APPENDIX A
GLOSSARY

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

ACTIVE CROWN FIRE – A crown fire in which the entire fuel complex becomes involved, but the crowning phase remains dependent on heat released from the surface fuels for continued spread. Also called running and continous crown fire.

ADAPTIVE MANAGEMENT - Adaptive management rigorously combines management, research, monitoring, and means of changing practices so that credible information is gained and management activities are modified by experience.

ADDITIONAL DISTANCE INDEX - An estimate of the relative significance of a potential break in connectivity for wildlife species that prefer to remain within or close to forested cover. It is measured as the additional distance such an animal would have to travel to reach a location just on the other side of a proposed harvest unit.

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.

APPROPRIATE MANAGEMENT RESPONSE - Specific actions taken in response to a wildland fire to implement protection and fire use objectives. Includes control and suppression.

ARTIFICIAL REGENERATION - Renewal of a tree crop by direct seeding or by planting seedlings or cuttings.

ASPECT - The cardinal direction a slope faces.

ASSOCIATED CHARACTERISTICS (Old growth habitat) - In the definitions of Old-growth Forest Types of the Western Montana Zone (Project File Exhibit J-1) there are "associated characteristics" typical of the old growth stands in each types. These include multiple canopy layers and moderate or high levels of downed woody debris.

ATV - Small All Terrain Vehicle, sometimes referred to as a "four-wheeler."

AVAILABLE CANOPY FUEL – The mass of canopy fuel per unit area consumed in a crown fire. There is no post-frontal combustion in canopy fuels, so only fine canopy fuels are consumed. We assume that only foliage and a small fraction of the branchwood is available.

BANK COVER - Living streamside vegetation overhanging the water for up to one meter above the water surface.

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.

BENEFIT-COST RATIO - Measure of economic efficiency, computed by dividing total discounted primary benefits by total discounted economic costs.

BERM – A barrier, such as an earthen mound or concrete structure, placed across a road to permanently restrict the road from use by wheeled motorized vehicles.

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 - 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 DIVERSITY (or Biodiversity) - The variety of life and its processes, including bacteria, fungi, plants, insects, birds, fish and mammals, the genes they contain and the ecosystems they form.

BIOLOGICAL EVALUATION - 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.

BIOLOGICAL LEGACIES - Features which remain on a site or landscape after a natural disturbance. These legacies include live and dead trees, coarse woody debris, soil organic matter, plants, fungi, microorganisms, and seeds.

BIOLOGICAL POTENTIAL - The maximum possible output of a given resource limited only by its inherent physical and biological characteristics.

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.

BOREAL - Of or relating to the forest areas of the northern temperate zone, dominated by coniferous trees.

BROADCAST BURN - Allowing a prescribed fire to burn over a designated area within well-defined boundaries, for reduction of fuel hazard, as a silvicultural treatment, or both.

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

BUFFER STRIP - A strip of land (often including undisturbed vegetation) where disturbance is not allowed or is closely monitored to preserve or enhance aesthetic and 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 relates to the intensity of the fire on soil hydrologic 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 BASE HEIGHT – The lowest height above the ground at which there is a sufficient amount of canopy fuel to propagate fire vertically into the canopy. Canopy base height is an effective value that incorporates ladder fuels such as shrubs and understory trees.

CANOPY BULK DENSITY – The mass of available canopy fuel per unit canopy volume. It is a bulk property of a stand, not an individual tree.

CANOPY COVER - 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.

CANOPY FUELS – The live and dead foliage, live and dead branches, and lichen of trees and tall shrubs that lie above the surface fuels. See also available canopy fuel.

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.

CAPABILITY AREA - A geographic delineation used to describe characteristics of the land and resources in integrated Forest planning.

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

CHAIN - A unit of linear measure equalling 66 feet.

CLEARCUTTING METHOD - The process of removing all trees, large and small, in a stand in one cutting operation. Also, a cutting method to regenerate an even-aged forest stand in which new seedlings become established in fully exposed microenvironments after removal of most or all of the existing trees. The area harvested may be a patch, stand, or strip large enough to be mapped or recorded as a separate age class. Regeneration can originate naturally or artificially.

CLEARCUT WITH RESERVES - A variation of the clear-cut silvicultural system in which trees are retained, either uniformly or in small groups, for purposes other than regeneration.

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-FILTER APPROACH - An approach to maintaining biodiversity that involves maintaining a diversity of structures within stands and a diversity of ecosystems across the landscape. The intent is to meet most of the habitat requirements of most of the native species. Compare with fine-filter approach.

COARSE WOODY DEBRIS - Any piece(s) of dead woody material, e.g., dead boles, limbs, and large root masses on the ground or in streams.

COMMERCIAL FOREST LAND (Suitable Timber Land) - Land that is producing, or is capable of producing, crops of industrial wood and (1) has not been withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service; (2) where existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity or watershed conditions; and (3) where existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be obtained within 5 years after final harvesting.

COMMERCIAL THINNING - A silviculture treatment that 'thins' out an overstocked stand by removing trees that 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.

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.

CONNECTIVITY - A measure of how well different areas (patches) of a landscape are connected by linkages, such as habitat patches, single or multiple corridors, or stepping stones' of like vegetation. The extent to which conditions among late-seral/structural forest areas provide habitat for breeding, feeding, dispersal and movement of late-seral/structural dependent wildlife species.

CONSULTATION - A process required by Section 7 of the Endangered Species Act whereby federal agencies proposing activities in a listed species habitat confer with the US 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 BASE HEIGHT – The vertical distance from the ground to the bottom of the live crown of an individual tree. See also canopy base height.

CROWN BULK DENSITY – The mass of available fuel per unit crown volume. It is a property of an individual tree, not a whole stand. See also canopy bulk density.

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.

CROWN FIRE CESSATION – The process by which a crown fire ceases, resulting in a surface fire. Crown fire cessation is a different mechanism than crown fire initiation, possibly leading to hysteresis.

CROWNING INDEX – The open (6.1-m) windspeed at which active crown fire is possible for the specified fire environment.

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.

DBH – See Diameter Breast Height.

DECOMMISSION – In relation to this document, this term means to change a road so it no longer functions as a road or trail. Road decommissioning can be accomplished through one or a combination of treatments including: recontouring to original slope, placement of natural debris, or revegetation with shrubs or trees. Culvert removals and stream restoration would occur where roads to be decommissioned intersect streams. Decommissioned roads are removed from the forest's road management database system.

DEDICATED SKID TRAIL - A trail used repeatedly for skidding logs in order to confine disturbance to that trail only.

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

DEVELOPED RECREATION - Recreation that occurs where improvements enhance recreation opportunities and accommodate intensive recreation activities in a defined area.

DIAMETER BREAST HEIGHT (DBH) - The diameter of a tree measured four and one-half feet above the ground.

DIRECT EFFECT - Effects on the environment which 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.

DISPERSED RECREATION - That portion of outdoor recreation use which occurs outside of developed sites in the unroaded and roaded forest environment i.e., hunting, backpacking, and berry picking.

DISPERSED SKID - Removing logs from a unit where the equipment makes only one or two passes over any given piece of ground to minimize disturbance.

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.

DISTURBANCE REGIME - Natural pattern of periodic disturbances, such as fire or flooding.

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

DOWNED WOOD RECRUITMENT - Trees, live or dead, that will contribute to future downed wood.

DOWNED WOODY MATERIAL HABITAT - Downed trees and other woody material, such as stumps, bark, and limb piles, that occur on the forest floor and provide diversity in the environment. Downed logs and stumps

are required for resting and denning, are vital for hunting below the snow in winter, and are apparently also used as travel cover, particularly in lieu of vegetative cover.

DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) - The draft form of a formal public document prepared to analyze the impacts on the environment of a proposed project or action and released for comment and review. Public comments are requested within 45 days after the release of a DEIS and are considered prior to making the final decision and are responded to in the Final Environmental Impact Statement (FEIS).

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

DYSGENIC - Being detrimental to the genetic qualities of future generations.

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.

ECOLOGICAL INTEGRITY - The quality of a natural unmanaged or managed ecosystem in which the natural ecological processes are sustained, with genetic, species and ecosystem diversity assured for the future

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.

ECOSYSTEM MANAGEMENT - The use of an ecological approach to achieve productive resource management by blending social, physical, economic and biological needs and values to provide healthy ecosystems.

ECOTONE - A zone of transition habitat created by the juxtaposition of distinctly different habitats, and usually exhibiting competition between organisms common to both.

EDGE - The outer band of a patch that has an environment significantly different from the interior of the patch.

EDGE EFFECTS - Changes in ecological community due to the rapid creation of abrupt edges in large patches of previously undisturbed habitat. For old growth habitat, this is where sun, wind, predators, competitors, etc., can penetrate further into what was previously interior forest.

EFFICIENCY, ECONOMIC - The usefulness of inputs (costs) to produce outputs (benefits) and effects when all costs and benefits than can be identified and valued are included in the computations. Economic efficiency is usually measured using present net value, though use of benefit-cost ratios and may sometimes be appropriate.

ELK HIDING COVER - Vegetation, primarily trees, capable of hiding 90 percent of an elk seen from a distance of 200 feet or less.

ELK HUNTING SEASON SECURITY AREA - Areas of contiguous hiding cover patches over 250 acres in size and more than 1/2 mile from roads or trails that are open to motorized use during the hunting season.

ENDANGERED SPECIES - Any species, plant, or animal which is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

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).

ENVIRONMENTAL VARIATIONS - The change in both topographical and fuel characteristics as they vary throughout the range of elevations in the project area. Closely related to Fire Behavior characteristics (weather, fuel, and topography).

EPHEMERAL STREAM - A stream or portion of a stream which flows only in direct response to precipitation, receiving little or no water from springs and no long continued supply from snow or other sources, and whose channel is at all times above the water table.

EPIDEMIC (OUTBREAK) - The rapid spread, growth, and development of pathogen or insect populations that affect large numbers of a host population throughout an area at the same time.

EVEN-AGED MANAGEMENT - The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of the stands of varying ages (and, therefore, tree sizes) throughout the forest area. The difference in ages between trees forming the main canopy level of the stand does not usually exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the same time that a stand has reached the desired age or size for regeneration and is harvested. Cutting methods include clearcutting, shelterwood cutting, and seed tree cutting.

EXTIRPATION - The local disappearance of a species, as opposed to extinction, which is global disappearance.

FINAL ENVIRONMENTAL IMPACT STATEMENT (FEIS) - The final formal public document prepared to analyze the impacts on the environment of a proposed project or action when significant environmental impacts are anticipated. .

FINE FILTER APPROACH - An approach to maintaining biodiversity that is directed toward particular habitats or individual species that might fall through the coarse filter. These habitats may be critical in some way and the species threatened or endangered.

FINE FUELS - Woody or herbaceous plants, live or dead, less than three inches in diameter.

FINES - Sediment in streams that is less than 0.25 inches or 6 millimeters in diameter.

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

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 fireline construction. Assessment is based on physical fuel characteristics, such as fuel arrangement, fuel load, condition of herbaceous vegetation, and presence of elevated fuels.

FIRE LINE INTENSITY – The rate of heat release in the flaming front per unit length of fire front (Byram 1959).

