIP CONTRACT PROVISIONS
14.09	IV. A-2	SUSPENDED LOG YARDING IN TIMBER HARVESTING - To protect the soil from excessive disturbance and accelerated erosion and maintain the integrity of the riparian areas and other sensitive areas.	Cable Logging Units	1. Units that have slopes that are unsuitable for or sensitive to ground base skidding will be identified. 2. Units with sustained slopes >35% will be designated cable harvest units.	IDT recognizes the hazards associated with operating on steep and/or rocky slopes. Areas found to be of concern will use appropriate harvest systems that provide for a safe work environment and protect natural resources.	IDT, PSF	B(T)6.42 C(T)6.4# C(T)6.50#	G.4.2 K-G.4# K-G.5.0#
14.10	IV. A-5,6 B-4	LOG LANDING LOCATION AND DESIGN - To locate in such a way as to avoid soil erosion and water quality degradation.	All Activities	1. TSA and purchaser agree on landing locations before operation. 2. Use minimum size and least excavation needed. 3. No side-cast material into sensitive areas or waterways. 4. Install proper drainage.	TSA must agree to landing locations proposed by the purchaser. Approved landing locations will meet the criteria of minimal size, least excavation needed, minimum skid roads necessary, no side-cast material into sensitive areas, and have proper drainage.	TSA	B(T)6.422 C(T)6.422	G.4.2.2 K-G.4.2.2
14.11	IV. A-5,6 B-4	LOG LANDING EROSION PREVENTION AND CONTROL- To reduce erosion and subsequent sedimentation from log landing through the use of mitigating measures.	All Activities	1. Proper drainage will be installed and maintained during operation. 2. Landings will be scarified, seeded, and fertilized upon completion of harvest activities. 3. TSA will assess conditions and take necessary steps to ensure soil and water protection.	PSF and TSA assess what is necessary to prevent erosion from landings and to ensure stabilization. It is up to the TSA to request technical assistance as needed.	PSF, TSA	B(T)6.6 B(T)6.64 C(T)6.6 C(T)6.632# C(T)6.633#	G.6 G.6.4 K-G.6 K-G.6.3.2# K-G.6.3.3#

SWCP	MT BMP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	STANDARD CONTRACT PROVISIONS	STEWARDSHIP CONTRACT PROVISIONS
14.12	IV. A-C	EROSION PREVENTION AND CONTROL MEASURES DURING THE TIMBER SALE OPERATION - To ensure that the purchaser's operations shall be conducted reasonably to minimize soil erosion.	All Activities	1. Designate units with seasonal restrictions. 2. Do not operate during wet periods including spring snowmelt and/or intense or long-duration rain storms. 3. TSA ensures that erosion control is kept current and prevents operation when excessive impacts are possible.	PSF and TSA sets purchaser's responsibility to prevent soil/water resource damage in TSC. TSA ensures that erosion control is kept current and prevents operation when excessive impacts are possible.	PSF, TSA	A16 B(T)6.6 B(T)6.64 C(T)6.6 C(T)6.601# C(T)6.316#	A.16 G.6 G.6.4 K-G.6 K-G.6.6.1 K-G.3.1.6#
14.13	IV. B-5, 6	SPECIAL EROSION PREVENTION MEASURES ON AREAS DISTURBED BY HARVEST ACTIVITIES - To prevent erosion and sedimentation on disturbed areas.	All Activities	1. Waterbar, slash, seed, and/or fertilize skid trails and landings. 2. Rehabilitate constructed skid trails and temporary roads. 3. BMPs may be adjusted by the TSA to meet operational requirements.	IDT identifies locations needing special stabilization measures. If any such areas are identified, BMPs may be adjusted by the TSA to meet operational requirements.	IDT, TSA	C(T)6.601# C(T)6.32# C(T)6.633#	K-G.6.0.1# K-G.6.3.2# K-G.6.3.3#
14.14	IV. B-5	REVEGETATION OF AREAS DISTURBED BY HARVEST ACTIVITIES - To establish a vegetative cover on disturbed areas to prevent erosion and sedimentation.	All Activities	1. Seed and fertilize areas of exposed soil with FNF approved vegetative and fertilizer mix.	IDT has established vegetation and fertilizer mix to be used in the project area with outlines on the extent to which it should be used. TSA is responsible for seeing that revegetation work required by purchaser is done correctly and in a timely manner. The purchaser will be responsible for revegetation immediately after the completion of harvest. Funds will be collected for the District to do follow-up seeding/fertilizing in years two and three after harvest.	IDT, TSA	C(T)6.01# C(T)6.633#	K-G.6.0.1# K-G.6.3.3#

SWCP	MT BMP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	STANDARD CONTRACT PROVISIONS	STEWARDSHIP CONTRACT PROVISIONS
14.15	IV. A-4, 5 B- 5, 6	EROSION CONTROL ON SKID TRAILS - To protect water quality by minimizing erosion and sedimentation derived from skid trails.	All Activities	1. Ensure proper skid trail location. 2. Ensure proper drainage on skid trails. 3. Rehabilitate constructed skid trails and temporary roads. 4. Ensure maintenance of erosion control structures by purchaser.	Erosion control measures may be recommended by the IDT, but site specifically adjusted by the TSA. TSA will ensure erosion control measures are applied prior to expected hydrologic events (spring runoff, high-intensity storms, etc.). Maintenance of erosion control structures by the purchaser may be necessary and requested by the TSA.	TSA	B(T)6.6 B(T)6.65 B(T)6.66 C(T)6.6 C(T)6.633#	G.6 G.6.5 G.6.6 K-G.6 K-G.6.3.3#
14.16	IV. B-2	WET MEADOW PROTECTION DURING TIMBER HARVESTING - To avoid damage to the ground cover, soil, and water in meadows.	All Activities	1. Identify units with or adjacent to wet meadows. 2. Units with unmapped wet areas will be reported to Hydrologist and afforded the same protection as those identified during the planning process. 3. Standard interim RHCA widths will be adhered to unless modification is in place. 2. SMZ law will be met or exceeded.	IDT has identified areas needing special protection. PSF will verify the areas needing protection and prepare the contract to prevent damage to meadows. The TSA will be responsible for on-the-ground protection of meadows. If meadows are found by the TSA during operations, it is their responsibility to either afford them the proper protection or pursue a contract modification.	IDT, PSF, TSA	B(T)1.1 B(T)6.422 B(T)6.61 C(T)6.4# C(T)6.62#	B.1 G.4.2.2 G.6.1 K-G.4# K-G.6.2#
14.17	V. A-C	STREAM CHANNEL PROTECTION (IMPLEMENTATION AND ENFORCEMENT) - Protect natural stream flows; provide unobstructed passage of flows; reduce sediment input; and restore flow if diverted by timber sale activity.	All Activities	1. Standard interim RHCA widths will be adhered to unless modification is in place. 2. SMZ widths will be used at a minimum if modification in place. 3. SMZ law will be met or exceeded.	IDT has identified the location of channels in the decision area. PSF will prepare a SAM locating the channels needing protection. Layout crew marks boundaries and trees according to HB-731 and FP guidelines. TSA will see that TSC items are carried out on the ground. Technical assistance will be consulted as needed.	IDT, PSF, TSA	B(T)1.1 B(T)6.5 B(T)6.6 C(T)6.50# C(T)6.6	B.1 G.5 G.6 K-G.5.0# K-G.6

SWCP	MT BMP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	STANDARD CONTRACT PROVISIONS	STEWARDSHIP CONTRACT PROVISIONS
14.18	IV. A-C	EROSION CONTROL STRUCTURE MAINTENANCE - To insure that constructed erosion control structures are stabilized and working effectively.	All Activities	1. During the period of the TSC, the purchaser is responsible for maintaining their erosion control features.	During the period of the TSC, the purchaser is responsible for maintaining their erosion control features. If work is needed beyond this time, the District will pursue other sources of funding.	TSA	B(T)6.66 B(T)6.67	G.6.6 G.6.7
14.19	IV. A-C	ACCEPTANCE OF TIMBER SALE EROSION CONTROL MEASURES BEFORE SALE CLOSURE - To assure the adequacy of required erosion control work on timber sales.	All Activities	1. TSA reviews erosion prevention work before each harvest unit is considered complete. 2. The inspection will determine if the work is acceptable and will meet the objective of the erosion control feature.	A careful review of erosion prevention work will be made by the TSA before each harvest unit is considered complete. The inspection will determine if the work is acceptable and will meet the objective of the erosion control feature. A feature is considered not acceptable if it does not meet standards or is not expected to protect soil/water values. Technical assistance will be used as necessary.	TSA	B(T)6.36	G.3.6
14.20	IV. C	SLASH TREATMENT IN SENSITIVE AREAS - To protect water quality by protecting sensitive tributary areas from degradation that would result from using mechanized equipment for slash disposal.	All Activities	1. Where harvest is proposed within riparian areas, either slash should be removed with the tree or scattered and not treated. 2. Mechanical fuels treatments should not be used on sensitive land types.	All activities will comply with the FNF Forest Plan as amended by INFISH. Where harvest within riparian areas is proposed, either the slash would be removed with the tree or scattered and not treated.	TSA, FMO	B(T)6.5 B(T)6.7 C(T)6.50# C(T)6.7 C(T)6.71 C(T)6.753	G.5 G.7 K-G.5.0# K-G.7# K-G.7.1 K-G.7.5.3
14.22	N/A	MODIFICATION OF THE TSC - To modify the TSC if new circumstances or conditions indicate the timber sale will cause irreversible damage to soil, water, or watershed values.	All Activities	1. Environmental modification procedure.	If TSC is not adequate to protect soil/water resources, the TSA and Contracting Officer are responsible for recommending modification of the TSC.	TSA	B(T)8.33	i.3.3

