Appendix C – Design Features, Best Management Practices, Mitigation, and Conservation Measures

Table C-1 lists design features, best management practices, and mitigation and conservation measures (collectively referred to as design features) that are designed to minimize or avoid effects common to all action alternatives. They are integral parts of the action alternatives that help align proposed activities with land management plan objectives, desired conditions, standards, and guidelines. As such, they have been included in the analysis presented in this FEIS. Design features in the table are organized by resource.

Legend:

AQ- Aquatics

BT- Botany

CK- Caves and Karst Features

CT- Cultural and Tribal Relations

FE- Fire Ecology

NW- Noxious Weeds

RM- Range Management

RS- Recreation and Scenery

SI- Silviculture

SU- Special Uses

SW- Soils and Watershed

TR- Transportation

WL- Wildlife

Table C-1. Design features, best management practices, mitigation, and conservation measures

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ001	Any equipment or personnel for activities in and around streams, natural or constructed waters, springs, or wetlands of any kind will use decontamination procedures to prevent the spread of disease (Chytrid fungus) and aquatic invasive species. Personnel entering the water will follow Appendix G in the 2007 Chiricahua Leopard frog Recovery Plan and the Stop Aquatic Hitchhikers Clean, Drain, Dry procedure: http://stopaquatichitchhikers.org/prevention/#clean-drain-dry.	To minimize potential for spreading aquatic diseases or invasive species.	Land Management Plan compliance
AQ002	**Porous Boulder Structures and Vane Restoration Treatments:** • Full channel spanning boulder structures are to be installed only in highly uniform, incised, bedrock-dominated channels to enhance or provide fish habitat in stream reaches where log placements are not practicable due to channel conditions (not feasible to place logs of sufficient length, bedrock dominated channels, deeply incised channels, artificially constrained reaches, etc.), where damage to infrastructure on public or private lands is of concern. • Install boulder structures low in relation to channel dimensions so that they are completely overtopped during channel-forming flow events (approximately a 1.5 flow event). • Boulder step structures are to be placed diagonally across the channel or in more traditional upstream pointing “V” or “U” configurations with the apex oriented upstream. • Boulder step structures are to be constructed to allow upstream and downstream passage of all native fish species and life stages that occur in the stream. Plunges shall be kept to less than 6 inches in height. • The use of gabions, cable, or other means to prevent the movement of individual boulder in a boulder step structure is not allowed. • Rock for boulder step structures shall be durable and of suitable quality to assure long-term stability in the climate in which it is to be used. Rock sizing depends on the size of the stream, maximum depth of low, planform, entrenchment, and ice and debris loading. • The project designer or an inspector experienced in these structures should be present during installation. • Full spanning boulder step structure placement should be coupled with measures to improve habitat complexity and protection of riparian areas to provide long-term inputs of large wood.	To guide porous boulder structures and vane restoration treatments for aquatic and watershed restoration.	Specialist recommendation
AQ003	When using pressure treated lumber for fence posts, complete all cutting/drilling offsite of the designated aquatic management zone (AMZ) (to the extent possible) so that treated wood chips and debris do not enter water or flood prone areas.	To prevent detrimental effects of chemicals from entering aquatic habitats.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ004	**Set-back or removal of existing berms:** • Design actions to restore floodplain characteristics-elevation, width, gradient, length, and roughness—in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type. • Remove drainpipes, fences, and other capital projects to the extent possible. • To the extent possible, remove nonnative fill material from the floodplain to an upland site. • Where it is not possible to remove or set-back all portions of berms, or in areas where existing berms support abundant riparian vegetation, openings will be created with breaches. Breaches shall be equal to or greater than the active channel width to reduce the potential for channel avulsion during flood events. In addition to other breaches, the berm, dike, or levee shall always be breached at the downstream end of the project or at the lowest elevation of the floodplain to ensure the flows will naturally recede back into the main channel thus minimizing fish entrapment.	To guide set-back or removal of existing berms, dikes, and levees to reconnect stream channels with floodplains as a means to increase habitat diversity and complexity, moderate flow disturbances, and provide refuge for fish during high flows.	Land Management Plan compliance and specialist recommendation
AQ005	**Channel Reconstruction/Relocation Treatments:** • Construct geomorphically appropriate stream channels and floodplains within a watershed, valley, and reach context. • Design actions to restore floodplain characteristics – elevation, width, gradient, length, and roughness-in a manner that closely mimics, to the extent possible, those that would naturally occur at that stream and valley type. • To the greatest degree possible, remove nonnative fill material from the channel and floodplain to an upland site. • When necessary, loosen compacted soils once overburden material is removed. Overburden or fill comprised of native materials, which originated from the project area, may be used within the floodplain where appropriate to support the project goals and objectives. • Structural elements shall fit within the geomorphic context of the stream system. For bed stabilization and hydraulic control structures, constructed riffles shall be preferentially used in pool-riffle stream types, while roughened channels and boulder step structures shall be preferentially used in step-pool and cascade stream types. • Material selections (large wood, rock, gravel) shall also mimic natural stream system materials. • Construction of the stream bed should be based on Stream Simulation Design principles as described in section 6.2 of Stream Simulation: An Ecological Approach to Providing Passage of Aquatic Organisms at Road-Stream Crossings or other appropriate design guidance documents (United States Department of Agriculture (USDA) - Forest Service (USFS) 2008).	To guide stream, floodplain, and other stream/watershed restoration treatments to minimize detrimental effects to aquatic habitats.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ006	All aquatic bearing stream crossings must be approved by approved by the sale administrator or contracting officer's representative after coordination with the resource specialist and authorized Forest Service officer in advance of use to minimize the number and length of stream crossings. Such crossings would be at right angles and avoid potential spawning or breeding areas to the greatest extent possible. Stream crossings shall not increase the risk of channel re-routing at low and high-water conditions. After project completion, temporary stream crossing would be restored per TR008. Timing of crossings is addressed in AQ017.	To minimize ground disturbance in aquatic and associated habitats during site preparation and sedimentation to aquatic habitats.	Land Management Plan compliance and specialist recommendation
AQ007	For recreation relocation projects—such as trails—move out of the riparian area or as far away from the stream as possible.	To reduce recreation effects on aquatic habitats.	Land Management Plan compliance
AQ008	To the extent feasible, heavy equipment will work from the top of the bank, unless working from within the stream bed would result in less damage to the aquatic ecosystem, as determined by a biologist.	To minimize ground disturbance in aquatic and associated habitats during site preparation and sedimentation to aquatic habitats.	Land Management Plan compliance and specialist recommendation
AQ009	Any fence placement must allow for lateral movement of a stream and to allow establishment of riparian plant species. To the extent possible, fences will be placed outside the channel migration zone. Fences that cross the channel migration and the stream channel proper should include breakaway portions that will not collect debris on the fence and cause potential breach of the debris jam.	To maximize success of riparian planting and reduce maintenance on fencing.	Specialist recommendation
AQ010	When building riparian exclosure fences, minimize vegetation removal, especially potential large wood recruitment sources, when constructing fence lines (see RM006 and SI003).	To reduce detrimental effects to riparian species (flora and fauna) and floodplains.	Specialist recommendation
AQ011	Leave sufficient numbers of cut trees (large woody debris) on site for needed surface flow grade control in systems where large woody debris is appropriate. Fisheries, wildlife, and hydrologist personnel will identify locations for large woody debris during sale preparation.	To minimize impacts to streams and soils in meadows from tree thinning operations.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ012	**Streambank Restoration Treatments:** Without changing the location of the bank toe, restore damaged streambanks to a natural slope and profile suitable for establishment of riparian vegetation. This may include sloping of unconsolidated bank material to a stable angle of repose or the use of benches in consolidated, cohesive soils. • Complete all soil reinforcement earthwork and excavation when soils are sufficiently dry to prevent excessive rutting. When necessary, use soil layers or lifts that are strengthened with biodegradable fabrics and penetrable by plant roots. • Include large wood to the extent it would naturally occur for streambank restoration. If possible, large wood should have untrimmed root wads to provide functional refugia habitat for fish. Wood that is already within the stream or suspended over the stream may be repositioned to allow for greater interaction with the stream. • Rock will not be used for streambank restoration, except as ballast to stabilize large wood. • Use a diverse assemblage of vegetation species native to the action area or region, including trees, shrubs, and herbaceous plants. Vegetation, such as willow, sedge and rush mats, may be gathered from abandoned floodplains, stream channels, etc. Sedge and rush mats should be sized to prevent their movement during high flow events. • Do not apply surface fertilizer within the AMZ of any stream channel. • Install fencing as necessary to prevent access to revegetated sites by grazing ungulates or unauthorized persons. • Conduct post-construction monitoring and treatment or removal of invasive plants until native plant species are well established in accordance with annual budgetary and program of work considerations.	To guide streambank and channel restoration/resilience treatments.	Land Management Plan compliance and specialist recommendation
AQ013	Minimize removal of desirable vegetation around springs, streams and wetlands.	To reduce detrimental effects to sensitive habitats.	Land Management Plan compliance and specialist recommendation
AQ014	When removing a culvert from a first or second order, non-fish bearing stream, roads managers, biologists, and watershed personnel shall determine if culvert removal should include stream isolation and rerouting in project design. Culvert removal on fish bearing streams shall adhere to the measures described in Fish Passage Restoration.	To reduce impacts to fish passage.	Specialist recommendation
AQ015	For culvert removal projects, restore natural drainage patterns and channel morphology. Evaluate channel incision risk and construct in-channel grade control structures when necessary.	To reduce detrimental effects to floodplains, riparian areas, stream channels and aquatic habitat.	Land Management Plan compliance and specialist recommendation
AQ016	Structural erosion control measures will not include materials (such as straw waddles) that can trap reptiles or amphibians in their habitat. Structural erosion control measures not made of biodegradable material (for example, silt fences) will be removed and material contoured in or removed once the site is stabilized to prevent them from causing resource issues and decomposing on site.	To minimize detrimental effects to federally listed, sensitive, or other reptiles and amphibians.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ017	• Given the potential for multiple aquatic species to occur in a given location, Forest Service, U.S. Fish and Wildlife Service (USFWS), and Arizona Game and Fish Department (AGFD) biologists will cooperatively prioritize aquatic species of concern on a site-specific basis regarding timing restrictions for instream and riparian restoration activities • Work will occur during base-flow conditions, and on dry or frozen riparian soil conditions where possible.	To minimize direct effects to critical habitat (for example, spawning and breeding) for federally listed and forest sensitive species.	Land Management Plan compliance and specialist recommendation
AQ018	Biologists will be consulted during pre-planning for all treatments that will occur in springs, streams, and riparian areas, as well as fens or bogs where histic soils are present, to determine presence of federally listed or sensitives species (plants or animals), as well as mitigations needed for rare or sensitive species in/near the work areas. Also see SI019.	To minimize effects to rare/sensitive aquatic species during project implementation.	Land Management Plan compliance and specialist recommendation
AQ019	**Narrow-headed gartersnakes:** • AMZ in Narrow-headed gartersnake proposed critical habitat will be 150 ft. on either side of the stream. • No mechanical or hand piling will occur within the gartersnake AMZ to minimize harm during controlled burns or pile burning because gartersnakes utilize piles for cover (also see FE006). • Disturbance of rock/boulder piles and large woody debris in narrow-headed gartersnake habitat or proposed critical habitat will be avoided to the greatest extent practical during their brumation/inactive period (November/December-February, depending on elevation). • Do not build temporary roads in narrow-headed gartersnake AMZs.	To minimize detrimental effects to federally listed gartersnakes.	Land Management Plan compliance and specialist recommendation
AQ020	Coordinate with AGFD, USFWS and the Forest Service district biologist early (at least 6 months prior to implementation) within narrow-headed gartersnake and Chiricahua leopard frog occupied habitat to determine if surveys are required and to determine agreed upon, short-term care facilities for any Chiricahua leopard frog or narrow-headed gartersnakes found prior to or during implementation.	To minimize direct effects to federally listed amphibians and reptiles.	Specialist recommendation
AQ021	Precautions would be taken to ensure fish are isolated from instream work areas during heavy mechanical stream restoration or any road/crossing work where equipment is in the stream or water may be diverted. If dewatering is necessary, ensure diversion passes flows and aquatic species to minimize detrimental effects. If surface water needs to be diverted to meet construction needs and aquatic species are or may be present, fish screen(s) will be installed, operated, and maintained.	To minimize sedimentation and detrimental effects to aquatic species and habitat during aquatic and watershed restoration projects.	Specialist recommendation
AQ022	Avoid water withdrawals from streams bearing aquatic species whenever possible. Water drafting must take no more than 10% of the stream flow and must not dewater the channel to the point of isolating species. Pump intakes shall have fish screens of 3/32 inch mesh or less and will have an intake flow of less than 1 foot/second to prevent entraining fish. Implement decontamination procedures as outlined in AQ001 when drafting from waterbodies and streams. Biologists must be consulted in all situations when pumping water from streams or other natural waterbodies.	To avoid or minimize detrimental effects to native or desirable aquatic species and habitats.	Land Management Plan compliance
AQ023	Avoid discharging water from one source into a different body of water, such as dumping unused water from a water tender in or near a water body other than the water body from which it was acquired.	To avoid spread of invasive species, disease, and contaminants.	Land Management Plan compliance

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ024	**Restoring fish passage during Headcut and Grade Stabilization Treatments:** • In streams with current or historic fish presence, provide fish passage over stabilized headcut through constructed riffles for pool/riffle streams or series of log or rock structures for step/pool channels. If large wood and boulder placement is used for headcut and grade stabilization, refer to Large Wood, Boulder, and Gravel Placement. • Armor headcut with sufficiently sized and amounts of material to prevent continued up-stream migration of the headcut. Materials can include both rock and organic materials which are native to the area. Material shall not contain gabion baskets, sheet pile, concrete, articulated concrete block, and cable anchors. • Focus stabilization efforts in the plunge pool, the headcut, as well as a short distance of stream above the headcut. • Minimize lateral migration of channel around headcut ("flanking") by placing rocks and organic material at a lower elevation in the center of the channel cross section to direct flows to the middle of the channel. • Short-term headcut stabilization may occur without associated fish passage measures. However, fish passage must be incorporated into the final headcut stabilization action and be completed during the first subsequent in-water work period. • In streams without current or historic fish presence, it is recommended to construct a series of downstream log or rock structures to expedite channel aggradation. • Construct structures in a 'V' or 'U' shape, oriented with the apex upstream, and lower in the center to direct flows to the middle of the channel. • Key structures into the stream bed to minimize structure undermining due to scour, preferably at least 2.5 times their exposure height. The structures should also be keyed into both banks – if feasible greater than 8 ft. • If several structures will be used in a series, space them at the appropriate distances to promote fish passage of all life stages of native fish. Incorporate jump height, pool depth, etc. in the design of step structures. Recommended spacing should be no closer than the net drop divided by the channel slope (for example, a one-foot-high step structure in a stream with a two-percent gradient will have a minimum spacing of 50-feet. • Include gradated (cobble to fine) material in the rock structure material mix to help seal the structure/channel bed, thereby preventing subsurface flow and ensuring fish passage immediately following construction if natural flows are sufficient. • If a project involves the removal of multiple barriers on one stream or in one watershed over the course of a work session, remove the most upstream barrier first if possible.	To minimize loss of fish passage during headcut and channel grade stabilization treatments.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ025	**Large Wood, Boulder, and Gravel Placement Treatments:** • Place large wood and boulders in areas where they would naturally occur and in a manner that closely mimic natural accumulations for that particular stream type. For example, boulder placement may not be appropriate in low gradient meadow streams. • Structure types shall simulate disturbance events to the greatest degree possible and if appropriate, could include, but are not limited to, log jams, debris flows, windthrow, and tree breakage. • No limits are to be placed on the size and shape of structures as long as such structures are within the range of natural variability of a given location and do not block fish passage. • Projects can include grade control and bank stabilization structures, while size and configuration of such structures will be commensurate with scale of project site and hydraulic forces. • The partial burial of large wood and boulders is permitted. This applies to all stream systems but more so for larger stream systems where use of adjacent riparian trees or channel features is not feasible or does not provide the full stability desired. • Large wood includes whole conifer and hardwood trees, lobs, and root wads. Large wood size (diameter and length) should account for bankfull width and stream discharge rates. When available, trees with root wads should be a minimum of 1.5 times bankfull channel width, while logs without root wads should be a minimum of 2.0 times bankfull width. • Structures may partially or completely span stream channels or be positioned along stream banks. • Stabilizing or key pieces of large wood must be intact, hard, with little decay, and if possible, have root wads (untrimmed) to provide functional refugia habitat for fish. Consider orienting key pieces such that the hydraulic forces upon the large wood increases stability. • Anchoring large wood – Anchoring alternatives may be used in preferential order: 1) Use of adequately sized wood sufficient for stability. 2) Orient and place wood in such a way that movement is limited. 3) Ballast (gravel or rock) to increase the mass of the structure to resist movement. 4) Use of large boulders as anchor points for large wood. 5) Pin large wood with rebar to large rock to increase its weight. For stream that are entrenched (Rosgen F, G, A, and potentially B) or for other streams with very low width to depth ratios (less than 12) and additional 60% ballast weight may be necessary due to greater flow depths and higher velocities.	To guide successful large wood and boulder stream restoration treatments.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ026	**Engineered Logjam Treatments:** • Engineered log jams will be patterned, to the greatest degree possible, after stable natural log jams. • Grade control engineered log jams are design to arrest channel downcutting or incision by providing a grade control that retains sediment, lowers stream energy, and increases water elevations to reconnect floodplain habitat and diffuse downstream flood peaks. • Stabilizing or key pieces of large wood that will be relied on to provide streambank stability or redirect flows must be intact and solid (little decay). If possible, acquire large wood with untrimmed root wads to provide functional refugia habitat for fish. • When available, trees with root wads should be a minimum of 1.5 times bankfull channel width, while logs without root wads should be a minimum of 2.0 times bankfull width. • The partial burial of large wood and boulders may constitute the dominant means of placement, and key boulders (footings) or large wood can be buried into the stream bank or channel. • Angle and Offset – The large wood portions of engineered log jam structures should be oriented such that the force of water upon the large wood increases stability. If a root wad is left exposed to the flow, the bole placed into the stream bank should be oriented downstream parallel to the flow direction so the pressure on the root wad pushes the bole into the streambank and bed. Wood members that are oriented parallel to flow are more stable than members oriented at 45 or 90 degrees to the flow. • If large wood anchoring is required, a variety of methods may be used. These include buttressing the wood between riparian trees, the use of manila, sisal or other biodegradable ropes for lashing connections. If hydraulic conditions warrant use of structural connections, such as rebar pinning or bolted connections, may be used. Rock may be used for ballast but is limited to that needed to anchor the large wood. • There is no d.b.h. (diameter at breast height) restriction for large wood, but consider the following before removing and placing trees:	To guide engineered log jam stream treatments.	Land Management Plan compliance and specialist recommendation