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

FIRE HISTORY ANALYSIS -An analysis of the Good Creek watershed using dendrochronology to determine the frequency and severity of historic fires.

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 SEVERITY – A relative measure of the post-fire appearance of vegetation (residual fuels/mortality) as it relates 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-INTOLERANT SPECIES - Tree species with thin bark at maturity, such as subalpine fir and spruce.

FIRE-TOLERANT SPECIES - Tree species with thick bark at maturity, such as western larch and Douglas-fir.

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.

FOREST HEALTH - The condition in which forest ecosystems sustain their complexity, diversity, resiliency, and productivity while providing for human needs and values. It is a useful way to communicate about the current condition of the forest, especially with regard to the ability of the ecosystem to respond to disturbances.

FOREST LAND - Land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use. Lands developed for non-forest use include areas for crops, improved pasture, residential, or administrative areas, improved constructed roads of any width, and adjoining road clearing and power-line clearing of any width.

FOREST PLAN - The Flathead National Forest Land and Resource Management Plan (LRMP), December 1985. 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 10-15 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 SUPERVISOR - The official responsible for administering the National Forest System lands in a Forest Service Administrative unit, which may consist of one or more National Forests or all the National Forests within a State.

FOREST SYSTEM ROAD - A road wholly or partly within or adjacent to and serving the National Forest System and which is necessary for the protection, administration, and utilization of the National Forest System and the use and developments of its resources.

FOREST TYPE - A category of forest usually defined by its vegetation, particularly its dominant vegetation as based on percentage cover of trees, e.g. spruce-fir, lodgepole.

FORESTED CONNECTIVITY - Connectivity for wildlife species that prefer to remain within or close to forested cover.

FORESTED RIPARIAN LINKAGES - Areas of continuous forested cover at least 300 feet wide along and connecting adjacent riparian features, such as streams, ponds, and wetlands.

FRAGMENTATION - The alteration of a large habitat patch to create isolated or tenuously connected patches of the original habitat that are interspersed with an extensive mosaic of other habitat types. This results in the reduction of total area, increased isolation of patches, and reduced connectivity between patches of natural vegetation. This occurs naturally through such agents as fire, landslides, windthrow and insect attack. In managed forests, timber harvesting and related activities have been the dominant disturbance agents.

FRY - The name applied to young fish from the time of hatching and until they have absorbed the yolk sac.

FSH - Forest Service Handbook

FSM - Forest Service Manual

FUEL BREAK - A zone in which fuel quantity has been reduced or altered to provide a position for suppression forces to make a stand against wildfire. Fuel breaks are designated or constructed before the outbreak of a fire. Fuel breaks may consist of one or a combination of the following: natural barriers, constructed fuel breaks, or man-made barriers.

FUEL COMPLEX – The combination of ground, surface, and canopy fuel strata.

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 MODEL – A set of surface fuel bed characteristics (load and surface-area-to-volume-ratio by size class, heat content, and depth) organized for input to a fire model. Standard fuel models (Anderson 1982) have been stylized to represent specific fuel conditions.

FUELS REDUCTION ZONE (FRZ) - Areas in which continuous high hazard fuels are broken up. They are designed to increase firefighter safety and reduce resistance to fire control efforts. FRZs may be of any size or shape. They may have a higher number of snags, down logs, and canopy closure than other fuels treatment zones. They are recognized as being a significant portion of a complete fuels management program.

FUEL TREATMENT - The rearrangement or disposal of natural or activity fuels.

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

GEOGRAPHIC INFORMATION SYSTEM (GIS) - Computer software that provides database and analytic capabilities.

GENOTYPE - An individual's hereditary (genetic) constitution. An individual's genotype plus the environment make up the individual's phenotype.

GLACIAL RELICT - A species that has survived from Pleistocene faunas and floras, typically in a restricted location or habitat.

GRADIENT (stream) -The slope of a streambed.

GROUP SELECTION METHOD - A cutting method to develop and maintain uneven-aged stands by the removal of small groups of trees at periodic intervals to meet a predetermined goal of size distribution and species composition in remaining stands.

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 state 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% 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.

HIGH-CONTRAST EDGE - High-contrast edge is created when stands adjacent to old growth habitat are converted from late or mid-seral/structural stage to the early seral/structural stage. See "Edge".

HOLARCTIC - Residing in the northern latitudes of the northern hemisphere.

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

HYDROLOGICAL UNIT CODE (HUC) - A Hydrologic Unit Code (HUC) is part of a coding system developed by the U.S. Geological Service to map geographic boundaries of watersheds of various sizes. The HUCs are called (from larger to smaller) first-, second-, third-, and fourth-field HUCs, etc.; smaller HUCs are nested within larger ones. A subbasin represents a fourth-field HUC, or a unit of approximately 800,000 to a million acres. The ICBEMP also identified two smaller sizes of HUCs, fifth- ("watersheds") and sixth-field ("subwatersheds") HUCs, to aid in analysis and description.

HYSTERESIS – The failure of a property that has been changed by an external agent to return to its original value when the cause of the change is removed. In crown fire, hysteresis is expressed in the persistence of active crowning after the fire environment has changed such that a crown fire could no longer initiate.

IMMATURE TIMBER - Trees or stands that have grown past the regeneration stage, but are not yet mature.

INDEPENDENT CROWN FIRE – A crown fire that spreads without the aid of supporting surface fire.

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

INDIVIDUAL TREE SELECTION METHOD - A cutting method to develop and maintain uneven-aged stands by the removal of selected trees from specified age classes over the entire stand area in order to meet a predetermined goal of age distribution and species in the remaining stand.

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.

INTERIOR COLUMBIA RIVER BASIN (ICRB) - The parts of the watershed of the Columbia River Basin that lie in eastern Oregon, eastern Washington, Idaho, far western Wyoming, western Montana and small portions of northern Utah and northern Nevada.

INTERIOR HABITAT - Forest interior conditions found deep within forests, away from the effect of open areas. Forest interior conditions include particular microclimates found within large forested areas. Interior conditions are achieved at a point where environmental conditions within a patch are no longer influenced by edge effects, such as light intensity, temperature, wind, relative humidity, and snow accumulation and melt. For Western Montana forests, the edge effect is generally felt for a distance equivalent to 2 to 4 times the average tree height into the stand.

INTERMEDIATE HARVEST - Any removal of trees from a stand between the time of its formation and the regeneration cut. Most commonly applied intermediate cuttings are release, thinning, improvement, and salvage.

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.

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

IRREGULAR UNEVEN-AGED STRUCTURE (Unbalanced) - Stands that have three or more distinct age classes which do not occupy approximately equal areas. Distribution of diameters is unbalanced.

ISSUE - See Public Issue.

JUVENILE TROUT - The fingerling or sub-adult stages (not sexually mature).

KEY USE ZONES (White-tailed deer) - Areas within one quarter mile of a riparian feature.

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.

LAND AND RESOURCE MANAGEMENT PLAN (LRMP) - A strategic integrated resource plan based on the principles of enhanced public involvement, consideration of all resource values, and resource sustainability.

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

LANDSCAPE MANAGEMENT - Creation of landscapes with a distribution of forest conditions for continuous production of desired goods and services and without adverse effects. Considers management on larger spatial scales and longer time frames.

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.

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.

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.

LITTORAL - The onshore area of a body of water, extending from the shore to the limits of rooted aquatic plants.

LONG-TERM SUSTAINED YIELD CAPACITY (LTSY) - The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified intensity of management consistent with multiple use objectives.

LOW-SEVERITY GROUND FIRE - A fire with low intensity that primarily scorches tree boles, allowing fire tolerant species to survive.

LYNX ANALYSIS UNIT (LAU) - An area that approximates the size of an average female lynx home range (25-40 square miles in contiguous habitat, and that contains habitats needed in all seasons. The LAU is not the actual home range, but is an analysis unit upon which direct, indirect, and cumulative effects analyses are preformed.

LYNX HABITAT - Higher-elevation, cool/cold, moist forests. In the western United States, subalpine fir/spruce associations (with lodgepole pine as a seral species) provide the primary habitat.

MAJOR FORESTED CONNECTIVITY LINKAGE - Areas where forested connectivity appears to be relatively important. If connectivity were to be severed in these areas, wildlife species that prefer to remain within or close to forested cover would have to travel 2.0 miles or further to reach a location just on the other side of a proposed harvest unit. See "Additional Distance Index".

MANAGEMENT AREA - An aggregation of capability areas which 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 - 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.

MATRIX - The most extensive and most connected habitat type in a landscape, which often plays the dominant role in landscape processes.

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 ANNUAL INCREMENT - The total volume increase in a tree or stand of trees up to a given age, divided by that age.

MESIC - Moderately moist.

METAPOPULATION - A collection or set of local populations living where discrete patches of the area are habitable and the intervening regions are not; a basic demographic unit composed of a set of populations in different habitat patches linked by the movement of individuals.

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 REGIME - Mixed-severity fire regime areas can experience the full range of severities during either a single event or consecutive events. In other words, mixed-severity fire regime areas may experience fires of intermediate effects, often consisting of fine-grained spatial patterns resulting from a mosaic of varying severity.

MOIST SITES (elk) - An important characteristic of elk habitat consisting of wet meadows, ponds, seeps, and springs, and typically located in more remote, upper-drainage perched sites.

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.

MULTIPLE USE - The management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some lands will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

NARROWED RIPARIAN CONNECTIVITY - Forested connectivity that would be narrowed to than 300 feet wide.

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 ENVIRONMENTAL POLICY ACT (NEPA) PROCESS - An interdisciplinary process, mandated by NEPA, which concentrates decision making around issues, concerns, alternatives, and the effects of the alternatives on the environment.

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 - 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 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.

NEOTROPICAL MIGRATORY BIRDS - Migratory bird species that nest in North America and winter in Central or South America or the Caribbean.

NO-ACTION ALTERNATIVE - The management direction, activities, outputs, and effects most likely to exist in the future if the current plan would continue unchanged.

NONATTAINMENT AREAS - Areas within the State that exceed the national ambient air quality standards are classified as nonattainment.

NON-LYNX HABITAT - "Temporary non-lynx" habitat includes sites capable of growing forests but currently in a early-seral/structural stage condition and too young to be of use by lynx. Most "permanent non-lynx habitat" is too rocky or too wet to support forests.

NON-POINT SOURCE POLLUTION - Pollution which is induced by natural processes, including precipitation, seepage, percolation, and runoff; and which is not traceable to any discrete or identifiable facility.

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.

OFF-ROAD VEHICLE - Any vehicle capable of being operated off an established road or trail, e.g., motorbikes, four-wheel drives, and snowmobiles.

OLD GROWTH ASSOCIATED SPECIES - The group of 31 wildlife species that is associated with old-growth forest plant communities on the Flathead National Forest. See Project File Exhibit J-1.

OLD GROWTH HABITAT - A community of forest vegetation which 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.

OLIGOTROPHIC – A habitat low in basic nutrients.

OPEN ROAD DENSITY - The miles of road open to motorized vehicle traffic within a specified area; e.g. a bear management analysis area 5000 to 15,000 acres. ORD equals miles of open road within a specific area divided by total square miles of a specific area.