SWCP	MT BMP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	STANDARD CONTRACT PROVISIONS	STEWARDSHIP CONTRACT PROVISIONS
15.01	III. A-E	GENERAL GUIDELINES FOR TRANSPORTATION PLANNING - To introduce soil and water resource considerations into transportation planning.	All Roads	1. Complete a roads analysis. 2. Transportation plans include installation and maintaining proper drainage.	The IDT has evaluated watershed characteristics and estimated the response of soil and water resources to proposed transportation alternatives and activities.	IDT, ER	N/A	
15.02	III. A-B	GENERAL GUIDELINES FOR THE LOCATION AND DESIGN OF ROADS AND TRAILS - To locate and design roads and trails with minimal soil and water impact while considering all Design Criteria.	New Road and Trail Construction	1. Follow INFISH Standards and Guidelines for road management. 2. Identify sensitive land types, riparian areas, and wetlands during planning. 3. Use the minimum amount of roads and trails necessary.	The IDT has insured that the location and design of roads and trails are based on multiple resource objectives. Mitigation measures have been designed to protect the soil and water resources identified in the NEPA process. Contract provisions will be prepared by the ER that meets the soil and water resource protection requirements.	IDT, ER		
15.03	III. A-E	ROAD AND TRAIL EROSION CONTROL PLAN - To prevent, limit, and mitigate erosion, sedimentation, and resulting water quality degradation prior to the initiation of construction by timely implementation of erosion control practices.	New Road and Trail Construction	1. Seed and fertilize disturbed areas. 2. Install proper ditching and road slope. 3. Install proper drainage. 4. Incorporate road grade breaks. 5. Use minimum road or trail length/width necessary. 6. Avoid wet areas or areas of sensitive soil types.	IDT has established soil/water conservation objectives and mitigation measures. ER will then prepare a contract that reflects the objectives. ER will see that erosion control measures are approved and completed in a timely manner. IDT reviews projects to check effectiveness of erosion control features.	IDT, ER	B(T)6.31 B(T)6.312 B(T)6.6 C(T)6.601#	G.3.1 G.3.1.2 G.6 K-G.6.0.1#
15.04	III. D 1, 4	TIMING OF CONSTRUCTION ACTIVITIES - To minimize erosion by conducting operations during minimal runoff periods.	New Road and Trail Construction	1. Avoid construction during wet periods.	IDT has outlined detailed erosion control measures in NEPA process. ER puts these measures into contract provisions. Compliance is assured by Contracting Officer or ER.	IDT, ER	B(T)6.31 B(T)6.312 B(T)6.6 SPS 204	G.3.1 G.3.1.2 G.6

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15.05	III. A-E	SLOPE STABILIZATION AND PREVENTION OF MASS FAILURES - To reduce sedimentation by minimizing the chances for road-related mass failures, including landslides and embankment slumps.	New Road and Trail Construction	Avoid construction across unstable areas. Construct embankments following approved engineering practices. 3. Use minimum road or trail length/width necessary.	Road and trail construction in mountainous terrain requires cutting and loading natural slopes which may lead to landslides and/or embankment failures. In areas with intrinsic slope stability problems, appropriate technical resource personnel must be involved in an interdisciplinary approach to route location.	IDT,; ER	N/A	
15.06	III. A-E	MITIGATION OF SURFACE EROSION AND STABILIZATION OF SLOPES - To minimize soil erosion from road cut slopes, fill slopes, and travel ways.	All Haul Roads	1. Seed and fertilize cut and fill slopes. 2. Install proper ditching and road slope. 3. Install proper drainage. 4. Incorporate road grade breaks. 5. Install ditch relief culverts before/after stream crossings.	IDT has outlined detailed erosion control measures in the NEPA process. Stabilization techniques are included in contract provisions. Compliance is assured by Contracting Officer or ER.	IDT, ER	SPS 203, 204, 206A 210, 412 619, 625, 626 630 B(T) 5.3 B(T)6.6 B(T)6.63 B(T)6.66 B(T)6.312 C(T)5.314# C(T)6.6 C(T)6.601#	F.3 G.6 G.6.3 G.6.6 G.3.1.2 K-F.3.1.4# K-G.6 K-G.6.0.1#
15.07	III. E-2	CONTROL OF PERMANENT ROAD DRAINAGE - To minimize the erosive effects of concentrated water and degradation of water quality by proper design and construction of road drainage systems and drainage control structures.	All Haul Roads	1. Avoid long, steep grades. 2. Maintain adequate surface drainage. 3. Prevent erosion of culvert fills. 4. Maintain ditches. 5. Ditch relief culverts before/after stream crossings.	IDT has identified locations, Design Criteria, drainage control features, and mitigation. Compliance will be assured by the ER/Contracting Officer.	ER	B(T)5.3 B(T)6.6 C(T)5.31# C(T)6.6	F.3 G.6 K-F.3.1# K-G.6

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15.08	III. D	PIONEER ROAD CONSTRUCTION - To minimize sediment production and mass wasting associated with pioneer road construction.	New Road and Trail Construction	1. Ensure stable slopes during construction. 2. Seed and fertilize exposed soil. 3. Avoid construction during wet periods. 4. Use slash filter windrows.	ER/Contracting Officer will be responsible for enforcing contract specifications. The purchaser is responsible for submitting an operating plan that includes erosion control measures.	ER	B(T)5.23 B(T)6.31 B(T)6.311 B(T)6.312 B(T)6.6 C(T)6.601# SPS 204	F.2.3 G.3.1 G.3.1.1 G.3.1.2 G.6 K-G.6.0.1#
15.09	III. E-7,8	TIMELY EROSION CONTROL MEASURES ON INCOMPLETE ROADS AND STREAM CROSSING PROJECTS - To minimize erosion of and sedimentation from disturbed ground on incomplete projects.	All Road construction, reconstruction, and maintenance	1. Avoid construction during wet periods. 2. Use slash filter windrows or silt fence. 3. Seed and fertilize disturbed areas.	IDT has identified project location and mitigation measures in NEPA process. Protective measures will be kept current on all areas of disturbed, erosion-prone areas. TSA ensures contract compliance.	IDT, TSA	B(T)5.23 B(T)6.31 B(T)6.6 B(T)6.66 C(T)6.6 C(T)6.601#	F.2.3 G.3.1 G.6 G.6.6 K-G.6 K-G.6.0.1#
15.10	III. D-8	CONTROL OF ROAD CONSTRUCTION, EXCAVATION, AND SIDE-CAST MATERIAL - To reduce sedimentation from unconsolidated excavated and side-cast material caused by road construction, reconstruction, or maintenance.	All Road construction, reconstruction, and maintenance	1. Do not side-cast into waterways or sensitive areas. 2. Use slash filter windrows or silt fence.	IDT has identified project location and mitigation measures in NEPA process. Protective measures will be kept current on all areas of disturbed, erosion-prone areas. TSA ensures contract compliance.	IDT, TSA	B(T)5.3 C(T)5.31# SPS 203 SPS 204	F.3 K-F.3.1#
15.11	VII. A- 1,2	SERVICING AND REFUELING EQUIPMENT - To prevent contamination of waters from accidental spills of fuels, lubricants, bitumens, and other harmful materials.	All Activities	1. Ensure proper fuel storage and transportation. 2. Keep fuel from streams, wetlands, ponds, and lakes.	ER/TSA/Contracting Officer will designate the location, size, and uses of service refueling areas. All projects will adhere to the FNF Hazardous Substance Spill Plan in case of accidents.	ER, TSA	B(T)6.222 B(T)6.34 B(T)6.341	G.2.2.2 G.3.4 G.3.4.1

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15.12	III A. 4	CONTROL OF CONSTRUCTION IN RIPARIAN AREAS - To minimize the adverse effects on riparian areas from roads.	New Road and Temporary Road Construction	1. Follow INFISH Standards and Guidelines for construction within riparian areas. 2. Use slash filter windrows or silt fence. 3. Install ditch relief culverts and surface water deflectors before/after stream crossings.	Proposed new and temporary roads will adhere to guidelines in the Montana Streamside Management Zone Law (HB-731). All road activities will follow INFISH Standards and Guidelines for road management.	ER, TSA	B(T)6.5 B(T)6.62 C(T)6.50# SPS 206 SPS 206A	G.5 G.6.2 K-G.5.0#
15.13	V. C-1	CONTROLLING IN-CHANNEL EXCAVATION - To minimize stream channel disturbances and related sediment production.	All Road construction, reconstruction, and maintenance	1. Use silt fence to minimize introduced sediment 2. Use minimum amount of road. 3. Construct minimum number of crossings.	BMP improvements at crossings would adhere to the guidelines in Montana Streamside Management Zone Law (HB-731) and the INFISH Standards and Guidelines for road management.	ER, TSA	B(T)6.5 SPS 204 SPS 206 206A	G.5
15.14	V. A, C	DIVERSION OF FLOWS AROUND CONSTRUCTION SITES - To minimize downstream sedimentation by insuring all stream diversions are carefully planned.	All Work at Stream Crossings	1. Divert stream flow around construction. 2. Use silt fence to minimize introduced sediment 3. Construction during low-flow	The IDT has determined, where stream crossings meet multiple resource objectives, the crossings would require a State 124 permit. This would require the State Fish, Wildlife, and Parks to review the adequacy of the proposed mitigation. Compliance with contract provisions would be done by the ER.	IDT, ER	B(T)6.5 B(T)6.31 C(T)6.50# C(T)6.6	G.5 G.3.1 K-G.5.0# K-G.6

SWCP	MT BMP	SWCP OBJECTIVE	APPLICABLE UNITS/ROADS	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	STANDARD CONTRACT PROVISIONS	STEWARDSHIP CONTRACT PROVISIONS
15.15	V. A-C	STREAM CROSSINGS ON TEMPORARY ROADS - To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.	All Roads	1. Consult Hydrologist on placement of crossing. 2. Use minimum number of stream crossings. 3. Construction during low-flow. 4. Follow INFISH Standards and Guidelines for construction within riparian areas.	The IDT identifies areas in need of a temporary road during the NEPA process. Proposed stream crossings would adhere to the guidelines in Montana Streamside Management Zone Law (HB-731).	PSF, ER, TSA	N/A	
15.16	V. C 1-7	BRIDGE AND CULVERT INSTALLATION - To minimize sedimentation and turbidity resulting from excavation for in-channel structures.	All Road construction, reconstruction, and maintenance	1. Installation should be done during periods of low flow. 2. In-stream sediment retention devices should be used throughout implementation.	IDT has identified project location and mitigation measures in NEPA process. Protective measures will be kept current on all areas of disturbed, erosion-prone areas. TSA ensures contract compliance.	IDT, TSA	C(T)5.31# (T-310) B(T)6.312	K-F.3.1# (T-618) G.3.1.2
15.17	III. D-9	REGULATION OF BORROW PITS, GRAVEL SOURCES, AND QUARRIES - To minimize sediment production from borrow pits, gravel sources, and quarries and limit channel disturbance in those gravel sources suitable for development in floodplains.	N/A			ER	B(T)6.5 C(T)6.50#	G.5 K-G.5.0#

