Watershed Report for the Lake HFRA Project

Executive Summary

No watershed, soil, or water quality issues were raised by the individuals that responded during the scoping period. Internal concerns were resolved during the design of the proposed project.

The best practices developed for the project, including a streamside management zone adjacent to Lake Canyon, will maintain water and soil quality and aquatic habitat for cutthroat trout. Soil and water conservation practices (SWCP's) are incorporated in the project design and requirements. With implementation of the design features and SWCP's, direct and indirect effects are expected to be minimal and limited in scope, intensity, and duration. No cumulative effects are expected.

One of the beneficial uses for the Left Fork of Huntington Creek is as a source of drinking water. The Huntington Creek watershed, including the Left Fork subwatershed, is a municipal watershed.

The project and associated best practices are consistent with the Forest Plan, the Clean Water Act, the Safe Drinking Water Act, and the Executive Orders for wetlands and floodplains.

Location of the proposed project

This project is in the headwaters of the Left Fork of Huntington Creek, adjacent to Huntington and Cleveland Reservoirs and Lake Canyon and Spring Creek.

Proposed Action

Under the authority of the Healthy Forest Restoration Act, the proposed action is to salvage dead or dying Engelmann spruce and improve stand conditions in selected aspen stands by either removing encroaching conifer or creating small clear cuts. Logging methods include helicopter and ground-based logging. Specifically, the following are proposed:

Remove most of the dead or spruce beetle infested Engelmann spruce 12 inches DBH or greater from approximately 600 acres.

Remove all conifers over 8 inches DBH from the aspen clones within the spruce fir stands.

Treat approximately 80 acres in aspen stands through small clear cuts in patches less than 10 acres in size and enhance the aspen component in others by removing the conifer element on approximately 65 acres. Aspen would be regenerated by coppice sprouting on approximately 145 acres. Prescribed fire may be utilized to enhance aspen sprouting and further reduce competition from conifer species.

Construct approximately 0.8 miles of new roads, reconstruct approximately 2.1 miles of existing road, and build approximately 0.25 miles of temporary logging roads.

Utilize approximately four temporary helicopter landings one acre in size and eleven temporary tractor landings of approximately ¼ acre each to deck logs during the logging operation.

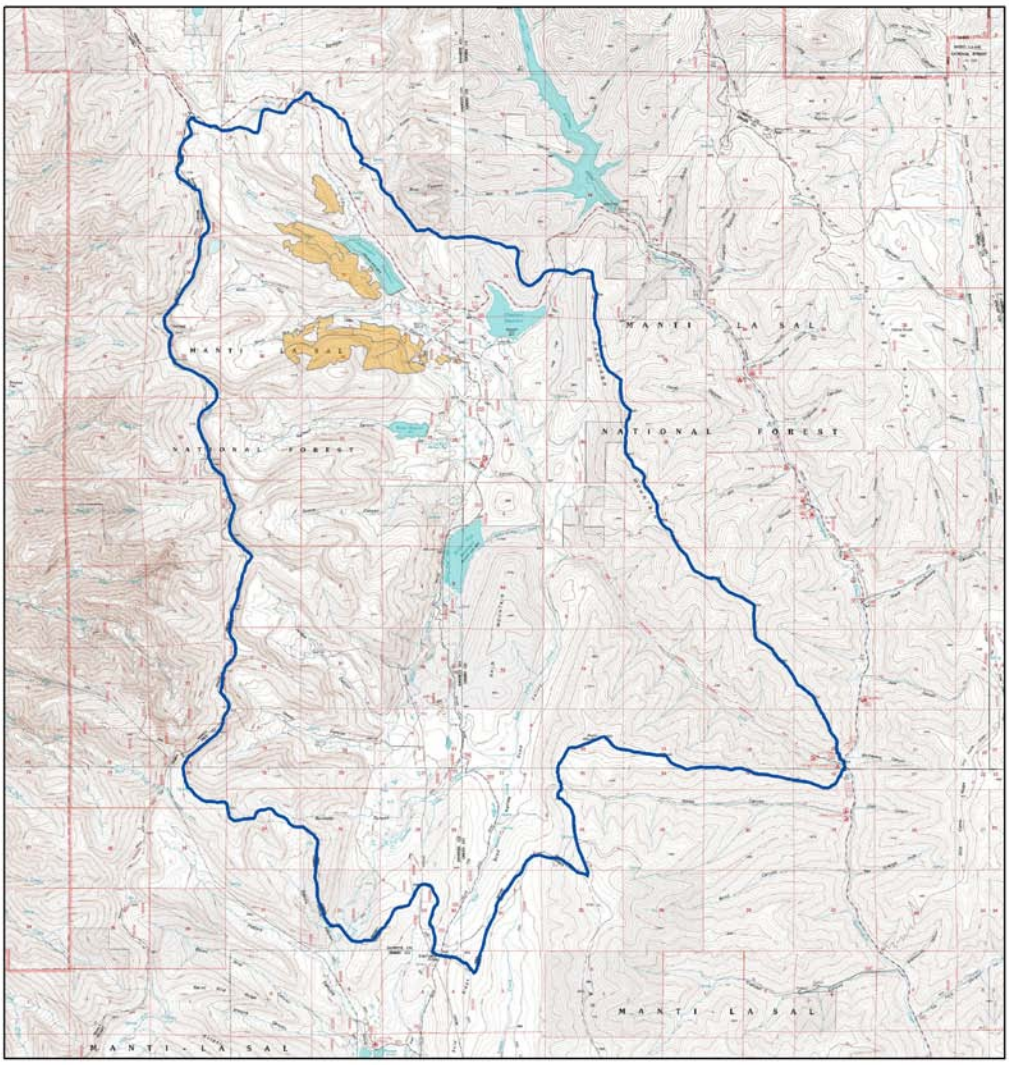
Precommercially thin the remaining live conifers 8 inches DBH and under on approximately 600 acres.

Treat fuels on 80% of the area by lopping and scattering, hand piling, or concentration burning of the slash generated by the logging operations. Approximately 110-300 acres will be concentration burned.

Plant approximately 600 acres to Engelmann spruce

Control gophers in areas planted by baiting approximately 135 acres using underground methods.

Lake HFRA Project
Location of Proposed Treatment Units
Left Fork Huntington Subwatershed



Legend
Proposed Harvest Units
Left Fork Huntington Subwatershed

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1:100,000

Map prepared by Katherine Foster, January 2008

Development of the proposed action and watershed design features included in the proposed action

Internal resource concerns were used during project design to develop the design features, including a streamside management zone (SMZ) adjacent to Lake Canyon, and the specifics of the SWCP's. The resource concerns included drinking water source protection, protection of springs and wetlands, protection and maintenance of habitat for cutthroat trout, and prevention of detrimental changes in soil quality.

Streamside Management Zone

A streamside management zone (SMZ) will be designated adjacent to Lake Canyon. The objectives for the SMZ are to provide an operable unit with a specific/customized treatment prescription and stipulations that would minimize compaction in the valley bottom adjacent to Lake Canyon, and reduce fuel loading while retaining sufficient trees for streamside shade and stability and a source of aquatic large woody debris.

The treatment prescription and stipulations will include the following:

Heavy equipment operations only when soils are dry or frozen, or over 2 feet of equipment-supporting snow.

