

**Appendix A - Project Design Criteria and Mitigation Measures**

Project design criteria and mitigation measures are developed to avoid, reduce, eliminate, rectify, or compensate for undesirable effects from proposed activities. They apply to both Alternatives 2 and 3. Unless noted otherwise in the decision document, the mitigation measures and design features are mandatory if the Responsible Official selects an action alternative for implementation.

The mitigation measures and design features listed in this table were developed to address site-specific environmental concerns and to meet applicable Forest Plan standards and guidelines. Each measure or feature is stated, followed by its objective, a rating of its effectiveness and basis for that rating, regulatory or scientific basis for the measure, and the person(s) responsible for enforcement.

**High.** The mitigation is highly effective (estimated at greater than 90 percent) at meeting the objective, and one or more of the following types of documentation is available: research or literature; administrative studies; Experience: professional judgment of an expert; or Fact: evident by logic, or reason.

**Moderate.** The mitigation is moderately effective (estimated at 60 to 90 percent), and its effectiveness is supported either by evidence or logic. Implementation of this mitigation needs to be monitored, and the mitigation may be modified if needed to achieve its objective.

**Low.** The mitigation is considered to be somewhat effective (estimated at less than 60%), because its effectiveness is not supported by substantial evidence, or professional judgment indicates that it has limited success in implementation or in meeting objectives. Implementation should be monitored, and the mitigation may be modified if necessary, to achieve its objective.

Mitigation Measure or Project Design Criteria	Objective	Effectiveness and Basis	Regulatory or Scientific Basis	Enforcement
<b>Botany- All Activities</b>				
B1 - Any previously undocumented Threatened or Endangered (T&E), or Regionally Sensitive (R6), or Survey and Manage (S&M) plants located before or during project implementation, will be appropriately managed by active coordination between contractor or purchaser, Forest Service Line officer, project administrator and FS botanist.	Prevent impacts to Threatened & Endangered, Sensitive, and Survey & Manage plants.	High (Logic)	Forest Plan p. 4-127, USDA Forest Service 1990.	Contract/Project Administrator
B2 - Protect TES and S&M plants by applying site-specific mitigations based on the current geographic extent of occupancy prior to implementation. Mitigations may include buffering occurrences, avoidance of occurrences, and/or other measures to provide for the persistence and maintain viability of the species at the site.	Prevent impact to TES, S&M plant species.	High (Logic)	R6 TES list management requirements	Presale Layout Crew Project/Contract Administrator

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B3 - No activities will occur within avoidance TES and S&M buffers.	Prevent impact to TES, S&M plant species.	High (Logic)	R6 TES list management requirements	Presale Layout Crew Project/Contract Administrator
B4 – Suppliers must provide annual documentation indicating that the following products have been examined by a qualified inspector and deemed free of State listed noxious weeds: Straw or other Mulch Gravel, Rock, or another fill Seeds (according to AOSA standards)	Prevent introduction of weeds.	Moderate (USDA Forest Service 2005a)	USDA FS 2005a S&G #3 & 7 Forest Plan BMPs, USDA FS 1999	Project or Contract Administrator
B5 - All equipment and gear that comes in contact with a known noxious weed infestation must be cleaned before moving to non-infested areas within the project to avoid spreading the infestation further. To minimize the amount of cleaning needed, work from weed free areas first.	Prevent weed spread.	High (USDA Forest Service 1999)	BMPs, USDA FS 1999	Contract Preparer and Administrator
B6 - Revegetate areas of bare soil exposed by project activities. Native plant materials are the first choice in revegetation where timely natural regeneration of the native plant community is not likely to occur. If native plant materials are not available, use the appropriate MBS non-native seed mix (ask FS Botanist).	Prevent erosion; prevent introduction and spread of weeds; maintain and restore habitat.	High (USDA Forest Service 2005a)	2005 Region 6 Record of Decision for Preventing and Managing Invasive Plants Standard 13, and Forest Service Manual 2070.	Contract Administrator
B7 - Any salvage and installation of plants will be approved by and coordinated through a FS Botanist.	Prevent impacts to TES & S&M species and ensure regeneration of native plant communities.	Moderate (Logic)	Forest Plant p 4-122 & 4-123, USDA Forest Service 1990	FS Botany Staff, Implementation Crew

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B8 - Treat selected, known infestations of invasive plants before ground disturbance begins. Coordinate and consult with the FS Botany Staff for required treatments.	Prevent the spread of invasive plants.	High (USDA Forest Service 2005a)	BMPs, USDA FS1999 USDA FS 2005a S&G #16	FS Botany or Invasives Staff Project or Contract administrator
B9 - Within Matrix land allocation, gaps greater than 0.25acres in size would only occur in stands that have received botanical surveys for Survey and Manage Category A and C species, as applicable.	Manage known sites.	High (Logic)	USDA FS and USDI BLM 1994, Survey and Manage	FS Botany Staff, Presale Layout Crew Project/Contract Administrator
B10 – Invasive plant inventory surveys and botanical surveys for <i>Impatiens noli-tangere</i> would occur along transportation routes, as needed, prior to implementation.	Prevent the spread of invasive plants.	High (USDA Forest Service 2005a)	BMPs, USDA FS1999 USDA FS 2005a S&G #16	FS Botany or Invasives Staff Project or Contract administrator
<p>B11 – For the R6 Sensitive plant <i>Impatiens noli-tangere</i>:</p> <ul style="list-style-type: none"> <li>• Road maintenance within the occurrence would happen outside of the growing season.</li> <li>• Culvert replacement would be coordinated with a FS Botanist.</li> <li>• No landings, temporary road re/construction, or machinery allowed within the occurrence.</li> <li>• No piling of brush or slash within the occurrence.</li> <li>• No non-specific broadleaf herbicide application or herbicide targeting the <i>Balsamiferae</i> allowed within 30-feet of the occurrence.</li> </ul>	Prevent impact to TES, S&M plant species.	High (Logic)	R6 TES list management requirements	FS Botany Staff, Presale Layout Crew Project/Contract Administrator
<b>Fire and Fuels</b>				
FF1 - Log landings utilized in harvest units along roads that will remain open to the public will have activity fuels, piled and	Reduce the occurrence and fire	HIGH. Majority of	1990 Forest Plan,	Timber Sale Administrator