OUTPUT - A good, service, or on-site use that is produced from forest and rangeland resources. Definitions of Forest and rangeland output definitions, codes, and units measure are contained in the Management Information Handbook (FSH 1309.11). Examples are: X06 - Softwood Sawtimber Production - MBF; X80 - Increased Water Yield - Acre Feet; WO1 - Primitive Recreation Use - RVDs.

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.

OVERSTORY REMOVAL - The removal, usually for silvicultural purposes, of overstory trees from a stand to release advanced regeneration.

PAI - Potentially Affected Interests or Periodic Annual Increment.

PASSIVE CROWN FIRE – A crown fire in which individual or small groups of trees torch out, but solid flaming in the canopy cannot be maintained except for short periods. Passive crown fire encompasses a wide range of crown fire behavior from the occasional torching of an isolated tree to a nearly active crown fire. Also called torching and candling.

PATCH - Areas distinguished from their surroundings by environmental discontinuities, such as a patch of early-seral/structural stage forest surrounded by mid- and late-seral structural stage forest.

PATCH DYNAMICS - The change in the distribution of habitat patches in a landscape generated by patterns of disturbance and subsequent patterns of vegetative succession.

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.

PHENOTYPE - The product of the interaction of the genes of an organism (genotype) with the environment.

PLUME-DOMINATED FIRE - The power of the fire is greater than the power of the wind in influencing its behavior.

POLE - A tree between a sapling and small timber size at least five inches in diameter at breast height but smaller than 8" 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.

PRECOMMERCIAL 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 which 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.

PROPOSED THREATENED SPECIES - A species that has been formally proposed for listing as Threatened under the Endangered Species Act.

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 National Forest System lands.

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.

RECLAMATION (Road) - The act of removing a road from availability for motorized travel. Drainage features may be removed to the extent that road management and monitoring is no longer necessary. Vegetation is allowed to grow on the road surface. The road prism is not substantially altered and the road may be put back into service with usually a small amount of reconditioning. Reclaimed roads are not removed from the forest's road management database system.

RECORD OF DECISION - A document separate from but associated with an environmental impact statement that publicly and officially discloses the responsible official's decision on the proposed action.

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 Endangered Species Act to the point at which listing is no longer appropriate. Plans are required for virtually all listed species.

RECREATION VISITOR DAY (RVD) - One 12 hour period of recreation. It can be one person for 12 hours, 2 people for 6 hours, 12 people for 1 hour, etc.

RECRUITMENT OLD GROWTH - For the purpose of the Westside Reservoir Post-Fire Salvage Project, these are areas with at least 10 lives trees per acre of larch or Douglas-fir over 17" DBH that experienced low fire severity, but that do not qualify as old growth habitat.

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

REFUGIUM - An area that remains unchanged while areas surrounding it change markedly; hence the area serves as a refuge for species requiring specific habitats.

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

REGULAR UNEVEN-AGED STRUCTURE (Balanced) - A stand in which three or more distinct age classes occupy approximate equal areas and provide a balanced distribution of diameter classes.

REHABILITATION (Road) - The act of maintaining a road and improving drainage features, usually to meet Best Management Practices 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.

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

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

RETENTION LEVEL - The amount of forest vegetation left on a site after a treatment is accomplished. Treatments are usually timber harvest, prescribed burns, or thinning.

RIFFLE - A shallow rapid where the water flows swiftly over completely or partially submerged obstructions (rocks, etc.) to produce surface agitation, but standing waves are absent.

RIP RAP - A loose assembly of broken rock, generally used to stabilize slopes.

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. RHCAs were established as INFISH guidelines.

RIPARIAN LANDTYPE - 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 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.

ROAD PRISM -The area of the ground containing the road surface, cut slope and fill slope.

ROADLESS AREA - A National Forest area which (1) is larger than 5000 acres, or if smaller than 5000 acres, contiguous to a designated wilderness or primitive areas; (2) contains no roads; and (3) has been inventoried by the Forest System for possible inclusion in the wilderness preservation system.

ROTATION - The planned number of years between the formation or regeneration of a tree crop or stand and its final cutting at a specified stage of maturity. Can be based on physical, biological, pathological or economic criteria.

SALVAGE HARVEST - The cutting of trees that are dead, dying, or deteriorating (e.g., because they are overmature or materially damaged by fire, wind, insect, fungi, or other injurious agents) to obtain monetary value that would otherwise be lost.

SANITATION SALVAGE HARVEST - Tree removal or modification operations designed to reduce damage caused by forest pests and to prevent their spread.

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

SAWTIMBER - Trees containing at least one 8 foot piece with a 5.6 inch diameter inside bark at the small end and meeting the Regional specifications for freedom from defect. Softwood trees must be at least eight inches in diameter at breast height for all species except lodgepole pine which must be seven inches at breast height.

SCARIFICATION - The removal of the surface organic material (duff) to the surface of the underlying mineral soil.

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 (Reg. 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. See "Elk Hunting Season Security Area".

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 five inches in diameter are the predominant vegetation.

SEEDTREE METHOD - A cutting method to regenerate a stand in which all trees are removed from an area except for a small number (commonly 4-8) of seed-bearing trees per acre, left singly or in small groups.

SEEDTREE WITH RESERVES - The application of the seedtree method with the intention of retaining or reserving all or a portion of the seed trees for future stand structure.

SEEDTREE-RESERVE SYSTEM - Seedtree silvicultural system where the seed trees are left on the site to meet other objectives after a new stand is regenerated.

SELECTION METHOD - A cutting method to regenerate a forest stand and maintain an uneven-aged structure, by periodically removing some trees in all size classes either singly or in small groups or strips.

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 which is developmental; a transitory stage in an ecologic succession.

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.

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.

SHELTERWOOD METHOD - A cutting method to regenerate an even-aged stand in which some of the mature trees are left to provide shelter for regeneration. The harvest may consist of 2 or 3 cuttings. It may be done uniformly throughout the stand, in strips, or in groups. Regeneration may be natural or artificial.

SHELTERWOOD WITH RESERVES - The application of the shelterwood method with the intention of retaining or reserving all or a portion of the shelterwood trees for future stand structure.

SHRUB SLASHING - The felling of shrubs, especially willow, at close to ground level to stimulate new growth for wildlife browse.

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 (Detailed) - 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.

SINK HABITAT - A habitat in which reproduction is insufficient to balance local mortality. The population can persist in the habitat only by being a net importer of individuals.

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.

SKIDDING - Moving logs or felled trees from the stump to a landing, usually with the forward end supported off the ground.

SKYLINE CORRIDORS - Linear areas cleared of vegetation for a type of cable logging system in which a skyline is stationary and a carriage moves along it carrying logs above the ground, from the felling site to the landing.

SLASH - The residue left on the ground after felling and other silvicultural operations, or accumulating there as a result of storms, fire, or natural pruning.

SNAG - A standing dead tree usually greater than five feet in height and six inches in diameter at beast height.

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.

SPAWNING GRAVEL - Small gravels (1/4" - 1.0" diameter) in streams grouped in areas of about one square foot or larger with good water circulation through them.

SPAWNING HABITAT - Areas of substrate which 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 System 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 (Lethal) - Fire that emphasizes the destruction of the living overstory vegetation.

STAND REPLACEMENT FIRE REGIME - Stand-replacement fire regimes typically occur on lands that historically experience lethal fires with less than 10% 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.
STREAMSIDE MANAGEMENT ZONE (SMZ) - An area adjacent to the bank of a stream or body of open water where extra precaution is necessary to carry out forest practices in order to protect bank edges and water quality.

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).

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."

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

SURFACE FIRE – A fire spreading through surface fuels.

SURFACE FUELS – Needles, leaves, grass, forbs, dead and down branches and boles, stumps, shrubs, and short trees.

SUSTAINED YIELD - The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without impairment of the productivity of the land.

SYSTEM ROAD - See Forest System Road, above.

TEMPORARY ROAD - A road constructed to facilitate forest management activities but is reclaimed soon after the activity is completed. A temporary road may be reclaimed immediately after timber harvesting is completed or may need to remain in use for up to five years to facilitate reforestation and/or weed control operations.

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% or more. Shading and windbreaking

THREATENED SPECIES - Any species, plant or animal, which is likely to become an endangered species within the foreseeable future throughout all, or a significant portion, of its range. Threatened species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

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 environmental assessment could be tiered to the Forest Plan EIS.

TIMBER PRODUCTION - The purposeful growing, tending, harvesting, and regeneration of rotational crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. For purposes of Forest planning, timber production does not include production of fuelwood or harvest from unsuitable lands.

TIMBER STAND IMPROVEMENT (TSI) - All noncommercial intermediate cuttings and other treatments to improve composition, condition, and volume growth of a timber stand.

TORCHING INDEX – The open (6.1-m) windspeed at which crown fire activity can initiate for the specified fire environment.

TOTAL MAXIMUM DAILY LOAD – A calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources.

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.

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.

UNSUITABLE TIMBERLAND - Lands not selected for timber production in the suitability analysis during the development of the Forest Plan due to (1) the multiple-use objectives for the alternative preclude timber production, (2) other management objectives for the alternative requirements set forth in 36 CFR 219.27 cannot be met, and (3) the lands are not cost-efficient over the planning horizon in meeting forest objectives that include timber production. Land not appropriate for timber production shall be designated as unsuitable in the Forest Plan.

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.

VERTICAL DIVERSITY - The distribution and abundance of different plant and animal communities and species on the vertical plane within an area.

VIABILITY - A viable animal or plant species is defined as consisting of self-sustaining populations that are well distributed throughout the species' 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.

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.

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.

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 - That line, area, or zone where structures and other human development meets 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.

YARDING - The operation of hauling timber from the stump to a collecting point. This is commonly done using a cable system, dozers, helicopters, or rubber-tired skidders.