Unless operating over snow, operate heavy equipment on skid trails over logging slash

No heavy equipment operation within 100' of the streamside boundary of the SMZ

Up to 50% of the merchantable trees may be marked for harvest but retain approximately 50% of larger diameter (18"+) trees within a tree length of the streamside edge of the SMZ

Intermittent drainages crossing the SMZ – in 50' zone of each side of channel, no heavy equipment operation but up to 50% of the merchantable trees may be removed

Seeps, springs, spring brooks, wetlands – 100' zone, no heavy equipment operations or removal of trees

No ignition within 100 feet of the streamside boundary of the SMZ.

Soil and water conservation practices

As mandated by the Clean Water Act and the MOU between the Utah Division of Water Quality and the Forest Service, best management practices including the soil and water conservation practices (SWCP's) in FSH 2509.22 are to be incorporated in the planning and implementation of all ground-disturbing activities on lands administered by the Forest Service.

Streams, springs and spring brooks, and wetlands not in the SMZ will be protected with the buffer zone requirements in SWCP 14.06 and other applicable SWCP's.

The SWCP's developed for this project are in Appendix A.

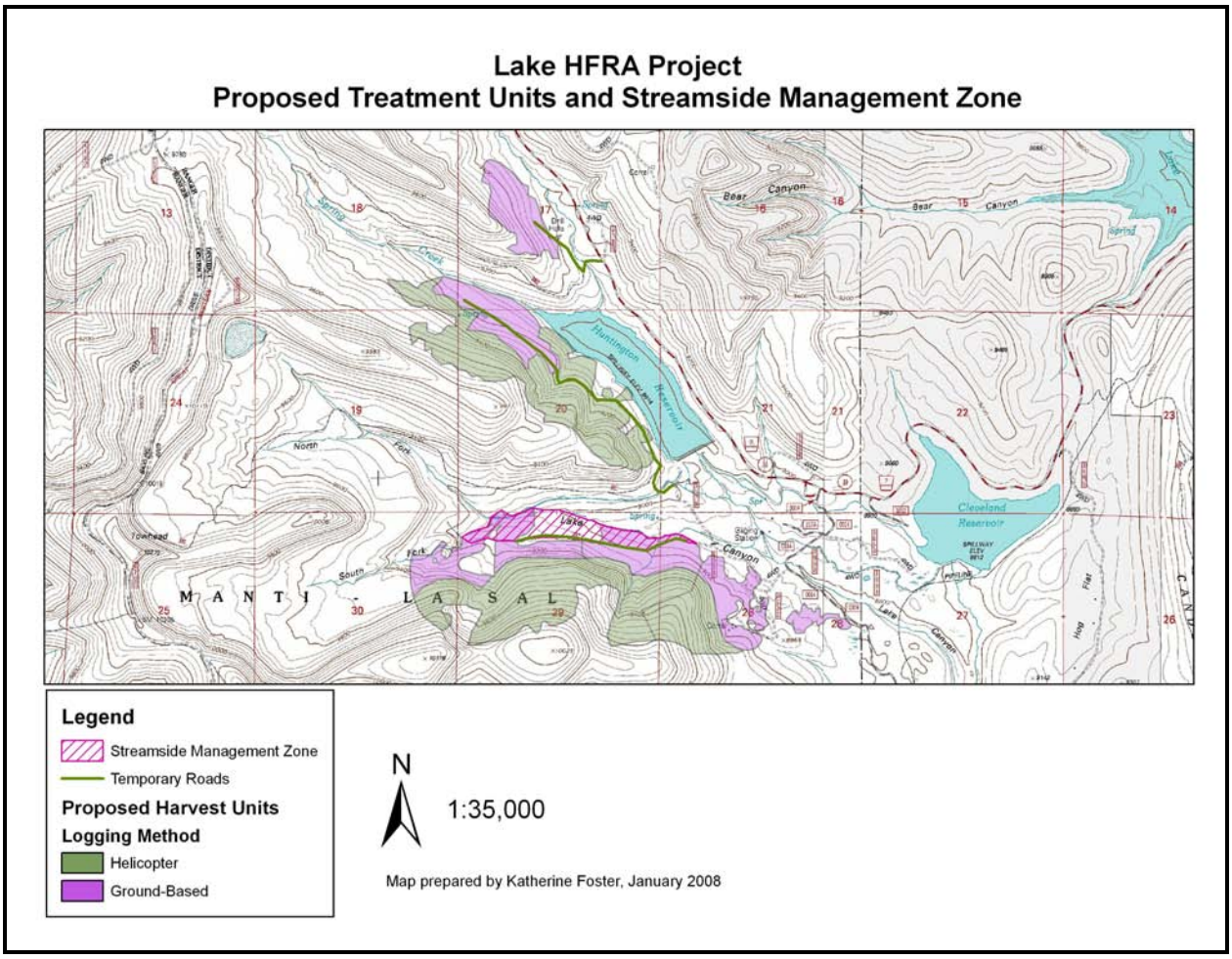


Figure 1 on the next page is a sketch of how the SMZ buffer zone requirements would be applied during sale layout and marking. [*Note that the 25-50% retention in the sketch was changed to 50% retention after peer review of the draft report*.]

Resolution of internal concerns

The internal issues and concerns were resolved with the final design of the proposed project. The following briefly describes how the concerns were resolved.

Drinking water source protection

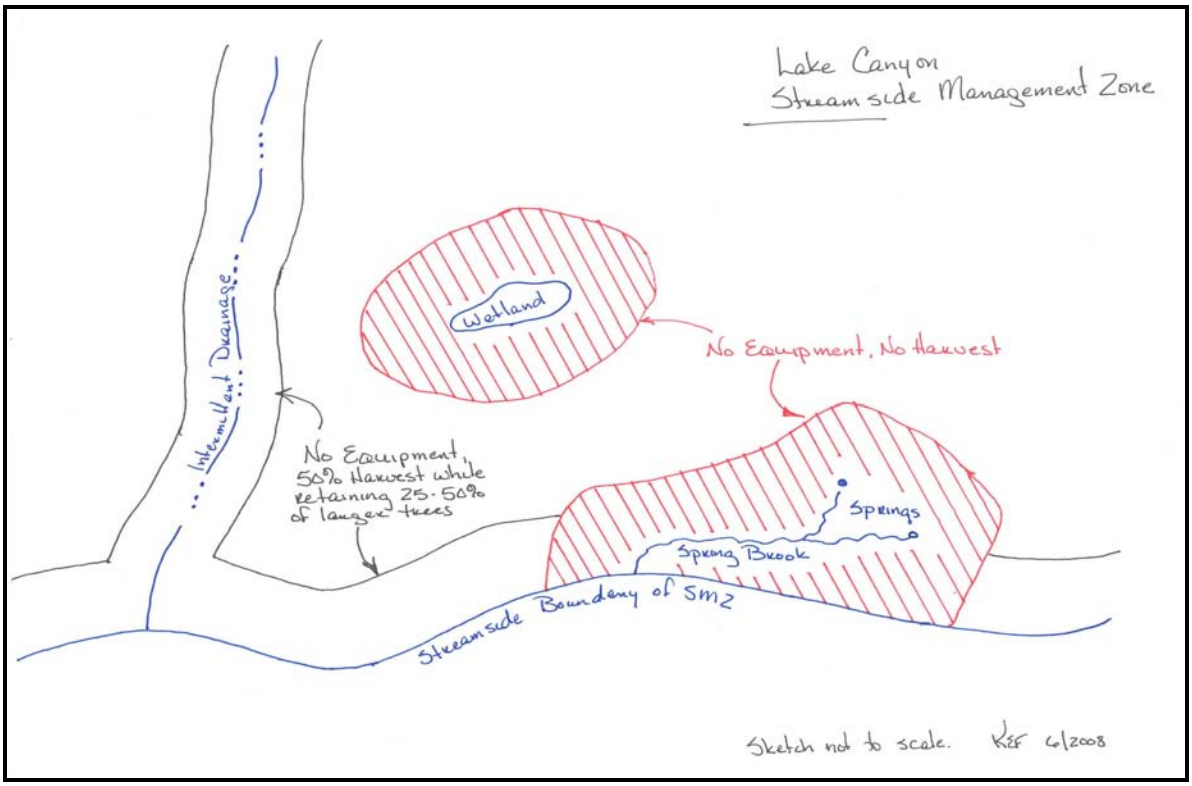
There is little specific guidance for management of surface water source protection zones in a non-urban setting. Most information found via internet research focuses on control of non-point source pollution and the use of buffer zones. The SWCP's and the SMZ share this focus and also include specifications for equipment refueling and spill containment and minimization of soil compaction.

