

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

Table 106 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 forest plan objectives, desired conditions, standards, and guidelines. As such, they have been included in the analysis presented in this DEIS. Design features in the table are organized by resource.

**Table 106. 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 (e.g., Chytrid fungus) and aquatic invasive species. Personnel entering the water following Appendix G in the 2007 Chiricahua Leopard frog Recovery Plan and the Stop Aquatic Hitchhikers Clean, Drain, Dry procedure <a href="http://stopaquatic hitchhikers.org/prevention/#clean-drain-dry">http://stopaquatic hitchhikers.org/prevention/#clean-drain-dry</a> .	To minimize potential for spreading aquatic diseases or invasive species.	Forest plan compliance
AQ002	<p>Porous boulder structures and vane restoration treatments:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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). <ul style="list-style-type: none"> <li>• 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.</li> </ul> </li> <li>• 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.</li> <li>• The use of gabions, cable, or other means to prevent the movement of individual boulder in a boulder step structure is not allowed.</li> <li>• 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.</li> <li>• The project designer or an inspector experienced in these structures should be present during installation.</li> <li>• 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.</li> </ul>	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 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	<p>Set-back or removal of existing berms:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Remove drain pipes, fences, and other capital projects to the extent possible.</li> <li>• To the extent possible, remove nonnative fill material from the floodplain to an upland site.</li> <li>• 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 natural recede back into the main channel thus minimizing fish entrapment.</li> </ul>	<p>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.</p>	<p>Forest plan compliance and specialist recommendation</p>

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ005	<p>Channel Reconstruction/Relocation Treatments:</p> <ul style="list-style-type: none"> <li>• Construct geomorphically appropriate stream channels and floodplains within a watershed, valley, and reach context.</li> <li>• 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.</li> <li>• To the greatest degree possible, remove nonnative fill material from the channel and floodplain to an upland site.</li> <li>• 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.</li> <li>• 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.</li> <li>• Material selections (large wood, rock, gravel) shall also mimic natural stream system materials.</li> <li>• 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 (USDA-Forest Service 2008).</li> </ul>	<p>To guide stream, floodplain, and other stream/watershed restoration treatments to minimize detrimental effects to aquatic habitats.</p>	<p>Forest plan compliance and specialist recommendation</p>
AQ006	<p>All stream crossings must be approved in advance of use to minimize the number and length of stream crossings. Such crossings will 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 will be restored.</p>	<p>To minimize ground disturbance in aquatic and associated habitats during site preparation and sedimentation to aquatic habitats.</p>	<p>Forest plan compliance and specialist recommendation</p>
AQ007	<p>For recreation relocation projects—such as campgrounds, horse corrals, off-road vehicle trails—move current facilities out of the riparian area or as far away from the stream as possible.</p>	<p>To reduce recreation effects on aquatic habitats.</p>	<p>Forest plan compliance</p>
AQ008	<p>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.</p>	<p>To minimize ground disturbance in aquatic and associated habitats during site preparation and sedimentation to aquatic habitats.</p>	<p>Forest plan compliance and specialist recommendation</p>