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removed for utilization, piled and later burned by USFS personnel, redistributed into the cutting unit, or chipped and spread not to exceed a depth of 4 inches. Slopes from 0% to 60% will be treated 150 feet uphill from the road and 50 feet downhill from the road or on flat ground adjacent to the road. Slopes greater than 60% will be treated 200 feet uphill from the road and 50 feet downhill from the road.	severity of human-caused wildfires.	human-caused wildfires on the MBS occur in dispersed recreation sites, harvest landings are popular dispersed camping sites post-harvest.	p. 4-142-149. 1994 Record of Decision NWFP, p. C-18 & C-36	with Fire Management Officer consultation
FF2 – Roads in and bounding timber harvest units that will remain open to the public will have activity fuels, piled and removed for utilization, piled and later burned by USFS personnel, redistributed into the cutting unit, or chipped and spread not to exceed a depth of 4 inches. Roadside slopes from 0%-60% will be treated 150 feet uphill from the road and 50 feet downhill from the road or on flat ground adjacent to the road. Roadside slopes greater than 60% will be treated 200 feet uphill from the road and 50 feet downhill from the road.	Reduce the occurrence of human-caused wildfires and create fuel breaks along system roads to increase fire suppression effectiveness.	HIGH. Reducing or removing activity generated fuels along roads creates a control point in the event of a wildfire.	1990 Forest Plan, p. 4-146. 1994 Record of Decision NWFP, p. C-18 & C-36.	Timber Sale Administrator with Fire Management Officer Consultation
FF3 - All prescribed fire projects will be executed in accordance with air quality and smoke management guidelines.	Minimize potential smoke impacts to sensitive receptors.	HIGH. All prescribed fire projects are subject to daily approval by WA DNR prior to ignition.	(1990 Forest Plan, p. 4-118).	Washington State Department of Natural Resources. District Ranger approval of Prescribed Fire Plan
FF4- To minimize effects on emergency response to fires or other emergencies in and around the project area, a maximum 2 hour	To reduce response time to reported	HIGH. Fast response and	Standard Timber contract	Timber Sale Administrator

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wait time for road closures during timber harvest operations for major access roads shall be implemented unless otherwise agreed to by the District Ranger. At the end of the workday these roads shall be left open and passable for emergency responses. Due to low emergency response use spur roads can be kept closed during logging activities but should be able to be re-opened for USFS or cooperator emergency access within 2 hours unless otherwise agreed to by the District Ranger.	wildfires or lightning strikes.	action on wildfires reduce fire size and fire severity.	specification in Region 6.	with Fire Management Officer Consultation.
<b>Heritage</b>				
H1 - If a previously unidentified resource is discovered during implementation, or if an identified resource is affected in an unanticipated way, stop work & secure find; notify FS Heritage Specialist.	Protect historic properties.	MODERATE TO LOW (experience)	36 CFR 800	Project Administrator or their representative Contractor Operator
H2 - If human remains are discovered all work must stop in the area of the discovery and NAGPRA protocols followed.	Protect American Indian burials and cultural items.	MODERATE TO HIGH (literature)	43 CFR 10	Project Administrator or their representative Contractor Operator
<b>Soil, Water, and Fisheries</b>				
SWF1 – 100-foot slope distance minimum no-cut buffer along fish bearing streams. Buffer is to be measured from outer edge of riverbank or from the top of the inner gorge, whichever width is greater. No cutting will occur within the Channel Migration Zone  No-cut buffer will be determined during sale layout, by pre-sale and/or aquatics staff.	Retain riparian vegetation to maintain shade for stream temperature, large wood recruitment, slope stability, and minimize soil erosion. Provide protection for	HIGH (Literature and Forest Experience)	1994 ROD ACSOs p. B-11& RR p. C-30 USDA FS 2012 FS National Core BMPs – Veg. #1-3 WDOE 2004 Anderson and Poage 2014,	Sale Preparation, Timber Sale Administrator