Protection of springs and wetlands

This is achieved through the specifications for the SMZ and buffer zones. Acceptable activities are limited; there should be no direct disturbance to springs, spring brooks, and

wetlands. Additionally, the buffer zones are sized to incorporate at least a portion of the seasonably variable saturated area surrounding these landscape features.

Figure 1



Protection and maintenance of cutthroat trout habitat

This is achieved through the specifications for the SMZ and buffer zones for other streams and drainages. There should be no direct disturbance adjacent to the stream channels. The SMZ allows removal of a portion of the dead trees adjacent to the stream channel while retaining some for stream/habitat features. The removal of some trees reduces the possibility of a sudden, large-scale addition of large woody debris to the stream channel that could result in stream channel erosion.

Prevention of detrimental changes in soil quality

This is achieved through the specifications for the SMZ and SWCP's and the use of helicopter logging on steeper slopes.

Consistency with Forest Plan, relevant law and executive orders

In this section, I will describe how the project with the design features and best practices is consistent with the 1986 Forest Plan management direction for watershed management and riparian areas, with the Clean Water Act and the Safe Drinking Water Act, and with the Executive Orders for floodplains and wetlands.

Forest Plan consistency

Applicable Forest Plan goals for soil and water (USDA Forest Service 1986, p. III-4) include the following: maintain satisfactory watershed conditions; provide favorable conditions of water flow (quality, quantity and timing); protect soil and water productivity so that neither will be significantly or permanently impaired; and protect and enhance riparian areas including dependent resources.

Specifically, the Forest Plan management direction for water quality, riparian areas and wetlands, and soil and watershed protection relevant to the proposed project includes:

Table 1 – Consistency with Forest Plan

Forest-wide general direction	Consistency review
Improve or maintain water quality by meeting state water quality standards [Water Quality F00-01].	2006 Utah 305(b) report and 2004 TMDL for West Colorado Management Unit document that water quality standards are currently met and beneficial uses are maintained in the subwatershed.
Implement best management practices relative to water quality in all resource activities [Water Quality F00-02].	See attached SWCP's.
Prior to implementation of project activities, delineate and evaluate riparian areas and or wetlands that may be impacted [Riparian F00-01].	Wetlands and riparian areas have been delineated and are part of the Forest core GIS layers. SMZ and project SWCP's (Appendix A) require no equipment operation buffer zones around mapped wetlands and riparian areas and for those unmapped areas that are discovered during sale layout.
Floodplains should be identified and, as appropriate, a risk/hazard analysis performed for project sites where long-term occupancy is proposed [Riparian F00-03].	Floodplains not mapped; however, no occupancy is associated with the proposed action. No equipment operation and harvest limitations are specified around all drainages in the project area.
Maintain or improve soil productivity and watershed qualities within the ecological site capabilities [Soil Mgt F00-01].	See attached SWCP's and soils resource report (Davidson, 2008)
Minimize adverse, man-caused impacts to the soil resource including accelerated erosion, compaction, contamination and displacement by: protecting or conserving topsoil when conducting surface disturbing activities; providing adequate drainage and revegetation on areas capable of supporting vegetation disturbed during construction or other surface disturbing activities to stabilize the area and control soil erosion; stabilizing and/or closing and rehabilitating non-system roads where significant resource damage is occurring; controlling livestock and big-game grazing so plant cover is not reduced to less than the amount needed for soil and watershed protection [Soil Mgt F00-02].	See attached SWCP's

Specific management direction for riparian areas, including wetlands	Consistency review
Minimize surface disturbing activities that alter vegetative cover, result in stream channel instability or loss of channel cross-sectional area, or reduce water quality [Wtr Quality Mgt F00-02].	See attached SWCP's and specifications for SMZ.
Prior to implementation of project activities, delineate and evaluate riparian areas and or wetlands that may be impacted [Rip Floodplain Wetland Mgt F00-01]. Where site-specific development adversely affects long-term productivity or management, those authorized to conduct development will be required to replace loss through appropriate mitigations.	See attached SWCP's.
Prevent or remove unacceptable debris accumulations that reduce stream channel stability and capacity [S&W Improvements F03-01].	See attached SWCP's. SMZ specifications allowing some removal of trees.

The proposed action is consistent with the Forest Plan.

The soil quality guidelines in FSH 2509.18 were developed to ensure that long-term soil productivity is protected. Detrimental soil disturbance and the soil quality guidelines are assessed in the soils resource technical report (Davidson, 2008)

Consistency with the Clean Water Act

Water quality and downstream impaired stream segments

Section 313 of the Clean Water Act requires the Forest Service to adhere to state water quality requirements.

The beneficial uses designated for Huntington Creek and its tributaries from Hwy 10 to the headwaters include 1C (drinking water), 2B (non-contact recreation), 3A (cold water aquatic life), and 4 (agriculture, including stock watering). Uses designated for Huntington Reservoir include 2B, 3A, and 4. (UDAR, R317-2-13).

In the 2002 and 2004 303(d) lists, the State listed Huntington Creek and its tributaries below the Forest boundary as not supporting agricultural beneficial uses due to total dissolved solids (TDS). Specifically, the segments listed are Huntington Creek and tributaries from the confluence with Cottonwood Creek to Utah Highway 10 and Huntington Creek and tributaries from Highway 10 to the USFS boundary.

In 2004, EPA approved a TMDL for the West Colorado Management Area that included Huntington Creek. The TMDL included an assessment of all available water quality data. Based on this data, the upper reaches of Huntington Creek, including the Left Fork of Huntington Creek, Lake Canyon and the project area, are considered to be fully supporting agricultural uses (DWQ, 2004, p 37). Based on current information, the Left Fork of Huntington Creek is supporting uses 1C, 3A, and 4; there is inadequate information to assess use 2A (DWQ, 2006a, p C-6). Huntington Reservoir supports its designated uses (DWQ, 2006a, p I-6-10).

Incorporation of best practices

Section 319 of the Clean Water Act requires the Forest Service to accommodate concerns of States regarding the consistency of federal projects with State nonpoint source pollution control programs. The State anti-degradation rule applies to all waters located within the boundary of

the National Forest. The rule requires that water quality is to be maintained with little or no degradation. New point sources are prohibited, and non-point sources must be controlled through implementation of Best Management Practices (Utah DAR, 2007). The State of Utah and the Forest Service have established a Memorandum of Understanding (MOU) to use Forest Plan Standards and Guidelines and the Forest Service Handbook of Soil and Water Conservation Practices (SWCP's – FSH 2509.22) as BMP's. The use of SWCP's meets the water quality protection elements of Utah's Nonpoint Source Management Plan. The SWCP's developed for this project are in Appendix A.