<b>DF/BMP/M&amp;CM Number</b>	<b>Description</b>	<b>Primary Purpose</b>	<b>Basis</b>
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.	To reduce detrimental effects to riparian species (flora and fauna) and floodplains.	Specialist recommendation
AQ011	Where appropriate, include hazard tree removal (amount and type) in project design. Fell hazard trees when they pose a safety risk. If possible, fell hazard trees within riparian stream systems areas towards a stream. Keep felled trees on site when needed to meet coarse large wood objective or to be used as part of restoration treatments.	Improve aquatic habitat complexity while meeting safety objectives.	Specialist recommendation
AQ012	Leave sufficient numbers of cut trees (large woody debris) onsite for needed surface flow grade control in systems where large woody debris is appropriate. Fisheries, wildlife, or watershed personnel will identify locations for large woody debris before works starts and/or inspect large woody debris placement work done by the timber sale administrator or contracting officer representative prior to unit closeout.	To minimize impacts to streams and soils in meadows from tree thinning operations.	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ013	<p>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.</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Rock will not be used for streambank restoration, except as ballast to stabilize large wood.</li> <li>• Use a diverse assemblage of vegetation species native to the action area or region, including trees, shrubs, and herbaceous. Vegetation, such as willow, sedge, and rush mats, may be gathered from abandoned floodplains, stream channels, etc.</li> <li>• Do not apply surface fertilizer within the AMZ of any stream channel.</li> <li>• Install fencing as necessary to prevent access to revegetated sites by livestock or unauthorized persons.</li> <li>• Conduct post-construction monitoring and treatment or removal of invasive plants until native plant species are well established.</li> </ul>	To guide streambank and channel restoration/resilience treatments.	Forest plan compliance and specialist recommendation
AQ014	Minimize removal of desirable vegetation around springs, streams and wetlands.	To reduce detrimental effects to sensitive habitats.	Forest plan compliance and specialist recommendation
AQ015	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
AQ016	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.	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ017	Structural erosion control measures will not include materials that can trap reptiles or amphibians in their habitat. Structural erosion control measures not made of biodegradable material (e.g., 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.	Forest plan compliance and specialist recommendation
AQ018	<ul style="list-style-type: none"> <li>• Given the potential for multiple aquatic species to occur in a given location, FS, FWS, and AGFD biologists will cooperatively prioritize aquatic species of concern on a site specific basis regarding timing restrictions for instream and riparian restoration activities.</li> <li>• Work will occur during base-flow conditions, and on dry or frozen riparian soil conditions where possible.</li> </ul>	To minimize direct effects to critical habitat (e.g. spawning and breeding) for federally listed and forest sensitive species.	Forest plan compliance and specialist recommendation
AQ019	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.	To minimize effects to rare/sensitive aquatic species during project implementation.	Forest plan compliance and specialist recommendation
AQ020	<p>Garter snakes:</p> <ul style="list-style-type: none"> <li>• Aquatic Management Zones in Narrow-headed and Northern Mexican Garter snake proposed critical habitat will be 600 ft. on either side of the stream.</li> <li>• No mechanical or hand piling will occur within the Garter snake AMZs to minimize effects during controlled burns or pile burning.</li> <li>• Any Narrow-headed and Northern Mexican garter snakes found will be relocated for the project types listed above following the Instream Construction Zone Isolation for Aquatic Species design features. Per the protocol, biologists will pre-identify areas where snakes would be moved in coordination with Arizona Game and Fish Department and U.S. Fish and Wildlife Service.</li> <li>• Disturbance of rock/boulder piles and large woody debris in narrow-headed or northern Mexican garter snake habitat or proposed critical habitat will be avoided to the greatest extent practical during their hibernation period.</li> <li>• Do not build temporary roads in narrow-headed or northern Mexican garter snake habitat or proposed critical habitat during their hibernation period.</li> </ul>	To minimize detrimental effects to federally listed garter snakes.	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ021	<p>A qualified, permitted biologist will be on site during heavy equipment construction activities to attempt to protect narrow-headed or northern Mexican garter snakes and/or key habitat features during construction. If this is a contract, the biologist will need to work with the COR to discuss activities related to the contract to avoid potentials for claims. This will occur within proposed critical habitat for construction zones in the following project types:</p> <ul style="list-style-type: none"> <li>• Fish Passage Restoration</li> <li>• Large Wood, Boulder, and Gravel Placement</li> <li>• Legacy structure removal or maintenance</li> <li>• Channel Reconstruction/Relocation</li> <li>• Off- and Side-Channel Habitat Restoration</li> <li>• Streambank Restoration</li> <li>• Set-back or Removal of existing berms for aquatic restoration</li> <li>• Beaver Habitat Restoration</li> </ul>	<p>To minimize direct effects to spawning and breeding grounds for federally listed and forest sensitive species.</p>	<p>Specialist recommendation</p>
AQ022	<p>Garter snakes: Any Narrow-headed and Northern Mexican garter snakes found will be relocated for the project types listed above following the Instream Construction Zone Isolation for Aquatic Species design features. Per the protocol, biologists will pre-identify areas where snakes would be moved in coordination with Arizona Game and Fish Department and U.S. Fish and Wildlife Service.</p>	<p>To minimize direct effects to spawning and breeding grounds for federally-listed and forest sensitive species.</p>	<p>Specialist recommendation</p>
AQ023	<p>Instream Construction Zone Isolation from Aquatic Species: Isolate Capture Area within the construction zone</p> <ul style="list-style-type: none"> <li>• Install block nets at up and downstream locations outside of the construction zone to exclude fish from entering the project area. Leave nets secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets or traps remain in place for more than one day, monitor the nets or traps at least on a daily basis to ensure they are secured to the banks and free of organic accumulation and to minimize fish predation or inadvertent capture of other aquatic species in the trap.</li> </ul>	<p>To minimize sedimentation and detrimental effects to aquatic species and habitat during aquatic and watershed restoration projects.</p>	<p>Specialist recommendation</p>



DF/BMP/M&CM Number	Description	Primary Purpose	Basis
<p>AQ023 Continued</p>	<p>Capture and release of species within the construction zone</p> <ul style="list-style-type: none"> <li>Species trapped within the isolate work area will be captured and released as prudent to minimize risk of injury, then released at a safe release site, preferably upstream of the isolated reach, for fish in a pool or other area that provided cover and flow refuge. Collect fish in the best manner to minimize potential stranding and stress by seine or dip nets as the area is slowly dewatered, baited minnow traps placed overnight, or electrofishing (if other options are ineffective). Fish must be handled with extreme care and kept in water the maximum extent possible during transfer procedures. A healthy environment for the stressed fish shall be provided – large buckets (five-gallon minimum to prevent overcrowding) and minimal handling of fish. Place large fish in buckets separate from smaller prey-sized fish. Monitor water temperature in buckets and well-being of captured fish. If buckets are not being immediately transported, use aerators to maintain water quality. As rapidly as possible, but after fish have recovered, release fish. In cases where the stream is intermittent upstream, release fish in downstream areas and away from the influence of construction. Capture and release will be supervised by a fishery biologist experienced with work area isolation and safe handling of all fish.</li> </ul> <p>Dewatering construction site</p> <ul style="list-style-type: none"> <li>When dewatering is necessary, ensure diversion passes flows and aquatic species to minimize detrimental effects. Return flow to downstream channel so they are not dewatered. Cofferdams should be built with non-erosive materials or covered in a manner that minimizes erosion and sedimentation as well as decreases in water quality.</li> </ul> <p>Diversion sandbags can be filled with material mined from the floodplain as long as such material is replaced at the end of project. Small amounts of instream material can be moved to help seal and secure diversion structures. Dissipate flow energy at the bypass outflow to prevent damage to riparian vegetation or stream channel. If diversion allows for downstream fish passage, place diversion outlet in a location to promote safe reentry of fish into the stream channel, preferably into pool habitat with cover. Pump seepage water from the de-watered work area to a temporary storage and treatment site or into upland areas and allow water to filter through vegetation prior to reentering the stream channel.</p> <p>Surface Water Withdrawals:</p> <ul style="list-style-type: none"> <li>Surface water may be diverted to meet construction needs, but only if developed sources are unavailable or inadequate. If aquatic species are or may be present (e.g. fish, tadpoles, mollusks), diversions may not exceed 10% of the available flow and fish screen(s) will be installed, operated, and maintained.</li> </ul>	<p>To minimize sedimentation and detrimental effects to aquatic species and habitat during aquatic and watershed restoration projects.</p>	<p>Specialist recommendation</p>