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15.18	III. D-8	DISPOSAL OF RIGHT-OF-WAY AND ROADSIDE DEBRIS - To insure that debris generated during road construction is kept out of streams and prevent slash and debris from subsequently obstructing channels.	All Road construction, reconstruction, and maintenance	1. Debris and slash generated during road construction should not be side-cast into streams.	Proposed road construction will adhere to the guidelines in the Montana Streamside Management Zone Law (HB-731).	ER	Std Spec 201 SPS 201	
15.19	III. A	STREAM BANK PROTECTION – To minimize sediment production from stream banks and structural abutments in natural waterways.	All Road construction, reconstruction, and maintenance	1. Take precautions to minimize or eliminate disturbance to stream banks. 2. Maintain in-stream structures.	IDT has identified project location and mitigation measures during NEPA process. Protective measures will be kept current on all areas of disturbed soils. TSA and ER ensure contract compliance.	IDT, ER, TSA	Std Spec 619	
15.20	N/A	WATER SOURCE DEVELOPMENT CONSISTENT WITH WATER QUALITY PROTECTION - To supply water for road construction and maintenance and fire protection while maintaining water quality.	N/A			ER, FMO	Std Spec 207	
15.21	III. E	MAINTENANCE OF ROADS - To maintain all roads in a manner that provides for soil and water protection by minimizing rutting, failures, side-cast, and blockage of drainage facilities.	All Road reconstruction and maintenance	1. Maintain all roads in a manner that provides for soil and water protection.	Road maintenance associated with a timber sale is the responsibility of purchaser. The ER/TSA will ensure that the purchaser maintains roads according to the appropriate maintenance level.	ER, TSA	B(T)5.12 B(T)5.3 B(T)6.6 C(T)6.6 C(T)5.31#	F.1.2 F.3 G.6 K-G.6 K-F.3.1#

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15.22	III. E-1	ROAD SURFACE TREATMENT TO PREVENT LOSS OF MATERIALS - To minimize the erosion of road surface materials and, consequently, reduce the likelihood of sediment production.	All Haul Roads	1. Maintenance of road surface should include proper blading and/or dust abatement. 2. Use crush-gravel where necessary.	Protective measures will be kept current on all areas of disturbed, erosion-prone areas. ER ensures contract compliance.	IDT, ER	B(T)5.3 C(T)5.31# C(T)5.314#	F.3 K-F.3.1# K-F.3.1.4#
15.23	III. E-6	TRAFFIC CONTROL DURING WET PERIODS - To reduce the potential for road surface disturbance during wet weather and reduce sedimentation.	All Haul Roads	1. Avoid hauling during wet periods.	Road restrictions and traffic control measures will be implemented on all haul roads when damage would occur during spring breakup. The decision to restrict a road is made by the ER. Hauling restrictions would be controlled by the TSA.	ER, TSA	B(T)6.6 C(T)6.6 C(T)5.316# C(T)5.41#	G.6 K-G.6 K-F.3.1.6# K-F.4.1#

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15.24	III.E-4 VI. A-B	SNOW REMOVAL CONTROLS - To minimize the impact of snow melt on road surfaces and embankments and reduce the probability of sediment production resulting from snow removal operations.	All Winter Haul Roads	1. Be careful not to leave snow berm at edge of road. 2. Ensure proper drainage by opening sections of berm to allow water to leave road surface. 3. Ensure no side cast material enters waterways. 4. Consider hauling only during frozen periods. During cold weather, plow any snow cover off the roadway to facilitate deep freezing of the road prior to hauling. 5. Before logging, mark existing culvert locations. During and after logging, make sure that all culverts and ditches are open and functional. 6. Use compacted snow for roadbeds in unroaded, wet or senstivie areas. Construct snow roads for single-entry harvests or for temporary roads. 7. Return the following summer and build erosion barriers on any trails that are steep enough to erode.	Snow removal will be kept current on all roads associated with winter logging operations. The TSA ensures compliance with contract provisions.	IDT, TSA	C(T)5.316# Std Spec 203.09	K-F.3.1.6#

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15.25	III. E 7, 8	OBLITERATION OF TEMPORARY ROADS - To reduce sediment generated from temporary roads by obliterating them at the completion of their intended use.	All Temporary Roads	1. Re-contour road fully where feasible. 2. Seed and fertilize exposed soil. 3. Pull slash and woody debris back onto rehabilitated road.	This work will be done on all new temporary roads in the decision area. The work will be done by the purchaser with compliance by the TSA.	TSA	B(T)6.63 C(T)6.6 C(T)6.632# C(T)6.633# C(T)6.601#	G.6.3 K-G.6 K-G.6.3.2# K-G.6.3.3# K-G.6.0.1#
18.03	IV. C -8	PROTECTION OF SOIL AND WATER FROM PRESCRIBED BURNING EFFECTS - To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris from entering surface water.	All Prescribed Burning	1. Follow INFISH Standards and Guidelines for burning in RHCAs. 2. Adhere to SMZ Law. 3. Where harvest within riparian areas is proposed, either the slash should be removed with the tree or scattered and not treated.	Prescribed burning adjacent to riparian areas will adhere to guidelines in the Montana Streamside Management Zone Law (HB-731). Prescribed burn plans identify the conditions necessary to prevent soil damage and meet site preparation objectives.	FMO	N/A	

APPENDIX C
VEGETATION TREATMENTS

WHAT IS A SILVICULTURAL SYSTEM?

A silvicultural system is a planned program of vegetation manipulation treatments during the whole life of a stand to meet specific management direction within the biological and ecological context of the land and landscape.

Included in this appendix are brief descriptions and illustrations of the silvicultural treatments proposed for implementation in the proposed alternatives. Complete documentation of the vegetation analysis and the silvicultural diagnosis and prescription process is included in the project file.

Timber harvest proposed includes a blend of traditional silvicultural treatments. These techniques incorporate even-aged stand management treatments that are characterized by stands comprised of trees that are approximately the same age. Both Regeneration Harvest and Intermediate Harvest Treatments are identified.

The timber harvest and fuels treatments proposed in the action alternatives are designed to meet one or more of the following objectives for vegetation management. All harvest is on lands identified as suitable for timber production in the Forest Plan.

- **Hazardous Fuels Reduction**
    - Reduce the associated risk of high-severity landscape wildfire risk within the Wildland Urban Interface as identified in the Seeley Swan Fire Plan.
    - Provide for a safer environment for the public and firefighters should a wildfire occur within proposed treatment areas.
    - Increase the probability of stopping wildfires on (NFS) lands before they burn onto private lands.
- **Improve Forest health**
    - Improve and/or maintain the general health, resiliency, and sustainability of forested stands.
    - Reduce the risk of insect epidemics and severe disease infestations within the project area.
- **Provide wood products for local economies**
    - Provide forest products to the local timber industry – contributing to short-term forest products and providing for long-term sustainability of timber on NFS lands.

VEGETATION TREATMENT DESCRIPTIONS AND ILLUSTRATIONS

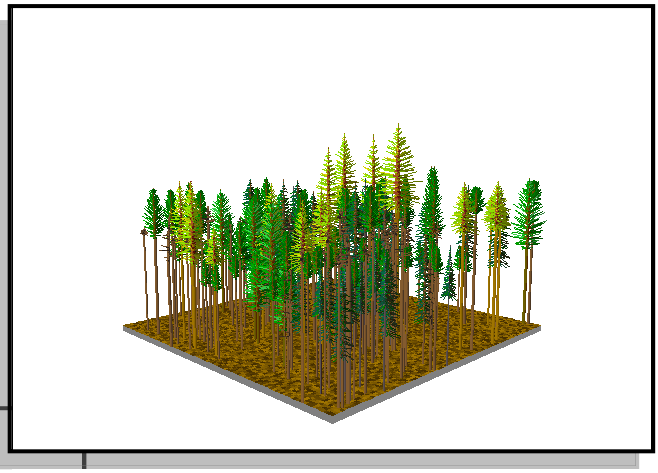
Following are descriptions of proposed treatments. Illustrations depicting approximate pre and post treatment conditions of a representative stand are included as a visual reference for some of the treatments. The actual post-harvest stand conditions will vary from the illustrations presented here due to site-specific conditions.

REGENERATION HARVEST

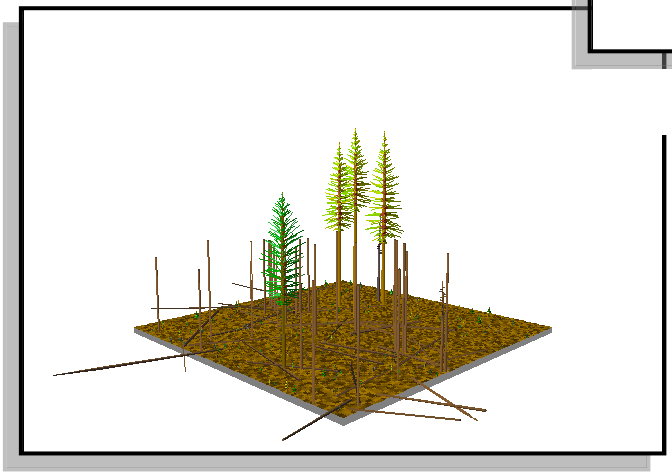
Three regeneration harvests are proposed and described below. These treatments are distinguished by post-harvest residual density and pre-harvest species composition.