The proposed action is consistent with the Clean Water Act because no adverse water quality impacts are anticipated, beneficial uses would not be adversely affected, and best management practices in the form of SWCP's and other design features are included in the proposed project.

Consistency with the Safe Drinking Water Act

As delineated by the Utah Division of Drinking Water, Surface Water Source Protection Zone Two extends into the project area along Spring Creek and Huntington Reservoir; the surrounding watershed area is in Zone Four. Surface Water Source Protection Zone One is downstream of the project area.

Surface water source protection zones are delineated from an intake or point of diversion upstream:

> *Zone One* is a ½ mile wide zone on both sides of the drainage?(1 mile total width) that begins 100 feet downstream of an intake and extends upstream 15 miles.
> *Zone Two* is a 1000 foot wide zone (2000 feet total width) that begins at the end of Zone One and extends an additional 50 miles upstream.
> *Zone Three* is a 500 foot wide zone (1000 feet total width) that begins at the end of Zone Two and extends to the watershed divide.
> *Zone Four* is that portion of the watershed not already included in Zones One, Two, or Three.

The letter from Emery County documents that the entire Huntington Creek watershed should be considered a municipal watershed. This is consistent with the surface water source protection zones.

The beneficial uses designated by the State Division of Water Quality include 1C – drinking water.

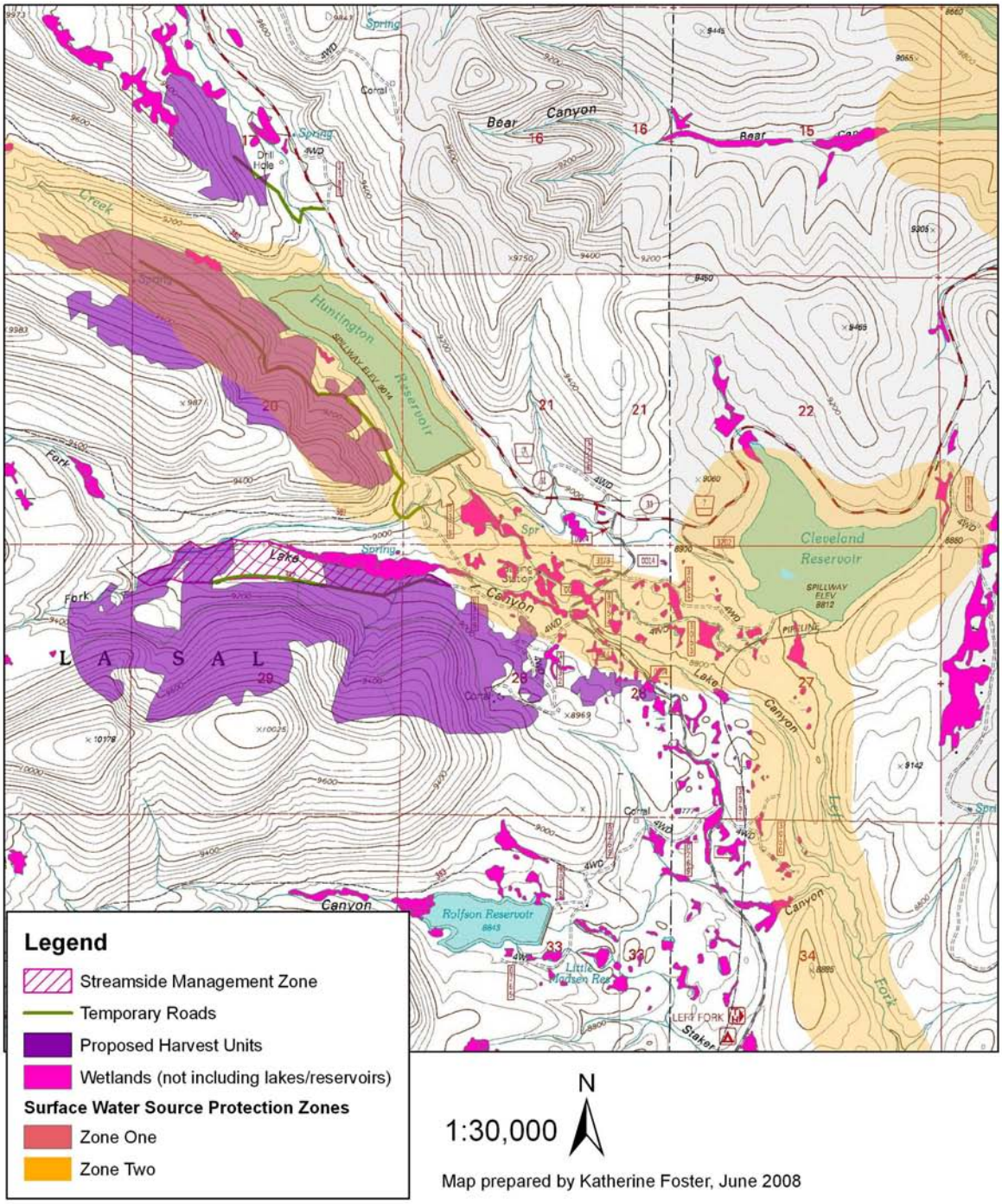
In 2000, the Forest Service published ***Drinking Water From Forests and Grasslands***. This report synthesizes the scientific literature about forest and grassland management activities and contaminants of concern in public drinking water source protection. The chapter about forest management (Stednick, 2000) focuses on erosion and sedimentation, stream temperature, and nutrients. Key points to minimize effects include careful implementation, adequate buffer zones, maintaining ground cover, operating during periods of low erosion risk, and maintaining streamside shading.

> The streamside management zone and SWCP's include specifications that address these key points. Careful implementation is achieved though sale administration.
>
> The soils technical report (Davidson, 2008) documents the results of modeling to estimate possible soil erosion and sedimentation; *de minimus* values of less than 0.1 tons/acre/year are predicted by the model. This is consistent with published values for undisturbed forests (Stednick, 2000).

The proposed action with the design features described above, including the SMZ and the SWCP's in Appendix A, is consistent with the Safe Drinking Water Act because non-point

source pollution and detrimental alteration of soil quality will be minimized and disturbance to stream channels, wetlands, and springs/spring brooks will be avoided.

Lake HFRA Project
Proposed Treatment Units and SMZ, Wetlands, and Source Protection Zones



Consistency with Executive Orders 11988 and 11990

EO 11988 – Floodplain Management

At stated in the order, the objective of EO 11988 is to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.

No occupancy is proposed with this action. The SMZ and the SWCP's specify harvest limitations and that there be buffer zones with no equipment operation around all drainages in the project area.

EO 11990 – Wetland Management

This requires the Forest Service to take action to minimize destruction, loss, or degradation of wetlands and to preserve the natural and beneficial values of wetlands.

The SMZ and project SWCP's (Appendix A) require buffer zones with no equipment operation around mapped wetlands and for those unmapped areas that are discovered during sale layout.

Issue-based assessment of direct, indirect, and cumulative effects of the proposed action

Issues

The Forest received seven responses to the public notice and scoping letter for this project. No watershed, soils, or water quality issues were raised by the individuals or groups that responded during the scoping period.

The internal resource concerns were used during project design to develop the project's design features, including the SMZ, and the specifics of the SWCP's.

Direct, indirect, and cumulative effects

Based on external scoping, there are no watershed, soils, or water quality issues that require detailed assessment.

As discussed above, the internal concerns are resolved with the final design of the proposed project including the design features and SWCP's. A detailed assessment of the proposed action and no action alternative is not required. The proposed action and the no action alternative were not compared.