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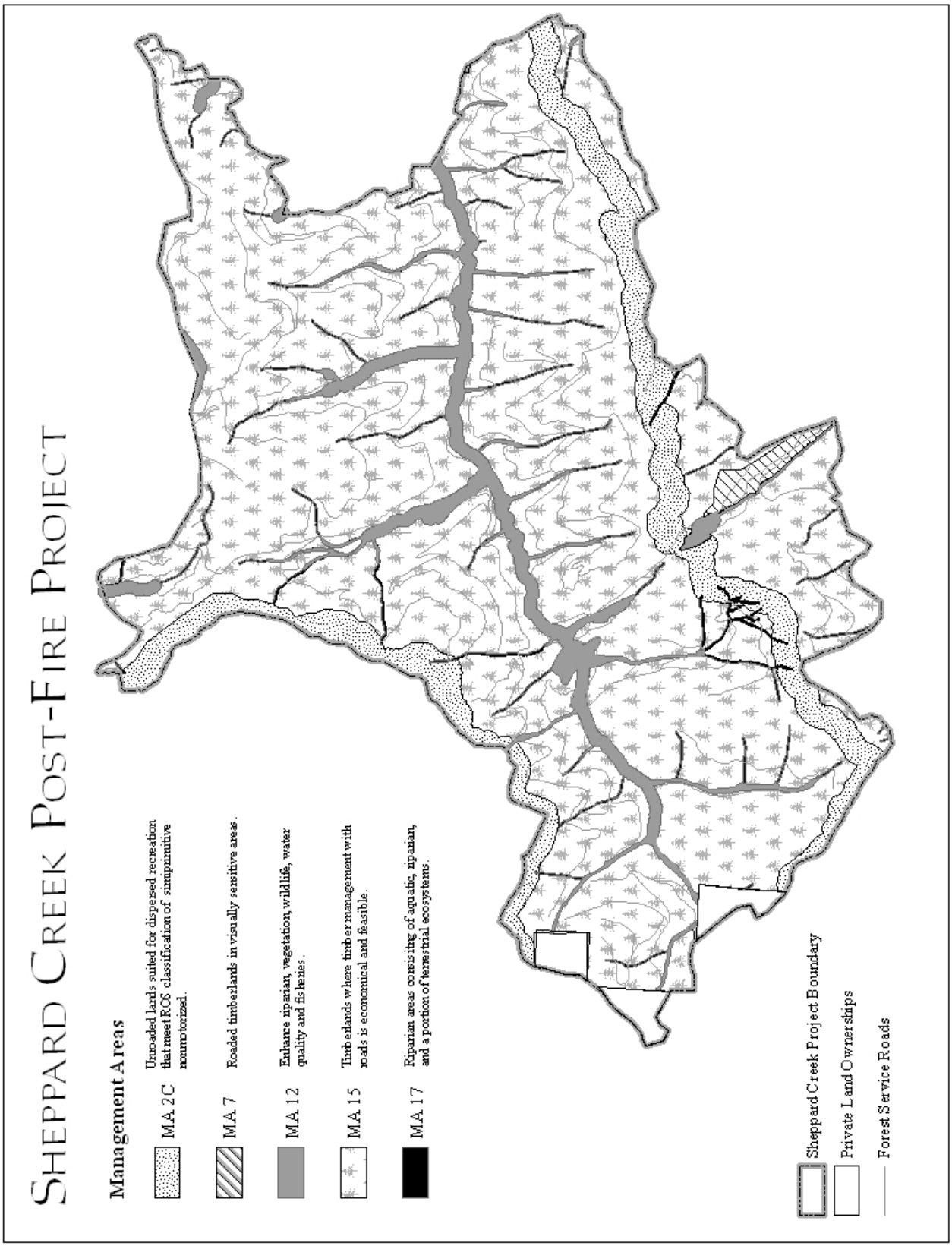
APPENDIX B
FOREST PLAN MANAGEMENT AREAS

The following table and map provides a summary description along with selected goals and standards for the Flathead National Forest Plan management areas located within the Sheppard Creek Post-Fire Project Area. The information was extracted from the Forest Plan (2001 version); please refer to the Forest Plan for a completed listing of Management Area goals and standards.

MA	Total Acres	Description	Goals	Standards
2C	2233	Lands suited for dispersed recreation that meet Recreation Opportunity Spectrum (ROS) classification of roaded natural appearing. LRMP, pages III-5 to III-11.	• Dispersed recreation opportunities will be managed to meet the roaded natural appearing ROS classification.	✓ Maintain trails for motorized access opportunities. ✓ Lands classified as unsuitable for timber management, timber harvest will not be scheduled; harvest timber only if salvage from existing roadways with protection of recreation values.
7	165	Roaded timberlands in areas of high scenic value. LRMP, pages III-25 to III-30.	• Maintain a pleasing, natural appearing landscape in which management activities are not dominant.	✓ Visual Quality Objective (VQO) is partial retention. ✓ Lands are classified as suitable for timber harvest, even-aged harvest units will generally not exceed 10 acres in size.
12	1358	Riparian areas consisting of aquatic, riparian, and a portion of terrestrial ecosystems along most perennial streams, lakes, and ponds. LRMP, pages III-52 to III-60.	• Manage riparian areas to enhance vegetation and wildlife diversity. • Maintain or enhance water quality and fisheries.	✓ Lands classified as unsuitable for timber management, timber harvest will not be scheduled; harvest timber only if riparian wildlife and fish habitat values can be maintained or improved. ✓ Maintain long-term water quality to meet or exceed State water quality standards.

MA	Total Acres	Description	Goals	Standards
15	18,161	Timberlands where timber management with roads is economical and feasible. LRMP, pages III-70 to III-76.	• Emphasize cost efficient production of timber while protecting the productive capacity of the land and timber resource.	✓ Lands reclassified as unsuitable for timber management, and timber harvest will be scheduled. ✓ Use timber stand improvement practices to maintain horizontal stand diversity.
17	371	Riparian areas consisting of aquatic, riparian, and a portion of terrestrial ecosystems along perennial stream reaches. LRMP, pages III-82 to III-88.	• Protect and maintain the riparian zone, including fish and wildlife habitat, while maintaining a sustained yield of timber.	✓ Lands are classified as suitable for timber management, and timber harvest will be scheduled. ✓ A riparian area analysis will be completed before a major project is implemented on the ground.

Figure B-1. Project Forest Plan Management Areas



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APPENDIX C
BEST MANAGEMENT PRACTICES

Introduction

Best Management Practices (BMPs) are the primary mechanism to enable the achievement of water quality standards (Environmental Protection Agency 1987). This Appendix describes the Forest Service's BMP process, lists the key Soil and Water Conservation Practices (SWCPs) selected to be used in the alternatives analyzed in this Environmental Impact Statement (EIS), and describes each SWCP that will be refined for site-specific conditions, arrive at the project level BMPs to protect beneficial uses, and meet water quality objectives.

BMPs include, but are not limited to, structural, and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution producing activities to reduce or eliminate the introduction of pollutants into receiving waters. Usually BMPs are applied as a system 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.

The Flathead National Forest Land and Resource Management Plan (Flathead Forest Plan 2001 version) emphasizes the application of BMPs "to protect or improve the quality of the water source" (p.II-49). Practices compiled from The Flathead Drainage 208 Project (May 1980), Flathead National Forest Hydrologic Guidelines (1981), 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-49 thru II-55). 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-49).

State Requirements for Protection of Water Quality

Compliance with State requirements for protection of waters of the State of Montana (Administrative Rules of Montana, 16.20.603) means that "land management activities must not generate pollutants in excess of those that are naturally occurring regardless of the stream's classification. 'Naturally occurring' is defined in the Administrative Rules as that water quality condition resulting from runoff or percolation over which man has no control or from developed land where all 'reasonable' land, soil, and water conservation practices have been applied." The Administrative Rules also state "Best Management Practices are 'reasonable' only if beneficial uses are protected" (i.e. fisheries). Land management activities that are in compliance with Montana water quality law and regulations have three elements in common:

1. BMPs are applied;
2. Beneficial uses are not impaired; and
3. Monitoring is in place to test whether BMPs are adequate to protect beneficial uses.

Montana State Water Quality Standards require the use of Reasonable Land, Soil, and Water Conservation Practices (analogous to BMPs) as the controlling mechanism for nonpoint pollution. Use of BMPs is also required in the Memorandum of Understanding (MOU) between the Forest Service and the State of Montana as part of our responsibility as the Designated Water Quality Management Agency on National Forest System lands.

BMP Implementation Process

In cooperation with the State, the Forest's primary strategy for the control of nonpoint sources is based on the implementation of preventive practices (BMPs) determined necessary for the protection of the identified beneficial uses.

The Forest's Nonpoint Source Management System consists of:

1. BMP selection and design based on site-specific conditions; technical, economic and institutional feasibility; and the designate beneficial uses of the streams.
2. BMP application.
3. BMP monitoring to ensure that they are being implemented and are effective in protecting designated beneficial uses.
4. Evaluation of BMP monitoring results from 'step' 3.
5. Feeding back the results into current/future activities and BMP design.

The District Ranger is responsible for ensuring that this BMP feedback loop is implemented on all projects.

1. BMP Selections and Design.

Water quality standards and goals are identified in the Flathead Forest Plan. These standards and goals meet or exceed applicable legal requirements, including State water quality regulations, the Clean Water Act, and the National Forest Management Act. The Sheppard Creek EIS is tiered to the Flathead Forest Plan, using the NEPA process. Appropriate BMPs are selected for each action alternative by the Interdisciplinary Team (ID Team). As BMPs are applied to differing conditions and locals, flexibility in BMP design is allowed to best suit local conditions and values and the beneficial uses of water.

BMP selection and design are dictated by 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 meet other resource needs. These final selected practices constitute the BMPs.

2. BMP Application.

The selected BMPs are translated into contract clauses and project plan specifications. This ensures that the operator or person responsible for applying the BMP actually is required to apply it. The site-specific BMP prescriptions are taken from plan-to-ground by a combination of project layout and resource specialists (hydrology, fisheries, soil, engineering, and others). This is when final adjustments to fit the BMP prescriptions to the site are made before implementing the resource activity.

3. BMP Monitoring.

When the resource activity begins, timber sale administrators, engineering representatives, contracting officer representatives, resource specialists, and others ensure that the BMPs are implemented according to plan. BMP implementation monitoring is done before, during, and after project activity. 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 BMPs are effective in meeting management objectives and protecting water beneficial uses. State water quality standards, including the beneficial uses, will serve as one evaluation criteria for the monitoring of the Proposed Action.

4. BMP Monitoring Evaluation.

The technical evaluation/monitoring described above will determine how effectively BMPs protect and/or improve water quality. Water quality standards and conditions of the beneficial uses of water will serve as one evaluation criteria. If the evaluation indicates that water quality standards are not being met and/or beneficial uses are not being protected, corrective action will consider the following three components:

A. The BMP: Is it technically sound. Is it really best or is there a better practice that is technically sound and feasible to implement?

B. The Implementation Program or Processes: Was the BMP applied entirely as designed? Was it only partially implemented? Were personnel, equipment, funds, or training lacking which resulted in inadequate or incomplete implementation?

C. The State Water Quality Criteria: Do the parameters and criteria that constitute water quality standards adequately reflect human induced changes to water quality and beneficial uses?

5. Feedback.

Feedback of 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 BMP, modification of the activity or ceasing the activity. 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 Flathead National Forest are on file with the Soil Scientist in the Flathead National Forest Supervisor's Office.

Format of the BMPs

The Practices (BMPs) described herein are tiered to the practices in Forest Service Handbook 2509.22 (Soil and Water Conservation Practices Handbook.) They were developed as part of the NEPA process, with interdisciplinary involvement and meet Forest and State water quality objectives.

Each Soil and Water Conservation Practice (SWCP) listed below is described as follows:

TITLE: Includes the sequential number of the Practice and a brief title.

MONTANA BMPs: Includes references for compliance to the State BMPs.

OBJECTIVE: Describes the SWCP objective(s) and the desired results for protecting water quality.

EFFECTIVENESS: Provides a qualitative assessment of expected effectiveness that the applied measure will have on preventing or reducing impacts on water quality. The SWCP effectiveness rating is based on literature and research, administrative studies, and professional experience. The SWCP is rated High, Moderate, or Low based on the following criteria:

a. Literature/Research (must be applicable to area)
b. Administrative studies (local or within similar ecosystem)
c. Experience (judgment of an expert by education and/or experience)
d. Fact (obvious by reasoned, logical response or observation)

IMPLEMENTATION: This section identifies:

1) The range of site-specific water quality protection measures to be implemented.
2) How the practices are expected to be applied.