CLEARCUT WITH RESERVE TREES

This treatment will remove nearly all trees from the site to facilitate regeneration of a new age class and increase species diversity. Although limited, all long lived, fire resistant, shade intolerant species (western larch, ponderosa pine, western white pine, and occasionally Douglas-fir) will be retained, where feasible and where not acting as an insect or disease vector. Reserve trees will be retained to provide long term structural diversity. These treatment areas consist of primarily even-aged lodgepole pine with little species or structural diversity and are either experiencing mountain pine beetle mortality or are at risk of being affected. Regeneration of trees would result from natural seeding, planted seedlings, or a combination of both. Mechanical treatments and/or prescribed fire could be used to reduce fuels, recycle nutrients and prepare the site for regeneration.



Pre-Harvest Stand



Post Harvest Clearcut with Reserve Trees

The National Forest Management Act (NFMA) and Forest Service Handbook (FSH) direction dictate that clearcutting must be justified as the optimum method to meet management objectives when prescribed. Fourteen areas are proposed for clearcutting in this project. Clearcutting was determined to be the optimum regeneration method for meeting management objectives for each of these areas by the Project Silviculturist. Criteria used to make this determination included; species composition relative to management direction and availability of desired species for seed sources, species susceptibility to observed insect agents, presence of disease infections which would be transmitted to the regenerated stand or where non-susceptible species conversion is necessary, and stands subject to windthrow if residual trees were retained.

In the Glacier Loon Project, Clearcut with Reserve Trees is proposed as follows:

Alternative B – 240 acres

Alternative C – 229 acres

Alternative D – 217 acres

SEED TREE WITH RESERVE TREES

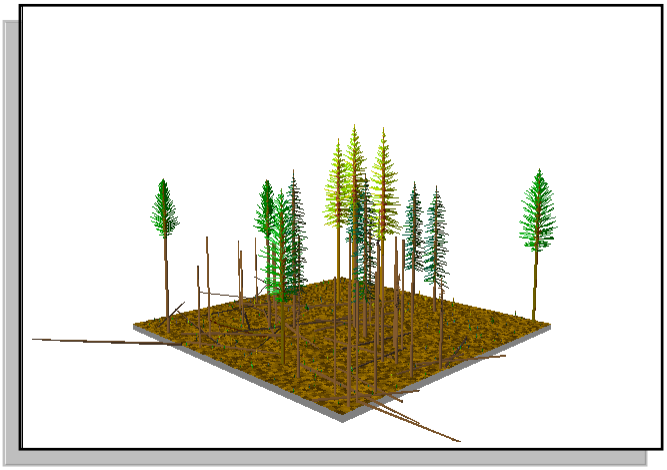
In this treatment, a portion of the existing overstory long lived, fire resistant, shade intolerant species (western larch, ponderosa pine, western white pine, and occasionally Douglas-fir) would be retained and reserved at a density sufficient to facilitate regeneration of these desired species and create a two-aged stand structure (e.g. 5 to 15 trees per acre). This density is designed to provide seed sources and long term structural diversity, while not interfering with the successful regeneration of desired species. The majority of these areas are dominated by lodgepole pine infested with mountain pine beetle or at risk. In addition, some proposed areas are affected by dwarf mistletoe and/or root diseases. Regeneration of trees would result from natural seeding, planted seedlings, or a combination of both. Mechanical treatments and/or prescribed fire could be used to reduce fuels, recycle nutrients and prepare the site for regeneration.

In the Glacier Loon Project, Seed Tree with Reserve Trees is proposed as follows:

Alternative B – 463 acres

Alternative C – 405 acres

Alternative D – 347 acres



Post Harvest Seed Tree with Reserve Trees

SHELTERWOOD WITH RESERVE TREES

A portion of the existing overstory long lived, fire resistant, shade intolerant species (typically; western larch, ponderosa pine, western white pine, and occasionally Douglas-fir) would be retained and reserved at a density sufficient to facilitate regeneration of these desired species and create a two-aged stand structure (e.g. 10 to 30 trees per acre). This density is designed to provide seed sources, long term structural diversity, and provide shelter and a moderated micro-climate favorable for regeneration. Although similar to Seed Tree treatments, the number of trees retained in Shelterwood treatments would be greater. Again, these areas are currently affected by mountain pine beetle, dwarf mistletoe, and/or root diseases. Regeneration of trees would result from natural seeding, planted seedlings, or a combination of both. Mechanical treatments and/or prescribed fire could be used to reduce fuels, recycle nutrients and prepare the site for regeneration.

In the Glacier Loon Project, Shelterwood with Reserve Trees is proposed as follows:

Alternative B – 76 acres

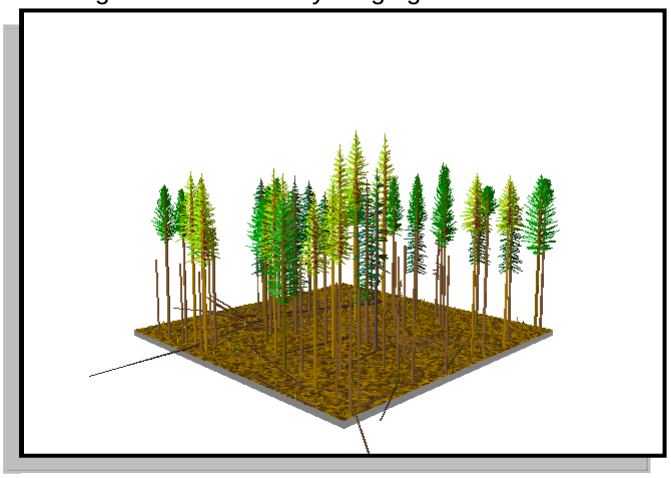
Alternative C – 56 acres

Alternative D – 36 acres

INTERMEDIATE HARVEST

COMMERCIAL THIN AND "MODIFIED" COMMERCIAL THIN

Existing tree density would be reduced from current levels to a target residual density ranging from 60 to 120 square feet of basal area per acre. This equates to approximately 50 to 150 trees per acre depending on tree species and site variables. Long lived, fire resistant, shade intolerant species (typically; western larch, ponderosa pine, western white pine, and occasionally Douglas-fir) would be favored for retention. The purpose of this treatment is to enlarge the growing space of desirable trees and reduce tree competition for limited site resources allowing for improved tree growth, vigor, resilience, and manipulation of fuel continuity. Mechanical treatments and/or prescribed fire would be used to reduce fuels and recycle nutrients. A "Modified" Commercial Thin is proposed in those portions of Units 66 and 67 which are adjacent to and which would directly impact the campground and private lands. The commercial thin treatment will be "modified" so that the primary treatment objectives of fuels reduction and hazard tree mitigation are met while ensuring retention/enhancement of the recreational experience and privacy retention/screening for private lands. Modifications could include, but not limited to, items such as varying residual tree densities near private lands and strategically retaining understory trees for visual/noise screening. During implementation the Project Silviculturist will work closely with the Recreation Staff and private land owners on treatment specifics.



Post Thinning

In the Glacier Loon Project, Commerical Thinning is proposed as follows:

Alternative B – 851 acres

Alternative C – 743 acres (includes 119 acres of "Modified Commercial Thin")

Alternative D – 361 acres (includes 125 acres of "Modified Commercial Thin")

IMPROVEMENT CUT

These treatments will be designed to achieve one of two objectives. Where mature ponderosa pine trees exist, the purpose will be to reduce impacts from mountain pine beetle by altering the stand micro-environment and enlarging the growing space of desirable trees. The existing tree density would be reduced from current levels either through thinning (residual densities ranging from 60- 80 square feet of basal area per acre) or "daylighting." Daylighting treatments are applied on an individual tree basis and involve clearing vegetation within a specified distance (~30 feet) of a target tree. Ponderosa pine and non-susceptible species (e.g. western larch and Douglas-fir) would be favored for retention in all treatments. In addition to the thinning of live trees, dead trees and pine trees currently infested with mountain pine beetle would be salvaged from these areas if encountered. Alternatively, improvement cutting is also proposed in immature stands with high existing tree densities and designed to manipulate fuel continuity and reduce mountain pine beetle hazard. Here, tree density would be reduced from current levels to a target residual density ranging from 50 to 200 trees per acre. The many of the trees to be removed would be smaller than the minimum Forest Service sawlog specifications of 7" inches in diameter at breast height; however larger trees are also likely to be removed. Mechanical treatments would be used to reduce fuels and recycle nutrients.

In the Glacier Loon Project, Improvement Cutting is proposed as follows:

Alternative B – 117 acres

Alternative C – 117 acres

Alternative D – 84 acres

SANITATION/SALVAGE

In these treatment areas the existing stand structure would generally remain intact following treatment. However, these areas would be modified by removal of dead, dying, or damaged trees. Primarily this includes lodgepole pine trees affected by mountain pine beetle. Where concentrations of affected trees exist, stand structure will be more significantly modified. The purpose of this treatment is to improve stand health, recover economic value, and manipulate fuel loadings and continuity. Mechanical treatments would be used to reduce fuels and recycle nutrients.

In the Glacier Loon Project, Sanitaion/Salvage is proposed as follows:

Alternative B – 8 acres

Alternative C – 11 acres

Alternative D – 5 acres

POST AND POLE

In these areas (**10 acres** in all action alternatives) permitted individuals will be allowed to harvest live lodgepole pine trees less than 5 inches in diameter at breast height. Areas will be identified on the ground and all specified permit conditions would apply, including limits on material harvested.

PRE-COMMERCIAL THINNING

In this treatment the existing immature tree density would be reduced to a target residual density (e.g. 50 to 300 trees per acre). The primary purpose of this treatment is to reduce fuel continuity, adjust species composition, and concentrate growth on the most desirable trees. This treatment will focus on the removal of sapling and pole sized trees generally not greater than 5 inches in diameter at breast height. Mechanical treatments and/or pile burning would be used to reduce fuels and recycle nutrients. Biomass or other products may or may not be removed from these areas. This treatment is typically accomplished through hand thinning methods or through mechanized chipping/mastication.