With timely and complete implementation of the design features and SWCP's, direct and indirect effects are expected to be minimal and limited in scope, intensity, and duration. Because direct and indirect effects are expected to be minimal, there should be no additive or synergistic interaction with other activities occurring in the project area or subwatershed. There should be no adverse cumulative watershed effects as a result of implementation of the proposed action.

Monitoring

Monitoring will focus on implementation. Monitoring elements could include the following:

Sale design & layout – At least one field interdisciplinary review of SMZ marking to ensure proper implementation of the buffer zones and harvest restrictions. To be most effective this should occur in the early phases of marking, not as a post-marking inspection.

Harvest operations – The majority of this monitoring will be achieved through sale administration and the associated documentation. Field reviews may also be done by the Forest's hydrologist, soil scientist, or fisheries biologist.

Information sources, methods, and best science

Information sources

Manti La Sal corporate/core GIS data

Aerial/satellite imagery

Utah Division of Water Quality assessment reports, 305(b) and 303(d) lists

Utah Division of Drinking Water source protection zones

Literature reviews

Methods

Field reconnaissance of the project area and interdisciplinary team field review of areas of concern to develop the project proposal.

Synthesis of published information with project area characteristics.

Peer review of this report by Robert Davidson, Manti La Sal soil scientist and by Joni Vanderbilt, Manti La Sal hydrologist.

Controversy

Based on comments received during scoping, there is little to no controversy specific to watershed management, water quality, or soils associated with the proposed action.

Best Science

It is my professional judgment that this analysis is based on and uses best practicable science.

Katherine Foster,
Hydrologist, Manti La Sal National Forest
July 25, 2008

Literature cited

Foster, Katherine. 2007. Unpublished report of interdisciplinary field review. Project file.

Davidson, Robert. 2008. Soils Technical Report – Lake Fuels Project. Project file report.

Stednick, John. 2000. Chapter 10 – Timber Management, in Drinking Water from Forests and Grasslands – A synthesis of the scientific Literature, edited by George Dissmeyer. USDA Forest Service, Southern Research Station, GTR SRS-39. Available at the time of this report at www.srs.fs.usda.gov/pubs/gtr/gtr_srs039.

Utah Division of Administrative Rules. 2007. Rule R317-2, Standards of Quality for the Waters of the State. Available at the time of this report at http://www.rules.utah.gov/publicat/code/r317/r317.htm.

Utah Division of Water Quality. 2006a. Utah's 2006 Integrated Report, Volume I – 305(b) Assessment. Available at the time of this report at http://www.waterquality.utah.gov/documents/Utah305b_2006Vol1_6-30-06.pdf.

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Utah Division of Water Quality. 2004. Price River, San Rafael, River, and Muddy Creek (West Colorado) TMDL's for Total Dissolved Solids. Available at the time of this report at http://www.waterquality.utah.gov/TMDL/West_Colorado_TMDL.pdf.

Appendix A - Soil and Water Conservation Practices (SWCP's)

SWCP's applicable to the planning phase of the proposed project include:

SWCP	SWCP OBJECTIVE	CONSIDERATIONS FOR IMPLEMENTATION
11.01	DETERMINATION OF CUMULATIVE WATERSHED EFFECTS – To determine the cumulative effects or impacts on beneficial water uses by multiple land management activities.	No direct or indirect effects are anticipated, therefore there would be no cumulative effects.
11.04	FLOODPLAIN ANALYSIS AND EVALUATION – To protect floodplain values and avoid, where possible, the long and short-term adverse impacts to soil and water resources associated with the occupancy and modification of floodplains.	*The SWCP states that a floodplain analysis and evaluation will be made when sites within floodplains are being considered for structures, developments, or management activities. Environmental quality, ecological effects, and individual safety and health will be considered*. No occupancy or development of the floodplains or flood-prone area is proposed. Temporary roads will have appropriately sized culverts.
11.05	WETLANDS ANALYSIS AND EVALUATION – To maintain wetlands function and avoid adverse soil and water resource impacts associated wit the destruction of modification of wetlands.	*The SWCP states that the Forest Service does not permit the implementation of activities and new construction in wetlands whenever there is a practical alternative. A wetland analysis and evaluation will be made prior to acquisition or exchange of wetlands. Evaluation of proposed actions in wetlands will consider factors relevant to the proposal's effective on the survival and quality of the wetlands.* There are wetlands in the harvest units; they will be avoided. Buffer zones are specified – see SWCP 14.04 and the specifications for the SMZ.
11.07	OIL AND HAZARDOUS SUBSTANCE SPILL CONTINGENCY PLANNING - To minimize contamination of water from accidental spills by prior planning and development of Spill Prevention Control and Countermeasure Plans	A SPCC Plan is required if the total, above-ground storage of oil, petroleum products, or other hazardous materials exceed 1320 gallons, or any single container exceeds a capacity of 660 gallons. Petroleum products and other hazardous materials will not be stored in areas designated in the Forest Plan as MWS or in Source Water Protection Zones One or Two. Each piece of heavy equipment must have sufficient supplies of absorbent and barrier materials on-hand to allow the rapid containment and recovery of any spills.
11.14	MANAGEMENT OF SNOW SURVEY SITES - To protect snow courses and related data sited from effects by land management activities	*The SWCP states that snow survey sites will be protected according to the terms of the MOU or special use permit issued to the NRCS. Consult with the NRCS if adjacent activities might affect their value or site integrity*. There are no snow courses or SNOTEL sites the project area.
13.07	PESTICIDE USE PLANNING - To incorporate water quality and hydrologic considerations into project planning.	*The SWCP states that the pesticide use planning process will be used to identify sensitive areas, identify preventive measures and other mitigation measures, and incorporate hydrologic, water quality, and aquatic concerns.* Materials for gopher control will be used in a manner consistent with label requirements.
13.10	PESTICIDE SPILL CONTINGENCY PLANNING - To reduce contamination of water from accidental pesticide spills.	Contingencies for pesticide spill should be incorporated into the job hazard analysis and application guidelines/plans.

SWCP	SWCP OBJECTIVE	CONSIDERATIONS FOR IMPLEMENTATION
14.02	TIMBER HARVEST UNIT DESIGN- To insure timber harvest unit design will secure favorable conditions of water flow, maintain water quality and soil productivity, and reduce soil erosion and sedimentation.	*The SWCP states that requirements necessary to assure an acceptable level of protection for soil and water resources will be identified during the NEPA process; prescriptions will be designed implement these requirements. Technical specialists will work with the pre-sale forester(s) during unit layout to avoid sensitive areas, adjust unit boundaries, and to develop specific measures to implement these SWCP's and other best management practices.* A streamside management zone will be designated adjacent to Lake Canyon.
14.05	PROTECTION OF UNSTABLE AREAS - To protect unstable areas and avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.	No unstable areas are proposed for harvesting.
14.10	LOG LANDING LOCATION AND DESIGN - To locate in such a way as to avoid soil erosion and water quality degradation.	The timber sale administrator must approve landing locations proposed by the purchaser. Approved landing locations will meet the criteria of minimal size, least excavation needed, minimal crossing of stream channels, minimum skid roads necessary, no side-cast material into sensitive areas, and proper drainage. Landings will not be located in Streamside/Riparian Management Zones or in other water-related buffer zones. Landing associated with ground-based and cable harvesting will be no more than ½ acre each; those associated with helicopter harvesting will be no more than 2 acres each.