Items Common to All Soil and Water Conservation Practices

Responsibility for Implementation: The Tally Lake District Ranger and the Forest Engineer are responsible for ensuring that all applicable SWCPs are applied and implemented. The Ecosystems Operations Staff, Project Engineer, and ID Team are responsible for ensuring that the objectives of the SWCPs identified in this appendix are incorporated into the Timber Sale Contracts by use of the appropriate Timber Sale Contract Provisions (2400-6 or 2400-6T, June 2006 version). This is accomplished by selecting and incorporating the appropriate

Timber Sale C provisions and by use of Forest Service Specifications for Construction of Roads and Minor Drainage Structures (April 1985), Forest Service Specifications for Construction of Bridges and Other Major Drainage Structures (April 1985), and by use of Special Project Specifications as needed. Similar contract provisions would be used for later contract versions or alternate contract types, such as Stewardship Contracts. The Timber Sale Administrator and Engineering Representative/Contracting Officers Representative (ER/COR) are 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. Should the practice not be 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.

SWCPs for the Sheppard Creek Proposal

PRACTICE 11.07 - Oil and Hazardous Substance Spill Contingency
PRACTICE 15.11 - Servicing and Refueling of Equipment

MONTANA BMPs: VII, A, 1-2.

OBJECTIVE: To minimize contamination of waters from accidental spills of fuels, lubricants, bitumens, raw sewage, wash water, and other harmful materials by prior planning and development of Spill Prevention Control and Countermeasure Plans.

EFFECTIVENESS: High

IMPLEMENTATION: The Contracting Officer, Engineering Representative, or certified Sale Administrator will designate the location, size, and allowable uses of service and refueling areas. They will also be aware of actions to be taken in case of a hazardous spill, as outlined in the Forest Hazardous Substance Spill Contingency Plan (SWCP 11.07). Contract provisions B6.34/C6.34 Sanitation and Servicing, B6.341Prevention of Oil Spills and C6.342 Hazardous Substances are included in all timber sale contracts. B6.341 requires the purchaser to prepare a spill prevention control and counter measure plan that shall meet applicable EPA requirements, including certification by a registered professional engineer. This requirement is enacted when the total oil or oil products storage exceeds 1,320 gallons, or if any single container exceeds a capacity of 660 gallons.

PRACTICE 13.02 - Slope Limitations for Tractor Operations
PRACTICE 14.07 - Determining Tractor Loggable Ground

MONTANA BMPs: IV, A, 2, 5; IV, B, 1.

OBJECTIVE: To reduce gully and sheet erosion and associated sediment production by restricting tractor operations to slopes where corrective measures for proper drainage are easily installed and effective.

EFFECTIVENESS: High; soil displacement when turning or climbing uphill is greatly reduced on slopes less than 40% (Observation, Forest Soil Scientist).

IMPLEMENTATION: All units designated as using tractor in the Sheppard Creek alternatives have been determined by the ID Team to be feasible to be logged with tractor equipment. Units with sustained slopes of more than 40% will be skyline yarded.

PRACTICE 13.03 - Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows

MONTANA BMPs: IV, B, 2, 3; VI, A, 1.

OBJECTIVE: To protect ground cover; and limit soil damage, turbidity, and sediment production resulting from soil compaction, rutting, runoff concentration in wetlands, bogs and wet meadows.

EFFECTIVENESS: High

IMPLEMENTATION: The timber sale contract provisions B6.61 Meadow Protection and B6.62 Wetlands Protection cover this. When it is necessary to identify these areas on the Sale Area Map, direction to do so and protective requirements will be incorporated into C6.62 Site Specific Wetlands Protection Measures. Vehicular or skidding equipment shall not be used on meadows except where roads, landings, and tractor roads are approved. In all cases, soil and vegetation will be protected from disturbance, which would cause adverse affects on water quality, quantity, and aquatic habitat. Unless otherwise agreed, trees felled into meadows shall be removed by end lining, and resulting logging slash shall also be removed. Damage to meadows, stream courses, and riparian areas caused by unauthorized operations shall be repaired in a timely manner to restore and prevent further damage.

PRACTICE: 13.04 - Revegetation of Surface Disturbed Areas

MONTANA BMPs: IV, A, 5; IV, B, 5, 6.

OBJECTIVE: To protect soil productivity and water quality by minimizing soil erosion.

EFFECTIVENESS: High

IMPLEMENTATION: All surface disturbed areas resulting from road rehabilitation, construction, and reconstruction will be seeded and fertilized. In the event that soil disturbance occurs in harvest units, these areas will be analyzed and a combination of seed and fertilizer, water bars, and spreading of slash will be used to minimize soil erosion (C6.601).

PRACTICE 13.06 - Soil Moisture Limitations for Tractor Operation

MONTANA BMPs: IV, A, 4; IV, B, 1; IV, C, 5.

OBJECTIVE: To minimize soil compaction, puddling, rutting, and gullying with resultant sediment production and loss of soil productivity.

EFFECTIVENESS: Moderate; less compaction of surface soil is observed on dry soils (18% soil moisture, or less). Dedicated skid trails reduce the area compacted (Froehlich, H. A., D. E. Aulerich, and R. Curtis, 1981. Designing skid trail systems to reduce soil impacts from tractor logging machines. Oregon State Univ., For. Res. Lab., Res Paper 44. 13p.)

IMPLEMENTATION: Timber Sale contract provisions B6.422, B6.424, C6.4, B6.6, B6.7, and C6.7 will be included in the Timber Sale Contract.

PRACTICE 14.03 - Use of Sale Area Maps for Designating Soil and Water Protection Needs

MONTANA BMPs: II.

OBJECTIVE: To delineate the location of protection areas and special treatment areas, to ensure their recognition, proper consideration, and protection on the ground.

EFFECTIVENESS: High

IMPLEMENTATION: The following features will be designated as needed on the Timber Sale Area Map:

1. Stream courses (perennial and intermittent) to be protected under contract clause B6.5
2. Wetlands and riparian areas (meadows lakes, pot holes, etc.) to be protected under C6.61.
3. Stream side management zones (SMZ'S) in units as per contract clause C6.50.
4. Special treatment zones (STZ'S) as per contract clause C6.4.

PRACTICE 14.04 - Limiting the Operating Period of Timber Sale Activities
PRACTICE 15.04 - Timing of Construction Activities

MONTANA BMPs: III, D, 1, 4; III, E, 6; IV, B, 1; IV, C, 5; V, C, 1; VI, A, 2.

OBJECTIVE: To minimize soil erosion, sedimentation, and loss in soil productivity by ensuring activities, including erosion control work, road maintenance, and other control work, are done in a timely manner: 1) within the time period specified in the Timber Sale Contract; and 2) when ground conditions are such that erosion and sedimentation can be minimized.

EFFECTIVENESS: High

IMPLEMENTATION: Within the Sheppard Creek Project Area, the following limitations for operating periods have been identified and recommended by the ID Team:

a. The normal operating season is from December 1 thru March 15 for winter operations and June 1 through October 15 for summer operations. These dates will be incorporated into Timber Sale Contract provisions C6.316 or C6.4 and A21.

b. Standard Timber Sale Contract provision B6.31 allows operations outside the Normal Operating Seasons, subject to requirements in B6.6 and B6.66. All contracts will include C5.316 Snow Removal.

PRACTICE 14.12 - Erosion Prevention and Control Measures During Timber Sale Operations
PRACTICE 14.11 - Log Landing Erosion Prevention and Control
PRACTICE 14.14 - Revegetation of Areas Disturbed by Harvest Activities
PRACTICE 14.15 - Erosion Control on Skid Trails

MONTANA BMPs: IV, A, 5, 6; IV, B, 4, 5, 6.

OBJECTIVE: To protect water quality by minimizing erosion and subsequent sedimentation derived from log landings and skid trails.

EFFECTIVENESS: High

IMPLEMENTATION: Standard Timber Sale provision B6.6 requires the purchaser to conduct operations in a reasonable fashion to minimize erosion. Additionally, specific erosion requirements will be spelled out in provisions such as C6.4, C6.6, C6.601, and C6.632. The following criteria will be used in controlling/minimizing erosion, restoring landings and skid trails. B6.4 and B6.5 covers landings and skid trails.

Landings:

a. During periods of use, landings will be maintained in such a manner that debris and sediment are not delivered to any streams.

b. Landings will drain in a direction and manner that will minimize erosion and will preclude sediment delivery to any stream.

c. Standard Timber Sale Contract provision B6.64 Landings requires that after landings have served the Purchaser's purpose, the Purchaser shall ditch or slope them to permit water to drain or spread. Landings will be seeded as needed with a mix approved by the Forest Soil Scientist and Forest Botanist.

Skid Trails:

a. Skid trails will be water-barred and location and spacing will be designated by the Sale Administrator (SWCP 15.25).

b. Skid trails likely to produce sediment will be covered with slash and/or seeded with a mix of seed and fertilizer specified in C6.601.

PRACTICE 14.18 - Erosion Control Structure Maintenance

MONTANA BMPs: III, D, 1; III, E, 2, 7; VI, B, 2, 5.

OBJECTIVE: To ensure that constructed erosion control structures are stabilized and working effectively.

EFFECTIVENESS: High

IMPLEMENTATION: Timber Sale Contract provision, B6.6, requires that during the period of the contract, the Purchaser shall provide maintenance of soil erosion control structures constructed by the Purchaser until they become stabilized. Should the Purchaser fail to do erosion control work prior to any seasonal period of precipitation or runoff, the Forest Service may temporarily assume responsibility and charge the Purchaser accordingly. The Timber Sale Administrator will ensure that erosion control structures are working effectively.

PRACTICE 14.19 - Acceptance of Timber Sale Erosion Control Measures Before Sale Closure

MONTANA BMPs: VI, B, 5.

OBJECTIVE: To assure the adequacy of required erosion control work on timber sales.

EFFECTIVENESS: High

IMPLEMENTATION: Timber Sale Contract provision, B6.36, requires that upon the Purchaser's written request and assurance that contract work has been completed; the Forest Service shall perform an acceptance inspection. For erosion control work, "acceptable" means only minor deviation from established standards, provided no major or lasting impact is caused to soil and water resources. The Timber Sale Administrator will not accept as complete, any erosion control work that does not meet this criteria.

PRACTICE 15.01 - General Guidelines for Transportation Planning
PRACTICE 15.02 - General Guidelines for the Location and Design of Roads and Trails

MONTANA BMPs: III, A, B; IV, A, 4, 5.

OBJECTIVE: To locate and design roads and trails with minimal soil and water resource impact while considering all design criteria.

EFFECTIVENESS: High

IMPLEMENTATION: All roads will be designed to drain naturally by appropriate location, use of out-sloping, and grade changes. Drain dips will be designed whenever reliance upon natural drainage would not protect the running surface, excavation, or embankment.

PRACTICE 15.03 - Road and Trail Erosion Control Plan

MONTANA BMPs: None Applicable

OBJECTIVE: To prevent, limit, and mitigate erosion, sedimentation, and resulting water quality degradation prior to the initiation of construction and maintenance activities.