In the Glacier Loon Project, Pre-commercial Thinning is proposed as follows:

Alternative B – 343 acres

Alternative C – 343 acres

Alternative D – 95 acres

FUEL TREATMENTS

A number of prescribed treatments are designed to reduce natural and activity generated fuels within the proposed treatment areas. These treatments include mechanical methods and the use of prescribed fire. Mechanical treatments could include a combination of the following; whole tree yarding (or possibly yarding of tops), lop and scatter, masticating, and/or excavator piling. Fuel accumulations at landings would be addressed through burning, chipping/masticating, and/or removal from National Forest lands. Prescribed fire treatments could include broadcast burning, pile burning and/or jackpot burning.

SITE PREPARATION

Depending on existing vegetation and ground conditions, site preparation may be prescribed to help create favorable conditions to help ensure adequate regeneration. These treatments are often prescribed in both artificial and natural regeneration situations and typically address competing vegetation, seed bed preparation, fuel accumulations, and duff reduction. Site preparation can be accomplished through hand, mechanical, or prescribed fire methods. Hand methods usually involve creating favorable conditions at the time of planting using hand tools. Mechanical treatments are often accomplished during harvest operations or shortly afterwards and involve scarification and seed bed preparation through the use of mechanized equipment. Prescribed fire can also be used to recycle nutrients, consume excess fuels, reduce competing vegetation, and create a favorable seedbed.

REFORESTATION

Where regeneration treatments are proposed, a combination of natural and artificial reforestation is planned. Specifically, up to **400 acres** of hand planting of desired species is planned. Where planting occurs, species selection will be based on management direction and site characteristics. Emphasis will be placed on establishing long-lived shade intolerant species such as western larch, ponderosa pine, western white pine, and occasionally Douglas-fir. Natural regeneration is planned in areas where site preparation and seed source proximity and reliability suggest success. Artificial reforestation may be prescribed in these areas if monitoring supports a need. It is expected that some level of natural regeneration will occur in all regeneration units.

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APPENDIX D
BIBLIOGRAPHY AND GLOSSARY

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Glossary

Action Alternative - An alternative that proposes some management action, as contrasted to the No Action Alternative.

Administrative Appeal - A request to a higher authority for review of a decision related to an Environmental Impact Statement, Environmental Analysis, or Categorical Exclusion.

Affected Environment - The biological and physical environment that will or may be changed by actions proposed and the relationship of people to that environment.

Age or Size Class - A distinct group of trees, or portion of growing stock recognized on the basis of age (or size).

Airshed - Basic geographic units in which air quality is managed.

Alternative - A combination of management prescriptions applied in specific amounts and locations to achieve a desired management emphasis. One of the several policies, plans or projects, proposed for decision-making.

Bear Management Area (BMA) – Areas delineated to include important habitat components and to implement standards and guidelines pertaining to grizzly bears. These areas have also been used for evaluating habitat for other wildlife species including big game and old growth indicator species.

Bear Management Subunit – An area approximately the size of an average female home range (about 50 mi^2), generally from ridge top to valley bottom, and including all seasonal habitats.

Best Management Practices (BMPs) - Methods, measures or practices to prevent or reduce water pollution, including but not limited to, structural and non-structural controls, operation and maintenance procedures, other requirements, and scheduling and distribution of activities. Usually BMPs are applied as a system of practices rather than a single practice. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

Biological Assessment (BA) - A document prepared by a federal agency for the purpose of identifying any endangered species or threatened species, which is likely to be affected by an agency action. This document facilitates compliance with the Endangered Species Act. The federal agency, in consultation with the Secretary of Interior, must insure that any action authorized, funded, or carried out by a federal agency is not likely to jeopardize the continued existence of any endangered or threatened species, or result in the destruction or adverse modification of its habitat.

Biological Evaluation (BE)- A document prepared by the Forest Service to review programs or activities to determine how an action might affect any threatened, endangered, proposed, or sensitive species. This document often focuses only on sensitive species if the Threatened, Endangered, and Proposed Species will be covered in a Biological Assessment.

Biomass (Fuels) - Live and dead accumulations of organic material.

Blowdown (Windthrow) - Uprooting by the wind. Also refers to a tree or trees so uprooted.

Board Foot - A unit of measurement represented by a board one foot square and one inch thick.

Browse - Twigs, leaves, and young shoots of trees and shrubs on which animals feed; in particular, those shrubs which are used by big game animals for food.

Buffer – A land area designated to block or absorb unwanted effects to the area beyond the buffer and to preserve other qualities along or adjacent to roads, trails, watercourses, and recreation sites.

Burn Severity– A relative measure of the degree of change in a watershed that related to the intensity of the fire on soil hydrological function. Burn severity is delineated on topographic maps of polygons. Classes of burn severity are high, moderate, low, and unburned.

Canopy - The forest cover of branches and foliage formed by tree crowns.

Canopy Cover or Crown Closure - The percentage of ground surface that is shaded by the live foliage of plants as seen from above. Used to describe how open or dense a stand of trees is.

Capability - The potential of an area of land and/or water to produce resources, supply goods and services, and allow resource uses under a specified set of management practices and at a given level of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology; as well as the application of management practices, such as silviculture or protection from fires, insects, and disease.

Cavity - A hollow in a tree that is used by birds or mammals for nesting, denning, roosting, etc.

Closed Canopy - The description given to a stand when the crowns of the main level of trees forming the canopy are touching and intermingled so that light cannot reach the forest floor directly.

Coarse Woody Debris (CWD) - Any piece(s) of dead woody material, e.g., dead boles, limbs, and large root masses on the ground or in streams.

Cohort – An age class of trees that is distinctively different from other age classes in a particular forest stand.

Commercial Thinning - A silviculture treatment that "thins" out an overstocked stand by removing trees, which are large enough to be sold as products such as poles or fence posts. It is carried out to improve the health and growth rate of the remaining crop trees.

Composition (Species) - The mix of different species that make up a plant or animal community, and their relative abundance.

Condition Class – A function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components, such as species composition, structural stage, stand age, and canopy closure. Categorized by three classes as follows: Condition Class 1 – Fire regimes are within or near an historical range; Condition Class 2 – Fire regimes have been moderately altered from their historical range; Condition Class 3 – Fire regimes have been significantly altered from their historical range.

Consultation - A process required by Section 7 of the ESA whereby Federal agencies proposing activities in a listed species habitat confer with the U.S. Fish and Wildlife Service about the impacts of the activity on the species. Consultation may be informal, and thus advisory, or formal, and thus binding.

Corridor - A band of vegetation, usually older forest, which serves to connect distinct patches on the landscape. By providing connectivity, corridors permit the movement of plant and animal species between what would otherwise be isolated patches.

Council on Environmental Quality (CEQ) - An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews Federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

Cover/Forage Ratio - The ratio of tree cover (usually conifer types) to foraging areas (natural openings, clearcuts, etc.).

Cover Type - The present vegetation composition of an area, described by the dominant plant species.

Crown - The part of a tree or other woody plant bearing live branches and foliage.

Crown Closure (see Canopy Cover)

Crown Fire - A fire that advances from top-to-top of trees or shrubs more or less independently of the surface fire. Sometimes, crown fires are classed as either running or dependent, to distinguish the degree of independence from the surface fire.

Cultural Resources - The physical remains of human activity (artifacts, ruins, burial mounds, petroglyphs, etc.) and conceptual content or context (as a setting for legendary, historic, or prehistoric events; as a sacred area of native peoples, etc.) of an area of prehistoric or historic occupation.

Cumulative Effect - The impact on the environment, which results from the incremental impact of the action when added to other actions. Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time.

Density (Stand) - The number of trees growing in a given area, usually expressed in terms of trees per acre.

Diameter Best Height (DBH) - The diameter of a tree measured four and one-half feet above the ground.

Direct Effect - Effects on the environment that occur at the same time and place as the initial cause or action.

Dispersal - The movement of organisms away from the place of birth or from centers of population density.

Disturbance (Ecosystem) - Refers to events that alter the structure, composition, or function of terrestrial or aquatic habitats. Natural disturbances include, among others, drought, floods, wind, fires, wildlife grazing, and insects and pathogens. Human-caused disturbances include actions such as timber harvest, livestock grazing, roads, and the introduction of exotic species.

Diversity - The distribution and abundance of different plant and animal communities and species.

Duff - The partially decayed organic matter on the forest floor.

Early Seral/Structural Stage - A stage of development of an ecosystem from a disturbed, relatively unvegetated state to a plant community that is up to 30 years old. Stand structure is seedling and sapling sized.

Ecosystem - A functional unit consisting of all the living organisms (plants, animals, and microbes) in a given area, and all the non-living physical and chemical factors of their environment, linked together through nutrient cycling and energy flow. An ecosystem can be of any size--a log, pond, field, forest, or the earth's biosphere--but it always functions as a whole unit. Ecosystems are commonly described according to the major type of vegetation, for example, forest ecosystem, old-growth ecosystem, or range ecosystem.

Endangered Species - Any species, plant, or animal that is in danger of extinction throughout all or a significant portion of its range. In accordance with the 1973 ESA, the Secretary of the Interior identifies endangered species.

Endemic - A species whose natural occurrence is confined to a certain region and whose distribution is relatively limited (vertebrate biology). A population that is at equilibrium or low density (invertebrate biology or pathology).

Escape Route – A means to access a safety zone.

Fire Exclusion - The disruption of a characteristic pattern of fire intensity and occurrence (primarily through fire suppression).

Fire Event (Fire Occurrence, Fire Incidence) - A single fire or series of fires within an area at a particular time.

Fire Frequency – A general term referring to the recurrence of fire in a given area over time.

Fire Hazard - The potential fire behavior for a fuel type, regardless of the fuel type's weather-influenced fuel moisture content or its resistance to fire line construction. Assessment is based on physical fuel characteristics, such as fuel arrangement, fuel load, condition of herbaceous vegetation, and presence of elevated fuels.

Fire Intensity – Based on temperature, flame length, rate of spread, heat of combustion, and total amount and size of fuel consumed. Accounts for convective heat rising into the atmosphere and fire effects to the overstory.