SWCP's applicable to the implementation phase of the proposed project include:

SWCP	SWCP OBJECTIVE	APPLICABLE TO	CONSIDERATIONS FOR IMPLEMENTATION
11.11	PETROLEUM STORAGE AND DELIVERY FACILITIES AND MANAGEMENT – To protect surface and subsurface soil and water resources from petroleum fluid contamination resulting from leaking delivery systems and storage facilities. ***Note that this also applies to other hazardous materials, including drilling fluids***	Project area, especially the harvest units adjacent to Spring Creek & Huntington Reservoir.	*The SWCP states that delivery and storage facilities will be located, designed, constructed, and maintained in a manner that minimizes the potential for contamination of surface and subsurface soil and water resources from leaking flowlines, pipelines, and storage tanks.* Fuel and other petroleum products will not be stored in Source Protection Zones One or Two.
13.02	SLOPE LIMITATIONS FOR TRACTOR OPERATION - To reduce gully and sheet erosion and associated sediment production	Harvest units	Ground-based logging (including forwarders) will be limited to slopes of 40% or less.
13.03	TRACTOR OPERATION EXCLUDED FROM WETLANDS, BOGS, AND WET MEADOWS - To limit soil damage, turbidity, and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion. ***Note that this SWCP applies to all heavy equipment operations.***	Harvest units and areas adjacent to access roads	*The SWCP states that application of the SWCP is mandatory for all vegetation manipulation projects, including mining operations; exceptions must be specifically addressed in an environmental document. The agency project administrator or project supervisor is responsible for identifying wetlands and meadows not previously recognized in the NEPA process and for following or developing management controls to protect wetland and meadows. Protection of wetlands (mapped and unmapped) should be included in pre-work briefings.* There are mapped and unmapped wetlands in the harvest units. Buffer zone requirements (SWCP 14.06) must be considered and incorporated in sale layout and timber marking and while locating temporary roads, skid trails, and landings.

SWCP	SWCP OBJECTIVE	APPLICABLE TO	CONSIDERATIONS FOR IMPLEMENTATION
13.04	REVEGETATION OF SURFACE DISTURBED AREAS - To protect soil productivity and water quality by minimizing soil erosion	Temporary roads, some skid trails and landings, and selected harvest areas	Select disturbed areas will be seeded as directed by the sale administrator with seed mixture(s) developed for the project. The seed will be certified weed and noxious weed free. The proponent should have an independent test of seed purity, germination, and weed content prior to seed application. If the soil surface is crusted, take appropriate measure to break up the crusted areas prior to seeding.
13.06	SOIL MOISTURE LIMITATIONS FOR TRACTOR OPERATION - To minimize soil compaction, puddling, rutting, and gullying with resultant sediment production and loss of soil productivity. ***Note that this SWCP applies to all heavy equipment operations.***	Project area	The normal operating season on National Forest lands in this area is from July 1st to October 1st. Construction and other activities outside the normal operating season may require supplemental plans addressing temporary shutdown and erosion control measures. If temporary erosion control measures are not effective, activities will be suspended until conditions improve. Rutting will be used as an indicator of wet conditions on roads and skid trails. Vehicle traffic and equipment operation will be restricted to prevent rutting in excess of one inch on gravel roads, 2 inches on native surface roads and 3-4 inches on skid trails. Proponent(s) will provide maintenance equipment to repair rutting as soon as ground conditions permit. In harvest units away from travelways, restrict operations when mud clings to equipment wheels until soils are dryer. To minimize compaction, operate equipment over logging slash when possible.
13.08	APPLY PESTICIDES ACCORDING TO LABEL AND EPA REGISTRATION DIRECTIONS - To avoid water contamination by complying with all label instructions and restrictions.	Planted areas	Gopher control using strychnine may be necessary in planted spruce stands. Label directions, other constraints identified on the label and legal requirements for application and disposal will be incorporated into project plans and contracts. Noxious weeds will be controlled using liquid or solid herbicides. Label directions, other constraints identified on the label and legal requirements for application and disposal will be incorporated into project plans and contracts.
14.03	USE OF SALE AREA MAPS (SAMs) FOR DESIGNATING SOIL AND WATER PROTECTION NEEDS -To delineate the location of protected areas and available water sources and insure their recognition, proper consideration, and protection on the ground.	Timber sale contract Harvest units	Streamside management zone will be delineated on the SAM. All perennial and intermittent streams will be designated for stream course protection. Other water features with buffer zones (see the design features and 14.06) will also be included in the SAM. ***Note that SWCP 13.03 is mandatory and applies to mapped and unmapped wetlands***. Ground verification and preparation of SAMs to be included in timber sale contract will be done by Presale Forester. Sale administrator reviews areas of concern with purchaser before operations.
14.04	LIMITING THE OPERATION PERIOD OF TIMBER SALE ACTIVITIES - To minimize soil erosion and sedimentation and loss in soil productivity by insuring the purchaser conducts his/her operations in a timely manner. ***Note that this SWCP applies to all heavy equipment operations.***	Timber sale contract Harvest units	See also 13.06. The normal operating season on National Forest lands in this area is July 1st to October 1st. Winter logging over frozen ground may be approved.

SWCP	SWCP OBJECTIVE	APPLICABLE TO	CONSIDERATIONS FOR IMPLEMENTATION
14.06	RIPARIAN AREA DESIGNATION - To minimize the adverse effects on riparian areas with prescriptions that manage nearby logging and related land disturbance activities. ***Note that this SWCP applies to all heavy equipment operations.***	Harvest units, temporary roads	See specifications for SMZ adjacent to Lake Canyon. For other areas, the minimum buffer zone will be 100 feet around seeps, springs and spring brooks, 100 feet from lake or reservoir high water lines, 100 feet from each perennial stream bank, 100 feet from the outer perimeter of a wetland, and 50 feet from the top of each intermittent stream bank. Operation of heavy equipment in these buffer zones is prohibited unless specifically authorized by an agency representative. Merchantable material may be removed.
14.11	LOG LANDING EROSION PREVENTION AND CONTROL - To reduce erosion and subsequent sedimentation from log landing through the use of mitigating measures.	Log landings	Considerations include proper drainage and dispersion of water including preventing any road runoff from reaching the landing, shaping cuts and fills, decompaction, revegetation, spreading slash.
14.12	EROSION PREVENTION AND CONTROL MEASURES DURING THE TIMBER SALE OPERATION - To ensure that the purchaser's operations shall be conducted reasonably to minimize soil erosion.	Harvest units	The timber sale contract sets purchaser's responsibility to prevent soil/water resource damage. Sale administrator ensures that erosion control is kept current and prevents operations when excessive impacts are possible. The kinds and intensity of work done shall be adjusted to ground and weather conditions, including seasonal periods of precipitation and the need for controlling runoff. Damage-causing storms are most likely to occur during mid to late summer associated with monsoon/intense thunderstorms.
14.14	REVEGETATION OF AREAS DISTURBED BY HARVEST ACTIVITIES - To establish a vegetative cover on disturbed areas to prevent erosion and sedimentation.	Harvest units, temporary roads	*The SWCP states that the Purchaser shall take appropriate measures normally used to establish an adequate cover of grass or other vegetation acceptable to the Forest Service when soil has been severely disturbed by the Purchaser's operations and establishment of vegetation is needed to minimize erosion. It is the responsibility of the sale administrator to see that revegetation work required by purchaser is done correctly and in a timely manner.* See SWCP 13.04. For this project, the purchaser will be responsible for revegetation for one year after the completion of harvest or acceptance of the sale unit, whichever comes first.
14.15	EROSION CONTROL ON SKID TRAILS - To protect water quality by minimizing erosion and sedimentation derived from skid trails. ***Note that this SWCP applied to any temporary working travelway.***	Skid trails, temporary roads	Erosion control measures are applied prior to expected hydrologic events (spring runoff, high-intensity storms, etc.). Purchaser must complete and maintain erosion control work as specified in the sale contract. Temporary measures may be necessary in some areas prior to harvest unit acceptance/closure. Permanent measures may include waterbarring, application of logging slash, and/or seeding
14.16	MEADOW PROTECTION DURING TIMBER HARVESTING - To avoid damage to the ground cover, soil, and water in meadows (wet and dry). ***Note that this SWCP applies to all heavy equipment operations***	Harvest units, temporary roads	*The SWCP states that vehicular or heavy equipment shall not be used on meadows except where roads, staging areas, or equipment travelways are specifically located and approved.* The project administrator will be responsible for on-the-ground protection of meadows. ***Note that SWCP 13.03 requires the protection of both mapped and unmapped wet meadows and other wetlands.***