EFFECTIVENESS: HIGH

IMPLEMENTATION: Within 60 days of final award of contract, purchaser must furnish Forest Service a written plan of operations. The plan will set forth planned periods for and methods of road construction, maintenance, and erosion control methods B6.311 and B6.312. No work will be permitted on the project until plans have been approved. In addition, proposed erosion control work, and the necessity of keeping the work current and maintained, will be stressed at the prework meeting.

PRACTICE 15.06 - Mitigation of Surface Erosion and Stabilization of Slopes
PRACTICE 15.10 - Control of Road Construction Excavation and Side cast Material

MONTANA BMPs: III, D; III, E, 1, 5, 7.

OBJECTIVE: To reduce sedimentation from unconsolidated excavated and side cast material caused by road reconstruction or maintenance, and to minimize erosion of the travel way.

EFFECTIVENESS: High (Burroughs and others, 1985. Burroughs and King, 1989)

IMPLEMENTATION: Design and construct the following erosion control devices on the following roads:

All road reconstruction: 1. Seed cut slopes, fill slopes, and roadbeds upon completion of road construction or reconstruction with a seed and fertilizer mix approved by the Forest Soil Scientist and Forest Botanist. 2. Require the use of certified weed free straw where needed to control sediment. Provision B6.22 Protection of Property.

PRACTICE 15.07 - Control of Permanent Road Drainage

MONTANA BMPs: III, C.

OBJECTIVE: To minimize the erosive effects of concentrated water and the degradation of water quality by proper construction of road drainage systems and drainage control structures.

EFFECTIVENESS: High

IMPLEMENTATION: The Contracting Officer or Engineering Representative will ensure compliance with the plans and specifications and that the Purchaser is in compliance with his approved operating plan.

PRACTICE 15.23 - Traffic Control During Wet Periods

MONTANA BMPs: III, E, 6.

OBJECTIVE: To reduce the potential for road surface disturbance during wet weather and to reduce sedimentation probability.

EFFECTIVENESS: High

IMPLEMENTATION: Road closures and traffic control measures will be implemented on all roads when damage would occur as a result of use during wet weather (B5.12 Use of Roads by Purchaser). The Sale Administrator will control hauling activities. The Tally Lake District Ranger will make the decision for road closures, should the Ranger determine that any resource could be damaged by Timber Sale activities during wet weather.

The following Soil and Water Conservation Practices are incorporated where applicable into the appropriate document (Sheppard Creek EIS, Timber Sale Contract, and Plans and Specifications through the normal NEPA process):

PRACTICE 11.01 - Determination of Cumulative Watershed Effects
PRACTICE 11.02 - Soil and Water Resource Monitoring and Evaluation
PRACTICE 11.03 - Watershed Improvement Planning and Implementation
PRACTICE 11.13 - Sanitary Guidelines for Construction of Temporary Logging or Fire Camps (B6.2 Improvements)
PRACTICE 14.01 - Timber Sale Planning
PRACTICE 14.02 - Timber Harvest Unit Design
PRACTICE 14.06 - Riparian Area Designation (Sale Area Maps)
PRACTICE 14.08 - Tractor Skidding Design (C6.4 Conduct of Logging)
PRACTICE 14.09 - Suspended Log Yarding in Timber Harvesting (C6.4 Conduct of Logging)
PRACTICE 14.10 - Log Landing Location and Design (B6.64 Landings)
PRACTICE 14.17 - Stream Channel Protection (Implementation and Enforcement) (B6.5 Stream course Protection)
PRACTICE 14.22 - Modification of the Timber Sale Contract (B8.3 Contract Modification)
PRACTICE 14.23 -Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects (B6.312 Plan of Operations for Road Construction and B6.361 Acceptance of Specified Roads)
PRACTICE 15.15 - Stream Crossings on Temporary Roads (B6.63 Temporary Roads)
PRACTICE 15.18 - Disposal of Right-of-Way and Roadside Debris (B6.222 Protection of Property)
PRACTICE 15.21 - Maintenance of Roads (C5.31 Road Maintenance Requirement)
PRACTICE 15.22 - Road Surface Treatment to Prevent Loss of Materials (C5.31 – T103 Dust Abatement)
PRACTICE 15.24 - Snow Removal Controls (C5.316 Snow Removal)

BEST MANAGEMENT PRACTICES FOR FORESTRY IN MONTANA

December 1997
(Revision of 1988 BMPs to include SMZ law requirements)

I. DEFINITIONS

1. "Hazardous or toxic material" means substances which by their nature are dangerous to handle or dispose of, or a potential environmental contaminant, and includes petroleum products, pesticides, herbicides, chemicals, and biological wastes.

2. "Stream," as defined in 77-5-302(7), MCA, means a natural water course of perceptible extent that has a generally sandy or rocky bottom or definite banks and that confines and conducts continuously or intermittently flowing water.

3. "Streamside Management Zone (SMZ)" or 'zone" as defined at 77-5-302(8), MCA means "the stream, lake, or other body of water and an adjacent area of varying width where management practices that might affect wildlife habitat or water quality, fish, or other aquatic resources need to be modified." The streamside management zone encompasses a strip at least 50 feet wide on each side of a stream, lake, or other body of water, measured from the ordinary high water mark, and extends beyond the high water mark to include wetlands and areas that provide additional protection in zones with steep slopes or erosive soils.

4. "Wetlands" mean those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support a. prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include marshes, swamps, bogs, and similar areas.

5. "Adjacent wetlands" are wetlands within or adjoining the SMZ boundary. They are regulated under the SMZ law.

6. "Isolated wetlands" lie within the area of operation, outside of the SMZ boundary, and are not regulated under the SMZ law.

II. STREAMSIDE MANAGEMENT

The Streamside Management Law (77-5-301 through 307 MCA) provides minimum regulatory standards for forest practices in streamside management zones (SMZ). The "Montana Guide to the Streamside Management Zone & Rules" is an excellent information source describing management opportunities and limitations within SMZs.

ROADS

A. Planning and Location

1. Minimize the number of roads constructed in a watershed through comprehensive road planning, recognizing intermingled ownership and foreseeable future uses. Use existing roads, unless use of such roads would cause or aggravate an erosion problem.

2. Review available information and consult with professionals as necessary to help identify erodible soils and unstable areas, and to locate appropriate road surface materials.

3. Fit the road to the topography by locating roads on natural benches and following natural contours. Avoid long, steep road grades and narrow canyons.

4. Locate roads on stable geology, including well-drained soils and rock formations that tend to dip into the slope. Avoid slumps and slide-prone areas characterized by steep slopes, highly weathered bedrock, clay beds, concave slopes, hummocky topography, and rock layers that dip parallel to the slope. Avoid wet areas, including moisture-laden or unstable toe slopes, seeps, wetlands, wet meadows, and natural drainage channels.

5. Minimize the number of stream crossings and choose stable stream crossing sites.

6. Locate roads to provide access to suitable (relatively flat and well-drained) log landing areas to reduce soil disturbance.

B. Design

1. Properly design roads and drainage facilities to prevent potential water quality problems from road construction.

2. Design roads to the minimum standard necessary to accommodate anticipated use and equipment. The need for higher engineering standards can be alleviated through proper road-use management.

3. Design roads to balance cuts and fills or use full bench construction (no fill slope) where stable fill construction is not possible.

4. Design roads to minimize disruption of natural drainage patterns. Vary road grades to reduce concentrated flow in road drainage ditches, culverts, fill slopes, and road surfaces.

C. Drainage from Road Surface

1. Provide adequate drainage from the surface of all permanent and temporary roads. Use out-sloped, in-sloped, or crowned roads, and install proper drainage features. Space road drainage features so peak flow on road surfaces or in ditches will not exceed capacity.

    a. Out-sloped roads provide a means of dispersing water in a low-energy flow from the road surface. Out-sloped roads are appropriate when fill slopes are stable, drainage will not flow directly into stream channels, and transportation safety can be met.

    b. For in-sloped roads, plan ditch gradients steep enough, generally greater than 2% but less than 8%, to prevent sediment deposition and ditch erosion. The steeper gradients may be suitable for more stable soils; use the lower gradients for less stable soils.

    c. Design and install road surface drainage features at adequate spacing to control erosion; steeper gradients require more frequent drainage features. Properly constructed drain dips can be an economical method of road surface drainage. Construct drain dips deep enough into the sub grade so that traffic will not obliterate them.

2. For ditch relief culverts, construct catch basins with stable side slopes. Protect the inflow end of cross drain culverts from plugging and armor if in erodible soil. Skew ditch relief culverts 20 to 30 degrees toward the inflow from the ditch to help maintain proper function.

3. Where possible, install culverts at the gradient of the original ground slope; otherwise, armor outlets with rock or anchor downspouts to carry water safely across the fill slope.

4. Provide energy dissipaters (rock piles, slash, log chunks, etc.) where necessary to reduce erosion at outlet of drainage features. Cross drains, culverts, water bars, dips, and other drainage structures should not discharge onto erodible soils or fill slopes without outfall protection.

5. Prevent down slope movement of sediment by using sediment catch basins, drop inlets, changes in road grade, headwalls, or recessed cut slopes.

6. Route road drainage through adequate filtration zones or other sediment-settling structures to ensure sediment doesn't reach surface water. Install road drainage features above stream crossings to route discharge into filtration zones before entering a stream.

D. Construction (see also Section IV on stream crossings)

1. Keep slope stabilization, erosion, and sediment control work current with road construction. Install drainage features as part of the construction process, ensuring that drainage structures are fully functional. Complete or stabilize road sections within same operating season.

2. Stabilize erodible, exposed soils by seeding, compacting, riprapping, benching, mulching, or other suitable means.

3. At the toe of potentially erodible fill slopes, particularly near stream channels, pile slash in a row parallel to the road to trap sediment. When done concurrently with road construction, this is one method that can effectively control sediment movement, and it can also provide an economical way of disposing of roadway slash. Limit the height, width, and length of "slash filter windrows" so wildlife movement is not impeded. Sediment fabric fences or other methods may be used if effective.

4. Minimize earthmoving activities when soils appear excessively wet. Do not disturb roadside vegetation more than necessary to maintain slope stability and to serve traffic needs.

5. Construct cut and fill slopes at stable angles to prevent sloughing and other subsequent erosion.

6. Avoid incorporating potentially unstable woody debris in the fill portion of the road prism. Where possible, leave existing rooted trees or shrubs at the toe of the fill slope to stabilize the fill.

7. Consider road surfacing to minimize erosion.

8. Place debris, overburden, and other waste materials associated with construction and maintenance activities in a location to avoid entry into streams. Include these waste areas in soil stabilization planning for the road.

9. Minimize sediment production from borrow pits and gravel sources through proper location, development, and reclamation.

10. When using existing roads, reconstruct only to the extent necessary to provide adequate drainage and safety; avoid disturbing stable road surfaces. Prior to reconstruction of existing roads within the SMZ, refer to the SMZ law. Consider abandoning existing roads when their use would aggravate erosion.

E. Maintenance

1. Grade road surfaces only as often as necessary to maintain a stable running surface and adequate surface drainage.

2. Maintain erosion control features through periodic inspection and maintenance, including cleaning dips and cross drains, repairing ditches, marking culvert inlets to aid in location, and clearing debris from culverts.