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ023 Continued	<p>Stream re-watering:</p> <ul style="list-style-type: none"> <li>Upon project completing, slowly re-water the construction site to prevent loss of surface water downstream as the construction site streambed absorbs water and to prevent a sudden release of suspended sediment. Monitor downstream during re-watering to prevent stranding of aquatic organisms below the construction site.</li> </ul>	<p>To minimize sedimentation and detrimental effects to aquatic species and habitat during aquatic and watershed restoration projects.</p>	<p>Specialist recommendation</p>
AQ024	<p>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.</p>	<p>To avoid, or minimize detrimental effects to native or desirable aquatic species and habitats.</p>	<p>Forest plan compliance</p>
AQ025	<p>Avoiding 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.</p>	<p>To avoid spread of invasives, disease, and contaminants.</p>	<p>Forest plan compliance</p>
AQ026	<p>Restoring fish passage during headcut and grade stabilization treatments:</p> <ul style="list-style-type: none"> <li>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 will be used for headcut and grade stabilization, refer to Large Wood, Boulder, and Gravel Placement.</li> <li>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.</li> <li>Focus stabilization efforts in the plunge pool, the headcut, as well as a short distance of stream above the headcut.</li> <li>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.</li> <li>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.</li> <li>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.</li> </ul>	<p>To minimize loss of fish passage during headcut and channel grade stabilization treatments.</p>	<p>Specialist recommendation</p>

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
<p>AQ026 Continued</p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Key structures into the stream bed to minimize structure undermining due to scour, preferably at least 2.5x their exposure height. The structures should also be keyed into both banks – if feasible greater than 8 ft.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>	<p>To minimize loss of fish passage during headcut and channel grade stabilization treatments.</p>	<p>Specialist recommendation</p>

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ027	<p>Large Wood, Boulder, and Gravel Placement Treatments:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• Large wood includes whole conifer and hardwood trees, logs, 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 1.5x bankfull channel width, while logs without root wads should be a minimum of 2.0x bankfull width.</li> <li>• Structures may partially or completely span stream channels or be positioned along stream banks.</li> <li>• 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.</li> <li>• Anchoring large wood – Anchoring alternatives may be used in preferential order:             <ol style="list-style-type: none"> <li>1) Use of adequate sized wood sufficient for stability.</li> <li>2) Orient and place wood in such a way that movement is limited.</li> <li>3) Ballast (gravel or rock) to increase the mass of the structure to resist movement.</li> <li>4) Use of large boulders as anchor points for large wood.</li> <li>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 (&lt;12) and additional 60% ballast weight may be necessary due to greater flow depths and higher velocities.</li> </ol> </li> </ul>	<p>To guide successful large wood and boulder stream restoration treatments.</p>	<p>Forest plan compliance and specialist recommendation</p>

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ028	<p>Engineered Logjams:</p> <ul style="list-style-type: none"> <li>• Engineered log jams will be patterned, to the greatest degree possible, after stable natural log jams.</li> <li>• Grade control engineered log jams are design to arrest channel down-cutting 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.</li> <li>• Stabilizing or key pieces of large wood that will be relied on to provide streambank stability or redirect flows must be intact, solid (little decay). If possible, acquire large wood with untrimmed root wads to provide functional refugia habitat for fish.</li> <li>• When available, trees with root wads should be a minimum of 1.5x bankfull channel width, while logs without root wads should be a minimum of 2.0x bankfull width.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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 it limited to that needed to anchor the large wood.</li> <li>• There is no DBH (diameter at breast height) restriction for large wood, but consider the following before removing and placing trees.</li> </ul>	To guide engineered log jam stream treatments	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
<p>AQ028 Continued</p>	<p>Diameter</p> <p>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.</p> <p>Bankfull widths and minimum diameter of logs to be considered key pieces.</p> <p>Bankfull Width* - Feet Minimum Diameter* - Inches</p> <p>0 to 10 10 10 to 20 16 20 to 30 18 Over 30 22</p> <p>* This table was taken from ‘1995 Guide to Placement of Large Wood in Streams’.</p> <p>Length</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• Mimic natural accumulations of large woody debris based on stream type, valley setting, and community type and ensure future large woody debris recruitment.</li> <li>• 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.</li> </ul>	<p>To guide engineered log jam stream treatments</p>	<p>Forest plan compliance and specialist recommendation</p>