SWCP	SWCP OBJECTIVE	APPLICABLE TO	CONSIDERATIONS FOR IMPLEMENTATION
14.17	STREAM CHANNEL PROTECTION (IMPLEMENTATION AND ENFORCEMENT) - To protect natural stream flows; to provide unobstructed passage of flows; reduce sediment input; and restore flow if diverted by timber sale activity.	Harvest units, temporary roads	All perennial and intermittent streams will be designated for stream course protection and included in the SAM. IDT specialists will be consulted as needed.
14.18	EROSION CONTROL STRUCTURE MAINTENANCE - To insure constructed erosion control structures are stabilized and working effectively.	Harvest units, temporary roads	During the period of the contract, the purchaser shall provide maintenance of soil erosion control structures constructed by the purchaser until they become stabilized 1) for up to, but not for more than, one year after their construction or 2) the sale unit is accepted as final, or 3) the sale is closed.
14.19	ACCEPTANCE OF TIMBER SALE EROSION CONTROL MEASURES BEFORE SALE CLOSURE - To assure the adequacy of required erosion control work on timber sales.	Harvest units, temporary roads	A careful review of erosion prevention work will be made by the sale administrator before each harvest unit is accepted as final. The inspection will determine if the work is acceptable and will meet the objective of the erosion control feature. Work is not acceptable if it does not meet standards or is not expected to protect soil/water values. Technical assistance will be used as necessary. See SWCP 14.18 - erosion prevention work done in the previous year should be periodically inspected during the life of the timber sale to determine maintenance needs within the first year following construction and to evaluate adequacy of the work and any necessary modifications.
14.22	MODIFICATION OF THE TSC - To modify the TSC if new circumstances or conditions indicate that the timber sale will cause irreversible damage to soil, water, or watershed values.	Timber sale contract	If contract specifications are not adequate to protect soil/water resources, the sale administrator and Contracting Officer are responsible for recommending a modification of the contract.
15.04	TIMING OF CONSTRUCTION ACTIVITIES - To minimize erosion by conducting operations during minimal runoff periods.	Timber sale contract Harvest units, temporary roads	The normal operating season includes the time period that typically has suitable soil moisture and runoff conditions for most Forest activities and operations. The proponent should schedule and conduct most operations within the normal operating season. The proponent shall conduct all activities to prevent erosion and sedimentation. Temporary erosion control measures may be required to prevent, control, and mitigate erosion and sedimentation. Temporary and permanent erosion control work must be kept current with ongoing operations, especially when construction occurs outside of the normal operating season. See SWCP 13.06 for soil moisture criteria.
15.05	SLOPE STABILIZATION AND PREVENTION OF MASS FAILURES - To reduce sedimentation by minimizing the chances for road-related mass failures, including landslides and embankment slumps. ***Note that this SWCP applied to any temporary working travelway.***	Temporary roads, skid trails	Unstable areas are generally avoided. The proponent will avoid undercutting road-side slopes. Slumped or sloughed material will not be side-cast; it may be incorporated into the travelway or end-hauled to an area designated by the project administrator.
15.07	CONTROL OF PERMANENT ROAD DRAINAGE - To minimize the erosive effects of concentrated water and the degradation of water quality by proper design and construction of road drainage systems and drainage control structures.		No permanent roads will be constructed.

SWCP	SWCP OBJECTIVE	APPLICABLE TO	CONSIDERATIONS FOR IMPLEMENTATION
15.09	TIMELY EROSION CONTROL MEASURES ON INCOMPLETE ROADS AND STREAM CROSSING PROJECTS - To minimize erosion of and sedimentation from disturbed ground on incomplete projects.	Temporary roads	*The SWCP states that temporary erosion control and other protective measures will be kept current on all disturbed areas. Areas must not be abandoned for the winter with remedial measures incomplete*.
15.11	SERVICING AND REFUELING EQUIPMENT - To prevent contamination of waters from accidental spills of fuels, lubricants, bitumens, and other harmful materials. ***Note that this SWCP applies in all areas where heavy equipment is operated.***	Project area	The proponent will designate the location, size, and use of service refueling areas for the approval of the sale administrator. Refueling areas will be a minimum of 200 feet from perennial and intermittent stream channels, seeps and springs, wetlands, lakes and reservoirs, stock water developments, and other water features. Fuel and other petroleum products will not be stored in Source Protection Zone Two. All heavy equipment and service vehicles will have a supply of absorbent and other cleanup materials on hand for initial containment of spills. All projects will adhere to the Hazardous Substance Spill Plan in case of accidents.
15.12	CONTROL OF CONSTRUCTION IN RIPARIAN AREAS - To minimize the adverse effects on riparian areas from roads. ***Note that this SWCP applies in all areas where heavy equipment is operated.***	Temporary roads	Except at designated stream crossings, fill materials will not be placed in riparian areas or wetlands.
15.13	CONTROLLING IN-CHANNEL EXCAVATION - To minimize stream channel disturbances and related sediment production.	Temporary roads	*The SWCP states that during construction of roads and installation of stream crossings, it may be necessary for construction equipment to cross or operate near riparian areas. This will be permitted only at locations designated by the sale administrator. In-channel excavation should be planned for low flow periods and be accomplished in as short a timer period as possible. Materials stockpiled or disposed of should be placed and contained in areas above the probable high water lines. Steam channels impacted by construction activity will be restored to their original plan and profile; stream bed armoring should be replaced to the extent possible.*
15.14	DIVERSION OF FLOWS AROUND CONSTRUCTION SITES - To minimize downstream sedimentation by insuring that all stream diversions are carefully planned.	Temporary roads	*The SWCP states that flow must sometimes be guided or piped around project sites. Diverted flows shall be restored to the natural stream course as soon as practicable and, in any event, prior to the major storm season or fish migration season. Stream channels impacted by construction activity will be restored to their natural cross-section, grade, condition, and alignment as soon as possible.*
15.15	STREAM CROSSINGS ON TEMPORARY ROADS - To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.	Temporary roads, some skid trails	*The SWCP states that culverts, temporary bridges, low water crossings, or fords will be required on temporary roads at all locations where it is necessary to cross stream courses. This includes perennial streams and intermittent drainages. Such facilities shall be designed and installed to provide unobstructed stream flow and fish passage, and to minimize damage to stream courses. Stream bank excavation shall be kept to the minimum needed for use of the crossing.* Culverts must be sized to accommodate the design storm associated with the planned structure life and a 70 to 80% chance of success. See following table.