<table>
<tr><th>DF/BMP/M&CM Number</th><th>Description</th><th>Primary Purpose</th><th>Basis</th></tr>
<tr><td>AQ026
(Continued)</td><td>
Diameter:
This key to establishing a logjam is utilizing larger diameter wood that resists decay. These pieces of wood are often called “key pieces,” and serve as the anchors for the logjam structure. Wood can improve fish habitat only if the wood is large enough to stay, influence flow patterns, and sediment sorting. Larger diameter wood retains its size longer as abrasion and decay occurs over the years. Larger diameter wood is more effective in creating pools and complex channels that improve fish populations. The minimum diameter required for a key piece of wood depends on bankfull width of the stream is found in the following table.
Bankfull widths and minimum diameter of logs to be considered key pieces.
Bankfull Width* - Feet Minimum Diameter* - Inches
Bankfull widths and minimum diameter of logs to be considered key pieces.
<table>
<tr><th>Bankfull Width* - Feet</th><th>Minimum Diameter* - Inches</th></tr>
<tr><td>0 to 10</td><td>10</td></tr>
<tr><td>10 to 20</td><td>16</td></tr>
<tr><td>20 to 30</td><td>18</td></tr>
<tr><td>Over 30</td><td>22</td></tr>
</table>
* This table was taken from ‘1995 Guide to Placement of Large Wood in Streams.’
Length:
The length of the wood is also important to stability. To be considered a key piece a log with a rootwad still attached should be at least one and one-half times (1.5X) the bankfull or a log without a rootwad should be twice (2X) the length of the stream’s bankfull width. As the best fish habitat is formed around jams composed of 3 to 7 logs, at least 2 key pieces should be used at each structure.

Mimic natural accumulations of large woody debris based on stream type, valley setting, and community type and ensure future large woody debris recruitment.
Tailholds as part of tree tipping operations are permitted across perennial, intermittent, and ephemeral streams but the use of protective straps will be required to prevent tree damage.

</td><td>To guide engineered log jam stream treatments.</td><td>Land Management Plan compliance and specialist recommendation</td></tr>
</table>

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ027	**Gravel Augmentation Stream Restoration Treatments:** • Gravel can be placed directly into the stream channel, at tributary junctions, or other areas in a manner that mimics natural debris flows and erosion. • Augmentation will only occur in areas where the natural supply has been eliminated, significantly reduced through anthropogenic disruptions, or used to initiate gravel accumulations in conjunction with other projects, such as simulated log jams and debris flows. • Gravel to be placed in streams shall be a properly sized gradation for that stream, clean, and non-angular. When possible, use gravel of the same lithology as found in the watershed. Reference the Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings (USDA-USFS 2008) to determine gravel sizes appropriate for the stream. • Gravel can be mined from the floodplain at elevations above bankfull, but not in a manner that would cause stranding during future flood events. Crushed rock is not permitted. • After gravel placement in areas accessible to higher stream flow, allow the stream to naturally sort and distribute the material. • Do not place gravel directly on bars and riffles that are known spawning areas, which may cause fish to spawn on the unsorted and unstable gravel, thus potentially resulting in red destruction.	To guide gravel augmentation treatments for aquatic and watershed restoration.	Land Management Plan compliance and specialist recommendation
AQ028	Imported gravel for use in or around aquatic systems must be free of invasive species, non-native seeds, and aquatic diseases. If necessary, wash gravel prior to placement and allow it to completely dry for a minimum of 2 days to prevent spread of chytrid fungus. More time for drying may be needed depending on the amount of gravel.	To prevent spread or introduction of invasive species and aquatic diseases in stream habitat.	Land Management Plan compliance and specialist recommendation
AQ029	**Off and Side Channel Stream Habitat Restoration:** • When a proposed side channel contains more than 20% of the bankfull flow, the action agencies will ensure that the action is reviewed by the forest or regional fisheries biologist and the forest or regional engineer. • Data requirements and analysis for off- and side-channel habitat restoration include evidence of historical channel location, such as land use surveys, historical photographs, topographic maps, remote sensing information, or personal observation. • Allowable excavation: Off- and side channel improvements can include minor excavation (less than 10% of volume) of naturally accumulated sediment within historic channels. There is no limit as to the amount of excavation of anthropogenic fill within historic side channels as long as such channels can be clearly identified through field or aerial photographs. Excavation depth will not exceed the maximum thalweg depth in the main channel. Excavated material removed from off- or side-channels shall be hauled to an upland site or spread across the adjacent floodplain in a manner that does not restrict floodplain capacity.	To reconnect historic side-channels with floodplains by removing off-channel fill and plugs. Furthermore, new side-channels and alcoves can be constructed in geomorphic settings that will accommodate such features.	Land Management Plan compliance and specialist recommendation
AQ030	Ensure that an experienced engineer, fisheries biologist, hydrologist and/or geomorphologist are involved in the design of all aquatic restoration projects as needed. Their experience should be commensurate with the technical requirements of the project being undertaken.	To ensure technical skills and planning requirements for all aquatic and watershed restoration treatments.	Specialist recommendation

<table>
<tr><th>DF/BMP/M&CM Number</th><th>Description</th><th>Primary Purpose</th><th>Basis</th></tr>
<tr><td>AQ031</td><td>Replant each area requiring revegetation prior to or at the beginning of the first growing season following instream or riparian restoration activities. Achieve reestablishment of vegetation in disturbed areas to at least 70% of pre-project levels within three years. Barriers will be installed as necessary to prevent access to revegetated sites by ungulates or unauthorized persons.</td><td>To rehabilitate all disturbed areas from aquatic and watershed restoration treatments, minimize erosion and sedimentation to aquatic habitats and potential effects to species.</td><td>Land Management Plan compliance</td></tr>
<tr><td>AQ032</td><td>During all implementation within AMZ's, maintain shade, bank stability, and large woody material recruitment potential.</td><td>Minimize detrimental disturbance of desirable riparian/aquatic conditions to the greatest extent practical.</td><td>Land Management Plan compliance</td></tr>
<tr><td>AQ033</td><td>Live conifers and other trees can be felled or pulled/pushed over for in-channel large wood placement in streams only when conifers and trees are fully stocked by silvicultural standards. Tree felling shall not create excessive stream bank erosion, increase the likelihood of channel avulsion during high flows, and does not negatively impact use of spawning gravels or increase width to depth ratios.</td><td>To maintain forest structure and facilitate riparian restoration activities.</td><td>Specialist recommendation</td></tr>
<tr><td>AQ034</td><td>Within the primary shade zone for streams, springs and wet meadows retain 100% of the over-story canopy closure with the exception of hardwood treatments, unless other exceptions listed below are met. Source trees being extracted (either by tipping and/or felling) for stream restoration will not be cut from within the primary shade zone.
<table><tr><th>Hill Slope</th><th>Primary Shade Zone Width (slope distance)</th></tr><tr><td><30%</td><td>50 ft.</td></tr><tr><td>30-60%</td><td>55 ft.</td></tr><tr><td>>60%</td><td>60 ft.</td></tr></table>Exceptions:
The distances listed above may be reduced (but not less than 25 ft.) if any of the following conditions apply:
The trees are located on a south facing slope and therefore do not provide stream shade;
An appropriate level of analysis is completed and documents, such as shade modeling with LiDAR, using site-specific characteristics to determine the primary shade tree width; and/or
Field monitoring or measurements are completed to determine the width where Optimum Angular Canopy Density (65% or greater) is achieved.
If trees are being felled for safety reasons they can be felled toward the stream.</td><td>To maintain or improve the primary shade zone surrounding aquatic habitats.</td><td>Specialist recommendation</td></tr>
<tr><td>AQ035</td><td>In leopard frog occupied and dispersal habitat, a 150 ft. AMZ would be established around designated stream courses, stock tanks, or other water bodies. Designated skid trail crossings through the AMZ are only allowed with biologist recommendation.</td><td>To minimize direct effects to federally listed and sensitive amphibians.</td><td>Specialist recommendation</td></tr>
</table>

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ036	Utilize prescribed firing techniques that ensure low-severity in native leopard frog AMZs and Arizona toad habitats within dispersal distance from occupied sites. No direct ignition will occur in occupied habitat (unless to ensure low-severity fire) or in riparian areas (FE006 and FE007). If fuel conditions result in significant ash and sediment flow into an occupied site that cannot be mitigated through erosion control measures following guidelines in AQ016, the resource advisor or biologist will contact AGFD and USFWS.	Minimize disturbance while restoring forest conditions.	Specialist recommendation
AQ037	Use of heavy mechanical equipment will temporarily cease in leopard frog dispersal or occupied habitat for the length of an isolated monsoon rain event producing greater than one tenth of an inch over a 24 hour period (based on the nearest rain gauge/station) in an active treatment area unless continuation of work is supported by a biologist and approved by a sale administrator or COR.	To minimize direct effects to federally listed and sensitive amphibians.	Specialist recommendation
AQ038	Do not use tanks for water sources that are known to have populations of leopard frogs as water sources for prescribed fire activities. Activities in and around natural or constructed waters would use decontamination procedures to prevent the spread of Chytrid (Bd) fungus and other invasive aquatic species unless an evaluation by a forest biologist determines it unnecessary.	To minimize direct effects to federally listed and sensitive amphibians and introduction of disease.	Specialist recommendation
AQ039	Prior to reinitiating operations in rock pits where standing water is pooled, a biologist will determine if aquatic surveys for sensitive or threatened species should occur.	To avoid or minimize potential impacts to threatened or sensitive aquatic species.	Land Management Plan compliance and specialist recommendation
AQ040	No cable operations would occur within spinedace occupied or critical habitat or slopes above said habitat.	To avoid or minimize potential impacts to threatened aquatic species.	Specialist Recommendation
BT001	During layout and marking, protect Southwestern Region sensitive plants and species of conservation concern where practical by including the plants within tree groups and using areas not occupied by the plants as interspaces. If species of conservation concern could benefit from thinning operations work with local specialist to develop marking guidelines.	Provide protection and shade needed by the sensitive plants while allowing for the least effect on clump/group/interspace design and layout during implementation and help mitigate effects on Southwestern Region sensitive plants and Land Management Plan analysis species.	Specialist recommendation
BT002	Survey springs and channels for Bebb's willow before implementation and identify locations. If plants are found, operational modifications will include avoiding plants, altering designs, or including plants in enclosures in coordination with the forest botanist or district wildlife biologist. Identify opportunities to enhance Bebb's willow where plants are decadent or dying. Manual grubbing of grasses may be used to increase the likelihood of planting success.	Protects populations and habitat of Bebb's willow. Bebb's willow stands would be enhanced by using cuttings, planting locally cultivated plants, and fencing existing or newly planted willows.	Land Management Plan compliance
BT003	Prescribed fires will be conducted under conditions that promote native plant communities, hinder weed species germination, aid with controlling existing weed infestations, and prevent the spread of existing weeds to the extent possible.	Promote healthy native plant communities and reduces the risk of noxious or invasive weed invasions.	Land Management Plan compliance