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ029	<p>Gravel Augmentation Stream Restoration Treatments:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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-Forest Service 2008) to determine gravel sizes appropriate for the stream.</li> <li>• 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.</li> <li>• After gravel placement in areas accessible to higher stream flow, allow the stream to naturally sort and distribute the material.</li> <li>• 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.</li> </ul>	<p>To guide gravel augmentation treatments for aquatic and watershed restoration.</p>	<p>Forest plan compliance and specialist recommendation</p>
AQ030	<p>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.</p>	<p>To prevent spread or introduction of invasive species and aquatic diseases in stream habitat.</p>	<p>Forest plan compliance and specialist recommendation</p>

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
AQ031	<p>Off and Side Channel Stream Habitat Restoration:</p> <ul style="list-style-type: none"> <li>• When a proposed side channel will contain &gt;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.</li> <li>• 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.</li> <li>• Allowable excavation –</li> <li>• Off- and side channel improvements can include minor excavation (&lt;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.</li> </ul>	<p>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.</p>	<p>Forest plan compliance and specialist recommendation</p>
AQ032	<p>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.</p>	<p>To ensure technical skills and planning requirements for all aquatic and watershed restoration treatments.</p>	<p>Specialist recommendation</p>
AQ033	<p>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.</p>	<p>To rehabilitate all disturbed areas from aquatic and watershed restoration treatments, minimize erosion and sedimentation to aquatic habitats and potential effects to species.</p>	<p>Forest plan compliance</p>
AQ034	<p>During all implementation within AMZ's, maintain shade, bank stability, and large woody material recruitment potential.</p>	<p>Minimize detrimental disturbance of desirable riparian/aquatic conditions to the greatest extent practical.</p>	<p>Forest plan compliance</p>
AQ035	<p>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 or increase the likelihood of channel avulsion during high flows.</p>	<p>To maintain forest structure and facilitate riparian restoration activities</p>	<p>Specialist recommendation</p>



DF/BMP/M&CM Number	Description	Primary Purpose	Basis								
AQ036	<p>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.</p> <table border="0"> <tr> <td><u>Hill Slope</u></td> <td><u>Primary Shade Zone Width (slope distance)</u></td> </tr> <tr> <td>&lt;30%</td> <td>50 ft.</td> </tr> <tr> <td>30-60%</td> <td>55 ft.</td> </tr> <tr> <td>&gt;60%</td> <td>60 ft.</td> </tr> </table> <p>Exceptions: The distances listed above may be reduced (but not less than 25 ft.) if any of the following conditions apply:</p> <ul style="list-style-type: none"> <li>• The trees are located on a south facing slope and therefore do not provide stream shade;</li> <li>• 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</li> <li>• Field monitoring or measurements are completed to determine the width where Optimum Angular Canopy Density (65% or greater) is achieved.</li> <li>• If trees are being felled for safety reasons they can be felled towards the stream.</li> </ul>	<u>Hill Slope</u>	<u>Primary Shade Zone Width (slope distance)</u>	<30%	50 ft.	30-60%	55 ft.	>60%	60 ft.	<p>To maintain or improve the primary shade zone surrounding aquatic habitats.</p>	<p>Specialist recommendation</p>
<u>Hill Slope</u>	<u>Primary Shade Zone Width (slope distance)</u>										
<30%	50 ft.										
30-60%	55 ft.										
>60%	60 ft.										
BT001	<p>During layout, protect Southwestern Region sensitive plants where practical by including the plants within tree groups and using areas not occupied by the plants as interspaces.</p>	<p>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 forest plan analysis species.</p>	<p>Specialist recommendation</p>								
BT002	<p>Survey springs and channels for Bebb's willow before implementation and identify locations. Inform the forest botanist or district wildlife biologist if new locations are found and mitigate effects to plants and populations. Mitigations include avoiding plants, altering designs, or including plants in enclosures. 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.</p>	<p>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.</p>	<p>Forest plan compliance</p>								
BT003	<p>Prescribed fires are 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.</p>	<p>Promote healthy native plant communities and reduces the risk of noxious or invasive weed invasions.</p>	<p>Forest plan compliance</p>								

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 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 NF and a rare species on the landscape for both forests.	Specialist recommendation
BT005	When planning for implementation, identify species of concern (such as Southwestern Region sensitive plants), and determine potential habitat based on past occurrences and the known ranges of the species. If there are no documented surveys, the appropriate specialist (e.g., forest 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.	Complies with FSM direction 2670. Manual direction (FSM 2670.5(19)) emphasizes that management actions should avoid or minimize effects on sensitive species.	Forest plan compliance
BT006	Monitor the effects of treatment on Southwestern Region sensitive plants after treatments are completed.	Provides opportunities to obtain knowledge on local species that are often poorly understood. Allows for adaptive management in future treatments.	Forest plan compliance
BT007	Mitigate loss of individuals and groups of Southwestern Region sensitive plants 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.	Forest plan compliance