SWCP	SWCP OBJECTIVE	APPLICABLE TO	CONSIDERATIONS FOR IMPLEMENTATION
15.18	DISPOSAL OF RIGHT-OF-WAY AND ROADSIDE DEBRIS - To insure debris generated during road construction is kept out of streams and prevent slash and debris from subsequently obstructing channels.	Temporary roads	Debris will not be placed in the stream channel or floodplain; incidental debris from tree felling will be removed. Streamside willows may be removed in clumps, set aside, and replaced during cleanup/shaping of the disturbed area. Other debris will be disposed of in adjacent upland areas. Disposal method will be specified by the agency project administrator.
15.21	MAINTENANCE OF ROADS - To maintain all roads in a manner which provides for soil and water protection by minimizing rutting, failures, side-cast, and blocking of drainage facilities.	All roads used by contractor	Road maintenance associated with a timber sale is the responsibility of purchaser. The sale administrator will ensure the purchaser maintains roads according to the appropriate maintenance level.
15.22	ROAD SURFACE TREATMENT TO PREVENT LOSS OF MATERIALS - To minimize the erosion of road surface materials and, consequently, reduce the likelihood of sediment production.	All roads used by contractor	Selected road segments will be graveled and/or treated with some type of dust abatement material. Additional measures may be required if activities occur or continue outside the normal operating season.
15.23	TRAFFIC CONTROL DURING WET PERIODS - To reduce the potential for road surface disturbance during wet weather and reduce sedimentation.	All roads used by contractor	*The SWCP states that roads that must be used during wet periods should have a stable surface and sufficient drainage to allow such use with a minimum of resource impact. Road not constructed for all weather use should be closed during the wet season. Where winter operations are planned, roads may need to be upgraded and maintenance intensified to handle the traffic without creating excessive erosion and damage to the road surfaces. Road closures and traffic control measures should be implemented on all roads when damage would occur as a result of use during wet weather.* Road restrictions and traffic control measures will be implemented on all roads when damage occurs. The decision to restrict a road is made by the agency project administrator or engineering representative Damage is indicated by rutting in excess of one inch on gravel roads, 2 inches on native surface roads and 4 inches in other travelways. Outside the normal operating period, vehicle traffic and equipment operation will be restricted to dry or frozen conditions. For roads initially proposed as access but not requiring improvement, continued use which extends beyond the normal operating season or during extended wet conditions may require improvement, such as gravel, or other measures.
15.24	SNOW REMOVAL CONTROLS - To minimize the impact of snow melt on road surfaces and embankments and reduce the probability of sediment production resulting from snow removal operations.	All roads used by contractor	Snow removal will be kept current on all roads used for winter logging operations. During snow removal, a minimum of 4 inches of show will be left on the roadway. Cut banks shall not be undercut nor shall gravel be bladed off the roadway. Ditches and culverts shall be kept functional. Snow berms should be removed or breached at a spacing to provide surface drainage without discharge over erodible fills. Deicing agents will not be used without special authorization from the agency project administrator or sale administrator

SWCP	SWCP OBJECTIVE	APPLICABLE TO	CONSIDERATIONS FOR IMPLEMENTATION
15.25	OBLITERATION OF TEMPORARY ROADS - To reduce sediment generated from temporary roads by obliterating them at the completion of their intended use.	Temporary roads	All temporary roads in the decision area will be obliterated. Obliteration will include removing culverts and reestablishing stream channel configuration, decompaction, recontouring or reshaping of sideslopes and/or construction of waterbars, construction of access controls, application of salvaged woody debris, and revegetation.
18.03	PROTECTION OF SOIL AND WATER FROM PRESCRIBED BURNING EFFECTS - To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris from entering surface water.	Harvest units	Prescribed burn plans identify the conditions necessary to prevent soil damage and meet site preparation objectives while maintaining the integrity of riparian areas and retaining sufficient ground cover to prevent erosion of the burned areas. Practices include construction of water bars in fire lines, and removal of all debris added to stream channels as a result of prescribed burning. Additional, remedial practices may be needed in areas where burn intensity and severity is greater than planned.

Additional requirements for roads

The Clean Water Act specifically includes the following baseline requirements for roads (33 CFR 323.4(6):

i. permanent and temporary roads and skid trails shall be held to the minimum feasible number, width, and total length;
ii. all roads, including skid trails, shall be located sufficiently far from streams and other water bodies to minimize discharge into waters of the U.S. (except for portions which must cross these waters);
iii. the road fill shall be bridged, culverted, or otherwise designed to prevent the restriction of expected flood flows;
iv. the fill shall be properly stabilized and maintained during and following construction to prevent erosion;
v. during construction, the encroachment of heavy equipment into the waters of the U.S. (and adjacent wetlands) outside of the construction boundaries will be minimized;
vi. vegetative disturbance in waters of the U.S. will be minimized during design, construction, and maintenance;
vii. the design, construction, and maintenance of road crossings will not disrupt the migration or other movement of aquatic species inhabiting the water body;
viii. borrow material will be taken from upland sources when feasible;
ix. discharges will not take or jeopardize the continued existence of a threatened or endangered species or adversely modify or destroy critical habitat of such species;
x. discharges into breeding and nesting areas for migratory waterfowl, spawning areas, and wetlands shall be avoided if practical alternative exist;
xi. discharges shall not be located in the proximity of a public water supply intake;
xii. the discharge shall not occur in areas of concentrated shell fish production;
xiii. the discharge shall not occur in a component of the National Wild and Scenic River System;
xiv. the discharge shall to free of toxic pollutants in toxic amounts;
xv. all temporary fills shall be removed and the area restored to its original elevation

Design Storm Return Interval by Structure Life and Probability of Success

Structure Life (years)	Desired Probability of Success																		
	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	05
	Acceptable Probability of Failure																		
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
1	20	10	7	5	4	4	3	3	3	2	2	2	2	2	2	2	2	2	2
2	40	20	13	10	8	6	5	5	4	4	4	3	3	2	2	2	2	2	2
3	59	29	19	14	11	9	8	7	6	5	4	4	3	3	3	2	3	2	2
4	78	39	25	19	15	12	10	8	7	7	6	5	4	4	4	3	3	2	2
5	98	48	32	23	18	15	13	10	9	8	7	6	6	5	4	4	3	3	2
6	117	58	38	28	22	17	15	12	11	10	8	7	7	6	5	4	4	3	2
7	136	67	44	32	25	20	17	14	12	11	9	8	7	6	6	5	5	4	3
8	156	77	50	37	28	23	20	16	14	12	11	9	8	7	7	5	5	4	3
9	175	86	56	41	32	26	22	18	16	13	12	10	9	8	7	6	5	4	4
10	195	96	63	46	35	29	24	20	17	15	13	11	10	9	8	7	6	5	4
12	234	114	75	55	42	34	29	24	21	18	16	14	12	10	9	8	7	6	5
15	293	143	93	68	53	43	36	30	26	22	19	17	15	13	12	10	8	7	6
20	390	190	123	91	70	57	47	40	34	29	26	22	20	17	15	13	11	9	8
25	488	238	154	113	88	71	59	50	42	36	32	28	25	22	19	16	14	11	9
30	585	285	185	135	105	85	71	60	51	44	38	33	29	25	22	19	16	14	11
40	780	380	247	180	140	113	94	79	68	58	51	44	39	34	29	25	22	18	14
45	878	428	277	202	157	127	105	89	76	66	57	50	43	38	33	28	24	20	15
50	975	475	308	225	174	141	117	99	85	73	63	55	48	43	37	32	27	22	17