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
BT004	Review various sites such as spring restoration for opportunities to introduce and restore Bebb's willow to supplement existing locations on the forest and introduce young plants into areas where plants are decadent and dying. Bebb's willow stands would be enhanced by using cuttings, planting locally cultivated plants, and using barriers as needed to protect existing or newly planted willows from browsing. Manual grubbing of grasses may be used to increase the likelihood of planting success. Where needed, fire lines for prescribed fire would be placed around Bebb's willows and/or fuels would be removed from the vicinity of willow clumps to ensure there is only low to very low burn severity (fire effects to soil) and low- to very low-severity (fire effects to vegetation) in and around willow clumps.	Aids in restoring Bebb's willow which is a Southwestern Region sensitive species for the A-S and Coconino National Forests (NF) and a rare species on the landscape for both forests.	Specialist recommendation
BT005	When planning for implementation, identify at-risk species (Southwest Region sensitive plant species and species of conservation concern) and narrow endemics, and determine potential habitat based on past occurrences and the known ranges of the species. If there are no documented surveys, the appropriate specialist (for example, forest or regional botanist, wildlife biologist) should be consulted to determine the need for, and extent of, new surveys. If the appropriate specialist is unavailable, the area to be treated should be surveyed prior to implementation and implementation plans should be adjusted if/as needed, based on survey results. Surveys should focus on areas most likely to contain plants or potential habitat for the targeted species, based on conditions such as soil or vegetation type, rather than covering the entire area. Habitat modeling, or the use of habitat descriptions of species from past documentation, etc. will be used to help define survey areas. Narrow endemics should receive more attention than more widespread species because the loss of individuals would have greater impact on the overall population of the species than in more widely distributed species. Work with partners on developing suitability layers for at-risk plant species within the 4FRI footprint.	Complies with Forest Service Manual direction 2670. Manual direction (FSM 2670.5(19)) emphasizes that management actions should avoid or minimize effects on sensitive species.	Land Management Plan compliance
BT006	Monitor the effects of treatment on Southwestern Region sensitive plants and Species of Conservation Concern after treatments at select sites.	Provides opportunities to obtain knowledge on local species that are often poorly understood. Allows for adaptive management in future treatments.	Land Management Plan compliance
BT007	Mitigate loss of individuals and groups of Southwestern Region sensitive plants and species of conservation concern during management activities by avoiding plants as much as possible while achieving management objectives. Preserve plants and habitat during implementation of management activities, while realizing there may be some short-term losses of individuals or groups and short-term effects to habitat while moving toward desired conditions.	Complies with FSM direction, minimizes effects on Southwestern Region sensitive plants and Species of Conservation Concern.	Land Management Plan compliance
BT008	Where possible, landings, machine slash piles and other ground disturbing activities (for example, firelines, parking areas, temporary road construction, road reconstruction, and pits) should not occur directly on Southwestern Region sensitive plant populations and species of conservation concern.	Mitigates effects of disturbance, loss of plants, and severe burning effects on soils. Reduces loss of native seed bank and limits extent of severe disturbances.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
CK001	A buffer to restrict mechanical treatment within a radius of 300 feet should be used to restrict activities that can negatively alter the resources, functions, and associated features of caves or karst features unless site-specific adjustments are made in coordination with the appropriate specialist(s), based on the characteristics and importance of the cave or karst features and the expected impact of the proposed activity. Thinning or other vegetation treatments with chainsaws or other light equipment, as needed to implement mechanical treatments or prescribed fire, may be used up to cave openings or edges of the sinkholes/pits if specialists determine that there is some risk to the cave/karst environment if nothing is done. Directional felling should be used to fell trees away from karst features. If felled trees must be removed from within the buffer, avoid yarding over or through karst features.	Minimize alteration of the chemical, physical, and biological conditions of karst features, to protect human health and safety, and to reduce potential disturbance to roosting bats. To protect cave ecosystems from negative fire effects and to minimize alteration of the chemical, physical, and biological conditions of karst features.	Land Management Plan compliance and specialist recommendation
CT001	All activities will comply with the National Historic Preservation Act for all ground-disturbing undertakings as appropriate. Effects on cultural resources would be determined in consultation with the State Historic Preservation Office and other consulting parties. Potential effects would be addressed through site avoidance strategies and implementing the site protection measures listed in Appendix J of the Southwestern Region Programmatic Agreement (PA) and in the 4FRI heritage strategy and section 106 clearance report.	Regulatory requirement. Compliance with NHPA and Southwestern Region Programmatic Agreement (PA) with Arizona SHPO.	Land Management Plan compliance and specialist recommendation
CT002	Consult with Federally Recognized Native American Tribes, particularly when projects and activities are planned in sites or areas of known religious or cultural significance.	Regulatory requirement. Compliance with NHPA, the American Indian Religious Freedom Act of 1978 , Southwestern Region PA with Arizona SHPO, Executive Order 13007, EO 13175, and other applicable Executive Orders and legislation.	Land Management Plan compliance
CT003	Eligible, or potentially eligible, cultural resources would be managed to achieve a “no effect” or “no adverse effect” determination whenever possible, in consultation with the SHPO and ACHP (36 CFR 800).	Regulatory requirement. Compliance with NHPA and Southwestern Region PA with Arizona SHPO.	Land Management Plan compliance and specialist recommendation
CT004	Monitoring during and after project implementation shall occur to document site protection and condition.	Compliance with Southwestern Region PA (Appendix J) with Arizona SHPO.	Land Management Plan compliance and specialist recommendation
CT005	Proposed treatment activities and schedules would accommodate tribal traditional and ceremonial use.	Compliance with the Food, Conservation, and Energy Act of 2008 (Public Law 110-234).	Land Management Plan compliance and specialist recommendation
CT006	In accordance with regulations (43 CFR 10) governing application of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), if human remains, funerary objects, sacred objects, or objects of cultural patrimony are inadvertently encountered, operations in the area must immediately cease and the Forest Archaeologist must be notified. The Forest will work to initiate consultation with the affected tribe (s) to implement any requirements listed in NAGPRA and the PA and to develop a plan to mitigate for the effects on the find.	Regulatory requirement. Compliance with NAGPRA, NHPA and Southwestern Region PA with Arizona SHPO.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
CT007	Should any previously unidentified cultural materials be discovered during project implementation, work must cease immediately, and the forest archaeologist must be contacted to initiate the consultation process as outlined in the Advisory Council on Historic Preservation Regulations (36 CFR Part 800.13).	Regulatory requirement. Compliance with NHPA and Southwestern Region PA with Arizona SHPO.	Land Management Plan compliance and specialist recommendation
CT008	Contracts, permits, or leases that have the potential to affect cultural resources shall include appropriate clauses specifying site protection responsibilities and liabilities for damage.	To ensure that mitigations measures identified during the analysis phase to protect cultural sites from being adversely affected are addressed during the implementation portion of the project.	Land Management Plan compliance and specialist recommendation
CT009	Fines, etc., for the costs of restoration and repair resulting from breaches of contracts, permits, or leases that cause inadvertent or intentional damages to cultural or tribal resources shall be strictly enforced.	Archaeological Resource Protection Act of 1979 (ARPA), Site protection	Land Management Plan compliance and specialist recommendation
CT010	Locate, record, and evaluate the General Crook and other significant historic trails within the project area well before implementation. Maintain historic and scenic integrity of National Register-eligible historic roads, including the preservation of associated historic features, tread width, curve radii, and other features that contribute to the National Register eligibility of the historic roads.	Regulatory requirement. Compliance with NHPA and Southwestern Region PA with Arizona SHPO. Site protection, ARPA (prevention of looting).	Land Management Plan compliance and specialist recommendation
CT011	Plate over National Register-eligible and unevaluated sites located within roads that will be maintained or reconstructed	NHPA compliance, 4FRI Rim Country Site Plating protocol.	Land Management Plan compliance and specialist recommendation
CT012	Coordinate with forest cultural resource specialists to design and implement projects (or don't implement projects) located in areas of very high site density.	Site protection, ARPA (prevention of looting).	Land Management Plan compliance and specialist recommendation
CT013	Culturally modified trees such as blazed trees, lookout trees, phone line trees, arborglyphs, peeled trees, etc. will be avoided. Protection measures may include removing ladder fuels around the trees by hand, establishing buffer zones to keep equipment from damaging trees or affecting root systems, etc.	Regulatory requirement. Compliance with NHPA and Southwestern Region PA with Arizona SHPO.	Land Management Plan compliance and specialist recommendation
CT014	Roads to National Register-eligible and unevaluated sites identified to be closed post implementation will be closed after identified treatments are completed.	Regulatory requirement. Compliance with NHPA and Southwestern Region PA with Arizona SHPO.	Land Management Plan compliance and specialist recommendation
CT015	All rock pit locations will be surveyed for cultural resources. As a general rule, all identified cultural resources that are considered eligible for the purposes of Section 106 of the National Register of Historic Places within or adjacent to the rock pit boundary shall be flagged prior to implementation. In addition to flagging, rock pit extraction areas shall include fencing along the pit boundary to minimize the potential for indirect effects on cultural resources outside of the pit boundary where applicable. The forest may recommend other types of site mitigation measures as they see fit.	Reduces disturbance footprint, protects cultural and historic sites, and retains seed sources for eventual reestablishment of residual plant cover, potentially enhancing fruit, seed, and plant production.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
CT016	During layout and implementation, identify traditionally used plants, including Emory oak, that are at risk or have been identified as culturally, medicinally, or economically important to tribal communities. Design and apply management prescriptions and activities to protect and enhance specified plant populations. Opportunities to harvest plants before implementation will be provided to Federally recognized tribes whose traditional territory is within the project area.	To protect and enhance populations of plants used traditionally by tribes and to improve tribal access to harvest those plants prior to implementation of restoration treatments.	Specialist recommendation
CT017	Restoration activities and uses should be administered in a manner that is sensitive to traditional American Indian beliefs and cultural practices	Compliance with the Food, Conservation, and Energy Act of 2008 (Public Law 110-234), 36 CFR 261.53(g) Closure Authority, EO 13007, EO 13175, and other applicable Executive Orders and legislation.	Land Management Plan Compliance
CT018	The Forest will coordinate with Tribal practitioners to ensure they have access to areas that provide them an opportunity to practice traditional activities, such as plant gathering and ceremonial activities that are essential in maintaining their cultural identity and the continuity of their culture, with reasonable limitations, consistent with public safety and multiple uses by other forest users. There are opportunities for solitude and privacy for ceremonial activities.	Compliance with the Food, Conservation, and Energy Act of 2008 (Public Law 110-234), 36 CFR 261.53(g) Closure Authority, EO 13007, EO 13175, and other applicable Executive Orders and legislation.	Specialist recommendation
CT019	Where appropriate, reduce fuels on archaeological sites in accordance with Section II of Appendix J of the Region 3 Programmatic Agreement. This process can include hand treatments within site boundaries, mechanical removal of trees along the edge of sites, and light burning through sites that are not fire sensitive.	To protect cultural sites from being adversely affected during the implementation portion of the project.	Specialist Recommendation
FE001	Prescribed fire will be implemented in such a way that, whenever possible, damage to fencing and other infrastructure used for managing livestock will be minimized. Any damage incurred to fences or other infrastructure associated with grazing management resulting from prescribed fire will be fixed as soon as possible following the burn, or on a timeline agreed on with range managers that would not affect planned grazing management.	To minimize damage to grazing infrastructure. Fire can easily damage grazing infrastructure, particularly fences, gates, and their supporting structure. Fencing can be costly and is critical to the effective implementation of grazing management strategies.	Specialist recommendation
FE002	Burn unit size, as well as strategic placement, would be a consideration in designing units and implementation prioritization.	Fire effects & behavior: Large treatment areas arranged across a landscape are generally more effective at reducing fire behavior than arrangements of small treatment areas are. The arrangement of treatment units, regardless of size, can also make a significant difference in the effectiveness of treatments.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
FE003	As burn plans and burn units are developed, ensure consideration is given to the spatial and temporal effects of broadcast burning in the upper levels of a watershed.	To mitigate the cumulative effects to aquatic habitats and riparian areas of broadcast burning multiple adjacent levels within a watershed. Such effects include but are not limited to sedimentation and ash delivery to aquatic habitat.	Land Management Plan compliance and specialist recommendation
FE004	When necessary and practicable, damage or mortality to old trees and large trees would be mitigated by implementing prescription parameters, ignition techniques, raking, wetting, thinning, compressing slash, or otherwise mitigating fire effects to the degree necessary to meet burn objectives and minimize fire effects and behavior that could threaten old trees. Trees identified as being of particular concern (for example, trees with known nests or roosts for herons, eagles, osprey, or other raptors, occupied nest cores, or in Mexican spotted owl protected activity centers (PACs) would be managed in accordance with wildlife design features (see Wildlife). Prepare old trees before a burn if possible.	Old trees are rare components and are under-represented across much of the project area. Implementing mitigation measures when possible is a critical component of restoration on a landscape-scale. Large trees that are not old are not as susceptible to damage from fire as old trees. Mitigation measures that can be implemented before a burn, such as thinning or raking, may improve the response of the effectiveness of the mitigation measures.	Specialist recommendation
FE005	Fire personnel should confer with the appropriate district or forest personnel to identify noxious or invasive weeds within the perimeter of the prescribed burn unit, and areas that will be utilized as part of the implementation (such as staging areas), before burning is implemented. Jointly they shall identify the necessary mitigations as identified in the applicable forest weed management document. Mitigations may include, but are not limited to, avoiding noxious weeds while implementing and/or pretreatment of weeds before implementation. Follow-up monitoring should be conducted, especially in areas of severe disturbance. Large slash pile sites should be monitored after burning, and noxious or invasive weeds should be controlled according to the applicable forest weed management document.	Detect new weed infestations before they spread. Controls weeds, reduces risk of invasion and reduces risk to native species by reducing weed competition.	Specialist recommendation
FE006	Prescribed fire within narrow-headed gartersnake AMZs will not occur during the inactive period (November/December-February, depending on elevation) when gartersnakes are more likely to be brumating in wood piles, debris jams, etc., unless cleared by a biologist (Also see AQ019).	To avoid, improve, or minimize effects on the narrow-headed gartersnake.	Land Management Plan compliance and specialist recommendation
FE007	Prescribed fire ignitions will not occur within any AMZ, unless approved by a watershed specialist and/or a biologist.	To prevent the introduction of chemicals, such as drip torch fuel, into soils and water.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
FE008	Firelines would be used to facilitate prescribed fire operations as needed to balance fire management and other resource protection objectives: (1) Firelines may consist of natural barriers, roads and trails, or may be constructed, if necessary, in coordination with other resource specialists (See RS004). (2) Fireline width would be determined as adjacent fuels and expected fire behavior dictate, assuming compliance with the requirements of cultural, wildlife, and other resource areas. (3) Constructed firelines would be rehabilitated when they are no longer needed, using methods appropriate to the site.	To provide for activities needed to implement prescribed fire while minimizing disturbance to all resources.	Specialist recommendation
FE009	Concerned/interested public would be given as much warning as possible in advance of prescribed burns via notices, press releases, email lists, public announcements, phone lists, or other notification methods as appropriate.	To provide advanced notice for publics concerned about potential effects from emissions resulting from prescribed fires.	Land Management Plan compliance and specialist recommendation
FE010	Prescribed fires may be conducted before or after mechanical treatments. The sequencing of prescribed fires and mechanical treatments would be decided on a site-specific basis, depending on the site, burn windows, available resources, thinning schedules, etc.	Increase the flexibility for implementing both prescribed fire and mechanical treatments.	Specialist recommendation
FE011	Mechanical treatments following broadcast burns would occur after surface vegetation has recovered sufficiently to minimize soil disturbance from the mechanical treatments. Prescribed fire treatments following mechanical treatments would occur after there has been adequate surface vegetation recovery that fuel loads are sufficient to meet the objectives of a prescribed burn.	Minimize effects from the combined effects from mechanical treatments and prescribed fire on vegetation and soil. To maintain soil condition and productivity, and to meet prescribed fire objectives.	Specialist recommendation
NW001	Survey for noxious or invasive weeds in treatment areas prior to treatment and follow appropriate guidance based on location: • Apache-Sitgreaves National Forests: Follow the guidance in Appendix A of the Environmental Assessment for the Forest Integrated Forest-Wide Noxious Or Invasive Weed Management Program • Coconino National Forest: Follow the guidance in appendix B of the "Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds, Coconino, Kaibab, and Prescott NFs within Coconino, Gila, Mojave, and Yavapai Counties, Arizona" • Tonto National Forest: Follow the guidance in Appendix C of the Tonto National Forest Weed Treatment EA when operating on the Forest	Provides guidance and mitigation for noxious or invasive weeds.	Land Management Plan compliance

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
NW002	Prevent spread of potential and existing noxious or invasive weeds by vehicles and equipment used in management activities by washing vehicles and equipment to remove seeds, soil, vegetative matter, and other debris that could contain or hold seeds prior to entering the project area and when moving from one treatment unit to another. For example, see timber sale contract provision 2400-6/6T B/BT6.35.	Reduces the potential for introduction of noxious weeds into National Forest Service (NFS) lands and mitigates effects of management actions on existing and potential noxious or invasive weed infestations; Land Management Plan direction is complementary to Timber Sale Contract Clause 2400-6/BT B6.35, and Stewardship Contract G/GT.3.5 and watershed best management practices.	Land Management Plan compliance and specialist recommendation
NW003	If contractor desires to clean off-road equipment on national forest land, such as at the end of a project or prior to moving to, or through an area that is free of invasive species of concern, contractor shall obtain prior approval from contracting officer or timber sale administrator as to the location for such cleaning and measures, if any, for controlling impacts.	This measure is designed to prevent the spread of noxious weeds from one treatment unit to another.	Land Management Plan compliance and specialist recommendation
NW004	If forest priority noxious or invasive weeds are identified during or post-implementation, treat the weeds and monitor for a minimum of three to five growing seasons. Consider seeding treated areas with the appropriate native plant materials to restore native plant communities and suppress invasive species.	This measure is designed to eliminate noxious or invasive weeds identified within a treatment area and provide assurance that the treatments were successful.	Land Management Plan compliance and specialist recommendation
NW005	Timing of prescribed fire and herbicide application in areas with leafy spurge will be determined on a site-specific basis by the district fuels specialist and district weeds coordinator at the time of implementation. Herbicide treatments in the fall are most effective, though spring herbicide treatments following fall burns may be necessary to facilitate control.	Allows prescribed fire to occur in our near existing populations of leafy spurge while providing for control of it. Allows on the ground, site-specific assessment and coordination of the prescribed fire and control of leafy spurge on a site-specific basis.	Specialist recommendation
NW006	Before ground disturbing activities begin, inspect material sources on site annually (or before disturbance for new sites) to ensure they are weed- free before use and transport. Treat weed-infested sources for eradication, and strip, stockpile, and treat contaminated materials before using pit materials.	Prevent establishment and spread of invasive weed populations.	Land Management Plan compliance and specialist recommendation
NW007	If weed treatments are not successful or not possible, operators would be informed of locations of noxious or invasive weed populations and ground disturbance associated with rock pit sites would be located away from noxious or invasive weed populations.	Prevent establishment and spread of invasive weed populations.	Specialist recommendation
NW008	Maintain stockpiled, uninfested material in a weed-free condition.	Prevent establishment and spread of invasive weed populations.	Land Management Plan compliance