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	aquatic and riparian dependent species.		Benda et al. 2016, Groom et al. 2011, Rashin et al. 2006, Anderson et al. 2007	
SWF4 – 30-foot slope distance minimum no-cut buffer along all non-fish bearing perennial streams. Buffer is to be measured from outer edge of streambank, 100-year floodplain, or from the top of the inner gorge, whichever width is greater. No-cut buffer will be determined by pre-sale and/or aquatics staff.	Retain riparian vegetation to provide shade to maintain stream temperatures and slope stability, minimize soil erosion, and protect riparian vegetation. Provide protection of aquatic and riparian dependent species.	MODERATE (Literature)	1994 ROD ACSOs p. B-11& RR p. C-30 USDA FS 2012 FS National Core BMPs – Veg. #1-3 Rashin et al. 2006, Benda et al. 2016, Anderson and Poage 2014, Groom et al. 2011, Anderson et al. 2007	Sale Preparation, Timber Sale Administrator
SWF5 – 15-foot slope distance minimum no-cut buffer along all non-fish bearing intermittent streams. Buffer is to be measured from outer edge of streambank, 100-year floodplain, or from the top of the inner gorge, whichever width is greater. No-cut buffer will be determined by pre-sale and/or aquatics staff.	Maintain shade for stream temperature, increase future recruitment of large wood while maintaining slope stability and minimizing soil erosion.	MODERATE to HIGH (Literature)	1994 ROD ACSOs p. B-11& RR p. C-30 USDA FS 2012 FS National Core BMPs – Veg. #1-3	Sale Preparation, Timber Sale Administrator
SWF6 – For commercial or non-commercial harvests in elk forage enhancement units, full RR buffer widths would apply (300 feet along fish-bearing streams, 150 feet along perennial	Retain riparian vegetation to maintain shade for	HIGH	1994 ROD ACSOs p. B-11& RR p. C-30	Sale Preparation,

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non-fish bearing streams, and 100 feet along intermittent non-fish bearing streams).	stream temperature, large wood recruitment, slope stability, and minimize soil erosion. Provide protection for aquatic and riparian dependent species.	(Literature and Forest Experience)	USDA FS 2012 FS National Core BMPs – Veg. #1-3 USDA Forest Service 2001	Timber Sale Administrator
SWF7 – 30-foot slope distance minimum no-cut buffer around ponds, wetlands, seeps and springs. Buffer is to be measured from the edge of the water, the outer edge of the riparian vegetation or the extent of seasonally saturated soil, whichever is greater.  No-cut buffer will be determined by pre-sale and/or aquatics staff.	Minimize soil disturbance, protect riparian vegetation, and provide protection of aquatic and riparian dependent species. Provide a buffer of no disturbance around waterbody for movement by amphibians to and from breeding sites.	HIGH (Literature and Forest Experience)	1994 ROD ACSO p. B-11 & RR p. C-30 USDA FS 2012 FS National Core BMPs – Veg. #1-3 Rashin et al. 2006	Sale Preparation, Timber Sale Administrator
SWF8 – 30-foot slope distance minimum no-cut buffer around unstable and potentially unstable areas. Buffer is to be measured upslope from major slope breaks that define a headwall, inner gorge or other potential unstable areas. Buffer is to be measured upslope from major slope breaks that define a headwall, inner gorge or other potential unstable areas. Landforms with slope stability concerns will be identified by a Soils Scientist and/or Hydrologist.	Prevent management related slope instability within headwall, failure of inner gorges, or unstable areas.	HIGH (Literature and Forest Experience)	1994 ROD ACSOs p. B-11 & S&Gs p. C-31 USDA FS 2012 FS National Core BMPs – Veg. #1-3	Sale Preparation, Timber Sale Administrator

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<p>No-cut buffers will be identified by pre-sale in coordination with soils and hydrology staff.</p>				
<p>SWF9 – Most if not all yarding and haul activities are expected to occur during the Normal Operating Season (NOS), defined as June 1 to October 15. However, if extended dry season conditions occur, then yarding activities and haul may proceed beyond October 15. During periods outside the NOS, yarding and haul operations may proceed with monitoring of weather and on-the-ground conditions such as saturated soil conditions to evaluate if logging operations meet project design elements and Management Requirements and Mitigation Measures. Any pre-approved hauling activities occurring outside the NOS will require monitoring of conditions as follows: Implementation and effectiveness monitoring of BMPs will be implemented. BMP monitoring on haul roads (NFS system roads and temp roads), skid trails, landings, etc. plus other on-site observations of ponding, rutting, riling, scour or sediment transport and deposition downstream of cross drains will inform when to curtail logging activities and/or take additional actions to mitigate water quality and aquatic resource impacts.</p>	<p>Minimize short- and long-term soil, hydrologic and water quality impacts at the project level and off-site.</p>	<p>MODERATE (Avoid activity when impact would occur)</p>	<p>USDA FS Region 6 Soil Quality Standards FSM 2520, R-6 Supplement No 2500.98-11994 ROD ACSOs p. B11 #2, #8, &amp; #9; RR pp. C31-32 FW-1 &amp; p. C-37USDA FS 2012 National Core BMPs – Veg. #1&amp; #4</p>	<p>Timber Sale Administrator and/or Project Engineer, Hydrologist or Soils specialist where pertinent</p>
<p>SWF10 – For all commercial harvest units, outside Riparian Reserves directionally fall trees away from no-cut riparian buffers where possible to protect riparian vegetation and soils from damage.</p> <p>Trees inadvertently felled into no-cut buffers may be removed with one-end suspension. Portions of these trees that reside within 30 feet of the aquatic resource will be left in place.</p>	<p>Minimize short- and long-term soil, hydrologic and limit water quality impacts. Meet FS region 6 Soil Quality standards</p>	<p>HIGH (Avoidance)</p>	<p>USDA FS Region 6 Soil Quality Standards (FSM R6 2521.03) USDA FS 2012 National Core BMPs – Veg. #1 &amp; #5 1994 ROD p. B-11 # 2, #8, #9;</p>	<p>Sale Preparation, Timber Sale Administrator</p>