3. Avoid cutting the toe of cut slopes when grading roads, pulling ditches, or plowing snow.

4. When plowing snow, provide breaks in snow berm to allow road drainage.

5. Haul all excess material removed by maintenance operations to safe disposal sites and stabilize these sites to prevent erosion. Avoid side casting in locations where erosion will carry materials into a stream.

6. Avoid using roads during wet periods, if such use would likely damage the road drainage features. Consider gates, barricades, or signs to limit use of roads during spring break up or other wet periods.

7. Upon completion of seasonal operations, ensure that drainage features are fully functional. The road surface should be crowned, out-sloped, in-sloped, or water-barred. Remove berms from the outside edge where runoff is channeled.

8. Leave abandoned roads in a condition that provides adequate drainage without further maintenance. Close these roads to traffic; reseed and/or scarify; and, if necessary, recontour and provide water bars or drain dips.

IV. TIMBER HARVESTING AND SITE PREPARATION

A. Harvest Design

1. Plan timber harvest in consideration of your management objectives and the following:

   a. Soils and erosion hazard identification.
   b. Rainfall.
   c. Topography.
   d. Silvicultural objectives.
   e. Critical components (aspect, water courses, landform, etc.).
   f. Habitat types.
   g. Potential effects on water quality and beneficial water uses.
   h. Watershed condition and cumulative effects of multiple timber management activities on water yield and sediment production.
   i. Wildlife habitat.

2. Use the logging system that best fits the topography, soil type, and season, while minimizing soil disturbance and economically accomplishing silvicultural objectives.

3. Use the economically feasible yarding system that will minimize road densities.

4. Design and locate skid trails and skidding operations to minimize soil disturbance. Using designated skid trails is one means of limiting site disturbance and soil compaction. Consider the potential for erosion and possible alternative yarding systems prior to planning tractor skidding on steep or unstable slopes.

5. Locate skid trails to avoid concentrating runoff and provide breaks in grade. Locate skid trails and landings away from natural drainage systems and divert runoff to stable areas. Limit the grade of constructed skid trails on geologically unstable, saturated, highly erosive, or easily compacted soils to a maximum of 30%. Use mitigating measures, such as water bars and grass seeding, to reduce erosion on skid trails.

6. Minimize the size and number of landings to accommodate safe, economical operation. Avoid locating landings that require skidding across drainage bottoms.

B. Other Harvesting Activities

1. Tractor skid where compaction, displacement, and erosion will be minimized. Avoid tractor or wheeled skidding on unstable, wet, or easily compacted soils and on slopes that exceed 40% unless operation can be conducted without causing excessive erosion. Avoid skidding with the blade lowered. Suspend leading ends of logs during skidding whenever possible.

2. Avoid operation of wheeled or tracked equipment within isolated wetlands, except when the ground is frozen (see Section VI on winter logging).

3. Use directional felling or alternative skidding systems for harvest operations in isolated wetlands.

4. For each landing, provide and maintain a drainage system to control the dispersal of water and to prevent sediment from entering streams.

5. Ensure adequate drainage on skid trails to prevent erosion. On gentle slopes with slight disturbance, a light ground cover of slash, mulch, or seed may be sufficient. Appropriate spacing between water bars is dependent on the soil type and slope of the skid trails. Timely implementation is important.

6. When existing vegetation is inadequate to prevent accelerated erosion, apply seed or construct water bars before the next growing season on skid trails, landings and fire trails. A light ground cover of slash or mulch will retard erosion.

C. Slash Treatment and Site Preparation

1. Rapid reforestation of harvested areas is encouraged to reestablish protective vegetation.

2. When piling slash, care should be taken to preserve the surface soil horizon by using appropriate techniques and equipment. Avoid use of dozers with angle blades.

3. Minimize or eliminate elongated exposure of soils up and down the slope during mechanical scarification.

4. Scarify the soil only to the extent necessary to meet the resource management objectives. Some slash and small brush should be left to slow surface runoff, return soil nutrients, and provide shade for seedlings.

5. Carry out brush piling and scarification when soils are frozen or dry enough to minimize compaction and displacement.

6. Carry out scarification on steep slopes in a manner that minimizes erosion. Broadcast burning and/or herbicide application is preferred means for site preparation, especially on slopes greater than 40%.

7. Remove all logging machinery debris to proper disposal site.

8. Limit water quality impacts of prescribed fire by constructing water bars in fire lines; not placing slash in drainage features and avoiding intense fires unless needed to meet silvicultural goals. Avoid slash piles in the SMZ when using existing roads for landings.

V. STREAM CROSSINGS

A. Legal Requirements

1. Under the Natural Streambed and Land Preservation Act of 1975 (the "310 law"), any activity that would result in physical alteration or modification of a perennial stream, its bed, or immediate banks must be approved in advance by the supervisors of the local conservation district. Permanent or temporary stream crossing structures fords, rip rapping or other bank stabilization measures, and culvert installations on perennial streams are some of the forestry-related projects subject to 310 permits.

   Before beginning such a project, the operator must submit a permit application to the conservation district indicating the location, description, and project plans. The evaluation generally includes on-site review, and the permitting process may take up to 60 days.

2. Stream-crossing projects initiated by federal, state, or local agencies are subject to approval under the "124 permit" process (administered by the Department of Fish, Wildlife, and Parks), rather than the 310 permit.

3. A short-term exemption (3a authorization) from water quality standards is necessary unless waived by the Department of Fish, Wildlife, and Parks as a condition of a 310 or 124 permit. Contact the Department of Environmental Quality in Helena at 444-2406 for additional information.

B. Design Considerations (Note: 310 permit required for perennial streams)

1. Cross streams at right angles to the main channel if practical. Adjust the road grade to avoid the concentration of road drainage to stream crossings. Direct drainage flows away from the stream crossing site or into an adequate filter.

2. Avoid unimproved stream crossings. When a culvert or bridge is not feasible, locate drive-throughs on a stable, rocky portion of the stream channel.

C. Installation of Stream Crossings (Note: 310 permit required for perennial streams)

1. Minimize stream channel disturbances and related sediment problems during construction of road and installation of stream crossing structures. Do not place erodible material into stream channels. Remove stockpiled material from high water zones. Locate temporary construction bypass roads in locations where the stream course will have minimal disturbance. Time construction activities to protect fisheries and water quality.

2. When using culverts to cross small streams, install those culverts to conform to the natural stream bed and slope on all perennial streams and on intermittent streams that support fish or that provides seasonal fish passage. Ensure fish movement is not impeded. Place culverts slightly below normal stream grade to avoid culvert outfall barriers. Do not alter stream channels upstream from culverts, unless necessary to protect fill or to prevent culvert blockage.

3. Design stream-crossings for adequate passage of fish (if present), minimum impact on water quality, and at a minimum, the 25-year frequency runoff. Consider oversized pipe when debris loading may pose problems. Ensure sizing provides adequate length to allow for depth of road fill.

4. Install culverts to prevent erosion of fill. Compact the fill material to prevent seepage and failure. Armor the inlet and/or outlet with rock or other suitable material where feasible.

5. Consider dewatering stream crossing sites during culvert installation.

6. Maintain a 1-foot minimum cover for culverts 15 to 36 inches in diameter, and a cover of one-third diameter for larger culverts, to prevent crushing by traffic.

7. Use culverts with a minimum diameter of 15 inches for permanent stream crossings and cross drains.

VI. Winter Logging

A. General

1. Consider snow-road construction and winter harvesting in isolated wetlands and other areas with high water tables or soil erosion and compaction hazards.

2. Conduct winter logging operations when the ground is frozen or snow cover is adequate (generally more than one foot) to prevent rutting or displacement of soil. Be prepared to suspend operations if conditions change rapidly, and when the erosion hazard becomes high.

3. Consult with operators experienced in winter logging techniques.

B. Road Construction and Harvesting Considerations

1. For road systems across areas of poor bearing capacity, consider hauling only during frozen periods. During cold weather, plow any snow cover off of the roadway to facilitate deep freezing of the road grade prior to hauling.

2. Before logging, mark existing culvert locations. During and after logging, make sure that all culverts and ditches are open and functional.

3. Use compacted snow for road beds in unroaded, wet or sensitive sites. Construct snow roads for single-entry harvests or for temporary roads.

4. In wet, unfrozen soil areas, use tractors or skidders to compact the snow for skid road locations only when adequate snow depth exists. Avoid steeper areas where frozen skid trails may be -subject to erosion the next spring.

5. Return the following summer and build erosion barriers on any trails that are steep enough to erode.

VII. HAZARDOUS SUBSTANCES

A. General

1. Know and comply with regulations governing the storage, handling, application (including licensing of applicators), and disposal of hazardous substances. Follow all label instructions.

2. Develop a contingency plan for hazardous substance spills, including cleanup procedures and notification of the State Department of Environmental Quality.

B. Pesticides and Herbicides

1. Use an integrated approach to weed and pest control, including manual, biological, mechanical, preventive, and chemical means.

2. To enhance effectiveness and prevent transport into streams, apply chemicals during appropriate weather conditions (generally calm and dry) and during the optimum time for control of the target pest or weed.

APPENDIX D
WATER REGULATIONS

Federal Water Pollution Control Act

The Federal Water Pollution Control Act (FWPCA) (33 U.S.C. 1251 et seq., as amended) establishes Federal water quality policies, goals, and programs. (Note: in 1977, the FWPCA was renamed the Clean Water Act [CWA].) Both the Environmental Protection Agency and States have the responsibility for carrying out the CWA. The sections pertinent to the Sheppard Creek Project Area are:

1. Objective/Goals/Policy (Section 101) of the CWA is to "**restore and maintain the chemical, physical, and biological integrity of the Nation's waters**."

2. Water Quality Standards (Section 303(c)). States are required to establish water quality standards that allow for protection of the beneficial uses made of the water. State water quality standards consist of: 1) **designated beneficial uses** of the waters involved; and 2) **water quality criteria** (either numeric or narrative) sufficient to protect the designated beneficial uses. Standards are established taking into consideration the use of the water body, and its value for public water supplies, propagation of fish and wildlife, recreational, agricultural, industrial, and other purposes. The standards are the legal basis for control decisions under the Act.

The State of Montana has classified all the streams in the Sheppard Creek Project area as B-1. Specific changes from naturally occurring values of certain water quality characteristics, such as turbidity and temperature, are allowed under State water quality standards. Growth and propagation of a salmonid fishery and associated aquatic life are the beneficial uses identified by the State of Montana for these streams.

3. Water Quality Limited Segments (Section 303(d)). States are required to identify waters within their boundaries for which the effluent limitations are not stringent enough to implement any water quality standard applicable to such waters. States are to establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters. States are to also establish Total Maximum Daily Loads (TMDL's) for those pollutants causing the water quality standards not to be met. Sheppard Creek was placed on the Montana 303(d) list for impairments related to elevated levels of nitrogen, phosphorus, and sediment. Sinclair Creek, located downstream of the project area on Sheppard Creek, was also placed on the 303(d) list for recreational impairments related to "low flow" but the State categorized this stream as 4C and a does not require a TMDL study.