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RM001	Historic range monitoring sites including witness trees/posts, 1-inch angle iron stakes, and any other site location markers would be protected. These sites would not be excluded from treatment, but care needs to be taken to avoid loss of these site markers and damage to the areas and shown as a protected improvement on the sale/contract/agreement area map. These sites would not be used as locations for temporary access roads, skid trails, landing areas, or large slash piles. District range and timber personnel will coordinate on these locations during presale packaging and prior to implementation.	Avoid monitoring site damage.	Specialist recommendation
RM002	The sale administrator would work closely with the district range staff to determine pasture use during thinning activities. On the ground placement of in-woods processing sites would also be coordinated with District range staff.	Avoid infrastructure damage and retain allotment and pasture fences within a thinning treatment area. Provides for coordination of different activities within the same areas.	Specialist recommendation
RM003	All fences and range improvements will be included as protected improvement on the sale/contract/agreement area. Skid trail layout would attempt to keep equipment on one side fences to avoid having to cut fences. If fences need to be cut, a gate or temporary cattle guard may need to be constructed/installed with appropriate bracing; these areas shall be coordinated with district range personnel prior to cutting. If the fence is cut or damaged it shall be repaired to conditions equal to or better than existed (to Forest Service Standards). When funding is available or a need exists, temporary cattle guards may be installed on haul roads where gates exist within active grazed pastures. All cattle guards on haul roads would be maintained throughout hauling activities and cleaned, if necessary, upon completion of a sale. Damage to other range improvements, such as tanks, drainage into tanks, spillways, drinkers, pipelines, corrals, etc., shall be repaired or cleaned to a condition that was as good as or better than existed. Skid trails, roads, landings, etc. should not be placed next to these range improvements. Minimize the location of skid trails, temporary roads, and landings adjacent to these range improvements.	Protect infrastructure.	Specialist recommendation
RM004	Rest or deferment of a pasture by livestock may occur after the completion of ground disturbing activities, such as prescribed burning and mechanical thinning. Range management personnel will evaluate conditions to determine when adjustment to livestock management, such as rest or deferment of a pasture is needed. Several factors may be used to assist in these determinations, such as plant recovery, plant vigor, and size of the disturbed area in relation to the pasture size. Plants that are well rooted, have multiple leaves or branches, and/or are producing seed head or flowers provide evidence of plant recovery, vigor, and reproductive ability.	Post ground-disturbing treatment assessment.	Specialist recommendation
RM005	The removal or exclusion of livestock water would be mitigated with alternative water sources, providing lanes to the water, or piping water to a livestock drinker.	Provide alternate water sources.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RM006	Prior to the construction of any exclosure fences or barriers, which exclude forage and/or water, or the removal of a water source, such as earthen tanks or trough, there needs to be a review by the district ranger, range management personnel and other specialist to evaluate the extent and amounts that may be excluded on an allotment/pasture (see AQ010 and SI003). If a pasture/allotment has a considerable amount or extent of fencing or water exclusion, which could change livestock management such as numbers, season of use, distribution, etc., then these proposals should be analyzed during the Allotment Management Planning process. During this process, livestock management on the allotment can be evaluated along with the resource concern that would have initiated the fence and other possible solutions may arise.	To ensure that changes to an allotment/ pastures will not hinder permittees' operations without coordination with local specialist expertise. This will also allow a review of water rights, if applicable.	Specialist recommendation
RM007	Range and fire managers will coordinate prescribed burning and grazing schedules to minimize disruption of grazing while maximizing the implementation of prescribed fires. Each allotment will have specific management needs to be considered as management actions are planned and implemented. Past and future burns, projected rest/deferment are examples of things that should be considered when burn plans are being written and prior to implementation of prescribed fire. Grazing options, such as swing pastures, may be utilized to increase flexibility for range and fire managers. Long-term and annual prescribed fire plans should be developed and adjusted to minimize burning in multiple pastures of an allotment, unless recognized and approved.	The process of planning and implementing prescribed fire is long and complex. The effects are beneficial to most resources, though there are a myriad of restrictions on where and when prescribed fire can be implemented. The Forest Service issues Term Grazing Permits, Allotment Management Plans, and/or Annual Operating Instructions describing numbers, season of use, pasture rotations, etc. that permittees follow. Coordination will help maintain good working relationships and will minimize hardships to the permittees, while managing for ecosystem health. Coordinating the management of these programs for minimal disruption to both is desirable.	Specialist recommendation
RS001	Coordination with the district recreation staff would occur during treatment area selection. Additional design components may be necessary to maintain scenic integrity along, the General Crook Trail, Arizona Trail, Highline Trail, Blue Ridge, other National Historic, Recreation, and Scenic trails, and designated roads and would be coordinated with district recreation staff. Recreation staff will coordinate with the Arizona Trail regional national scenic trail administrator on an annual basis or as needed. The forest would be responsible for signing trails to notify the public of restoration activity.	Resource protection	Land Management Plan compliance and specialist recommendation
RS002	Historic trails, historic roads and historic trail markers will be protected during project implementation.	Regulatory requirement. Compliance with NHPA and Southwestern Region PA with Arizona SHPO, National Recreational Trails compliance, National Historic Trails compliance	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS003	Efforts would be taken to limit forest treatment activities and hauling from rock pits within the project area during high-use weekends and holidays (for example, Memorial Day, 4th of July, Labor Day, etc.); especially in locations where recreation-based activities (for example, trails, trailheads, etc.) occur.	Protect public safety, decrease noise, reduce dust and minimize visibility issues on roads during high-use periods.	Land Management Plan compliance and specialist recommendation
RS004	**Control Lines:** (a) Whenever possible, firelines would be constructed in a manner that minimizes the visual impact in the middle and background views. Firelines will be rehabilitated in the foregrounds (within 300 feet) of sensitive roads, sensitive trails, developed recreation sites and private property. If national trails, including the Arizona Trail, are to be used as firelines, management actions should be reviewed and approved by the authorized Forest Service line officer prior to use, and adverse effects should be mitigated. Treatments to be implemented would be developed by fire/fuels working together with recreation/viewshed/scenic specialists. (b) Generally, rehabilitate firelines by rolling back the soil berm formed during line construction and constructing drainage features as necessary to prevent concentration of runoff. (c) To hasten recovery and help prevent unauthorized motorized and nonmotorized use of firelines, use measures such as recontouring, pulling slash and rocks across the line, and disguising entrances. When alternatives exist, do not use heavy machinery on non-motorized forest system trails that are used as a fireline, unless approved by the authorized Forest Service officer. Coordinate with the district recreation staff regarding use of national trails as firelines. (d) Control lines on National Scenic, Historic and Recreation trails can be used only if the trails are co-located on roads. Do not use heavy machinery on any forest system trail used as a control line, unless approved by an authorized Forest Service officer. Coordinate with the district recreation staff and the Arizona Trail regional national scenic trail administrator regarding use of national trails as control lines.	Resource protection.	Land Management Plan compliance and specialist recommendation
RS005	Where new temporary roads intersect existing roads or trails, native materials such as logs, slash, and/or boulders would be placed along temporary road to line-of-sight or 300 ft.	Reduce unauthorized use.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS006	**Unit Marking:** (a) Strive to avoid using trails as marked boundaries. (b) Strive to avoid abrupt changes between treatment units. (c) Where feasible strive to have the minimal marking of trees within the Arizona Trail, General Crook Trail, and Highline Trail corridors. Avoid using the Arizona Trail as a boundary. (d) Utilize species designation where appropriate to minimize the amount of necessary marking. (e) Unit boundaries will be painted along trails on the side of trunk facing away from trails, roads or sensitive e travel ways. (f) Use the below techniques suggested for edges of treatment units. Edges of Individual Units: i. Ensure that forest stand composition changes are textural, with small, natural openings and not symmetrical in shape. Strive to avoid straight lines and right angles. Ensure that openings resemble the form, line, and texture of naturally appearing edges to avoid a shadowing effect. ii. Where treatment unit interfaces with an opening (including savanna and grassland treatments, and natural openings) the transition zone would progressively increase toward open edges of the unit. iii. Soften edges by thinning adjacent to the existing unit boundaries. Treat up to edges; do not leave a screen of trees. Favor groups of trees complying with prescribed treatments that visually connect with the unit's edge to avoid an abrupt and noticeable change. When feasible, treat both sides of open system roads and trails to avoid contrast. iv. Treatment boundaries should extend up and over ridgelines to avoid edge effect, where possible. v. The ridgeline silhouette should have a textural effect of small, natural-appearing openings rather than large, thinned areas and unnatural-appearing breaks. vi. Where mechanized treatments are authorized, consider additional contract provisions to maintain scenic integrity along trails in order to promote a more naturally appearing setting. Treat the edges of thinning areas to maintain the scenic integrity of the Arizona National Scenic Trail and other national trails. vii. Implementation will comply with the nature and purpose of the Arizona National Scenic Trail. The Forest Service will meet annually, as needed, with the Arizona Trail Association regional national scenic trail administrator to discuss and document monitoring activities.	Scenic integrity	Land Management Plan compliance and specialist recommendation
RS007	When possible, new fuelwood piles, and skid trails should be located out of view in areas of High Scenic Integrity to avoid observation of rutting. Rehabilitate fuelwood skid trails, fuelwood piles, or other disturbed areas. Strategies may include restoring original contours, fine grading, and seeding with native seed mix.	Avoid degrading recreation setting and resource protection.	Land Management Plan compliance and specialist recommendation
RS008	Mechanical thinning operations shall not damage cairns or markers that are displayed as protected improvements on the sale, contract or agreement map.	Resource protection and scenic integrity and avoid substantial interference with the nature and purpose of the trail (in compliance with Section 7(c)).	Land Management Plan compliance and specialist recommendation
RS009	If trails are temporarily closed due to thinning, trails shall be returned to pre-treatment conditions. The public will be notified of the closure and the closure duration should be as short as feasible.	Resource protection	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS010	**Temporary Road, Skid Trail, Landing, In-Woods Processing Site Construction, and Cable Operation:** (a) Utilize dust abatement methods for hauling during the season when dust is likely, and funding is available. Coordinate with the appropriate county on the application and timing of application of dust abatement on road segments that have county maintenance responsibilities. (b) When constructing temporary roads and skid trails blend them into the characteristic landscape of the surrounding area. Create cut and fill banks to be sloped to accommodate natural revegetation and to reduce sharp contrasts viewed from any distance. (c) When possible, shape the edges of log landings and in-woods processing sites to avoid straight lines, right angles, and abrupt changes between treated and untreated areas. Standing trees and shrubs around in-woods processing sites and landings should be left in strategic locations where possible to serve as screening in sensitive viewsheds. (d) When possible, landings, temporary roads, and skid trails should be located out of view of Concern Level (CL) 1 and CL2 travel routes and eligible and designated wild and scenic rivers (see RS022) to avoid observation of management activities. (e) Do not locate in-woods processing sites in view of Concern Level (CL) 1 and CL2 travel routes and eligible and designated wild and scenic rivers to avoid observation of management activities. Do not locate perpendicular to roads or trails, rather set off at an angle whenever possible. (f) In-woods processing sites, landings, temporary roads, and skid trails should be minimized within sensitive viewsheds, such as those within eligible or suitable wild and scenic river corridors or next to developed recreation sites, private homes, or communities, and along paved and passenger car level roads and trails. Stump heights should be treated per RS011. (g) Highest emphasis for slash treatment, temporary road closures and road decommissioning will be placed on eligible or suitable wild and scenic river corridors; foreground (up to 300 feet) of developed recreation sites, private homes or communities; and CL 1 roads (paved roads and passenger car roads) and trails, especially those designated as national scenic, historic, or recreation trails. (h) All constructed features including but not limited to fencing, office trailers, sanitation facilities, fuel storage containers, or temporary structures shall be designed to blend with the surrounding environment. Color of proposed above-ground features shall be non-reflective and treated to be Forest Service brown or for a rusty appearance, or as approved by a Forest Service landscape architect or other Forest Service official. (i) In-woods processing sites, landings, skid trails, and temporary roads will be rehabilitated, including restoring proper drainage and reseeding as needed with native species. (j) To hasten recovery and help eliminate unauthorized motorized and non-motorized use of skid trails, use physical measures where feasible, such as re-contouring, pulling slash and rocks across the line, and disguising entrances. (k) National Historic, Scenic, and Recreation Trails (motorized and non-motorized) will not be used for temporary roads or skid trails. Crossing of the nationally designated trails will be done sparingly and only if no other alternative exists. Crossings will be rehabilitated after use. These crossing locations will be coordinated with district recreation staff.	Resource protection and scenic integrity and avoid substantial interference with the nature and purpose of the trail (in compliance with Section 7(c)).	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS010 (continued)	(l) Avoid using forest system trails that are not nationally designated as temporary roads or skid trails to the extent possible. If they are determined to be necessary, district recreation staff will be involved to determine the preparation and post treatment of those trails. When system trails are needed, coordination with district recreation staff will occur. Temporary roads should be rehabilitated after use to avoid adverse effects in accordance with TR008. Locations of trail crossings will be designated and should be rehabilitated after use. When using system trails as skid trails, minimize widening, straightening, or changing the surface of the trail; retain character trees and vegetation that defines the trail tread. Trails would be restored to Forest Service standards and Trail Management Objective prescriptions (pre-project condition) following treatment. (m) Minimize the impact of cable logging corridors in visually sensitive areas. When possible, select skyline systems with lateral yarding capabilities. Design skyline corridors for cable yarding without linear edges by utilizing existing openings and clearing the vegetation to promote meandering edges. Strive to make corridor widths 14 ft. to reduce scenic impacts with 20 ft. as the maximum exception and rarely occurring.		
RS011	**Cull Logs, Stump Heights, and Activity Generated Slash Treatments:** (a) Cull logs would not be abandoned on landings. Cull logs may be used for closing temporary roads and decommissioning roads. Cull logs may also be suitable to use as down woody material but should be scattered away from the landings. (b) Stump heights should be cut as low as possible. Where possible, keep stump heights less than 1 foot from ground level. In the immediate foreground of Concern Level 1 and 2 travel routes (roads and trails), developed recreation sites, and private property, stumps should be flush cut, if possible, or cut less than 8 inches above ground (uphill side), where topography and operational safety allows, to maintain scenic integrity (See RS013). (c) Slash must be treated or removed in the immediate foreground of sensitive places (for example, in corridors of eligible or suitable wild and scenic rivers); within 300 feet of the centerline of Concern Level 1 roads, or national trails and sensitive trails; or 300 feet from the boundary of a recreation site or private land/communities. Prioritize slash burning in these locations within 3 years or as soon as possible after treatment. If conventional thinning practices are used and trees are delimbed and topped in the forest, machine-piled slash should be burned as soon as possible, or within 1 – 3 years. If scattering is required, scatter slash to 18 inches or less in depth on average. Root wads and other debris in sensitive foreground areas and in wild and scenic river corridors would be removed, burned, or chipped. Outside of these areas, it is acceptable to scatter root wads and debris or use them to help close temporary roads or skid trails in accordance with TR008. If slash is not removed in grassland treatment areas, it is acceptable to create machine piles 300 feet away from the centerline of CL1 and CL2 level roads and trails, developed recreation sites, and private land/communities. Within eligible or suitable wild and scenic river corridors, slash should be removed, burned, or otherwise treated to restore to the character to which it was designated.	Resource protection and avoid substantial interference with the nature and purpose of the trail. (In compliance with Section 7(c)).	Land Management Plan compliance and specialist recommendation
RS012	Coordinate with a designated Forest Service representative prior to implementing jackstraw, spring, and road restoration treatments. Do not implement jackstraw treatments within the line of sight and/or 300 feet of the Arizona Trail or other National Trails.	Maintain scenic integrity.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS013	In semi-primitive non-motorized recreation opportunity spectrum classes (occurring on about 13 percent of the project area), in eligible or suitable wild and scenic river corridors, and in inventoried roadless areas (IRAs): (a) Temporary Roads • Temporary roads should not generally be built in semi-primitive non-motorized opportunity spectrum classes or eligible or suitable wild and scenic river corridors. If they are built, they would be rehabilitated after use in accordance with TR008. Avoid constructing long stretches of conspicuous temporary roads paralleling the riverbank. • Temporary roads shall not be built in inventoried roadless areas. No road realignment or reconstruction is allowed in inventoried roadless areas. (b) Strive to make stump heights 8 inches above ground (uphill side) or lower, with 12-inch heights the exception and rarely occurring; (c) Slash must be treated or removed in these areas; (d) Use existing barriers (roads) and natural barriers as control lines whenever possible; and (e) Cable operations shall not be conducted in inventoried roadless areas.	Protection of visitor experience.	Land Management Plan compliance and specialist recommendation
RS014	**Developed Recreation Sites:** Proposed mechanical treatments and prescribed fire adjacent to developed recreation sites must be reviewed and approved by the district ranger. Work with the district recreation staff to determine boundaries or no treatment zones around constructed features that need to be protected in campgrounds. Treatments around the perimeter of campgrounds are encouraged. The timing of treatments must be worked out with districts. Treatments would generally avoid summer. Activity slash must be removed within the line-of-sight of developed recreation sites. If campgrounds remain open into fall and winter, provide information about upcoming closures and management activities onsite, at Forest Service offices, and on Forest Service websites.	Protection of visitor experience.	Land Management Plan compliance and specialist recommendation
RS015	Implement road closures, one-way traffic, and area closure restrictions as deemed necessary by forest officials for health and safety concerns during any operation. Signs would be placed at major intersections on hauling routes during periods of active hauling. If it is necessary to close forest roads or areas of the forest, notices and signs would be posted at key locations adjacent to and within the project area, such as along major Forest Service roads accessing the area or on kiosks at trailheads, bulletin boards, electronic sign boards, etc. Closures due to operations would also be posted online and on social media as well as being publicized via news releases. Coordinate with the District Recreation Planner or trails specialist to ensure well marked and publicized detour routes for the Arizona Trail, General Crook Trail, and Highline Trail, and system trails during operational closures within the project. Any closures should be done for as short a time as possible.	Public safety	Land Management Plan compliance and specialist recommendation
RS016	When mechanical treatment occurs along open trails that are not National Trails, slash will be pulled back immediately within 20 feet of the centerline of the trail corridor within specified timeframes (coordinate with recreation specialist).	Maintain scenic integrity.	Land Management Plan compliance and specialist recommendation
RS017	Retain heathy, large diameter, or character trees that have unique shape or form along all trails in a manner that results in stable, wind -firm residuals within 100 ft. of the trail. Avoid lines of trees; strive to achieve a grouped appearance where appropriate to avoid abrupt changes in the landscape character along the trail corridor.	Protect visitor experience.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS018	(a) Prior to blasting activities, nearby landowners or other permitted forest users near the blasting location would be notified. (b) Standing trees and shrubs would be left in strategic locations along the perimeter of active rock pits to serve as screening to sensitive viewsheds.	To improve public safety by increasing awareness of blasting activities and to minimize impacts to scenic resources	Land Management Plan compliance and specialist recommendation
RS019	Entrances to active rock pit sites would be gated to prevent inappropriate motor vehicle use, dumping, or other activities.	Decrease noise, protect public safety and minimize impacts to forest resource in and around rock pit sites.	Land Management Plan compliance and specialist recommendation
RS020	Material extraction activities should not be permitted in designated or recommended special areas or Chevelon Canyon.	To protect the unique character of these areas.	Land Management Plan compliance
RS021	All restoration activities within eligible or suitable wild and scenic river corridors will be designed to protect or enhance the free-flowing character and outstandingly remarkable values (ORVs) of rivers, and to maintain the rivers' current inventoried classifications (wild, scenic, or recreational), unless a suitability study is completed that recommends management for a less restrictive classification (See RS022).	To protect eligible and suitable wild and scenic rivers.	Land Management Plan compliance
RS022	Restoration activities within the corridors of eligible or suitable wild river segments on the Apache-Sitgreaves National Forests would not include any tree cutting.	To protect the primitive character of eligible or suitable rivers classified as wild.	Land Management Plan compliance
SI001	A phased approach can be used to complete light thinning with lop/scatter, so slash does not have to be piled or disposed of mechanically.	To facilitate desired fuel conditions for broadcast burning.	Specialist recommendation
SI002	Where livestock or wildlife grazing could be a threat to restoration of riparian deciduous vegetation and an immediate moderate-severity burn would consume large amounts of felled trees, consider delaying the burn and leaving felled trees in place to create grazing barriers to help assure plant growth. Felled trees may be left in place, lower limbs may be cut and scattered, or all or part of trees may be used for streambank or wetland restoration in order to provide surface roughness and bank stabilization or as necessary to protect riparian or wetland shrubs from grazing by livestock or wildlife (for example, jackstraw barriers).	To create grazing barriers and assure desirable vegetation response.	Specialist recommendation
SI003	Exclosure fencing to prevent utilization of plantings by deer, elk, and livestock is permitted (See RM006).	To provide desired vegetation composition in riparian areas.	Specialist recommendation
SI004	Source trees for placement in stream restoration should come from but are not limited to: over or fully stocked upland and riparian stands that are adjacent to the site, hazard trees, trees that have fallen naturally and are still suitable, trees generated from administrative sites (maintenance, expansion, or new construction), and hardwood restoration.	To maintain forest structure and facilitate riparian restoration activities.	Specialist recommendation
SI005	Danger trees, hazard trees, and trees killed through fire, insects, disease, blow-down and other means can be felled and used for in-channel placement regardless of live-tree stocking levels.	To facilitate riparian restoration activities.	Specialist recommendation
SI006	Identified wildlife trees shall not be felled.	To maintain nest/roost habitat.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SI007	Trees may be stockpiled from upland treatment for use in planned, upcoming instream restoration projects, or other erosion control projects. Stockpiles would not exceed 30 feet wide and the length of trees. Stockpiles would not persist on the landscape for more than 1 year and any unused material would be burned or hauled off site. Stockpiles would not occur in drainages, AMZs, protected areas (SW046), or species-specific buffers.	To facilitate riparian restoration activities.	Specialist recommendation
SI008	Remove juniper to natural stocking levels where Forest Service determines that juniper trees are expanding into neighboring plant communities to the detriment of other native riparian vegetation, soil, or streamflow.	To maintain desired vegetation composition in riparian areas and wetlands.	Specialist recommendation
SI009	For each area evaluated for juniper treatments, interdisciplinary teams would discuss the following questions in order to identify the attributed of an area and select the appropriate treatments: • What kind of site (potential natural vegetation, soils)? • Successional state of site? • Components that need to be restored? • How units may fit into the overall landscape mosaic? • Long-term goals and objectives?	To maintain desired vegetation composition in riparian areas and wetlands.	Land Management Plan Compliance
SI010	Do not cut old-growth juniper, which typically has several of the following features: sparse limbs, dead limbed or spiked-tops, deeply furrowed and fibrous bark, branches covered with bright-green arboreal lichens, noticeable decay of cambium layer at base of tree, and limited terminal leader growth in upper branches.	To provide future snag and coarse woody debris habitat.	Land Management Plan compliance
SI011	Felled trees may be left in place, lower limbs may be cut and scattered, or all or part of trees may be used for streambank or wetland restoration in order to provide surface roughness and bank stabilization or as necessary to protect riparian or wetland shrubs from grazing by livestock or wildlife (for example, jackstraw barriers)	To facilitate riparian restoration.	Specialist recommendation
SI012	On steep or south-facing slopes, where ground vegetation is sparse, leave enough course woody debris in sufficient quantities to promote reestablishment of vegetation and prevent erosion.	To provide soil resource protection in wetlands and riparian areas.	Specialist recommendation
SI013	If seeding is a part of the action, consider whether seeding would be most appropriate before or after juniper treatment.	To provide the most desirable vegetation response.	Specialist recommendation
SI014	Silviculturists, biologists, watershed specialist (specialist responsible for hydrologist or soil scientist duties), or their representatives shall be involved in designing riparian vegetation treatments.	To provide desired vegetation composition in riparian areas and wetlands.	Specialist recommendation
SI015	Prioritize the selection of genetically and ecologically appropriate native plant materials for revegetation activities.	To improve planting success.	Specialist recommendation
SI016	Tree and shrub species, willow cuttings, as well as sedge and rush mats to be used as transplant material, shall come from outside the bankfull width, typically in terraces (abandoned floodplains), or where such plants are abundant.	To provide desired vegetation composition in riparian areas.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SI017	Concentrate plantings above the bankfull elevation.	To provide desired vegetation composition in riparian areas.	Specialist recommendation
SI018	All known survey monuments, witness corners, reference monuments, and bearing trees will be protected against avoidable destruction, obliteration, or damage.	To ensure protection of land survey monuments.	Specialist recommendation and Forest Service requirement.
SI019	Coordinate with US Fish and Wildlife Service during planning and implementation of cable operations that occur in critical habitat and/or occupied habitat for federally listed species.	To avoid or minimize potential impacts to threatened species.	Specialist recommendation
SU001	Notify the affected landowners, permit holders, and Forest Service permit administrators whenever project activities are planned in areas having special use authorizations or non-National Forest System inholdings.	To ensure that landowners and permit holders are aware of planned activities well in advance, and to provide them opportunity to discuss concerns and potential mitigations to protect their sites.	Specialist recommendation
SU002	All National Forest System property boundary lines adjoining private, State, and public trust lands, such as Indian Reservations, shall be located, monumented, marked, and posted to prescribed Forest Service standards prior to undertaking land management activities that will occur near or adjacent to the property line.	To ensure that project activities occur only on National Forest System lands.	Complies with policy in FSM 7152.03
SU003	Evaluate potential haul routes that may be needed through non-Federal land and ensure easements, or road use agreements, are in place or obtained prior to use.	To prevent illegal trespass across lands with other ownership.	Specialist recommendation
SU004	Coordinate management activities with permit holders for any utility corridors (powerlines, pipelines, etc.) to determine how to protect facilities and improvements. Provide notification of activities during planning/layout and prior to implementation. Include pre-work safety meetings between utility holders and contractors.	To protect permit holders' facilities and improvements and ensure that management activities do not interfere with the operation of utility corridors.	Specialist recommendation
SU005	Place project-generated slash outside of permitted utility line and pipeline rights-of-way; do not interfere with utility corridor management.	Ensure that activities do not interfere with the operation of utility corridors.	Specialist recommendation
SU006	Vegetation treatments adjacent to power line corridors will be designed to reduce linear edges and create a more irregular natural appearance outside of the rights-of-way (ROW).	Maintain natural appearance of landscape.	Specialist recommendation
SU007	Prior to selecting sites to harvest, determine if any weather or stream course monitoring infrastructure exists within the project area and coordinate with the special use permit holder to determine if they would like treatments adjacent to their facilities.	To ensure that project activities do not interfere with meteorological data gathering.	Land Management Plan compliance and specialist recommendation
SU008	Protect highway ROW infrastructure from damage by management activities. Include facilities to be protected on contract area maps.	To ensure ROW infrastructure remains functional for its intended purposes.	Specialist recommendation
SU009	Coordinate planned activities with Arizona Department of Transportation (ADOT) and/or the appropriate county to ensure safe operation of roads and highways during project implementation.	To protect public safety on the affected roadways during operations.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SU010	Remove thinning slash from highway ROWs. If approved by the Forest Service, chipped slash may be left onsite at a maximum depth of two inches on average, otherwise excess chips must be removed completely. Any decking or tree processing within ROW needs prior approval. The maximum duration that logs and biomass can be left in the ROW is 30 days.	To ensure slash does not interfere with ROW access as potentially needed by ADOT or county.	Specialist recommendation
SU011	In-woods processing sites would be authorized under the terms of the timber contract or through a special use authorization depending on who would be the operator. Fees may be associated with special use authorizations. Before implementation, all sites would require interdisciplinary surveys and/or involvement.	Ensure proper authorization and permitting of in-woods processing sites.	Land Management Plan compliance
SU012	Through the Arizona Department of Environmental Quality (ADEQ), the operator of an in woods processing site would obtain coverage under a Multi-Sector General Permit (MSGP) for storm water discharges associated with non-mining industrial facilities such as timber products http://www.azdeq.gov/node/525 and http://www.azdeq.gov/permits-needed-timber-products-sector. Coverage under this permit would entail preparation and implementation of a storm water pollution prevention plan (SWPPP) as well as periodic inspections of the facility consistent with requirements of the permit.	Ensure proper authorization and permitting of in-woods processing sites.	Land Management Plan compliance
SU013	Support operations and facilities on in-woods processing sites that would be allowed include office trailers, sanitation facilities and fuel products storage containers or temporary structures. Fencing would be allowed to provide security for equipment and products. Camping or living trailers would not be allowed in the processing sites. Operators would provide their own water and water storage facilities and trash pickup. Connections to nearby powerlines and phones lines would be permitted. Operations on site would comply with fire restrictions and forest closures as applicable. Processing sites located in the interior of the project area would operate when the roads are open and passable and may be closed during the winter months if road and in-woods conditions are such that resource damage will occur, typically mid-December to April. Sites located near state highways or other paved roads may operate year-round.	Ensure proper design and construction of in-woods processing sites.	Land Management Plan compliance and specialist recommendation
SU014	The design, construction and operation of in-woods processing sites shall utilize practicable procedures for control of surface water runoff from facilities.	Ensure proper design and construction of in-woods processing sites.	Land Management Plan compliance
SU015	The contractor or permittee operating the in-woods processing site shall maintain the authorized facility and site in good condition and in accordance with approved contract or operating plans and specifications. When the contractor or permittee completes the authorized activity, they must rehabilitate by removing all facilities and structures, removing all wastes with disposal at an approved facility, restoring the pre-disturbance site gradient, preparing the site for reseeding by scarifying the site, and application of a native seed mix as specified and approved by the Forest Service.	Ensure proper reclamation and rehabilitation of in-woods processing sites.	Land Management Plan compliance