Fire Intolerant (or "intolerant") - Species of plants that do not grow well or die from the effects of fire. Generally these species are shade-tolerant as well.

Fire Regimes - The ecological effects of frequency, intensity, extent, season, and synergistic interactions with other disturbances, such as insects and disease, classified into generalized levels of fire severity.

Fire Return Interval (Fire Interval) - The number of years between successive fire events in a given area.

Fire Risk - The probability or chance of fire starting determined by the presence and activities of causative agents.

Fire Rotation – The length of time necessary for an area equal in size to the study area to burn.

Fire Severity – A relative measure of the post-fire appearance of vegetation (residual fuels/mortality) as it related to the intensity of the fire and its consumptive effects on vegetation.

Fire Suppression (Fire Control) - All of the work and activities connected with fire extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Fire Tolerant (or "tolerant") - Species of plants that can withstand certain frequency and intensity of fire. Generally these species are shade-intolerant as well.

Firefighter Safety - A work environment where foreseeable risks have been minimized through the mitigation of known hazards associated with wildlife suppression.

Fish Habitat - The place where a population of fish species lives and its surroundings; includes the provision of life requirements such food and cover.

Fish Passage - Clear access for migrating fish through a potential barrier.

Fishery - The total population of fish in a stream or body of water and the physical, chemical, and biological factors affecting that population.

Forage - All browse and non-woody plants available to livestock or wildlife for feed.

Forb – Any herbaceous (herb-like) plant other than grass or grass-like plants that has little or no wood on it. For example, wildflowers are forbs.

Forest Development Road (FDR) - A road wholly or partly within or adjacent to and serving the National Forest System and which is necessary for the protection, administration, and use of the National Forest System and the use and development of its resources.

Forest Health - (also called forested landscape or forestland) is defined as: the conditions under which the integrity of the soil and ecological processes are sustained resulting in systems that maintain their diversity, resiliency, and productivity with associated sustainable human resource issues.

Forest Plan- The Flathead National Forest Land and Resource Management Plan.. A Forest Plan is a document prepared under the National Forest Management Act by each national forest that generally describes how the resources in the forest will be managed for a 10 to 15 year period.

Forest Structure - The mix and distribution of tree sizes, layers, and ages in a forest. Some stands are mostly one size (single-story), some are two-story, and some are a mix of trees of different ages and sizes (multi-story).

Forest Type - Relates to the tree species (and to generalized understory plant) composition.

Fuels - Includes living plants, dead, woody vegetative materials; and other vegetative materials capable of burning.

Fuel Loading - The oven dry weight of fuels in a given area, usually expressed in tons per acre. Fuel loadings may be referenced to fuel size or time-lag categories; and may include surface fuels or total fuels.

Fuel Management - Manipulation or reduction of flammable matter for the purpose of reducing the intensity or rate of spread of a fire, while preserving and enhancing environmental quality.

Fuel Treatment - The rearrangement or disposal of natural or activity fuels.

Geographic Information System (GIS) - Computer software that provides database and spatial analytic capabilities.

Goal – A concise statement that describes a desired condition to be achieved. It is normally expressed in broad, general terms and is timeless in that it has no specific date that it is to be completed. Goal statements form the principal basis upon which objectives are developed.

Guideline - An indication or outline of policy or conduct dealing with the basic management of the Forest. Forest-wide management standards and guidelines apply to all areas of the Forest regardless of the other management prescriptions applied.

Habitat Type - An aggregation of all land areas potentially capable of producing similar plant communities at climax.

Hazard - A real or potential condition that may result in an undesired event, the cause of risk. Hazard can apply to the probability of tree mortality or damage by an insect or disease and also represents material or fuel that will ignite and burn.

Hiding Cover - Vegetation used by an animal for hiding. The amount and quality of vegetation needed depends on the animal's size, mobility, and reluctance to venture into relatively open areas. For an elk, hiding cover conceals 90 percent of a standing adult elk from the view of a human at a distance equal to or less than 200 feet. Hiding cover allows elk to use areas for bedding, foraging, thermal relief, wallowing, or other functions, but it does not necessarily provide security during the hunting season.

Historic Range of Variability (HRV) - Conditions which be expected to occur under natural disturbance and succession regimes.

Home Range - An area, from which intruders may or may not be excluded, to which an individual restricts most of its usual activities.

Indirect Effects - Secondary effects which occur in locations other than the initial action or significantly later in time.

Initial Attack - An aggressive suppression action consistent with firefighter and public safety and values to be protected.

Instream Cover - Anything in the water that provides protection to fish from predators (including turbulence, debris, logs, and rocks).

Intensity - Energy release rates; these are physical descriptors of the fire, not its ecological effects. Generally referred to as High, Moderate, or Low intensity.

Interdisciplinary Team (ID Team) - A group of individuals with different training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately solve the problem. Through interaction, participants bring different points of view to bear on the problem.

Intermittent Stream - A stream which flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow.

Invasive Plant – All State and county listed “noxious weeds” are considered invasive plants. Also, other exotic species (not listed by State or counties as noxious weeds) that can successfully out compete and displace native plant communities.

Inventoried Roadless Area - An area identified and classified as roadless. These areas were identified during the second Roadless Area Review and Evaluation (RARE II).

Issue - See Public Issue.

Ladder Fuels - Fuels which provide vertical continuity between the surface fuels and crown fuels in a forest stand, thus contributing to the ease of torching and crowning.

Landscape - The landforms of a region in the aggregate; the land surface and its associated habitats at scales of many acres to many square miles; a spatially heterogeneous area.

Landtype - An inventory map unit with relatively uniform potential for a defined set of land uses. Properties of soils landform, natural vegetation, and bedrock are commonly components of landtype delineation used to evaluate potentials and limitations for land use.

Large Woody Debris – Large logs and stumps in streams and on land that provide habitat for aquatic and terrestrial organisms and affects stream function.

Late Seral/Structural Stage - A stage of development of an ecosystem from approximately 80 to 120 years old. Forested stands are generally 12 to 16 inches average dbh.

Lethal Fire/Lethal Fire Regime - Fire that consumes the entire vegetative community (grasses, shrubs, trees. Also see Stand Replacement Fire.

Linkage (Habitat) - Linkage zones are combinations of landscape structural factors that allow wildlife to move through, and live within, areas influenced by human actions. A linear habitat patch through which a species must travel to reach habitat more suitable for reproduction and other life-sustaining needs.

Low Severity Ground Fire - A fire with low intensity that primarily scorches tree boles, allowing fire tolerant species to survive.

Maintenance Level (ML) – The Maintenance Level of a road indicates the type of traffic it can accommodate.

Management Area (MA) - An aggregation of capability areas that have common management direction and may be dispersed over the Forest. Consists of a grouping of capability areas selected through evaluation procedures and used to locate decisions and resolve issues and concerns.

Management Indicator Species (MIS) - Species identified in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish including those that are socially or economically important.

Mature Timber - Individual trees or stands of trees that in general are at their maximum rate in terms of the physiological processes expressed as height, diameter, and volume growth.

MBF and **MMBF -** Thousand board feet and million board feet, respectively.

Mean Fire Return Interval (Mean Fire Interval) – The average of all fire intervals in a given area over a given time period.

Mesic - Moderately moist.

Mid-Seral/Structural Stage - A stage of development of an ecosystem from approximately 30 to 80 years old. Forested stands are generally 5 to 12 inches average dbh. Stand structure is pole- and small sawlog-sized trees.

Mixed-Severity Fire/Mixed Severity Fire Regime - Mixed-severity fire regime areas can experience the full range of fire severities during either a single event or consecutive events. In other words, in a single fire event both low severity (killing few trees) and high severity (killing all trees) in patches of variable sizes. This tends to create complex fine-grained spatial patterns of vegetation conditions across a landscape.

Monitoring and Evaluation- The periodic evaluation on a sample basis of Forest Plan management practices to determine how well objectives have been met and how closely management standards have been applied.

Montane - Of, growing in, or inhabiting mountain areas.

National Environmental Policy Act (NEPA) - An act which encourages productive and enjoyable harmony between man and his environment; promotes efforts to prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; enriches the understanding of the ecological systems and natural resources important to the Nation; and establishes a Council on Environmental Quality.

National Forest Management Act (NFMA) - A law passed in 1976 as amendments to the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of Regional and Forest Plans and the preparation of regulations to guide that development.

National Forest System (NFS) - All national forest lands reserved or withdrawn from the public domain of the United States, all national forests lands acquired through purchase, exchange, donation, or other means, the national grasslands and land utilization projects administered under Title III.

National Wilderness Preservation System - All lands covered by the Wilderness Act and subsequent wilderness designations, irrespective of the department or agency having jurisdiction.

Native Species - Species that are indigenous to a region, as opposed to introduced or exotic species.

Native (Natural) Succession and Disturbance Regimes - The historic patterns (frequency and extent) of fire, insects, wind, landslides, and other natural processes in an area.

Natural Regeneration - Renewal of a tree crop by natural seeding, sprouting, suckering, or layering.

No Action Alternative - The management direction, activities, outputs, and effects most likely to exist in the future if the current plan would continue unchanged.

Non-Lethal Fire/Non-Lethal Fire Regime – Fire that primarily consumes surface fuels causing little mortality to overstory trees. See also Low Severity Fire.

Noxious and Invasive Weed EA (NIWC EA)

Noxious Weed - Any exotic plant species established or that may be introduced in the area which may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses.

Old Growth Habitat - A community of forest vegetation that has reached a late stage of plant succession characterized by a diverse stand structure and composition along with a significant showing of decadence. The stand structure will typically have multi-storied crown heights and variable crown densities. There is a variety of tree sizes and ages ranging from small groups of seedlings and saplings to trees of large diameters exhibiting a wide range of defect and breakage both live and dead, standing and down. The time it takes for a forest stand to develop into old growth condition depends on many local variables such as forest type, habitat type, and climate. Natural chance events involving forces of nature such as weather, insect, disease, fire, and the actions of man also affects the rate of development of old-growth stand conditions.

Open Road – A road with no restrictions on motorized vehicle use.