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			pp. C31-32; FW-1 & p. C-37	
SWF11 – Avoid harvest on areas that have average sustained slopes greater than 80 percent. Some trees may be cut on slopes steeper than 80 percent for occasional skyline corridors to access areas of a unit less than 80 percent.	Minimize soil erosion, maintain slope stability, and damage to felled and residual trees. Meet FS Region 6 Soil Quality Standards	MODERATE (Limits activity where impact would occur)	USDA FS Region 6 Soil Quality Standards (FSM R6 2521.03) USDA FS 2012 National Core BMPs – Veg. #1-3 & #5 1994 ROD ACSOs p. B-11 #2, #8, & #9; RR p. C31-32 FW-1 & p. C-37 USDA FS 1990	Layout Crew and Watershed Specialist
SWF12 – If it is necessary for equipment to travel away from approved corridors or temporary roads, equipment will operate on a slash mat of limbs and tops that is deposited directly in front of the machine. This mat will be as thick and continuous as practicable. Activities will be planned to make as few trips as possible.	Minimize short- and long-term soil, hydrologic and water quality impacts.	MODERATE to HIGH (BMP, NFS Experience)	USDA FS 2012 National Core BMPs – Veg. #4	Timber Sale Administrator
SWF13 – If mobile or other anchors are needed outside of cutting units that may result in impacts to soils or adjacent forest stands, the aquatics specialist will be notified.	Minimize impacts to soils and vegetation outside of harvest units	MODERATE (Limits activity where impact would occur)	USDA FS 2012 National Core BMPs – Veg. #1-3 & #5	Sale Preparation, Timber Sale Administrator
SWF14 – When constructing landings or new turnarounds:	Minimize soil disturbance, protect	HIGH (Avoidance)	USDA FS 1990	Presale Layout Crew

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<p>No unanalyzed landings or turnarounds will be constructed outside of EA stand boundaries without consultation with the IDT.</p> <p>Make all attempts to locate new landings or turnarounds a minimum 150-foot slope distance from rivers, streams, ponds, seeps, wetlands, and wet areas. If location outside of the 150-foot slope distance is not possible, then landings or turnarounds shall be located outside of the applied no-thin buffer for that stream type. Landings needed within the no-thin buffer of fish-bearing streams will require approval from aquatic specialist prior to implementation.</p> <p>If landings or turnarounds must be located within 150-foot slope distance, they will be placed on existing roadways or on existing landings that require only minimum reconstruction (e.g., clearing vegetation, sloping for drainage, or surfacing for erosion control purposes) to be made suitable for use.</p> <p>Any new landing or turnaround construction areas (or portions thereof), which are not located on existing roadways or cleared, compacted areas, will be treated with one or more of the following: decompaction and mulching with certified weed-free straw, wood-straw, or slash after use, and/or seeding with erosion control seed mix.</p>	<p>riparian vegetation, protect aquatic and riparian habitat, and minimize impacts to other resources (e.g. heritage or wildlife).</p>		<p>USDA FS &amp; USDI BLM 1994</p>	
<p>SWF15 – Maintenance and erosion control on landings, disturbed skyline corridors, skid roads, and temporary and permanent roads will be completed prior to the onset of expected seasonal periods of precipitation or runoff, and kept current during and outside of NOS. As conditions require, sediment filters (straw bales, slash filter windrow, and/or sediment fence) will be placed in ditch-lines along the haul route or in areas where ground is disturbed and sediment has the potential for delivery to streams (i.e. stream</p>	<p>Minimize short- and long-term soil, hydrologic and water quality impacts.</p>	<p>MODERATE to HIGH (BMP, NFS Experience)</p>	<p>USDA FS 2012 National Core BMPs – Veg. #1-3 &amp; #5 T-6 and T-13 standard timber sale contract clause BT6.6</p>	<p>Timber Sale Administrator, Project Engineer</p>

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crossing fills, adjacent to downhill skyline units). Sediment filters will be maintained and adjusted as needed. Removal of sediment filters will be done when site conditions are dry, and captured sediment will be relocated locally to stable locations away from stream courses.			Erosion Prevention and Control	
SWF16 – Areas of gouging or soil displacement on steep slopes resulting from yarding systems will be treated to prevent rill and gully erosion and possible sediment delivery to stream courses. Erosion control treatments may include, but are not limited to: repositioning displaced soil to re-contour disturbed sites; creating small ditches or diversions to redirect surface water movement; installation of coir logs along slope contours; and scattering slash material to create flow disruption and surface soil stability. These measures will be in place prior to expected seasonal periods of precipitation or runoff, and kept current during and outside of NOS.	Minimize short- and long-term soil, hydrologic and water quality impacts.	MODERATE to HIGH (BMP, NFS Experience)	BMPs T-6 and T-13	Timber Sale Administrator
SWF17 – For skyline systems: Yarding with full suspension would be allowed across or over potentially unstable slopes, streams, wetlands, wet areas, and other no-cut buffers with BMPs. Whenever possible, corridors will be no more than 15 feet wide. When tether logging, all corridors will generally be 60-feet apart with a slash mat. When using traditional cable systems, all corridors will generally be 120-feet apart.	Minimize short- and long-term soil, hydrologic and water quality impacts.	HIGH (Avoidance)	USDA FS Region 6 Soil Quality Standards (FSM R6 2521.03) USDA FS 2012 National Core BMPs – Veg. #1 & #5 1994 ROD p. B-11 # 2, #8, & #9; pp. C31-32 FW-1 & p. C-37	Sale Preparation, Timber Sale Administrator
SWF18 – Traditional ground-based log transport equipment is restricted to sustained slopes that are no greater than 35 percent.	Minimize extent and degree of soil	MODERATE (Limits	USDA FS Region 6 and	Timber Sale Administrator