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW001	All waterbodies, including reservoirs, lakes, streams, and water dependent features including groundwater dependent ecosystems such as springs, seeps, fens, and other wetland features such as wet meadows would be protected with AMZs (referred to as Riparian Management Zones on the Tonto National Forest), measured as the slope distance from the edge of each side the stream and or riparian areas (wet meadows, springs, wetlands etc.). AMZ widths should be based on Land Management Plan direction or other guidance documents. Where AMZ widths are not customized to site conditions or species (see AQ021, AQ0040), the default minimum width for ground-based mechanical and prescribed burning treatments for perennial, intermittent, and ephemeral streams are 150, 75, and 50 feet, respectively. AMZ widths for all other features are 150 feet. Features to be protected with an AMZ will be shown on the project task order, contract or agreement maps, or burn plan maps. AMZ widths will be clearly labeled or described. Project specific design features such as Best Management Practices for water quality protection within AMZs will be implemented prior to construction when specified. (See SW003 for acceptable activities within AMZ's).	To ensure adequate protection of surface water quality during ground-based mechanical vegetation treatments and to provide consistency in how AMZ widths are measured and identified on the ground.	Specialist recommendation
SW002	Unless prescribed by Land Management Plan direction, AMZs can be increased by an interdisciplinary team (IDT) of qualified specialists prior to project implementation based on desired conditions along the stream reach and the nature of resource values at risk (such as the presence of aquatic Endangered Species Act species or its potential introduction), special concerns for water quality degradation, erosion hazard, existing vegetative ground cover conditions, stream bank and riparian conditions, natural geologic features, and flow regime. The IDT will determine appropriate AMZ widths and treatment limitations within these zones. These changes should be reflected in the plan-in-hand documents and included in the task order or contract maps.	To allow the greatest flexibility in designing AMZ prescription to meet resource benefits while protecting the values at risk.	Specialist recommendation
SW003	Accepted activities within AMZs include mechanical and hand tree felling, yarding, limited skidding, backing fire, and stream and springs restoration projects. When completing mechanical vegetation treatments within an AMZ, minimize the area of equipment usage in the AMZ. Vehicular operations including skidding should not occur longitudinally through AMZs. Turning machines and skidding within an AMZ should be minimized to the greatest extent possible. Landings, decking areas, machine or hand piles will occur outside of AMZs unless otherwise specified. Skidding across stream channels is covered in SW029 and SW031. Minimize disturbance and removal of riparian vegetation within AMZ's.	To avoid, improve, or minimize effects to soils, water quality, and aquatic species and habitat.	Land Management Plan compliance and specialist recommendation
SW004	Mechanical vegetation treatments within AMZs will minimize the amount of thinning debris deposited in stream channels and remove excess debris by hand or end-lining with one end suspension except where coarse woody debris is needed for stream health as identified by fisheries or watershed specialist (a specialist responsible for hydrologist or soil scientist duties). Remove thinning debris less than six inches in diameter and less than six feet long and place it above the ordinary high-water mark.	To minimize the potential for stream or culvert blockage.	Specialist recommendation
SW005	Mechanical vegetation treatments within AMZs will fell trees outside the stream channel unless otherwise specified as a stream treatment.	To minimize disturbance to stream morphology as much as possible and reduce the amount of fine woody debris entering the stream system.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW006	If completing mechanical vegetation treatments within an AMZ, do not designate trees for removal where the root system is important in maintaining channel morphology without first consulting with a watershed specialist (a specialist responsible for hydrologist or soil scientist duties).	To provide for bank stability and minimize erosion and bank instability to streams or other aquatic habitats.	Land Management Plan compliance and specialist recommendation
SW007	Burn plans which allow fire to enter AMZs will be driven by the need to maintain or improve riparian and stream habitat (with the exception of WUI areas, see SW010 below). Consult with a watershed specialist (specialist responsible for hydrologist or soil scientist duties) and biologist if within threatened and endangered habitat where treatment in the AMZ is proposed.	Proper maintenance of prescribed burning activities adjacent to and/or within AMZs should help maintain the sediment filtering capacity of drainage way and reduce potential erosion in these locations.	Specialist recommendation
SW008	Fire control lines shall only be constructed within AMZs if mutually agreed upon by the authorized Forest Service officer, fuels specialist, watershed specialist (specialist responsible for hydrologist or soil scientist duties), and biologist. When constructing firelines, only the following are allowed in AMZs: Raking, brushing (less than 3 feet wide), leaf-blower, or other techniques that limit disturbance to soils. Any fireline in AMZ's need to be rehabilitated by removing any berms and raking removed material back across the fireline as soon as possible to prevent sediment movement.	To minimize the disturbance of riparian vegetation and minimize sediment.	Specialist recommendation
SW009	The following direction should be incorporated in developing the burn plan and project implementation: High soil burn severity should not occur on greater than 5 percent areal extent of the uplands or an AMZ in each burn unit unless to meet specific IDT treatment objectives. High-severity should be patchy rather than concentrated. No more than 5 percent mortality should occur in the mature desired riparian canopy along a streamside in each burn unit, with this mortality occurring as discontinuous patches. Variance in these parameters would need to be approved by appropriate specialist(s).	Maintaining low / moderate burn intensities and limiting the areal extent of high intensity burning will reduce the potential for severe soil burning which ultimately helps retain long-term soil stability/productivity and minimizes detrimental effects to soil, aquatic species, aquatic habitat, and desirable riparian species (flora and fauna) in AMZs.	Land Management Plan compliance and specialist recommendation
SW010	Apply the following direction if AMZ is within ½ mile of private land boundary or designated WUI: Treatment measures necessary to reduce the risk of wildfire encroachment on adjacent private lands may take priority over other considerations in these AMZs. Entry and treatments in these reaches will be considered on a case-by-case basis by IDTs.	To ensure that the fire management objectives and water quality objectives for these reaches are appropriately balanced.	Specialist recommendation
SW011	As part of seeding or other revegetation activities, do not apply surface fertilizer within an AMZ.	To protect water quality.	Land Management Plan compliance and specialist recommendation
SW012	Domestic livestock grazing within an AMZ affected by prescribed fire may be deferred until ground cover is adequately re-established as per guidance outlined in RM004.	Promote recovery and establishment of riparian species, protect floodplain function, and provide for resilient stream systems.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW013	During project implementation use existing system travel courses and stream crossings whenever possible unless new construction would result in less resource disturbance. Minimize the number of temporary access roads and operational travel courses to lessen soil disturbance, compaction, and impacts to vegetation. Temporary roads will not be constructed on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. Temporary road construction is not allowed within AMZs. Temporary roads areas will be restored to natural, preconstruction conditions as much as possible in accordance with TR008.	To minimize soil disturbance and reduce sedimentation and erosion in aquatic habitats.	Land Management Plan compliance and specialist recommendation
SW014	When altering spring developments or splitting flow, place troughs far enough away from groundwater-dependent ecosystems), wetlands, and other sensitive or unique habitats to prevent erosion, compaction, or degradation to sensitive soils and vegetation due to livestock or wildlife congregations.	To maintain or improve the integrity of springs and other groundwater-dependent ecosystems and minimize effects on these sensitive systems.	Specialist recommendation
SW015	During implementation, vehicle staging, fueling of vehicles, and storage of petroleum products would be done on a designated protected upland outside of AMZs. Equipment operators shall maximize the recovery and proper disposal of all fuels, fluids, lubricants, empty containers, and replacement parts. If more than 1,320 of gallons of petroleum products are to be stored onsite above ground or if a single container exceeds 660 gallons, then a SPCC would be prepared as per 40 CFR 112. All herbicide and pesticide servicing and storage will be on designated, approved, upland sites.	To protect soil/water resources and aquatic species from petroleum, herbicide and pesticide contamination.	Land Management Plan compliance and specialist recommendation
SW016	Contractor shall take all reasonable precautions to prevent pollution of air, soil, and water by Contractor's Operations. If facilities for employees are established on a project area, they shall be operated in a sanitary manner. In the event that Contractor's Operations or servicing of equipment result in pollution to soil or water, the contractor shall conduct cleanup and restoration of the polluted site to the satisfaction of Forest Service and state regulations. Contractor shall maintain all equipment operating within the project area in good repair and free of abnormal leakage of lubricants, fuel, coolants, and hydraulic fluid. Contractor shall not service tractors, trucks, or other equipment on National Forest System lands where servicing is likely to result in pollution to soil or water. Contractor shall furnish oil-absorbing mats for use under all stationary equipment or equipment being serviced to prevent leaking or spilled petroleum-based products from contaminating soil and water resources. Contractor shall remove from National Forest System lands all contaminated soil, vegetation, debris, vehicle oil filters (drained of free-flowing oil), batteries, oily rags, and waste oil resulting from use, servicing, repair, or abandonment of equipment.	To protect soil/water resources and aquatic species from petroleum contamination.	Land Management Plan compliance
SW017	Dry meadow and grassland locations will be identified during the layout phase of a project sale and will be clearly labeled on contract maps for protection. In meadow and grassland restoration sites where, encroaching trees are being removed, designate skid trails in order to limit disturbance. Where material is not being removed, lop and scatter or manually remove slash from meadow are the preferred methods of treating slash. Do not machine pile within meadows or grasslands. Temporary roads, storage areas, camp sites, landings, machine piles and/or skidding should not occur on dry meadows in a project area.	To minimize impacts to meadow systems and improve implementation.	Specialist recommendation
SW018	At spring development restoration sites, place watering troughs far enough from a steam or surround with a protective surface to prevent sediment delivery to the stream. Avoid steep slopes and areas where compaction or damage could occur to sensitive soils, slopes or vegetation due to congregating livestock or wildlife.	To reduce sediment delivery to aquatic habitats.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW019	Spring developments should not disturb the spring orifice (point where water emerges). Spring head boxes should be places in a location that will cause the least amount of disturbance to the soils and vegetation of the groundwater-dependent ecosystem. Preferable locations for spring head boxes should be in an established channel downstream from the orifice or a locations where flowing water becomes subsurface.	To maintain or improve the integrity of springs and other groundwater-dependent ecosystems and minimize effects on these sensitive systems.	Specialist recommendation
SW020	Formerly used skid trails should be utilized where they do not impair soil or other watershed resource conditions. The designation of new skid trails should be oriented to the contour of the slope as much as operationally feasible. Skid trail design should minimize concentrated runoff and sediment delivery by avoiding long, straight skid trails and providing breaks in grade. Designated skid trails and log landings would be required within the tree removal contracts (BMP 24.18 in FSH 2509.22) on all cutting units. Location of new skid trails and overall skid trail placement should be designed to minimize the overall disturbance footprint across the treatment unit while still meeting the objectives of the stand treatment.	Utilization of existing skid trails, designation of new skid trails, and proper skidding design should reduce the overall heavy disturbance footprint across the treatment unit. Skid trail placement that follows the contour of the slope as much as operationally feasible will help lessen the potential for accelerated erosion downslope.	Specialist recommendation
SW021	Closed skid trails and roads must have adequate runoff and erosion control features to minimize excess erosion and sedimentation. Slash is the preferred method for diverting water if of sufficient quantity and size is available to maintain complete contact with the ground. Otherwise, construct water bars and lead out ditches. Waterbars should not be constructed more than 2 feet high. Lead-out ditches or water bars shall be constructed to hydrologically disconnect travel route surface runoff from stream channels. All berms and depressions (such as ruts) created along the skid trail or road will be filled in to restore the natural grade of the slope as much as possible.	Minimize the concentration of run-off and sediment delivery into stream channels.	Land Management Plan compliance and specialist recommendation
SW022	Erosion control structures and measure must be in place prior to an erosive event. The timber sale and/or stewardship contract, and or agreement outlines the timing and application of erosion control methods to minimize soil loss and sedimentation of stream courses.	Minimize the concentration of run-off and sediment delivery into stream channels.	Land Management Plan compliance and specialist recommendation
SW023	Scarification or shallow ripping of landings should be conducted in a manner as not to mix the surface soil and subsoils to the point where subsoil becomes inverted and exposed at the surface.	Mixing of surface soil and subsoil is generally not conducive to obtaining desirable herbaceous revegetation.	Specialist recommendation
SW024	During machine piling of slash, rough piling is encouraged. This involves piling only large concentrations of slash, leaving areas of low concentration undisturbed. Also, where feasible, use a brush rake to minimize disturbance to the soil surface.	Rough piling minimizes disturbance to existing ground cover and the surface soil.	Specialist recommendation
SW025	Slash can be placed on skid trails and travel corridors to a maximum depth of 18 inches to drive on to reduce rutting and soil disturbance from mechanized equipment.	To reduce potential for rutting and compaction along mechanical equipment travel courses.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW026	Seed mixes for erosion control on disturbed locations should be certified weed-free native species at a minimum of 5 pounds per acre pure live seed. Potential vegetation for individual sites should utilize the Apache-Sitgreaves, Coconino, and Tonto National Forests' Terrestrial Ecosystem Surveys (TES) to identify species to be utilized. Where appropriate and feasible, protect site with a variety of methods (for example, ungulate proof fencing, spreading slash etc.).	Minimize soil loss and sedimentation of stream courses from skidding operations. Minimize noxious weed spread and reestablish native vegetation. Minimize effects on severe erosion soils.	Land Management Plan compliance
SW027	Mechanical crushing or placement of lopped slash for the purposes of promoting long-term soil productivity or maintaining soil stability is appropriate in accordance with SW025.	Incorporate slash into the soil to promote long term soil productivity.	Land Management Plan compliance
SW028	Slash and/or chips can be scattered on landings to help minimize the formation of rills and gullies.	Minimize the concentration of run-off and sediment delivery into stream channels.	Specialist recommendation
SW029	Skid trail stream crossings on intermittent and perennial streams must be pre-approved by the authorized Forest Service officer in consultation with a watershed specialist (a specialist responsible for hydrologist or soil scientist duties) or another qualified specialist. Ephemeral stream skid trail crossings will be authorized in locations to minimize soil and channel disturbance by the authorized Forest Service officer. The number of designated crossings should be minimized.	A qualified person should designate stream crossings in order to protect stream banks and stream morphology.	Specialist recommendation
SW030	Felling to the lead would be required within the timber sale and/or stewardship contract, and or agreement to minimize ground disturbance from skidding operations.	Felling of timber should be done to minimize ground disturbance from skidding operations and to minimize effects on severe erosion soils.	Land Management Plan compliance
SW031	Culverts, temporary bridges, low-water crossings, log-fords, or other types of acceptable features will be required on all reopened and utilized Maintenance Level 1 systems roads, and skid crossings on all streams that will have flowing water during the life of the temporary crossing. All constructed features and fill material will be removed from these stream crossings and the channel and stream banks restored to a pre-project condition, unless otherwise approved by the sale administrator or COR after coordination with a hydrologist, soils specialist, and biologist, and the authorized Forest Service officer.	Protect stream morphology from damage from crossings while avoid damming or impounding free-flowing waters to provide streamflows needed for aquatic and riparian-dependent species.	Land Management Plan compliance and specialist recommendation
SW032	During thinning, operators shall avoid excavating skid trails whenever practical, locate skid trails where the need for sidecasting is minimized, and avoid adverse skidding to the greatest extent possible. If specialized equipment is available, utilize equipment designed to minimize ground disturbance when operating on sensitive soils and adverse slopes.	To prevent soil displacement.	Specialist recommendation
SW033	Slash should be distributed throughout skid trails, forwarder trails and cable corridors wherever mineral soils are exposed.	To provide surface roughness and prevent concentrated runoff that could cause accelerated erosion.	Specialist recommendation
SW034	During cable thinning operations, operators shall limit cable thinning to uphill yarding whenever practical. When downhill cable yarding is necessary, operators shall layout the cutting system in a manner which minimizes soil displacement. The numbers and widths of yarding corridors shall be minimized.	To prevent soil displacement from cable yarding operations.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW035	Operators shall minimize the yarding of logs across streams or wetlands. Yarding across ephemeral streams shall be performed in ways that minimize soil and bank disturbances. Where it is necessary to yard across intermittent or perennial streams or wetlands, it shall be done by swinging the yarded material free from the ground to the greatest extent practicable (such as full suspension).	To prevent adverse effects to water quality.	Specialist recommendation
SW036	During cable thinning operations, operators shall install effective cross ditches that drain onto undisturbed forest floor or spread slash on all skid trails and cable corridors located on steep or erosion-prone slopes	To prevent erosion and sediment delivery to stream courses and other waterbodies.	Specialist recommendation
SW037	Landings and decks should be clearly designated on the timber sale project plan.	To aid in implementation of project.	Specialist recommendation
SW038	Sizing, spacing, and placement of landings should be designed to minimize the overall ground disturbance footprint across the treatment unit while still meeting the objectives of the stand treatment.	Limit the overall amount and extent of heavy ground disturbance that implicates soil stability/ productivity as well as the filtering capacity of upland areas.	Land Management Plan compliance and specialist recommendation
SW039	Heavy ground disturbance activity areas (landings, major skid trails, unsurfaced haul roads, etc.) and excessive ground disturbance in any location (such as exceeding the rutting guidelines) should aim to not exceed 15 percent -areal extent of a treatment unit within a timber sale area.	To meet soil condition thresholds for management concern and to reduce the overall heavy ground disturbance footprint across a treatment unit.	Land Management Plan compliance and specialist recommendation
SW040	Skid trails, landings, and temporary roads are to be closed and have erosion control measures implemented as outlined in SW021 and TR008. Post-treatment and landings are to be scarified and seeded with a certified weed-free mix of primarily native, perennial grasses. The Coconino National Forest does not require scarification unless compaction is present.	Scarification and seeding of heavily disturbed areas will help break up soil compaction and reintroduction of native, perennial grass species will aid in mitigating the over-establishment of exotic or noxious weeds. Water-barring, restoring the natural grade or the slope, and utilizing slash for additional erosion control mitigation will dissipate the run-off energy, reducing sediment delivery, as well as aiding in long-term site stability/productivity.	Land Management Plan compliance and specialist recommendation
SW041	When thinning trees, no skidding is allowed across wetlands or springs and their outflows. This restriction needs to be displayed on contract or agreement area maps.	To minimize impacts to streams and soils in meadows from tree thinning operations.	Land Management Plan compliance