Overmature Timber - Individual trees or stands of trees that in general are past their maximum rate in terms of the physiological processes expressed as height, diameter, and volume growth.

Overstory - The portion of the trees that form the uppermost canopy layer in a forest of more than one story.

Perennial Streams - Streams that flow continuously throughout most years and whose upper surface generally stands lower than the water table in the region adjoining the stream.

Phloem – The layer of cells under the bark and outside of the cambium layer responsibility for transporting food created by the leaves.

Pole - A tree between a sapling and small timber size at least 5 inches DBG but smaller than 8 inches DBH.

Pool - A portion of the stream with reduced current velocity, often with water deeper than the surrounding areas, and which is usable by fish for resting and cover.

Population - A group of coexisting (conspecific) individuals that interbreed if they are sexually reproductive.

Potential Habitat (Wildlife) - Habitat that is likely to be occupied by a wildlife species or group of species, currently or in the near future.

Potential Vegetation Group (PVG) - Groupings of habitat groups on the basis of similarity of general moisture or temperature environment.

Pre-Commercial Thinning - The selective felling, deadening, or removal of trees in a young stand primarily to accelerate diameter increment on the remaining stems, maintain a specific stocking or stand density range, and improve the vigor and quality of the trees that remain.

Preferred Alternative - The Agency's preferred alternative is the alternative that the agency believes would best fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors, and which meets the purpose and need of the NEPA document.

Prescribed Burning- The controlled use of fire to reduce or eliminate the unincorporated organic matter of the forest floor, or low, undesirable vegetation. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition.

Proposed Action - The proposed action or proposal exists at that stage in the development of an action when an agency subject to the Act (NEPA) has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated.

Public Involvement - A process designed to broaden the information base upon which agency decisions are made by informing the public about Forest Service activities, plans, and decisions, and participation in the planning processes which lead to final decision making.

Public Issue - A subject or question of widespread public interest identified through public participation relating to management of NFS lands.

Ranger District – Administrative subdivision of the Forest supervised by a District Ranger.

Reach - A length of stream channel, lake, or inlet exhibiting, on average, uniform hydraulic properties and morphology.

Rearing Habitat - In the case of juvenile westslope cutthroat trout, this is primarily the pool environment in streams.

Recovery Plan - A plan that details actions or conditions necessary to promote species recovery, that is, improvement in the status of species listed under the ESA to the point at which listing is no longer appropriate. Plans are required for virtually all listed species.

Reforestation - The renewal of forest cover by seeding, planting, and natural means.

Regeneration - The renewal of a forest, whether by natural or artificial means. This term may also refer to a tree crop itself.

Rehabilitation (Road) - The act of maintaining a road and improving drainage features, usually to meet BMP standards.

Release - Freeing a tree or group of trees from more immediate competition by cutting or otherwise eliminating growth that is overtopping or closely surrounding them.

Resident Fish - Non-migratory fish species.

Resilient, Resiliency - The ability of a system to respond to disturbances. Resiliency is one of the properties that enable the system to persist in many different states or successional stages.

Responsible Official - The Forest Service employee who has the authority to select and/or carry out a specific planning action.

Restore, Restoration - The re-creation of a natural or self-sustaining, resilient community or ecosystem, or a movement in that direction.

Restricted Road - A road on which motorized vehicle use is restricted during the entire non-denning period. The road requires physical obstruction and motorized vehicle use in the non-denning period is legally restricted by order.

Riparian Areas - Areas with distinctive resource values and characteristics that are comprised of an aquatic ecosystem and adjacent upland areas that have direct relationships with the aquatic system. This is considered the horizontal distance of approximately 100 feet from the normal high water line of a stream channel, or from the shoreline of a standing body of water.

Riparian Ecosystem - A transition between the aquatic ecosystem and the adjacent upland terrestrial ecosystem. It is identified by soil characteristics and by distinctive vegetative communities that require free or unbounded water.

Riparian Habitat Conservation Area (RHCA) - Portions of watersheds where riparian-dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. Riparian Habitat Conservation Areas were established as INFISH guidelines.

Riparian Land Type - Integrated map units of the types of riparian habitats based on topography, substrate materials (i.e., clays or boulders), and associated vegetation.

Riparian Wildlife Habitat - Vegetation growing close to a watercourse, lake, swamp, or spring that is generally critical for wildlife cover, fish food organisms, stream nutrients and large organic debris, and for streambank stability.

Risk - The probability of a hazard and/or the consequences of that hazard (hazards are undesirable events).

Road Density – Number of miles in a given area.

Road Management - The combination of both traffic management and maintenance management operations. Traffic management is the continuous process of analyzing, controlling, and regulating uses to accomplish National Forest objectives. Maintenance management is the perpetuation of the transportation facility to serve intended management objectives.

Salvage – Harvest of trees that are dead, dying, or deteriorating due to fire, wind, insect or other damage, or disease.

Sapling - A young tree that is larger than a seedling but smaller than a pole, typically 5 to 25 feet tall.

Scoping Process - An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to the proposed action. Identifying the significant environmental issues deserving of study and deemphasizing insignificant issues, narrowing the scope of the environmental impact statement accordingly (CEQ regulations, 40 CFR 1501.7).

Security - The protection inherent in any situation that allows a wildlife species to remain in a defined area despite an increase in stress or disturbance, such as that associated with hunting season. The components of security include vegetation, topography, the size of the blocks of vegetation, road density, distance from roads, intensity of the disturbance, and seasonal timing.

Sediment - Solid material, both mineral and organic, that is in suspension, being transported, or has been moved from its site of origin by air, water, gravity, or ice.

Seedling - A young tree that has just germinated but has not yet reached sapling size, typically 1 to 5 feet tall.

Seedling/Sapling - A size category for forest stands in which trees less 5 inches in diameter are the predominant vegetation.

Sensitive Species - Those wildlife and plant species identified by the Regional Forester for which population viability is a concern because of significant current or predicted downward trends in (a) population numbers or density, or (b) habitat capability that would reduce a species' existing distribution.

Seral - A biotic community that is developmental; a transitory stage in an ecologic succession.

Seral Stage (also called successional or structural stage) refers to vegetation structural development; and describes the mix and distribution of tree species, sizes, canopy layers, ages, and general conditions in a forest.

Seral/Structural Stage - A stage of development of an ecosystem from a disturbed, relatively unvegetated state to a complex, mature plant community.

Severity - Refers to the ecological effects of fires, usually on the dominant organisms of the ecosystem, for example a stand dominated by lodgepole pine.

Shade Intolerant - Species of plants that do not grow well or die from the effects of too much shade. Generally, these are fire-tolerant species.

Shade Tolerant - Species of plants that can develop and grow in the shade of other plants. Generally, these are fire-intolerant species.

Silviculture - The theory and practice of controlling the establishment, composition, growth, and quality of forest stands in order to achieve the objectives of management.

Silviculture Diagnosis - The process of compiling, summarizing, analyzing, and recording of stand data.

Silvicultural Prescription - A written document that describes management activities needed to implement silvicultural treatment or treatment sequence. The prescription documents the results of the analysis during the diagnosis phase.

Silvicultural Systems - A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. It includes all cultural management practices performed during the life of the stand, such as regeneration cutting, thinning, and use of genetically improved tree seeds and seedlings to achieve multiple resource benefits.

Site Preparation - A general term for a variety of activities that remove competing vegetation, slash, and other debris that may inhibit the reforestation effort.

Site Productivity - Production capability of a specific area of land.

Slash - The residue left on the ground after felling and other silvicultural operations and/or accumulating there as a result of storms, fire, or poisoning trees.

Snag - A standing dead tree usually greater than 5 feet in height and 6 inches DBH.

Soil Productivity - The capacity of a soil to produce a specific crop such as fiber and forage, under defined levels of management. It is generally dependent on available soil moisture and nutrients and length of growing season.

Spatial – Of relating to, involving, or having the nature of space.

Spawning Habitat - Areas of substrate that provide well-oxygenated and suitable sized gravels for fish spawning.

Species - A group of actually or potentially interbreeding populations that are reproductively isolated from all other kinds of organisms.

Specified Road - See Forest Development Road above.

Stagnation - A condition where plant growth is markedly reduced or even arrested through, e.g., competition, state of the soil, or disease.

Stand - A community of trees or other vegetative growth occupying a specific area and sufficiently uniform in composition (species), age, spatial arrangement, and conditions as to be distinguishable from the other growth on adjoined lands, so forming a silvicultural or management entity.

Stand Maintenance Fire (Non-Lethal) - Fire that emphasizes the survival of the living overstory vegetation.

Stand Replacement Fire- Fire that emphasizes the destruction of the living overstory vegetation. See also Lethal fire.

Stand Replacement Fire Regime - Stand-replacement fire regimes typically occur on lands that experience predominantly lethal fires, with less than 10 percent of the forested canopy cover remaining after the fire.

Stand-Replacing Disturbance - An agent such as fire, blowdown, insect or disease epidemic, or timber harvest that kills or removes enough trees to result in an early-seral/structural stage condition.

Standards and Guidelines - An indication or outline of policy or conduct dealing with the basic management of the Forest. Forest-wide management standards and guidelines apply to all areas of the Forest regardless of the other management prescriptions applied.

Stocking - A measure of timber stand density as it relates to the optimum or desired density to achieve a given management objective.

Structure - The various horizontal and vertical physical elements of the forest, including tree size, canopy composition, quantity and quality of deadwood, ephemeral herbaceous species, density of wildlife trees, fungi, age structure, forest height, etc.

Subspecies - Subpopulations or races within a species that are distinguishable by morphological characteristics and, sometimes, by physiological or behavioral characteristics.

Substrate - Mineral and/or organic material that forms the stream bed (stream bottom).

Summer Range - Land used by wildlife species (specifically big game and/or grizzly bear) during the summer months.

Succession - A predictable process of changes in structure and composition of plant and animal communities over time. Conditions of the prior plant community or successional stage create conditions that are favorable for the establishment of the next stage. The different stages in succession are often referred to as "seral stages."