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<p>Non-yarding ground-based equipment (such as a self-leveling feller-buncher) is restricted to sustained slopes less than 50%. Tethered ground-based equipment is restricted to sustained slopes that are no greater than 80 percent, with monitoring to determine if operations are meeting thinning objectives and standards and guidelines to minimize impacts to other resources. Stands proposed for tethered based harvest and yarding will have approved monitoring criteria identified prior to operations. Stands proposed for tethered based harvest and yarding will be approved by the Timber Sale Administrator (in consultation with the ID team) prior to operations.</p>	<p>in a detrimental condition and meet desired stand conditions. Monitor amount of soil disturbance created by tethered based operations. Compare soil disturbance and impacts to aquatic resources from tethered based operations to standard harvest and yarding methods.</p>	<p>activity where impact would occur) UNKNOWN (tethered equip) Monitoring will allow data to be collected and analyzed for evaluation of equipment operations and incorporation into future planning</p>	<p>MBSNF Soil Quality Standards (FSM 2520, R-6 Supplement No 2500.98-1); USDA FS 2012 National Core BMPs – Veg. 1 &amp; 4</p>	
<p>SWF19 – For ground-based yarding: Skid trails must be approved by the Timber Sale Administrator prior to felling and construction operations. Old skid trails will be used wherever possible, as long as they avoid wet areas and will prevent sediment delivery to streams. Skid trails will generally be no closer than 100 feet apart, center-to-center, and be only as wide as necessary for the equipment to travel (less than 12 feet wherever possible). Erosion control devices such as water-bars and/or slash will be used as necessary on sloped skid roads, and kept current, particularly preceding expected seasonal precipitation or runoff. Ground-based skidding and yarding operations shall be conducted with one-end suspension to minimize soil erosion. Line pulling will be accomplished by yarding logs to lead, or at a 30-45-degree angle towards skid trails for one-end suspension</p>	<p>Prevent management-related unacceptable degree and extent of surface erosion and other long-term detrimental soil conditions.</p>	<p>MODERATE (Limits activity where impact would occur)</p>	<p>USDA FS 2012 National Core BMPs – Veg. #1-3 &amp; #5 BMP #T-11</p>	<p>Timber Sale Administrator</p>

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<p>whenever possible. Full suspension of logs is not required during lining operations.</p> <p>Wherever possible, skid trails will be located a minimum of 25 feet away from riparian no-cut buffers.</p> <p>To travel off approved skid trails, equipment (e.g., harvester, feller/buncher, shovel) will operate on a slash mat whenever possible. The slash mat should consist of limbs and tops deposited directly in front of the machine. The mat will be as thick and continuous as practicable. Activities will be planned to make as few trips as possible.</p>				
<p>SWF20 – Schedule road reconstruction activities (includes rock additions) during the NOS. Additional spot rocking may be required to keep roads in acceptable condition during operational periods outside of the NOS per specifications outlined in SWF9 above.</p>	<p>Avoid or minimize direct soil and water disturbance during periods of the year when heavy precipitation and runoff are likely to occur.</p>	<p>MODERATE (Avoid activity when impact would occur)</p>	<p>USDA FS 2012 FS National Core BMPs - Roads #5 T-5, R-3, R-7</p>	<p>Timber Sale Administrator</p>
<p>SWF21 – Comply with provisions of the Memorandum of Understanding (MOU) between the WDFW and USFS for Hydraulic Project Approval (most recent is effective through 10/1/2022) including the “General Provisions Applicable to all Appendix A Projects,” and specific applicable provisions including but not limited to: bank protection; permanent culvert installation and replacement; permanent bridge installation; permanent culvert, bridge, and ford removal; temporary culvert and bridge installation and removal; culvert and bridge debris removal; instream habitat improvement; and streambank restoration.</p>	<p>Ensuring compliance with State regulations that protect aquatic and related resources</p>	<p>MODERATE</p>	<p>WDFW and USDA FS 2017 (HPA)</p>	<p>Timber Sale Administrator</p>
<p>SWF22 – Comply with and adhere to all requirements of Regional General Permit #8 (RGP-8) (USACE 2017) authorized by the Seattle District of the US Army Corps of Engineers, and</p>	<p>Compliance with Section 404 of the Clean Water Act,</p>	<p>MODERATE</p>	<p>USACE 2017 (RGP-8)</p>	<p>Contract provision 5.1 Option 1,</p>

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the USFWS and NMFS programmatic biological opinions for aquatic restoration activities (ARBO II; NMFS 2013 and USFWS 2013) including all special conditions, general conditions, and design criteria of the authorized activities. The primary authorized activities to be used in this project include: fish passage restoration; large wood (LW), boulder, and gravel placement (including tree removal for LW projects); reduction/relocation of recreation impacts; and road and trail erosion control and decommissioning. Other authorized project activities include but are not limited to dam, tide gate and legacy structure removal, and streambank restoration.	Section 10 of the Rivers and Harbors Act of 1899, Section 7 of the Endangered Species Act, and the Magnuson-Stevens Fishery Conservation and Management Act		NMFS 2013 (ARBO II); USFWS 2013 (ARBO II)	Timber Sale Administrator
SWF23 – Disturbance of vegetation shall be limited to the minimum amount necessary for all activities.	Protect and minimize Riparian Reserve impacts	MODERATE (Consultation, BMP, MBS Forest Experience)	USDA FS 2012, ACS, 1990 Forest Plan, p. 4-126, 119, & USACE 2017 (RGP-8)	Timber Sale Administrator and/or suitable specialists/ or contract administrator
SWF24 – Ground-disturbing activities within channels, and along the banks of fish-bearing streams or streams located within ¼ mile of fish-bearing streams shall be performed during instream work window approved by WDFW and USFS Fisheries Biologists.	Avoid or minimize negative impacts to fish	HIGH (Consultation with USFWS and NMFS regulatory agencies concur this is effective)	WDFW and USDA FS 2017 (HPA)	Engineering or their representative
SWF25 – When reconstructing roads, install stream-crossing structures at the location where water flows into roadbed. All installed culverts or crossing features should maintain flow down primary, natural pathway of flow and not redirect flow into a ditch, pond, or another channel. All installed/replaced culverts on perennial and intermittent streams will be done to design criteria specifications of ARBO II. Exceptions, such as installing non-	Minimize disruption of natural hydrologic flow paths, including surface and subsurface flow. Ensuring compliance with	MODERATE to HIGH (BMP, NFS Experience)	WDFW and USDA FS 2017 (HPA) 1994 ROD ACSOs p. B-11 & RR pp. C -32 & 33 (RF-3a & RF-4)	Timber Sale Administrator or their representative, Project Engineer