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SW042	Prior to the closure of the project contract, the authorized Forest Service contract team member or the sale administrator, in consultation with a watershed specialist (a specialist responsible for hydrologist or soil scientist duties) or other applicable specialist, will verify that the contractor has properly implemented the project watershed BMPs and erosion control measures. In evaluating acceptance, the following definition will be used by the Forest Service: "Acceptable" erosion control means only minor deviation from the established standards and guidelines, providing no major or lasting impact is caused to soil and water resources. Include biology staff where units are adjacent to federally listed and sensitive aquatic species habitat. Certified timber sales administrators or contracting officer representatives (CORs) would not accept erosion control measures that fail to meet these criteria.	It is necessary to have a watershed specialist present during closeout to ensure that project watershed BMPs were implemented correctly as they were the original designer of the conservation practice. To minimize sediment delivery to threatened and endangered and sensitive species aquatic habitat	Specialist recommendation
SW043	Meadow vegetation treatments will be conducted in a site-specific manner to be determined by a watershed specialist (specialist responsible for hydrologist or soil scientist duties) and a silviculturist.	Dry meadow soil types have low soil weight-bearing strength due to seasonally high moisture contents and inherent soil characteristics which make them highly prone to detrimental soil compaction and topsoil displacement.	Specialist recommendation
SW044	Whether identified pre-implementation and on a task order/contract area map or during the implementation phase, locations above 25 percent slope gradient on sensitive soil types (for example, cinder cones) will include a "protected area" designation that is clearly marked to exclude the use of mechanized thinning equipment. Hand-felling methods only will be permitted in these locations, unless use of specialized equipment may allow operations on steeper slopes. Viability and authorization of specialized equipment use above these slope gradients will be determined during the layout phase of a sale by the pre-sale forester and a watershed specialist (specialist responsible for hydrologist or soil scientist duties). This specification of desired equipment must be specified in the contract.	To protect highly erodible/sensitive soils on steep slopes by preventing traffic by heavy machinery on soils that are susceptible to destabilization and erosion.	Specialist recommendation
SW045	All ground-disturbing activities using heavy equipment must be done under conditions which maintain soil condition (such as avoiding excess rutting, compaction, and displacement).	Ensure that mechanical operations do not take place when ground conditions are such that detrimental soil compaction and topsoil displacement can occur.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW046	Skid Trails: Allow up 6 inches of rutting over no more than 15 percent areal extent along a skid trail (two or more drags being considered a skid trail). Depth of rut is a measurement from the bottom to the top of a berm.	Excessive ground disturbance and rutting causes detrimental soil compaction and topsoil displacement. Compaction effects to the surface soil and inverted, exposed subsoil is not conducive to obtaining desirable long-term herbaceous revegetation. Excessive ground disturbance hinders long-term soil stability and productivity through increased erosion and establishment of exotic or invasive species that out-compete native, perennial grasses and forbs.	Land Management Plan compliance and specialist recommendation
SW047	At landings and within 75 feet of landings, rutting depths greater than 10 inches will not be allowed. Landings on slopes greater than 20 percent will be minimized to the greatest extent practicable and soil and watershed mitigation measures will be applied on a case by case basis to ensure that unacceptable soil loss does not occur.	Prevents detrimental soil disturbance to depths that are difficult to adequately ameliorate and that could lead to broken tree roots resulting in drought stress of remaining trees.	Land Management Plan compliance and specialist recommendation
SW048	Rutting on an unsurfaced road (generally Maintenance Level 1, 2 and temporary roads) will not exceed 8 inches depth for more than 75 linear feet or 10% of road length, whichever is shorter. Rutting in excess of 3 inches depth will not be permitted on surfaced collector or arterial roads (generally some maintenance level 2 and all maintenance level 3 and 4 roads).	Prevents rutting of the road traveled way that could lead to concentrated runoff, erosion and adverse effects to surface water quality.	Land Management Plan compliance and specialist recommendation
SW049	For any other locations (for example, interior locations other than skid trails) within a sale area, if wheel tracks or depressions consistently exceed 2 inches then conditions are too wet to operate in these areas.	To prevent detrimental soil disturbance and compaction that would make it difficult for vegetation to become reestablished.	Land Management Plan compliance and specialist recommendation
SW050	No prescribed fire control lines should be constructed using mechanized equipment on slopes greater than 40 percent or greater than 25 percent on identified fragile or sensitive soil types.	Restriction of fire control line construction and burning activities to these slope breaks will help mitigate accelerated overland flow and erosion typically associated with these settings.	Specialist recommendation
SW051	If fire control lines are constructed, rehabilitate lines after use by either rolling berm back over the entire fire line, spreading slash across the fire line, or water barring the fire line. If water barring only, vary spacing dependent on slope and disguise the first 300 feet of line to discourage use as a trail.	To prevent erosion and sediment delivery from firelines to stream courses. Also prevents firelines from being used as trails, thereby hastening recovery.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW052	Coarse woody debris will be managed to achieve Land Management Plan direction and specialist recommendations. These recommended levels may be lower in WUI areas. Ponderosa Pine Forest: 3 to 10 tons per acre (For Tonto National Forest: Refer to Land Management Plan). Dry Mixed Conifer: 5 to 15 tons per acre (For Tonto National Forest: Refer to Land Management Plan). For facilitative operations or other activities that may occur in non-target vegetation types (for example, Pinyon-Juniper, Wet Mixed Conifer), refer to the applicable Land Management Plan to find appropriate fuel loading levels.	Maintain long term soil productivity. To provide levels of surface fuels (fine and coarse woody debris) to address the need for habitat (cover), soils (organic material and limited areas of high burn severity), and fire (to limit areas of high burn severity and a high resistance to control).	Land Management Plan compliance and specialist recommendation
SW053	Burn plans will be designed to promote resource benefits to riparian and wetland areas. Minimize fire severity in areas where degradation to riparian or wetland existing condition is a concern.	These systems may lack the vegetation to adequately dissipate energy and protect stream banks, therefore retaining the vegetative cover is necessary.	Specialist recommendation
SW054	At some stage prior to mechanical treatment and prescribed burning implementation include a watershed specialist (specialist responsible for hydrologist or soil scientist duties) or other relevant specialist to determine whether treatment extent or severity is appropriate for a subwatershed (HUC12). As a default, limit the areal extent of mechanical treatment which may occur in a subwatershed to 25% in a given year and 40% over 5 years of that subwatershed. For prescribed burning the percentages can be doubled. This is for subwatersheds that have not experienced a relatively recent largescale disturbance such as a fire and/or in a nonfunctioning condition. If exceeding these percentages by either treatment type or in combination, perform a more detailed watershed evaluation/analysis using a procedure such as the Equivalent Disturbed Area Analysis or other appropriate methodology. If it is determined that potential cumulative effects may be adverse to watershed function and condition, treatments should be spread out spatially and temporally.	Reduce potential cumulative effects which may adversely affect subwatershed scale (HUC12) condition or function.	Specialist recommendation
SW055	When restoring floodplains, mimic to the extent possible, the elevation, width, gradient, length, and roughness that would occur naturally for that stream reach and associated valley type.	To improve hydrologic function and connectivity and reduce detrimental effects to channel morphology and aquatic habitat. Reconnecting floodplains to their historic stream channels will improve soil hydrologic function, increase wetted area, and provide for improved stream morphology.	Specialist recommendation
SW056	Open system road and temporary road erosion control features, such as lead-out ditches or cross drains, shall be constructed and maintained as needed to hydrologically disconnect road surface runoff from stream channels.	Minimize the concentration of run-off and sediment delivery into stream channels.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW057	Road drainage is controlled by a variety of methods including rolling the grade, insloping, outsloping, crowning, water spreading ditches, and contour trenching. Sediment loads at drainage structures can be reduced by installing sediment filters, rock and vegetative energy dissipaters, and settling ponds. Design of roads is included in the transportation plan of the forest product removal contract or agreement and T- specs. Road maintenance through the integrated resource service contract forest product removal contracts/agreements should require pre-haul and post-haul maintenance on all roads to be used for haul.	Minimize soil movement, maintain water quality, and minimize effects on severe erosion soils.	Land Management Plan compliance and specialist recommendation
SW058	Prioritize relocation of trails or roads in locations that benefit multiple resource areas. Relocated trails or roads will be constructed in a manner that does not hydrologically connect them to stream courses to the extent practical. Relocated roads and trails will have sufficient drainage features to maintain the integrity of the traveled way. New cross drains or lead-out ditches shall discharge to stable areas where the outflow will quickly infiltrate the soil and not develop an erosional feature such as a gully.	To provide for stable and serviceable roads and trails that do not adversely affect soils, surface water quality or aquatic habitats.	Specialist recommendation
SW059	Site rehabilitation on riparian sites for stream channel and road reconstruction projects where ground disturbance occurs: seed at 5 pounds per acre or other appropriate rate with certified weed-free native seed mix to rehabilitate the site and minimize effects of noxious weeds.	To comply with State and Federal water quality standards by minimizing soil erosion through the stabilizing influence of vegetation ground cover.	Land Management Plan compliance and specialist recommendation
SW060	Site rehabilitation on disturbed sites and stream channel shaping on decommissioned roads consists of several revegetation methods, such as, but not limited to: (1) Storing sod removed from the initial ground disturbance and replace the sod from the top of the bank on the disturbed site; (2) Use appropriate mix of species that will achieve vegetation establishment and erosion control objectives at the site. (3) Protect site with slash spread across the disturbed area to create microclimates and protect from grazing ungulates. Slash placement should be limited to the upper two-thirds of the bank to limit transport downstream of woody material;(4) Consider the use of mycorrhizal inoculum on severely disturbed sites where no topsoil is left; and (5) install erosion mat.(6) Protect site with herptile-friendly barriers until the site has reestablished (see AQ016). Temporary erosion control should be installed before land or channel disturbing activities commence and will be inspected for adequacy/effectiveness at sufficient intervals to minimize adverse effects to soils or surface water quality.	Comply with State and Federal water quality standards by minimizing soil erosion through the stabilizing influence of vegetation ground cover. To rehabilitate all disturbed areas from aquatic and watershed restoration treatments, minimize erosion and sedimentation to aquatic habitats and potential effects to species.	Specialist recommendation
SW061	All potential seeding areas as part of restoration treatment to re-establish native, perennial grass abundance and vigor will be evaluated on a site-specific, case-by-case basis by the project IDT. Seeding product for potential treatment areas will contain a mixture of certified weed-free native grasses which will contain a composition and ratio to be determined by the IDT.	For locations that do not have a viable enough seed bank to be propagated by prescribed fire activities alone, seeding may be necessary to help sites rejuvenate a more abundant and diverse herbaceous cover component that is aligned with the natural vegetative potential of the site.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW062	De-compact soil by scarifying the soil surface of roads and paths, stream crossings, staging, and stockpile areas so that seeds and plantings can root. (See SW040)	To rehabilitate all disturbed areas from aquatic and watershed restoration treatments, minimize erosion and sedimentation to aquatic habitats and potential effects on species.	Land Management Plan compliance
SW063	For road, trail, aquatic, and watershed treatments: dispose of slide and waste material in stable sites out of the flood-prone area. Use native materials to restore natural or near-natural contours.	To protect water quality and aquatic habitat.	Specialist recommendation
SW064	If soil compaction occurs during implementation, mitigate through ripping, seeding with native weed-free seed, and covering compacted areas with slash or other certified weed free mulch material.	Minimize soil compaction, soil detachment, and sediment transport. To maintain long term soil productivity.	Specialist recommendation
SW065	Erosion control measures for roads, skid trails, landings, fire control lines, in woods processing sites, rock pits, and restoration and construction activities will be implemented in a timely manner to prevent excessive erosion and sedimentation from precipitation events or other disturbances. If implementation timing is not specified in a contract consult with a watershed specialist (specialist responsible for hydrologist or soil scientist duties) for clarification if needed.	To minimize ground disturbance in aquatic and associated habitats during site preparation and sedimentation to aquatic habitats.	Specialist recommendation
SW066	Minimize clearing and grubbing activities when preparing staging, project, and or stockpile areas. Any large wood, topsoil, and native channel material displaced by construction will be stockpiled for use during restoration if applicable. Materials used for implementation of aquatic and watershed restoration categories (for example, large wood, boulders, fencing material) should be staged out of the 100-year floodplain.	To minimize ground disturbance in aquatic and associated habitats during site preparation and sedimentation to aquatic habitats.	Specialist recommendation
SW067	Minimize time in which heavy equipment is in stream channels, riparian areas, and wetlands. Complete earthwork as quickly as possible when ground conditions are driest. During excavation, stockpile native streambed materials above the bankfull elevation, where it cannot reenter the stream, for later use.	To minimize ground disturbance in aquatic and associated habitats during site preparation and sedimentation to aquatic habitats.	Land Management Plan compliance and specialist recommendation
SW068	Disturbance to streambank vegetation should be minimized in all project activities.	To protect riparian vegetation and stream channel stability.	Specialist recommendation
SW069	Do not borrow road fill or embankment materials from the stream channel or meadow surface on road maintenance projects. End-load all material hauled onsite and compact fill.	Minimize disturbance in drainage systems and minimize sediment production within channel.	Specialist recommendation
SW070	Heavy equipment will be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (for example, minimally sized, low pressure tires, minimal hard turn paths for tracked vehicle, temporary mats or plates within wet areas or sensitive soils).	To minimize impacts to streams and wetlands as well as aquatic habitats from heavy equipment use to implement restoration treatments.	Land Management Plan compliance and specialist recommendation
SW071	Placement piles for burning will occur outside of fragile or sensitive soil types.	Minimize disturbance of sensitive soil.	Specialist recommendation
SW072	Project implementation activities will be completed as to not negatively impact existing water rights as recognized and being consistent with Arizona Department of Water Resources and applicable regulations.	To protect existing water rights.	Land Management Plan compliance