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
BT008	Landings, machine slash piles and other ground disturbing activities (e.g., firelines, parking areas, etc.) and other ground-disturbing activities (such as temporary road construction and reconstruction, tracked vehicles, and pits) should not occur directly on Southwestern Region sensitive plant populations.	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.	Forest plan compliance and specialist recommendation
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.	Forest plan compliance and specialist recommendation
CT001	All activities will comply with the NHPA for all ground-disturbing undertakings as appropriate. Effects on cultural resources would be determined in consultation with the SHPO 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 PA with AZ SHPO.	Forest plan compliance and specialist recommendation
CT002	Consult with Native Americans, particularly when projects and activities are planned in sites or areas of known religious or cultural significance.	Regulatory requirement. Compliance with NHPA, AIRFA, Southwestern Region PA with AZ SHPO, EO 13007, EO 13175, and other applicable Executive Orders and legislation.	Forest 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 AZ SHPO.	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
CT004	Monitoring during and after project implementation shall occur to document site protection and condition.	Compliance with Southwestern Region PA (Appendix J) with AZ SHPO.	Forest 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)	Forest 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 AZ SHPO.	Forest plan compliance and specialist recommendation
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 AZ SHPO.	Forest 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 insure that mitigations measures identified during the analysis phase to protect cultural sites from being adversely effected are addressed during the implementation portion of the project.	Forest 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.	ARPA, Site protection	Forest 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 AZ SHPO. Site protection, ARPA (prevention of looting)	Forest 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	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
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)	Forest 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 AZ SHPO.	Forest 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 AZ SHPO.	Forest plan compliance and specialist recommendation
CT015	All rock pit locations will be surveyed for cultural resources. 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. Flagged cultural resources shall be fully avoided. 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.	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.	Forest plan compliance and specialist recommendation
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. Provide opportunities for tribal members to harvest plants before implementation in areas where important species are known to exist.	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
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 the responsibility of fire to fix 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

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
FE002	Burn unit size, as well as strategic placement, would be a consideration in designing units and implementation prioritization.	<p>Fire effects &amp; 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. Air Quality: Larger burn blocks, can mitigate some air quality impacts by increasing the number of acres that could be burned in a single burn window.</p>	Specialist recommendation
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.	Forest plan compliance and specialist recommendation
FE004	When 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 (e.g., trees with known nests or roosts for herons, eagles, osprey, or other raptors, occupied nest cores, or critical areas in Mexican spotted owl protected activity centers (PACs) would be managed in accordance with wildlife design features (see Wildlife). Prepare old trees 1 year or more before a burn if possible.	<p>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 a year or more before a burn, such as thinning or raking, may improve the response of the effectiveness of the mitigation measures.</p>	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
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	Burning within narrow-headed garter snake occupied habitat or proposed critical habitat will not occur during the hibernation period (December - February) when garter snakes are more likely to be hibernating in wood piles, debris jams, etc., unless cleared by the district biologist.	To avoid, improve, or minimize effects on the narrow-headed garter snake.	Forest plan compliance and specialist recommendation
FE007	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.	Forest plan compliance and specialist recommendation
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. (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	Burn plans will incorporate Emission Reduction Techniques (ERTs) when they can effectively minimize air quality impacts, and when feasible (subject to economic and technical constraints, safety criteria, and land management objectives). Decision documents will identify smoke-sensitive receptors (or specify that there are none), and include objectives and courses of action to minimize and mitigate effects on those receptors as feasible.	Emission reduction techniques are recommended by the ADEQ as techniques that can be effective for minimizing air quality impacts.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
FE010	<p>Mitigation and design features for smoke effects include:</p> <ol style="list-style-type: none"> <li>1) Reducing emissions produced for a given area treated</li> <li>2) Redistributing/diluting emissions through meteorological scheduling and by coordinating with other burners in the airshed. Dilution involves controlling the rate of emissions (from multiple fires) or scheduling for dispersion to assure tolerable concentrations of smoke in designated areas</li> <li>3) Avoidance uses meteorological conditions when scheduling burning in order to avoid incursions of wildland fire smoke into smoke sensitive areas.</li> <li>4) no direct ignition of stumps to reduce smolder residence time</li> </ol>	Minimize air quality impacts	Forest plan compliance and specialist recommendation
FE011	Concerned/interested public will 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.	Forest plan compliance and specialist recommendation
FE012	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
FE013	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 ensure that prescribed fire objectives can be met.	Specialist recommendation
NW001	<p>Survey for noxious or invasive weeds in treatment areas prior to treatment and follow appropriate guidance based on location:</p> <p>Apache-Sitgreaves NFs: Follow the guidance in Appendix A of the Environmental Assessment for the ASNFs Integrated Forest-Wide Noxious Or Invasive Weed Management Program</p> <p>Coconino NF: 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”</p> <p>Tonto NF: Follow the guidance in Appendix C of the Tonto NF Weed Treatment EA when operating on the Tonto NF.</p>	Provides guidance and mitigation for noxious or invasive weeds.	Forest 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 NFS lands and mitigates effects of management actions on existing and potential noxious or invasive weed infestations; Forest 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.	Forest 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.	Forest plan compliance and specialist recommendation
NW004	If noxious or invasive weeds are identified during or post-implementation, treat the weeds and monitor for a minimum of three growing seasons.	This measure is designed to eliminate noxious or invasive weeds identified within a treatment area and provide assurance that the treatments were successful.	Forest 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	Forest 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