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culvert type structures (e.g., drainage dips, armored fords, etc.) may be approved by the Aquatics Specialist.	State regulations that protect aquatic and related resources.		USDA FS 2012 FS National Core BMPs - Roads #7	
SWF26 – Where existing culverts on perennial stream crossings stay in place during haul and related activities, they should be maintained to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure. This may involve cleanout of plugged culvert inlets, lowering of road fill at the culvert crossing, and/or construction of a drivable dip downgrade of the crossing.	Prevent diversion of streamflow out of the channel and down the road in the event of crossing failure. Such failures can result in debris flows or mass wasting events due to fill slope or culvert failures downgrade of crossing.	MODERATE to HIGH (BMP, NFS Experience)	1994 ROD ACSOs p. B-11 & RR pp. C -32 &33 (RF-3a & RF-4) USDA FS 2012 FS National Core BMPs - Roads #7	Timber Sale Administrator or their representative, or other contracts representative
SWF27 – New temporary roads will be located and designed to minimize disruption to hydrologic flows by: minimizing clearing limits (generally no more than 16 feet on level ground, 20 feet for curves, slightly more for steeper hillslopes);Minimizing excavation of cut slopes and fill slopes; and routing drainage away from potentially unstable hillslopes, side-cast, and channels. Fully decommission new temp roads after the period of use has concluded.	Minimize disruption of natural hydrologic flow paths, including surface and subsurface flow. Protect and minimize impacts to riparian areas, habitats, and dependent species, including amphibians.	MODERATE (BMP, NFS Experience)	1994 ROD ACSOs p. B-11 & RR pp. C -32 & 33 (RF-2e, 2g & RF-3b) USDA FS 2012 FS National Core BMPs - Roads #2 & 7	Timber Sale Administrator or their representative
SWF28 – If new temporary roads are proposed for construction, they would generally be located within EA stand boundaries. New temporary roads would avoid sensitive sites such as shallow	Minimize disruption of natural hydrologic	HIGH (Avoidance)	1994 ROD ACSOs p. B-11 & RR pp. C -32	Timber Sale Administrator or

Mitigation Measure or Project Design Criteria	Objective	Effectiveness and Basis	Regulatory or Scientific Basis	Enforcement
soils, unstable landforms; wetlands and minimize disruption of natural hydrologic flow paths, including surface and subsurface flow. Upon additions or changes to the road system, consult the ID Team to ensure changes are within the effects analyzed.	flow paths, including surface and subsurface flow. Protect and minimize impacts to riparian areas, habitats, and dependent species, including amphibians.		& 33 (RF-2e, 2g & RF-3b) USDA FS 2012 FS National Core BMPs - Roads #2 & 7	their representative
SWF29 – Any timber sale temporary access roads identified to remain in place over the winter (into a second year of operation) shall use drainage features (culverts and/or water bars) that would accommodate a 100-year flood and associated debris flow, including seeding and mulching of any exposed or disturbed soils.	Prevent erosion and/or mass wasting and road damage	MODERATE (Relatively new requirement, but based on permanent road requirements)	USDA FS USDI BLM 1994 p. C-33, RF-4 and RF-5	Timber Sale Administrator or their representative
SWF30 – Design road drainage features to hydrologically disconnect road surface runoff from stream channels and wetland areas. On roads to be closed or decommissioned, cross-drains or water bars will be installed as needed.	Protect stream channel from water quantity and quality impacts	MODERATE to HIGH (BMP, NFS Experience)	USDA FS 2012a. FS National Core BMPs, Road-6, USACE 2017 (RGP-8)	Timber Sale Administrator or their representative
SWF31 – Where existing unclassified and previously decommissioned roads will be reconstructed for temporary use, adequately address road drainage, cut slope, and fill slope instability, and potential water diversions. Side-casting of loose material is prohibited within 150 feet of aquatic resources.	Protect and minimize Riparian Reserve impacts. Minimize disruption of natural hydrologic flow paths, including surface	MODERATE to HIGH (BMP, NFS Experience)	USDA FS 2012 FS National Core BMPs - Roads #2 & 7	Project Administrator or their representative, Project Engineer