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW073	All erosion control work to be constructed related to ground disturbing activities would be in place or maintained prior to potential damaging runoff events.	To avoid and minimize impacts to water quality and watershed integrity.	Land Management Plan compliance and specialist recommendation
SW074	One 50-gallon spill kit (or two 30-gallon spill kits) must be located on-site during use of all heavy equipment.	To avoid impacts to water quality and wildlife.	Specialist recommendation
SW075	No permanent structures would be constructed as part of any rock pit; although at least one self-contained portable toilet is required to be on-site during all operations.	To protect water quality and prevent unnecessary impacts to vegetation and wildlife.	Specialist recommendation
SW076	In rock pit areas, minimize soil and vegetation disturbance to the extent practical outside of the area needed for extraction of material from the pit.	Prevents impacts to soil, vegetation, and wildlife.	Specialist recommendation
SW077	If possible, stockpile rock-pit soil for reclamation that is first removed to access the aggregate material source. Soil would be stockpiled instratum and replaced so that the “A” horizon is back on the surface. Replace soil, revegetate, and reclaim mined areas pit as soon as possible once pit use is discontinued.	To facilitate reclamation efforts.	Specialist recommendation
SW078	In rock pits, stockpiled material should be placed and shaped to prevent water from ponding and to direct water to a drainage system. Mine pit areas would be designed to be internally draining, keeping sediment on-site of rock pits using settling ponds, check dams, or sediment barriers; and monitor and inspect the site frequently and correct problems promptly. Ponds should be cleaned out before they are more than 1/3 full of sediment.	To protect water quality.	Specialist recommendation
SW079	Slash piles should not be placed within 300 feet of perennial or intermittent streams or within 100 feet of ephemeral streams unless local conditions suggest otherwise.	To minimize impacts to streams and wetlands as well as aquatic habitats.	Land Management Plan Conformance
SW080	Surveys would be conducted within the modeled habitat identified in the soil specialist report (USDA FS 2021) for biological soil crusts prior to implementation using the Field Guide to Biological Soil Crusts of Western US Drylands (Rosentreter, 2007). Where feasible, flag and avoid areas with confirmed biological soil crusts categories 4-6 (Rosentreter 2007) for mechanical treatments and temporary road building.	To minimize impacts to biological soil crusts.	Specialist recommendation
TR001	Avoid locating temporary roads on soils with severe erosion hazard.	The completion of a total maximum daily load assessment may result in developing additional water quality improvement strategies and mitigation of effects within associated watersheds.	Specialist recommendation
TR002	On areas to be prescribed burned, if decommissioned roads are used as fire lines, return decommissioned roads to their pre-burn condition. Rehabilitation of the surface should refer to the soil and water BMPs for rehabilitation of fire lines and disturbed areas.	Discourage use on previously decommissioned roads and maintain a safe and economic road system.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
TR003	Where temporary road construction is unavoidable, provide soil protection through implementation of any of the following methods to control sediment and protect water quality. Methods may include but are not limited to properly locating the temporary road in an upland position, road drainage (waterbars/rolling dips), and outsloped roads. For activities adjacent to the road to control runoff, include tactics such as wattling, hydro-mulching, straw or wood-shred mulching, spread slash, erosion mats, terraces, blankets, mats, silt fences, riprapping, tackifiers, soil seals, seeding and side drains.	To protect long-term soil productivity.	Specialist recommendation
TR004	Utilize road safety signage with any project road activities that are related to project implementation.	Provide for user safety.	Specialist recommendation
TR005	Utilize the closest material source that has the specified material type for all road maintenance/reconstruction/relocation projects.	Minimize energy use for road maintenance/reconstruction/relocation activities.	Specialist recommendation
TR006	The timber contract or stewardship contract should require pre-haul and post-haul maintenance on all roads to be used for haul.	Provide for a safe travel surface and provide for access to the project area.	Specialist recommendation
TR007	Decommissioned roads should have the roadbed removed and natural contours and gradients restored as much as possible. Slash or other suitable erosion material (mats, wattles, jute, silt fence, etc.) should be used where necessary and disturbed areas should be seeded with a suitable erosion control see mix consisting primarily of native grass species. Roads that are in closed status should be either lightly scarified and seeded or stabilized with erosion control features (for example, rolling the grade, waterbars, etc.). Road entrances should be blocked to prevent access and signed as closed. Camouflaging of road entrances with large rocks and woody debris may prevent unauthorized access and improve stability. Road drainage features such as lead-out ditches or waterbars should not be hydrologically connected to stream channels on active or closed roads.	To protect long-term soil stability/productivity and water quality by reducing overland flow and sediment delivery originating from these locations.	Specialist recommendation
TR008	As a condition of approval for use of a temporary road under any contract involving mechanical thinning, temporary roads would be decommissioned, using any one or combination of appropriate methods (FSM 7734.1, , also see TR007), by the purchaser/contractor immediately after mechanical treatments and restoration work are completed.	To protect long-term soil productivity and water quality and ensure that temp roads do not become de facto new roads.	Specialist recommendation
TR009	Roads causing damage to hydrological resources, cultural resources or threatened endangered, and sensitive species habitat are a priority for decommissioning.	To reduce effects to aquatic habitats from roads.	Specialist recommendation
TR010	Where feasible, relocate roads out of drainage bottoms to an upland location. If this is not feasible, rock armor outfall of drainage features as an energy dissipater.	To minimize sediment delivery into and disturbance to drainage systems, and minimize sediment production within channels.	Specialist recommendation
TR011	Avoid road rehabilitation and maintenance during periods of sustained or heavy rainfall.	To minimize erosion and negative effects from sediment and other contaminants on water bodies and aquatic and associated habitats and cave/karst systems.	Specialist recommendation