Antidegradation Policy

Although not a requirement of the Act, the EPA developed regulations in 1975 requiring states to adopt an antidegradation policy as a part of a state's water quality standard. States were also directed to spell out how they would implement the policy. 40 CFR 131.12 states, "The antidegradation policy and implementation methods shall, at a minimum, be consistent with the following:

> (1) Existing in stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.
>
> (2) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, wildlife, and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the inter-governmental coordination and public participation provisions of the state's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State

shall assure that there shall be achieved the highest statutory and regulatory requirement for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

(3) Where high-quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected."

Montana Water Quality Standards

The Administrative Rules of Montana (ARM), Title 16, Chapter 20, Sub-Chapter 6, Surface Water Quality Standards establish water-use classifications for river drainages within the State based upon "present and future most beneficial uses." For each water-use classification, surface water quality standards of performance are assigned to protect the designated beneficial water uses. For all water-use classifications, standards for bacteria, dissolved oxygen, pH, and toxic substances (i.e., herbicides) are defined by specific limits. Standards for sediment, turbidity, water temperature, and color are described in terms of "naturally occurring." See previous discussion for beneficial uses of the streams that flow through the Sheppard Creek Project Area.

Section 75-5-306 of the Montana Water Pollution Control Law (MCA) and the ARM 16.20.603(17) define "naturally occurring" as "conditions or material present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil, and water conservation practices have been applied. Conditions resulting from the reasonable operation of dams at July 1, 1971, are natural."

The ARM 16.20.603(21) defines "Reasonable land, soil, and water conservation practices" as "methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include, but are not limited to, structural and non-structural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after pollution producing activities." These practices include Best Management Practices, but they are only considered "reasonable" if beneficial uses are protected.

For the Sheppard Creek Project Area, the Forest has applied the following process to insure compliance with the State water quality standards:

1. Best Management Practices (BMPs) were selected and designed by an interdisciplinary team (ID Team) based on site-specific conditions, technical, economic and institutional feasibility, and designated beneficial uses of the stream (see above).

2. BMPs were translated into required activities through the timber sale contract; they become legal requirements as "BT" and "CT" contract clauses.

3. BMP implementation would be monitored by a certified sale administrator who would insure that they are being implemented, and that they are effective in protecting designated beneficial uses.

4. The results of BMP monitoring would be evaluated by the ID Team and other forest specialists.

5. The results of BMP monitoring and evaluation would fed back into other activities. BMPs and other design criteria would be redesigned if it were determined that they are not fully effective.

Montana Nondegradation Policy

MCA 75-5-303 states that (1) Existing uses of state waters and the level of water quality necessary to protect those uses must be maintained and protected; (2) Unless authorized by the department under subsection (3), the quality of high-quality waters must be maintained; (3) the department may not authorize degradation of high-quality waters unless it has been affirmatively demonstrated by a preponderance of evidence to the department that (a) degradation is necessary because there are no economically, environmentally, and technologically

feasible alternatives to the proposed project that would result in no degradation, (b) the proposed project will result in important economic or social development that exceeds the benefit to society of maintaining existing high-quality waters and exceeds the costs to society of allowing degradation of high-quality waters, (c) existing and anticipated use of state waters will be fully protected, and (d) the least degrading water quality protection practices determined by the department to be economically, environmentally, and technologically feasible will be fully implemented by the applicant prior to and during the proposed activity.

ARM 16.20.708 states that (a) The water quality necessary to protect existing and anticipated uses must be maintained and protected on all state waters, and (b) For high-quality waters, degradation may be allowed only according to the procedure in ARM 16.20.711. These rules apply to any activity that may cause degradation of high-quality waters, for any parameter, unless the changes in existing water quality resulting from the activity are determined to be nonsignificant under ARM 16.20.712 or 16.20.713.

> **Degradation** is defined in the 75-5-103 as: "a change in water quality that lowers the quality of high-quality waters for a parameter. The term does not include those changes in water quality determined to be non-significant pursuant to 75-5-301(5)(c)."
>
> **High-quality Water** is defined as: "state waters whose quality for a parameter is better than standards established pursuant to 75-5-301. All waters are high-quality..." (Only Class I waters are not high quality).

The ARM 16.20, Subchapter 7, Nondegradation of Water Quality provides the criteria for determination of nonsignificance in ARM 16.20.713. Specifically, 16.20.713 lists:

> (a) activities which are nonpoint sources of pollution where reasonable land, soil, and water conservation practices are applied **and existing and anticipated beneficial uses will be fully protected**;
>
> (c) changes in existing water quality resulting from an emergency or remedial activity that is designed to protect public health or the environment and is **approved, authorized, or required by the department**.

Streamside Management Zone Act

The STREAMSIDE MANAGEMENT ZONE ACT, House Bill 731, became effective October 1, 1991. This law prohibits seven forest practices in Streamside Management Zones (SMZs). These include:

1. Broadcast burning;

2. Operation of wheeled or tracked vehicles except on established roads;

3. The forest practice of clearcutting;

4. Construction of roads, except when necessary, to cross a stream or wetland;

5. Handling, storage, application, or disposal of hazardous or toxic material in a manner that pollutes streams, lakes, or wetlands, or that may cause damage or injury to humans, land, animals, or plants;

6. The side-casting of road material into a steam, wetland or watercourse;

7. The deposit of slash in streams or other water bodies.

A streamside management zone is a minimum of 50 feet wide on both sides of a stream and includes adjacent wetlands. The seven forest practices prohibited within the SMZ may be permitted by the State with an "alternative practice." Approval for the activity must be obtained from the Department of State Lands before the practice begins. Alternative practices are site-specific and are only approved if the State determines that the integrity of the SMZ will be maintained.

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APPENDIX E
MONITORING PLAN

Introduction

As stated in Chapter 2, monitoring is gathering information and observing management activities to provide a basis for periodic evaluation of Forest Plan goals and objectives. The purpose is to determine how well objectives have been met and how closely management standards have been applied during and after post-fire project implementation. Evaluation of the monitoring results assists in the review of the condition of NFS lands as required by National Forest Management Act regulations. It may result in decisions for further action, such as modifying management practices. The first section describes aquatics and soil monitoring items. Next, vegetation and wildlife habitat monitoring is summarized. Lastly, transportation monitoring is presented.

Several sources of funding exist for resource monitoring. Some items would be funded with Knutson-Vandenberg (KV) funds, while other items would be funded with appropriated funds. No assignment of funding source to the monitoring would be made at this time because future availability of funds is unknown. Priorities for annual monitoring are established and agreed upon by the ID Team and the Responsible Official, and implementation would be based on annual budgets and program direction. All legally required monitoring would be performed.

Aquatics and Soil

There are two primary elements of concern in the post-fire environment that are addressed in this monitoring plan. The first element is detrimental soil disturbance, particularly in units proposed for summer logging. The amount of detrimental soil disturbance is a key consideration in determining relative long term soil productivity. The second element erosion and sediment delivery associated with temporary road construction and summer logging. Post-fire environments are especially vulnerable to erosion and sediment delivery. Accelerated erosion can reduce soil productivity, and sediment delivery can degrade water quality and aquatic habitats. Sheppard Creek is currently impaired and on the State of Montana's 303(d) list. In addition, Upper Sheppard Creek contains genetically pure westslope cutthroat trout. The following monitoring objectives reflect the above elements.

1. Determine the amount of detrimental soil disturbance in priority units that are salvage harvested during the summer.
2. Determine if temporary road construction and summer salvage logging are causing sediment delivery in sensitive areas.
3. Determine whether Best Management Practices (BMPs) were implemented as specified and whether individual BMPs were effective.

4. Determine condition and trend of Sheppard Creek through continued monitoring of channel morphology and aquatic habitat.

Detrimental soil disturbance would be measured in a sample of units that may be close to exceeding the soil quality standard of 15 percent. Temporary roads in sensitive areas would be visually inspected to determine if they are resulting in direct sediment delivery to stream channels. A sample of summer salvage units would be selected for on-site visual inspection. Priority units for review would include those that have a high potential for erosion and/or sediment delivery. Key BMPs would be reviewed on the same units as described above and on 1-2 selected haul routes. Three monitoring sites were established on Sheppard Creek in 2007 prior to the Brush Creek Fire, using the R1 AEUI protocol. Data collection at these sites would be repeated in 2009 and 2010 to determine how the creek is responding to post-fire conditions.

Vegetation and Wildlife Habitat Monitoring

Surveys of the vegetation in the project area were conducted both before and after the fires. The existing surveys are described in detail in the Vegetation, Bark Beetle, and Wildlife sections of the EIS.

Timber sale contract activities would be inspected to ensure contract specifications are followed. A qualified Timber Sale Contract Administration team, including Sale Administrators, Harvest Inspectors, and others will monitor leave tree and downed wood retention, protection of residual trees, erosion control and soil effects, log utilization, and other contract requirements. In addition, timber sale administration personnel will assist in monitoring for bark beetle activity, timber quality deterioration over time, and fuel treatment and reforestation needs.

Bark beetle surveys are scheduled in 2008 to estimate the amounts and locations of bark beetle and wood boring beetle activity throughout the fires. Results of these surveys will help determine if and where additional beetle treatments may be applied. They may also indicate the effects of salvage on reducing populations. If treatments, such as funnel traps and/or pheromones are used, they will be monitored and maintained which will provide estimates of relative abundance of beetles from site to site.

Post-harvest surveys would be scheduled in each salvage unit to determine how well the prescriptions were met through salvage activities or what modifications are needed to meet various resource objectives such as wildlife habitat. Monitoring items in the post-harvest exams include estimates of fuel loading, downed wood habitat, snag and live tree retention, reforestation needs, bark beetle activity, and soil conditions. Additional, more intensive surveys for snags and downed wood habitat will be included in a subset of the units to monitor compliance with Forest Plan standards.

Reforestation stocking surveys will be scheduled in every unit to monitor seedling stocking, survival, and growth following standard procedures outlined in Forest Service Handbooks.

Noxious weeds would be surveyed and monitored in all ground-disturbed areas in treatment units (slash piles, exposed soil from excavator tracks, skid trails), roads, and temporary roads. Monitoring would occur for at least three years following proposed action. Surveys and monitoring would be conducted by the Forest Botanist, Botany Crew, Noxious Weed Specialist, Weed Crew, or Silviculture Crew.

Roads would be monitored for at least three years and future treatments would be prioritized and scheduled based on funding by the Forest Weeds Coordinator.

Vegetation and Wildlife Habitat Monitoring Funding Sources

Funds for timber sale administration and noxious weed monitoring are derived from the annual agency budget appropriation. Post-harvest and reforestation surveys are funded by timber sale proceeds and/or annual budget appropriations. Insect and disease surveys are funded by appropriated and specifically allocated forest health management funds.

Transportation Monitoring

All road construction and road maintenance would be monitored to ensure compliance with specifications and to meet the intent of management practices. Specifications would be designed to meet objectives and management practices. The Forest Service would monitor the work performed by the contractor to ensure that their methods of operation and work are in compliance with the specifications that were designed to meet the intent of the management practices. If the designed work is not meeting the objectives and management practices, a modification may have to be made by the Forest Service to change the work to meet the objectives and management practices.

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