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	and subsurface flow.			
SWF32 – All decommissioned roads would be reclaimed to resist erosion, improve subsurface hydrology, improve regrowth, and deter motorized traffic. Reclamation may include: (1) improving the infiltration by decompaction to a depth of 18 inches where feasible, and/or out-sloping towards the natural contour; and (2) stabilizing the surface by either applying mulch or by distributing slash across 70 percent of the disturbed ground surface, whichever is appropriate, and seeded with appropriate mix as described in PDC B6. Asphalt removed from road surfaces shall be removed from National Forest system land and disposed of properly.	Restore eco-hydraulic function of soils and soil productivity	MODERATE to HIGH (BMP, NFS Experience)	USDA FS 2012 FS National Core BMPs Road-5 & 6	Project Administrator or their representative, Project Engineer
SWF33 – During decommissioning activities, remove all fill material and man-made structures from stream channels. After removal, stream channel shall match upstream and downstream channel dimensions, channel roughness, bank shape, natural floodplain contours, and natural adjacent hillslope. Extent of activities may need to be adjusted where road would be used as a trail.  Notify Aquatic Specialist of any changes in final specifications for stream crossing removal, out-sloping, and road-decommissioning designs.	Restore eco-hydraulic function of channel, valley bottom and riparian areas	MODERATE to HIGH (NFS Experience)	USDA FS 2012, ACS, 1990 Forest Plan, p. 4-126, 119, USACE 2017, WDFW and USDA FS 2017 (HPA)	Project Administrator or their representative, Project Engineer
SWF34 – Dust abatement for use on haul roads will be limited to the use of clean water or Lignin.	Protect water quality. Prevent chemically laden water from entering waterways.	HIGH	USDA FS 2012, ACS	Timber Sale Administrator or their representative, Project Engineer
SWF35 – Trash and removed culverts shall be removed from National Forest System (NFS) lands and disposed of at an appropriate disposal area.	Keep forest clean and free of trash.	HIGH	USDA FS 2012 Road-6	Timber Sale Administrator or representative

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SWF36 – Heavy machinery and project service vehicles shall be free of leaks. Operators shall check heavy machinery for leaks prior to commencement of daily work. Repairs will be conducted before commencement of or continuing work.	Prevent and minimize potential effects to water quality	HIGH (NFS Experience)	USDA FS 2012, FP-03, ACS, 1990 Forest Plan p. 4-118, & USACE 2017	Project Administrator or representative, Project Engineer Timber Sale Administrator
SWF37 – Establish a Spill Prevention Control and Containment Plan (SPCCP) when total oil products storage exceeds 1,320 gallons in containers of 55 gallons or greater. Maintain a spill remediation kit onsite for any fuel stored on NFS lands in association with this project. Fuels stored on NFS lands shall be 100 feet from aquatic resources.	Prevent and minimize potential effects to water quality	HIGH (Standard for Construction)	USDA FS 2012, FP-03, ACS, & 1990 Forest Plan p. 4-11840 CFR 112 Standard provision in contract	Project Administrator or representative, Project Engineer Timber Sale Administrator
SWF38 – Pumps and generators shall be kept and operated on a sorbent pad or petroleum containment basin with 150% of the pumps’ fuel capacity. All petroleum products will be secured in self-contained safety cans.	Prevent and minimize potential effects to water quality	HIGH (NFS Experience)	USDA FS 2012, ACS, 1990 Forest Plan p. 4-118, & USACE 2017	Timber Sale Administrator; Project Engineer
SWF39 – Approved water sources will be shown on timber sale maps and/or listed in the sale contract. No more than 10% of the instantaneous stream flow may be removed at any time. An air gap or positive anti-siphon device shall be provided between the water source and the holding tank if the tank has been used for purposes other than water haul, if the source is a domestic water supply, or if the water is being mixed with any other materials. The withdrawal hose or pipe must be fitted with a screen with a minimum effective surface area of at least one square inch of functional screen area for every gallon per minute (gpm) of water drawn through it, a round or square screen mesh that is no larger than 2.38 mm in the narrow dimension, or any other shape that is no larger than 1.75 mm in the narrow dimension.	Protect aquatic organisms. Minimize channel disturbance and associated sedimentation.	HIGH (NFS Experience)	NMFS 2013; WDFW and USDA FS 2017 (HPA) USDA FS 2012a, WatUses-3 WAC 173-201A-200	Timber Sale Administrator; Project Engineer

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<p>Designated water sources may require work including cleaning ponded areas, pipe repair, and pump installation. Bags filled with pea gravel may be used, or a weir may be placed across the stream to pond water. No fill or woody material may be used to seal the water retention area within the bank full channel. All bags or weirs shall be completely removed at the end of the NOS. Obtain approval from Timber Sale Administrator prior to working on water sources.</p>				
<p>SWF40 – Follow Mt. Baker-Snoqualmie National Forest Blasting Guidelines for Protection of Fish where possible. Where effects cannot be avoided, minimize effects through one or more of the following: timing restrictions; size of charges; blasting caps with 40msec delays; and keeping blasted materials out of fish-bearing stream channels.</p>	<p>Minimize effects of blasting on fish</p>	<p>Consultation with USFWS and NMFS</p>	<p>USFWS and NMFS 2007; Timothy 2013</p>	<p>Project engineer; Aquatics specialist</p>
<p>SWF41 – Pre-harvest monitoring will be done to establish baseline detrimental soil conditions (DSC) and determine whether levels are at, below, or above the Forest Plan Standard. Monitoring may result in requiring mitigation measures which limit DSC post-harvest levels. Conduct harvest activities in a manner that minimizes DSCs (compaction, puddling, displacement, and severe burning) so as not to exceed 20 percent of the total activity unit, including landings and system roads. Post-implementation monitoring (prior to the close of harvest operations) will be done to ensure that DSC levels remain within Forest Plan Standards. Monitoring may result in implementation of mitigation measures including soil remediation involving decompaction and/or Redistribution of the topsoil layer (soil horizon A) Ensure organic matter, vegetation and/or coarse woody debris is dispersed within harvested areas to provide the greatest extent of soil surface cover practicable.</p>	<p>Minimize extent and degree of soil in a detrimental condition and meet desired stand conditions. Monitor amount of soil disturbance.</p>	<p>MODERATE (Limits activity where impact would occur)</p>	<p>USDA FS Region 6 Soil Quality Standards (FSM R6 2520.3)</p>	<p>Hydrologist or soil scientist</p>