<b>DF/BMP/M&amp;CM Number</b>	<b>Description</b>	<b>Primary Purpose</b>	<b>Basis</b>
NW008	Equipment operators shall maximize that recovery and proper disposal of all fuels, fluids, lubricants, empty containers, and replacement parts.	Prevent establishment and spread of invasive weed populations	Specialist recommendation
NW009	Monitor and treat noxious or invasive weed populations following project implementation annually for at least three years to ensure that any weeds transported to the site are detected and controlled.	Prevent establishment and spread of invasive weed populations	Specialist recommendation
NW010	Maintain stockpiled, uninfested material in a weed-free condition.	Prevent establishment and spread of invasive weed populations	Forest plan compliance
RM001	Historic range monitoring sites including witness trees/posts, 1inch 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.	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 shown as a protected improvement on the sale/contract/agreement area map in the cutting area would be protected from thinning activities. Skid trail layout would attempt to keep equipment on one side of the fence 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). Temporary cattle guards would be installed on all 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.	Protect infrastructure.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RM004	Rest or deferment of a pasture by livestock may occur after the completion of ground disturbing activities, such as burning and mechanical thinning. Range management personnel will evaluate conditions to determine when adjustment to livestock management, such as rest of 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
RM006	<p>Prior to the construction of any enclosure 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.</p> <p>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.</p>	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

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RM007	<p>Range and fire managers will coordinate 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.</p>	<p>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 USFS issues Term Grazing Permits, Allotment Management Plans, and/or Annual Operating Instructions describing grazing 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.</p>	<p>Specialist recommendation</p>
RM008	<p>Range readiness monitoring will be included in the appendix D implementation plan checklist. Annual monitoring typically includes measures for forage production, precipitation, forage utilization, livestock numbers, and livestock season of use. Condition and trend monitoring every 5 to 10 years measures plant canopy cover, plant frequency, and ground cover. By requiring inclusion of all design features and mitigation, appendix E, the biophysical and social monitoring and adaptive management plan, includes grazing-related monitoring.</p>	<p>To ensure range readiness is part of the annual compliance process.</p>	<p>Specialist recommendation</p>
RS001	<p>Coordination with the District Recreation Planner, District Trails Specialist, and local trail stewards will occur during prescription or burn plan development, layout, marking, thinning, and burning where any treatment will occur on, adjacent or near National and system trails. This is to ensure that trails and trail infrastructure are considered and protected and effects to scenic qualities are minimized to the extent practicable.</p>	<p>Resource protection</p>	<p>Forest plan compliance and specialist recommendation</p>
RS002	<p>Historic trails, roads and trail markers in the project area will be protected during project implementation in all contract types and force account work. Additionally, the General Crook Trail, the Arizona Trail, the Highline Trail, and other historic trails, roads and National Recreation Trails will maintain historic and scenic integrity during project implementation.</p>	<p>Regulatory requirement. Compliance with NHPA and Southwestern Region PA with AZ SHPO, National Recreational Trails compliance, National Historic Trails compliance.</p>	<p>Forest plan compliance and specialist recommendation</p>