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TR012	When deemed necessary to prevent potential damage to buried utilities, the Forest Service will coordinate any hauling activity which will cross buried utilities with the owner of the line. Care shall be taken to prevent damage to buried utilities which may include mitigation measures such as gravel padding or other suitable measures.	Prevent damage to water pipelines.	Specialist recommendation
TR013	While a rock pit is in operation, appropriate dust abatement measures will be taken on roads and pit areas where trucks are operating if necessary.	Reduce dust and minimize visibility issues on roads.	Specialist recommendation
WL001	In Mexican spotted owl Recovery Foraging non-breeding habitat strive to maintain all trees more than 24 inches d.b.h. except in overriding management situations such as for human safety. Consult Appendix F – Mexican spotted owl Recovery Plan Framework for further guidance.	To minimize adverse effects on Mexican spotted owls while restoring Mexican spotted owl habitat, contribute toward the recovery of the owl, and to comply with Endangered Species Act and direction in the 2012 Mexican Spotted Owl (Mexican spotted owl) Recovery Plan, pp. 268-269.	Land Management Plan compliance and specialist recommendation
WL002	Mexican spotted owl PACs and recovery nest/roost habitat will be managed to meet basal area, trees per acre, and canopy cover requirements as specified in the most current Mexican spotted owl Recovery Plan. In Mexican spotted owl PACs and Nest/Roost Recovery Habitat strive to maintain all trees 18 inches d.b.h. except in overriding management situations such as for human safety. Consult Appendix F – Mexican spotted owl Recovery Plan Framework for further guidance. Also see SI019.	To minimize adverse effects on Mexican spotted owls while restoring Mexican spotted owl habitat, contribute toward the recovery of the owl, and to comply with Endangered Species Act and direction in the 2012 Mexican spotted owl Recovery Plan, tables C.1, C.2, and C.3.	Land Management Plan compliance and specialist recommendation
WL003	Coordinate and implement management activities within Mexican spotted owl PACs to reduce potential disturbance and minimize the frequency and duration of operations within and immediately adjacent to these areas.	To minimize adverse effects on Mexican spotted owls while restoring Mexican spotted owl habitat, contribute toward the recovery of the owl, and to comply with the Endangered Species Act.	Land Management Plan compliance and specialist recommendation
WL004	In Mexican spotted owl recovery foraging/non-breeding habitat, follow the most current Mexican spotted owl Recovery Plan and incorporate the following guidelines: • Crown spacing between tree groups (interspace) would average 25 to 60 feet distance, providing for forest health, prey habitat development, and to move toward or facilitate stand conditions more conducive to low-severity fire. • Tree thinning in pine-oak would target 40 to 110 BA; thinning in mixed conifer would target 40 to 135 BA. The goal is manage for a sustainable range of density and structural characteristics. • No trees greater than 24 inches in diameter would be cut and trees greater than 18 inches would be retained, unless overriding management situations require their removal.	To minimize adverse effects to Mexican spotted owls and contribute toward the recovery of the owl while restoring Mexican spotted owl habitat.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
WL005	In Mexican spotted owl PACs, springs, riparian and stream restoration, obliteration, relocation, and maintenance, would not occur during the breeding season (March 1 to August 31). Timing restrictions may be waived on a case by case basis if protocol level surveys confirm non-nesting or an active nest is more than 0.25 mile from project work. Timing restrictions may also be waived if the district biologist, in coordination with USFWS determines actions within 0.25 mile will not disturb nesting birds.	To minimize adverse effects on Mexican spotted owls while restoring Mexican spotted owl habitat, contribute toward the recovery of the owl, and to comply with the Endangered Species Act.	Land Management Plan compliance and specialist recommendation
WL006	In Mexican spotted owl PACs, no mechanical or prescribed fire treatments or road or trail maintenance would occur during the breeding season (March 1 to August 31). Timing restrictions may be waived if protocol surveys indicate non-breeding or infer absence. Timing restrictions may also be waived if the district biologist, in coordination with USFWS determines actions within 0.25 mile will not disturb breeding birds.	To minimize adverse effects to Mexican spotted owls and comply with the Endangered Species Act and the 2012 Mexican spotted owl Recovery Plan, table C.1 while restoring Mexican spotted owl.	Land Management Plan compliance and specialist recommendation
WL007	Thinning equipment would remain greater than or equal to 0.25 mile from Mexican spotted owl PAC boundaries during breeding season unless topographic features would minimize noise such that breeding owls would not be disturbed.	To minimize effects on Mexican spotted owls while restoring Mexican spotted owl habitat, contribute toward the recovery of the owl, and to comply with the Endangered Species Act	Land Management Plan compliance and specialist recommendation
WL008	• Hauling would generally avoid Mexican spotted owl PACs during the breeding season (March 1 to August 31) unless specific analysis has documented that this would not lead to adverse effects or protocol surveys indicate non-breeding or infer absence. Timing restrictions may also be waived if the district biologist, in coordination with USFWS, determines actions within 0.25 mile will not disturb breeding owls. • Trucks would drive less than or equal to 25 miles per hour in PACs during breeding season.	To minimize adverse effects on Mexican spotted owls while restoring Mexican spotted owl habitat, contribute toward the recovery of the owl, and to comply with the Endangered Species Act.	Land Management Plan compliance and specialist recommendation
WL009	In Mexican spotted owl PACs, no new wire fencing would be constructed to minimize the risk of owls colliding with new fences. Other alternatives would be used for aspen, sensitive plants, springs, and ephemeral channel restoration exclosures.	To minimize adverse effects to Mexican spotted owls and contribute toward the recovery of the owl while restoring Mexican spotted owl habitat.	Specialist recommendation
WL010	In Mexican spotted owl PACs, road maintenance would not occur during the breeding season (effective March 1 to August 31). Timing restrictions may be waived if protocol surveys indicate non-breeding or infer absence. Timing restrictions may also be waived if the district biologist, in coordination with USFWS determines actions within 0.25 mile will not disturb nesting birds.	To minimize disturbance effects on Mexican spotted owls while restoring Mexican spotted owl habitat, contribute toward the recovery of the owl, and comply with the Endangered Species Act.	Land Management Plan compliance and specialist recommendation
WL011	All stands included in the proposed mechanical treatments for Mexican spotted owl PACs would be hand-marked for thinning, and prescriptions and marking would be coordinated with the U.S. Fish and Wildlife Service.	To improve site specificity of treatments to retain trees with the greatest habitat value and continue coordination with the U.S. Fish and Wildlife Service during implementation.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
WL012	Fireline associated with prescribed burning would not be constructed during the breeding season in Mexican spotted owl PACs and/or core areas. Timing restrictions may be waived if protocol surveys indicate non-breeding or infer absence. Timing restrictions may also be waived if the district biologist, in coordination with USFWS determines actions within 0.25 mile will not disturb breeding owls.	To minimize adverse effects to Mexican spotted owls while restoring Mexican spotted owl habitat, contribute toward the recovery of the owl, and comply with the Endangered Species Act.	Land Management Plan compliance and specialist recommendation
WL013	In Mexican spotted owl PACs, nest trees would be protected in the design and implementation of prescribed fires.	To minimize adverse effects to Mexican spotted owls while restoring Mexican spotted owl habitat, contribute toward the recovery of the owl, and comply with the Endangered Species Act.	Land Management Plan compliance and specialist recommendation
WL014	Survey all potential Mexican spotted owl areas including protected and recovery nest/roost, within the implementation area plus the area 0.5 mile to all habitat up to 0.5 mile beyond the perimeter of the proposed treatment area. Surveys should be conducted for two years, with the second-year survey either the year before or the year of (but prior to) project implementation. If more than five years have elapsed between the last survey year and the initiation of the proposed action, then one additional year of survey will be conducted prior to project implementation.	To minimize adverse effects to Mexican spotted owls while restoring Mexican spotted owl habitat, contribute toward the recovery of the owl, and comply with the Endangered Species Act.	Land Management Plan compliance and specialist recommendation
WL015	Coordinate burning spatially and temporally to limit smoke effects on nesting Mexican spotted owls, particularly for PACs in low-lying areas (March 1 to August 31).	To minimize the effects to Mexican spotted owls and comply with the Endangered Species Act.	Land Management Plan compliance and specialist recommendation
WL016	No cable operations or temporary road construction will be conducted in Mexican spotted owl PACs.	To minimize adverse effects to Mexican spotted owls and comply with the Endangered Species Act.	Specialist recommendation
WL017	Unless subsequent finalized revised Land Management Plan Species of Conservation Concern determinations do not include northern goshawk, in northern goshawk nest stands, burn plans covering areas with nesting northern goshawks and/or known nest trees would include mitigations to minimize smoke effects on nesting birds and nest trees would be protected.	To minimize disturbance to northern goshawks while restoring northern goshawk habitat.	Land Management Plan compliance and specialist recommendation
WL018	Unless subsequent finalized revised Land Management Plan Species of Conservation Concern determinations do not include northern goshawk, fuels in northern goshawk nesting areas would be evaluated and, if necessary, would be manipulated outside of the breeding period (March 1 to September 30) to ensure low-severity fire effects from prescribed fire.	To minimize disturbance to goshawks while restoring goshawk habitat.	Land Management Plan compliance and specialist recommendation
WL019	Unless subsequent finalized revised Land Management Plan Species of Conservation Concern determinations do not include northern goshawk, in northern goshawk post-fledging family areas (PFAs), thinning activities would not occur in occupied PFAs during the breeding season (March 1 September 30) unless the protocol surveys indicate non-nest or infer absence. Timing restrictions may also be waived if the district biologist, determines actions within 0.25 mile will not disturb nesting birds.	To minimize disturbance to goshawks while restoring goshawk habitat.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
WL020	Unless subsequent finalized revised Land Management Plan Species of Conservation Concern determinations do not include northern goshawk, hauling will not occur within northern goshawk PFAs during the breeding season (March 1 through September 30) unless surveys determine the PFA is not nesting, or the nest is 1/4 mile away, topographically isolated, or as determined by a wildlife biologist.	To minimize disturbance to northern goshawks.	Specialist recommendation
WL021	Unless subsequent finalized revised Land Management Plan Species of Conservation Concern determinations do not include northern goshawk, in northern goshawk PFAs, spring, riparian and stream restoration projects would not occur during the breeding season (March 1 to September 30) if occupied. However, work could potentially occur on an individual basis through coordination with the district biologist.	To minimize disturbance to northern goshawks while restoring northern goshawk habitat.	Land Management Plan compliance and specialist recommendation
WL022	Unless subsequent finalized revised Land Management Plan Species of Conservation Concern determinations do not include northern goshawk, in northern goshawk PFAs road construction, obliteration, relocation, and maintenance would not occur during the breeding season (March 1 to September 30). Timing restrictions may be waived if protocol surveys indicate non-breeding or infer absence. Timing restrictions may also be waived if the district biologist, determines actions within 0.25 mile will not disturb nesting birds.	To minimize disturbance to northern goshawks while restoring northern goshawk habitat.	Land Management Plan compliance and specialist recommendation
WL023	--During project implementation, the Forest Service will not remove or degrade bald and golden eagle nest trees and treatments will reduce the risk of high-intensity fire affecting nest sites. • The Forest Service will coordinate with AGFD and FWS prior to planning treatments within bald or golden eagle breeding areas. • In bald and golden eagle breeding areas, mechanical treatments within 500-1,000 feet of bald or golden eagle nest trees or nest sites would only occur outside of the breeding season (January 1 to August 31), unless the nest is determined to be inactive by the District Biologist in coordination with AGFD and FWS.	To minimize disturbance to eagles while restoring forest habitat.	Specialist recommendation
WL024	In bald and golden eagle nest sites, fire staff will coordinate burn plans with the district wildlife biologist to ensure smoke will not nesting adversely affect nesting eagles.	To minimize disturbance to eagles while restoring forest habitat.	Specialist recommendation
WL025	• Restrict project activities within 500 feet of known bald eagle winter roost sites from October 15 - April 15, unless, in coordination with AGFD and FWS, it is determined eagles are not using the winter roost at that time. • If the Forest Service determines that thinning or temporary road construction must occur within 300 feet of a known bald or golden eagle winter roost, the Forest Service will coordinate with AGFD and FWS during project layout to ensure roost habitat is maintained.	To minimize disturbance to eagles while restoring forest habitat.	Specialist recommendation
WL026	If new Mexican spotted owl PACs are established in areas with planned or ongoing 4FRI activities, then existing design features related to Mexican spotted owl protection would apply to management activities. New PACs would be drawn in coordination with FWS.	To minimize adverse effects to Mexican spotted owls while restoring Mexican spotted owl habitat.	Land Management Plan compliance and specialist recommendation
WL027	In turkey foraging and roosting cover, mechanical thinning will retain mostly medium, with some areas of high canopy cover in ponderosa pine stringers in the pinyon-juniper transition zone. Thinning activities would emphasize retaining large and old trees in accordance with the OTIP and LTIP.	To minimize disturbance to turkeys while restoring forest habitat.	Land Management Plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
WL028	Manage prescribed fire to retain ponderosa pine and roosting cover for turkeys.	To minimize disturbance to turkeys while restoring forest habitat.	Land Management Plan compliance and specialist recommendation
WL029	No mechanical treatment would occur within 900 feet of an active great blue heron rookery between April 1 and June 30. Burn plan development would include consultation with the local biologist as well as the implementation of prescribed fire to minimize adverse impacts of smoke on nesting herons.	To minimize disturbance to rookeries while restoring forest habitat.	Specialist recommendation
WL030	Emphasize retainment of dominant or co-dominant trees in great blue heron rookeries. Nest trees would be prepped prior to implementing prescribed fire and ignition mitigations would apply. Timing would avoid mechanical thinning while birds are in the nest. Activities would be coordinated with the local biologist.	To minimize disturbance to rookeries while restoring forest habitat.	Specialist recommendation
WL031	Protect active raptor nest sites from disturbance by project-related activities by restricting activities during nesting season as specified in the applicable Land Management Plan, or as determined by a local wildlife biologist. Known nest trees for any raptor species will be prepped, as needed, to avoid negative impacts to survival or successful reproduction, prior to implementing management activities, including prescribed fire.	To minimize disturbance to raptors while restoring forest habitat.	Land Management Plan compliance and specialist recommendation
WL032	All personnel involved in thinning and prescribed burning activities, transportation of equipment and forest products, research, or restoration activities would be briefed on the Mexican spotted owl, know to report sightings and to whom, avoid harassment of the owl, and are informed as to whom to contact (FWS) and what to do if an owl is incidentally injured, killed, or found injured or dead.	To minimize adverse effects to Mexican spotted owls while restoring Mexican spotted owl habitat, contribute toward the recovery of the owl, and comply with the Endangered Species Act.	Specialist recommendation
WL033	A 300-foot buffer for mechanical treatment with heavy equipment should be designated around known bat colonies (use AGFD Heritage Data Management System (HDMS) database). For treatments around cave entrances, sink hole rims and other karst features that are to occur during the maternity season (April 15-August 31) or during monsoon season, coordination should occur with a wildlife biologist regardless of whether HDMS data indicates the occurrence of bat colonies or not.	To minimize disturbance to bats and their habitat, including detrimental effects to the cave/karst microclimate and hydrology, and to prevent collapse and sedimentation.	Specialist recommendation
WL034	Where cover exists near dependable waters, consult with a wildlife biologist to determine where and if hiding areas, openings, and interspaces should be created.	Maintain hiding cover where wildlife congregates while restoring forest structure.	Specialist recommendation
WL035	Snags and Logs: Protect snags and logs wherever possible by placing landings in existing openings or in areas where snags and/or logs, and old trees would be minimally affected in accordance with OTIP and LTIP.	Maintain key but limited wildlife habitat components while restoring forest structure.	Land Management Plan compliance

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
WL036	Snags and Logs: In ponderosa pine, protect/provide snags and logs wherever possible through site prep, implementation planning, green tree selection, and ignition techniques to retain 1-2 snags per acre greater than or equal to 18 inches in diameter, and greater than or equal to 3 logs greater than or equal to 8 feet long and greater than or equal to 12 inches mid-point diameter, and 3-10 tons of coarse woody debris (greater than 3 inches in diameter) per acre in pine and pine-oak habitat. In dry mixed conifer, protect/provide snags and logs wherever possible through site prep, implementation planning, green tree selection, and ignition techniques to retain 3 snags per acre greater than or equal to 18 inches in diameter, and greater than or equal to 3 logs greater than or equal to 8 feet long and greater than or equal to 12 inches mid-point diameter, and 5-15 tons of coarse woody debris (greater than 3 inches in diameter) per acre.	Maintain key but limited wildlife habitat components while restoring forest structure.	Land Management Plan compliance
WL037	Snags: Retain trees greater than or equal to 18 inches in diameter with dead tops, cavities, and lightning strikes wherever possible to provide cavity nesting/foraging habitat (such as the living dead) in ponderosa pine habitat.	Maintain key but limited wildlife habitat components while restoring forest structure.	Specialist recommendation
WL038	In pinyon-juniper cover type, snags 8 inches and greater in diameter at root collar would be managed for an average of 5 per acre, while snags 18 inches and greater in diameter would be managed for 1 per acre, and coarse woody debris would be managed for a post-treatment average of 2-5 tons per acre.	Maintain key wildlife habitat components while restoring forest structure.	Land Management Plan compliance and specialist recommendation
WL039	Emphasize retention of snags exhibiting loose bark to provide habitat for roosting bats and retain large-diameter, tall, early-decay-stage trees, as well as snags, especially those with natural cavities or sloughing bark to provide habitat for roosting bats.	Maintain key but limited wildlife habitat components while restoring forest structure.	Land Management Plan compliance and specialist recommendation
WL040	Gambel oak, juniper and pinyon species greater than 5-inch diameter at the root collar (diameter root collar) may be considered as residual trees in the target group spacing and stocking. Manage for large Gambel oaks (10 inch diameter at the root collar or larger) by removing ponderosa pine up to 18 inches in diameter that do not meet the “old tree” definition and do not have interlocking crown with oaks and occur within 30 feet of base of oak 10 inches in diameter at the root collar or larger.	Maintain a range of structure conditions (such as wildlife habitat heterogeneity) while restoring forest conditions.	Specialist recommendation
WL041	Burn plans will develop prescriptions that will maintain coarse woody debris levels that align with Land Management Plan direction.	Maintain a range of structure conditions (such as wildlife habitat heterogeneity) while restoring forest conditions.	Specialist recommendation
WL042	Burn Plans: Ensure that the potential cumulative effects of multiple fires burning in a given area do not produce negative effects to local wildlife; coordinate burning between administrative units and between wildlife and fire management to minimize potential disturbance.	Minimize disturbance to wildlife while conducting restoration activities.	Specialist recommendation
WL043	Defer thinning in a ¼ mile radius around documented black bear den sites from April 15 to June 30; maps would be provided to those implementing the activities.	Minimize potential for disturbance.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
WL044	Temporarily restrict human access and disturbance-causing land-use activities within a 1-mile radius around active Mexican wolf dens between April 1 and July 31, and around active rendezvous sites between June 1 and September 30. Exceptions include any authorized specific land use that was active and ongoing at the time Mexican wolves chose to locate a den or rendezvous site nearby. Coordinate with the Interagency Field Team \to determine current denning/rendezvous site locations.	To avoid adverse effects to reproductive success, natural behavior, or persistence of Mexican wolves. To prevent loss of Interagency Field Team equipment (cameras, etc.) on Forest.	Land Management Plan compliance and specialist recommendation
WL045	Rock pits within ½ mile of Mexican spotted owl recovery and protected habitat would be surveyed to protocol to determine occupancy status of recovery habitat or breeding status of owls in PACs before operations are initiated, unless a wildlife biologist determines this restriction is unnecessary.	To avoid or minimize potential impacts to Mexican spotted owls.	Land Management Plan compliance and specialist recommendation
WL046	No ground disturbance from rock pit development or operation and in-woods processing sites would occur in known Mexican spotted owl PACs, or within 1/4 mile of nests and roosts during the breeding season, unless a wildlife biologist determines this restriction is unnecessary.	To avoid or minimize potential impacts to Mexican spotted owls.	Land Management Plan compliance and specialist recommendation
WL047	Material hauling from rock pits in or within ¼ miles of occupied Mexican spotted owl PACs would occur outside of the Mexican spotted owl breeding season unless a wildlife biologist determines this restriction is unnecessary.	To avoid or minimize potential impacts to Mexican spotted owls.	Land Management Plan compliance and specialist recommendation
WL048	Unless subsequent finalized revised Land Management Plan Species of Conservation Concern determinations do not include northern goshawk, pit development and operation within occupied northern goshawk PFAs may occur when surveys have indicated there are no active nests. If surveys identified an occupied nest, all operational activities and hauling would be avoided March 1 - September 30 unless a wildlife biologist determines this restriction is unnecessary.	To minimize impacts to northern goshawk.	Land Management Plan compliance and specialist recommendation
WL049	Unless subsequent finalized revised Land Management Plan Species of Conservation Concern determinations do not include northern goshawk, if a northern goshawk is detected at a rock pit location at any time, the local district biologist would be contacted prior to any additional activity to confirm northern goshawk activity in the area and determine additional mitigations, if necessary, to limit impacts to nesting northern goshawks.	To avoid or minimize potential impacts to nesting northern goshawk.	Specialist recommendation
WL050	No ground disturbance from in-woods processing site development or operation would occur within 1/4 mile of Mexican spotted owl PAC or northern goshawk PFAs, unless a district biologist, in coordination FWS (for MSO only), determines this restriction is unnecessary (unless subsequent finalized revised Land Management Plan Species of Conservation determinations do not include northern goshawk).	To avoid or minimize potential impacts to Mexican spotted owls and northern goshawk.	Specialist Recommendation
WL051	No mechanical thinning and prescribed burning in potential yellow-billed cuckoo habitat during the height of the breeding season (July 1 – September 30), but thinning and prescribed burning could occur from May 15 – July 1, when cuckoos may be present. The FS will coordinate with the state and federal YBCU species leads to determine when potential habitat polygons require timing restrictions. Field visits assessing habitat, stream gradient, vegetation, and floodplain width in coordination with FWS will determine if and where timing restrictions should occur.		