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SWF42 – Pile burning will be conducted outside all no-cut stream buffers. Pile size generally limited to 25 feet diameter or less.	Minimize soil sterilization and effects to riparian resources.	MODERATE Barnett 1989, NFS experience	USDA FS 2012 Fire-2	Timber Sale Administrator or Fire Mgmt Officer
SWF43 – Disposition of danger/hazard trees not associated with vegetation treatment stands, and particularly if within Riparian Reserves, should be considered for instream uses if not left on-site as down wood.	Minimize effects to Riparian Reserve function	MODERATE Logic	USDA FS and USDI BLM 1994, ACS	Project lead, Aquatics specialist
<b>Wildlife</b>				
W1 – Trees no greater than 26 inches DBH would be cut in LSR. Any trees greater than 26 inches DBH that are required to be cut for safety will remain on site as coarse woody debris.	To maintain and retain late-successional conditions in stands with dense codominant competition.	HIGH Contract requirement	Exemption to REO letter	Timber sale contract and administrator, or their representative
W2 – Retain existing down woody debris and standing snags that are not deemed a hazard.	Maintain and enhance habitat diversity	MODERATE - LOW Availability within project stands.	Wildlife Forest-wide S&G (p. 4-124)	Timber sale contract and administrator, or their representative
W3 – If a raptor nest site is incidentally located during the course of sale layout or project implementation activities will stop and a Forest Service Wildlife Biologist will be consulted. At the Wildlife Biologist’s discretion protective buffers and/or seasonal operation restrictions may be assigned to the newly located nest sites.	Minimize changes to microhabitat features adjacent existing nest sites & the protection of active nest site,	HIGH Forest Experience	Migratory Bird Act Wildlife Forest-wide S&G (4-125)	Wildlife Biologist, Timber sale administrator, or their representative
W4 – Trees with interlocking branches with trees with suitable nest structure for owl and murrelet nest would be retained (visible suitable cavities or nest structure (platforms 4” at 30 ft.).	Maintain microhabitat	HIGH	ESA Section 7 consultation	Timber sale contract, layout and Timber sale

Mitigation Measure or Project Design Criteria	Objective	Effectiveness and Basis	Regulatory or Scientific Basis	Enforcement
	conditions around potential nest trees	Forest Experience		administrator, or their representative
W5- Any tree $\geq$ 21inch dbh located in adjacent old-growth habitat proposed as a tail tree or anchor will first be field reviewed by a Forest Wildlife Biologist or their representative to determine if the selected tree is a spotted owl or marbled murrelet potential nest tree (PNT). All tail trees will be retained as future wildlife trees.	Protect occupied nest trees of federally protected species (northern spotted owl and marbled murrelet)	HIGH Contract requirement	Wildlife Forest-wide S&G (4-124)	Timber sale contract and administrator, or their representative
W6-The thinning prescription would designate wildlife trees to retain that include dominant trees for future large snags and marking of deformed green trees to retain for future wildlife trees. Snags would be created or protected through treatment of green trees with high stumping of hazard trees and leaving green trees around snags of greater than 21 inches.	Snags and green trees would be designated for retention during sale layout to meet standards and guidelines for cavity nesters	HIGH Contract requirement	Wildlife Forest-wide S&G (4-124)	Timber sale contract and administrator, or their representative
W7- Dominant trees (> 20 inches dbh) infested with dwarf mistletoe will be retained in the thinning marking with thinning to occur within mistletoe stands to enhance light for growth.	Maintain and enhance murrelet nest structure and Hairstreak butterfly habitat	HIGH Contract requirement	Wildlife Forest-wide S&G (4-124)	Timber sale contract and lay out crew, TSA, or their representative
W8 - Heavy equipment and other activities generating noise above ambient levels in historic owl or murrelet use areas, and occurring between April 1 and September 15 would occur between two hours after sunrise to two hours before sunset within units located 0.5 miles of historic murrelet occupancy sites and within 110 yards of suitable habitat..	Reduce the potential disruption of marbled murrelet feedings or nesting.	Moderate 90% impacts reduction post-incubation stage; pre-incubation, the, mitigation	ESA Section 7 consultation	Timber sale contract and administrator, or their representative

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		would be ineffective		
W-9 – A seasonal operating restriction shall be applied to portions of non-commercial units protect mountain goat wintering habitat (MA 15) from Nov 15 to June 15.	Protect wintering mountain goats	HIGH Contract requirement	Wildlife Forest-side S&G	Timber sale administrator or their representative
W-10 – Slash pile burning would occur during the period of August 31 to February 28, outside of the early nesting season. If burning activities cannot be accomplished in this work window, the wildlife biologist will be advised and work with fire staff to meet approved conditions for fire control and smoke management.	Reduce the potential disruption of marbled murrelet feedings or nesting	HIGH Contract requirement	ESA Section 7 consultation	Timber sale contract and administrator, Forest fire staff and wildlife biologist