Sustainability is defined as the capacity of forests, ranging from stands to eco-regions, to maintain their health, productivity, diversity, and overall integrity, in the long run, in the context of human activity and use.

System Road - See Forest Development Road, above.

Temporary Road - A road constructed to facilitate forest management activities but is reclaimed soon after the activity is completed.

Territory - Any area defended by one or more individuals against intrusion by others of the same or different species.

Thermal Cover- Cover used by animals to ameliorate the chilling effects of winter weather or the heating effects of summer weather. For elk, a stand of coniferous trees 40 feet or taller with an average crown closure of 70 percent or more.

Threatened Species - Any species, plant or animal, which is likely to become an endangered species within the near future throughout all, or a significant portion, of its range. In accordance with the 1973 ESA, the Secretary of the Interior identifies endangered species.

Tiering - Refers to the elimination of repetitive discussions of the same issue by incorporating by reference the general discussion in an environmental impact statement of broader scope. For example, a project EA could be tiered to the Forest Plan EIS.

Travel Habitat - Habitat used by a wildlife species for daily or periodic movements between areas of higher-quality habitat. For example, for a lynx this would be the forested cover used while traveling between areas used for denning and that used for hunting.

Underburning - A fire that consumes surface fuels but not trees and large shrubs. See also Low Severity Fire and Stand Maintenance Fire.

Understory - The trees and other woody species which grow under a more or less continuous cover of branches and foliage formed collectively by the upper portion of adjacent trees and other woody growth.

Ungulate - A mammal with hooves.

Vegetative Screening - Vegetation (trees, shrubs, etc.) that ameliorates the visual effect of management activities adjacent to viewing areas (i.e. main roads).

Vegetative Succession - A phase in the gradual supplanting of one community of plants by another.

Viability - A viable animal or plant species is defined as consisting of self-sustaining populations that are well distributed throughout the specie's range. Self-sustaining populations are those that are sufficiently large, and have sufficient genetic diversity to display the array of life history strategies and forms that will provide for their persistence and adaptability in the planning area over time.

Visual Resource - The composite of basic terrain, geologic features, water features, vegetative patterns, and land use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

Water Quality- The physical, chemical, and biological properties of water.

Water Yield - The runoff from a watershed, including groundwater outflow.

Watershed - The land area drained by a river system.

Water Erosion Prediction Project (WEPP) –. A computer simulation that predicts soil erosion.

Wetland - Areas that under normal circumstances have hydrophytic vegetation, hydric soils, and wetland hydrology.

Wilderness - Federal land retaining its primeval character and influence without permanent improvements or human habitation as defined under the 1964 Wilderness Act. It is protected and managed so as to preserve its natural conditions, which (1) generally appear to have been affected primarily by forces of nature with the imprint of man's activity substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and confined type of recreation; (3) has at least 5000 acres or is of sufficient size to make practical its preservation, enjoyment, and use in an unimpaired condition, and (4) may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.

Wildfire - An unwanted wildland fire that requires a suppression response.

Wildland Fire - A non-structure fire, other than prescribed fire, that occurs in the wildland. Any fire originating from an unplanned ignition.

Wildland Urban Interface (WUI) - That line, area, or zone where structures and other human development meet or intermingles with undeveloped wildland or vegetative fuels.

Wind Dominated Fire - The power of the wind is greater than the power of the fire in influencing its behavior.

Windfirm - A tree (live or dead) or species of tree that is relatively resistant to being blown over by the wind.

Windthrow - A tree or stand of trees that have been blown over by the wind.

Winter Range - The areas available to and used by big game during the winter season. Must contain forage or browse to feed big game. Winter range areas tend to have a relatively low amount of snow cover which enables the animals to reach the forage.

Acronyms

A19	Amendment 19
ARM	Administrative Rules of Montana
APHIS	Animal and Plant Health Inspection Service
ATV	All-Terrain Vehicle
BA	Biological Assessment
BBER	Bureau of Business and Economic Research
BCR	Bird Conservation Regions
BE	Biological Evaluation
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMA	Bear Management Analysis Area
BMP	Best Management Practice
BMU	Bear Management Unit
BO	Biological Opinion
CAA	Clean Air Act
CCF	100 cubic feet
CEQ	Council of Environmental Quality
CFLRP	Collaborative Forest Landscape Restoration Program
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CSKT	Confederated Salish and Kootenai Tribes
CWPP	Community Wildfire Protection Plan
DBH	Diameter at Breast Height
DEQ	MT Department of Environmental Quality
DMR	Designated Monitoring Reach
DN	Decision Notice
DNRC	MT Department of Natural Resources and Conservation
DSD	Detrimental Soil Disturbance
EA	Environmental Assessment
ECA	Equivalent Clearcut Acre
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ERC	Energy Release Component
ESA	Endangered Species Act
FACTS	Forest Service Activity Tracking System
FEIS	Final Environmental Impact Statement
FHP	Forest Health and Protection
FIA	Forest Inventory and Analysis
FlamMap	Fire Behavior Mapping and Analysis Program
FOFEM	First Order Fire Effects Model
FONSI	Finding of No Significant Impact
Forest Plan	Land and Resource Management Plan
FRCC	Fire Regime Condition Classes
FS	Forest Service
FSH	Forest Service Handbook
FSM	Forest Service Manual
FSVeg	Field Sampled Vegetation
FVS	Forest Vegetation Simulator
GIS	Geographic Information System
GTR	General Technical Report
HRV	Historic Range of Variability
ID Team	Interdisciplinary Team
IMBCR	Integrated Monitoring in Bird Conservation Regions
INFISH	Inland Native Fish Strategy
IMPLAN –	IMpact analysis for PLANning

LANDFIRE	Landscape Fire and Resource Management Planning Tools Project
LAU	Lynx Analysis Unit
LCAS	Lynx Conservation Agreement Strategy
LDM	Larch Dwarf Mistletoe
LWCF	Land and Water Conservation Fund
MA	Management Area
MAFI	Mean Annual Fire Intervals
MAPS	Monitoring Avian Productivity and Survivorship
MBF	Thousand Board Feet
MFI	Mean Fire Interval
MIS	Management Indicator Species
ML	Maintenance Level
MMA	Maximum Management Area
MMBF	Million Board Feet
MMW	Mission Mountains Wilderness
MNHP	Montana Natural Heritage Program
MOU	Memorandum of Understanding
MPB	Mountain Pine Beetle
MS	Management Situation
MS	Mixed Severity
Mt SHPO	Montana State Historic Protection Office
NAAQS	National Ambient Air Quality Standards
NAIP	National Agriculture Imagery Program
NCDE	Northern Continental Divide Ecosystem
NEPA	National Environmental Policy Act
NFDRS	National Fire Danger Rating System
NFMA	National Forest Management Act
NFS	National Forest System
NIFMID	National Interagency Fire Management Integrated Database
NIWC	Noxious and Invasive Weed Control
NPS	National Park Service
NR	Not Recorded
NRCS	Natural Resources Conservation Service
NRIS	Natural Resource Information System
NRLMD	Northern Region Lynx Management Direction
NTMB	Neotropical Migratory Bird
NWCG	National Wildland Fire Coordinating Group
OHV	Off-Highway Vehicle
OMB	Office of Management and Budget
ORD	Open Road Density
PCE	Primary Constituent Elements
PCTC	Plum Creek Timber Company, LLP
PM	Particulate Matter
PNV	Present Net Value
PVG	Potential Vegetation Groups
RAWS	Remote Access Weather Station
RFSS	Regional Forester's Sensitive Species
RHCA	Riparian Habitat Conservation Area
RMO	Road Management Objectives
RMRS	Rocky Mountain Research Station
ROD	Record of Decision
SDMP	Soil Disturbance Monitoring Protocol
SEC	Swan Valley Ecosystem Center
SIAM	Structure Ignition Assessment Model
SMZ	Stream Management Zone
SOPA	Schedule of Proposed Activities
SVGBCA	Swan Valley Grizzly Bear Conservation Agreement
SWCP	Soil and Water Conservation

	Practices
TES	Threatened and Endangered Species
TMDL	Total Maximum Daily Load
TNC	The Nature Conservancy
TPA	Tons Per Acre
TPL	Trust for Public Land
TRD	Total Road Density
TSMRS	Timber Stand Management Record System
USGS	U.S. Geological Survey
USC	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
UV	Ultra Violet
VMAP	Vector Map
VQO	Visual Quality Objectives
WATSED	Water Yield and Sediment Model
WEPP	Water Erosion Prediction Project
WFDSS	Wildland Fire Decision Support System
WRA	Weed Risk Assessment
WUI	Wildland Urban Interface
WWPA	Western Woods Products Association

APPENDIX E
LIST OF PREPARERS

The following individuals assisted with the development of the Glacier Loon Fuels Reduction and Forest Health Project.

INTERDISCIPLINARY TEAM MEMBER	TITLE	AREA OF CONTRIBUTION
Rich Kehr	District Ranger	Project Oversight and Guidance
Joleen Dunham	District Planning Team Leader	Project Coordination
Beth Gardner	District Fisheries Biologist	Fisheries
Jane Ingebretson	District Wildlife Biologist	Wildlife
John Ingebretson	District Fire/Fuels Specialist	Fire and Fuels, Air Quality
Andrew Johnson	District Resource Forester	Recreation, Wilderness, Range, Lands
Greg Karow	Silviculturist	Vegetation
Keith Konen	District Silviculturist	Vegetation
Andy Reed	District Forester	Logging Systems
Pete Robinson	District Resource Information Manager	Geographic Information System
Annie Schomer	District Resource Information Assistant	Geographic Information System Information, Mapping
Liz Rohde	District Hydrologist	Hydrology
Sue Tebay	District Writer/Editor	Writing, Editing
Chantelle DeLay	Forest Botanist	Sensitive and Invasive Plants
Mitch Guenthner	Engineering Coordinator	Transportation Planner
Joe Krueger	Forest NEPA Program Leader	NEPA Guidance
Tim Light	Forest Archeologist	Heritage Resources
Derek Milner	Forest Soil Scientist	Soils
Byron Stringham	Landscape Architect	Visuals