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 (e.g., Memorial Day, 4th of July, Labor Day, etc.); especially in locations where recreation-based activities (e.g., trails, trailheads, etc.) occur.	Protect public safety, decrease noise, reduce dust and minimize visibility issues on roads during high-use periods	Forest plan compliance and specialist recommendation
RS004	<p>Fire Control Lines:</p> <p>(a) Fire holding lines would be constructed, where ever possible, to reduce the contrast so that they are not noticeable in the middle and background views. Generally restore control lines to a near undisturbed condition in the foregrounds (within 300 feet) of sensitive roads, trails, developed recreation sites and private property. Avoid constructing fire holding lines within the AZT unless no other viable alternatives exist, and follow all requirements for areas with high scenic integrity objectives. If the Arizona Trail must be used as a holding line, both sides of the trail would be treated- a lateral distance to be determined by a scenery specialist.</p> <p>(b) Rehabilitate containment lines by rolling back the soil berm formed during line construction and constructing drainage features as necessary to prevent concentration of runoff. Disguise containment lines to line of sight or first 300 feet, whichever is greater;</p> <p>(c) To hasten recovery and help eliminate unauthorized motorized and nonmotorized use of control lines in these areas, use measures such as recontouring, pulling slash and rocks across the line, and disguising entrances, and</p> <p>(d) Do not use motorized equipment on national scenic, historic and recreation trails, or other forest system trails if these are used for control lines. Control lines however should be avoided on these trails under any circumstances unless the trails are co-located on roads. Coordinate with the district recreation staff regarding use of national trails as control lines.</p>	Resource protection	Forest 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.	Reduce unauthorized use	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS006	<p>Unit Marking:</p> <ul style="list-style-type: none"> <li>(a) Avoid using trails as boundaries.</li> <li>(b) Avoid abrupt changes between treatment units.</li> <li>(c) Where feasible strive to have the minimal marking of trees within the Arizona Trail, General Crook Trail, and Highline Trail corridors.</li> <li>(d) Utilize species designation where appropriate to minimize the amount of necessary marking.</li> <li>(e) Unit boundaries will be marked with water based paint and on the side of truck not seen from trails, roads or sensitive travel ways. When possible, utilize discernible boundaries that do not require paint.</li> <li>(f) Use the below techniques suggested for edges of treatment units.</li> </ul> <p>Edges of Individual Units:</p> <ul style="list-style-type: none"> <li>(a) Ensure that forest stand composition changes are textural, with small, natural openings and not symmetrical in shape. Avoid straight lines and right angles. Ensure that openings resemble the form, line, and texture of those found in the surrounding natural landscape with edges feathered to avoid a shadowing effect.</li> <li>(b) Where treatment unit is adjacent to denser forest (treated or untreated), the percent of thinning within the transition zone (150–250 feet) would be progressively reduced toward denser edges of the unit.</li> <li>(c) 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.</li> <li>(d) 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.</li> <li>(e) Treatment boundaries should extend up and over ridgelines to avoid "Mohawk" look.</li> <li>(f) The ridgeline silhouette should have a textural effect of small, natural-appearing openings rather than large, thinned areas and unnatural-appearing breaks.</li> <li>(g) Minimize mechanical treatments within 1/4 mile of the Arizona Trail, General Crook Trail, and Highline Trail corridors. Where mechanized treatments are authorized, restore visual evidence of mechanized treatment activity with 1/4 mile of the trails in order to promote a naturally appearing setting.</li> </ul>	Scenic integrity	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS006 Continued	(h) Implementation will comply with the nature and purpose of the Arizona National Scenic Trail. The Forest Service will meet annually with the Arizona Trail Assoc. to discuss and document monitoring activities; (i) ensure a landscape architect or recreation specialist with knowledge of scenery management is involved in implementation planning, initial layout strategy and mechanical treatment design.	Scenic integrity	Forest plan compliance and specialist recommendation
RS007	When possible, new fuelwood piles, and fuelwood skid trails should be located out of view in areas of High Scenic Integrity to avoid observation of bare mineral soil. Rehabilitate fuelwood skid trails, fuelwood piles, or other disturbed areas by restoring original contours, fine grading, and seeding with native seed mix. Skidding activities would avoid National and forest system trails, if possible, except where motorized use is already authorized (trails located on open system and administrative roads). If it is determined necessary that a trail must be used as a skid trail crossing, make perpendicular trail crossings. Trails needing protective measures and skid trail approval will be identified on the sale contract/or agreement map. Trail crossing locations, including those on the Arizona National Scenic Trail and the General Crook and Highline National Recreation Trails would be designated and flagged with input from the District Trails Specialist, Recreation Planner or Archaeologist. The trail would be restored to USFS standards (pre-project condition) following treatment.	Avoid degrading recreation setting and resource protection	Forest 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)).	Forest 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	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS010	<p>Temporary Road, Skid Trail, Landing, and In-Woods Processing Site Construction:</p> <p>(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.</p> <p>(b) Blend temporary roads and skid trails 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. Where new temporary roads and skid trails meet a primary travel route, they should intersect at a right angle and, where practicable, curve after the junction, to minimize the length of route seem from the primary travel route.</p> <p>(c) Shape and/or feather the edges of log landings and in-woods processing sites to avoid abrupt changes between treated and untreated areas. Standing trees and shrubs around in-woods processing sites and landings shall be left in strategic locations to serve as screening in sensitive viewsheds.</p> <p>(d) When possible, in-woods processing sites, landings, temporary roads, and skid trails should be located out of view of CL1 and CL2 travel routes and 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. When avoiding these locations is not possible, the evidence of management activities should be restored in a timely manner per (f).</p> <p>(e) 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 shall be cut low with a 8" height above ground (uphill side) within wild and scenic river corridors; in the immediate foreground (300 feet) of CL1 and CL2 travel ways; and in the foreground of recreation sites, private lands, and trails.</p> <p>(f) 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 Concern Level 1 roads (paved roads and passenger car roads) and trails, especially those designated as national scenic, historic, or recreation trails.</p> <p>(g) 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 FS landscape architect or other FS official.</p>	<p>Resource protection and scenic integrity and avoid substantial interference with the nature and purpose of the trail (in compliance with Section 7(c)).</p>	<p>Forest plan compliance and specialist recommendation</p>



DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS010	<p>(h) In-woods processing sites, landings, skid trails, and temporary roads will be rehabilitated, including restoring proper drainage and reseeding as needed with native species.</p> <p>(i) To hasten recovery and help eliminate unauthorized motorized and non-motorized use of skid trails and temporary roads, use physical measures such as re-contouring, pulling slash and rocks across the line, and disguising entrances;.</p> <p>(j) National Scenic, Historic, and Recreation Trails as well as forest system trails (motorized and non-motorized) will not be used for temporary roads or skid trails. It is acceptable to make perpendicular trail crossings. The locations of crossings will be designated. Trail crossings will be restored to pre-project condition after use.</p> <p>(l) Crossing of the Arizona Trail will be done sparingly and only if no other alternative exists. These crossing locations will be coordinated with District Recreation Staff and the national trail administrator.</p>	<p>Resource protection and scenic integrity and avoid substantial interference with the nature and purpose of the trail (in compliance with Section 7(c)).</p>	<p>Forest plan compliance and specialist recommendation</p>
RS011	<p>Cull Logs, Stump Heights, and Slash Treatments:</p> <p>(a) Cull logs would not be abandoned on landings. Use cull logs for closing temporary roads and decommissioning roads. Cull logs may also be suitable to use as down woody material, but must be scattered away from the landings.</p> <p>(b) Stump heights should be cut as low as possible. Flush cut or low cut stumps horizontally to 6" (on the uphill side) within immediate foreground (300 feet) of roads, trails, developed recreation sites and private property. Flush cut or low cut to 8" in other distance zones where topography and operational safety allows, with 12" heights as the exception and rarely occurring.</p>	<p>Resource protection and avoid substantial interference with the nature and purpose of the trail. (in compliance with Section 7©)</p>	<p>Forest plan compliance and specialist recommendation</p>

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS011 Continued	<p>(c) Slash must be treated or removed in the immediate foreground of sensitive places (e.g., 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). Where whole tree thinning occurs, machine piling may occur toward the back of landings. Prioritize slash burning in these locations within one year or as soon as possible after treatment. If conventional thinning practices are used and trees are delimited and topped in the forest, machine-piled slash should be placed outside of eligible or suitable wild and scenic river corridors and at least 300 feet away from the centerline of roads, national trails, and sensitive trails; developed recreation sites; or private land/communities. In these instances, piles should be burned as soon as possible or within 1 - 3 years. After burning is complete, burn sites that are visible from roads, trails, developed sites, or private dwellings will be covered with natural duff to a minimum of 3 inches to minimize visibility of the burned area. In areas where burning will not occur until after 2 growing seasons: Remove slash within 300 feet from sensitive areas. If scattering is required, scatter slash to 18" or less in depth. 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. If slash is not removed in grassland treatment areas, it is acceptable to create machine piles 300 feet away from the centerline of sensitive 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 return the area to its pre-implementation condition.</p>	<p>Resource protection and avoid substantial interference with the nature and purpose of the trail. (in compliance with Section 7©)</p>	<p>Forest plan compliance and specialist recommendation</p>
RS012	<p>Coordinate with designated Forest Service representative prior to implementing jackstraw, spring, and road restoration treatments. Do not implement jackstraw treatments within 1,000 feet of National Trails.</p>	<p>Maintain scenic integrity.</p>	<p>Forest plan compliance and specialist recommendation</p>
RS013	<p>In semi-primitive non-motorized recreation opportunity spectrum classes specifically (occurring on about 13 percent of the project area), in eligible or suitable wild and scenic river corridors, and in inventoried roadless areas (IRAs) :</p> <p>(a) Temporary roads should not generally be built (also see RS024). If they are used, they would be restored to pre-treatment conditions when projects are completed;</p> <p>(b) Strive to make stump heights 8 inches above ground (uphill side) or lower, with 12-inch heights the exception and rarely occurring;</p> <p>(c) Slash must be treated or removed in these areas; and</p> <p>(d) Use existing barriers (roads) and natural barriers as control lines whenever possible.</p>	<p>Protection of visitor experience</p>	<p>Forest plan compliance and specialist recommendation</p>

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS014	<p>Recreation Sites:</p> <p>(a) 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 treated either through removal, lop and scatter, chipping or piling. If piled, slash must be piled in agreed upon locations, and treated as soon as possible. If campgrounds remain open into fall and winter, provide information about upcoming closures and management activities onsite, at FS offices, and on FS Web sites.</p>	Protection of visitor experience	Forest plan compliance and specialist recommendation
RS015	<p>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 FS 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.</p>	Public safety	Forest plan compliance and specialist recommendation
RS016	<p>When mechanical treatment and/or burning are occurring along open trails that are not National Recreation Trails, slash will be pulled back immediately within 100 feet of the centerline of the trail corridor within specified timeframes (coordinate with recreation specialist).</p>	Maintain scenic integrity.	Forest plan compliance and specialist recommendation
RS017	<p>Retain healthy, large diameter, or character trees that have unique shape or form along all trails in a manner that results in stable, wind -firm residuals that are seen within 1/4 mile 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.</p>	Protect visitor experience	Forest plan compliance and specialist recommendation
RS018	<p>(a) Prior to blasting activities, nearby landowners or other permitted Forest users near the blasting location would be notified.</p> <p>(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.</p>	To improve public safety by increasing awareness of blasting activities and to minimize impacts to scenic resources	Forest plan compliance and specialist recommendation
RS019	<p>Trucks hauling materials would be limited to no more than 25 miles per hour on all forest roads, and 10 miles per hour within 0.25 miles of all signed campgrounds and trailheads. The speed restriction near campgrounds will be outlined on contract area maps.</p>	Reduces noise and dust during hauling	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
RS020	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	Forest plan compliance and specialist recommendation
RS021	Material extraction activities should not be permitted in designated or recommended special areas or Chevelon Canyon.	To protect the unique character of these areas.	Forest plan compliance
RS022	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.	To protect eligible and suitable wild and scenic rivers	Forest plan compliance
RS023	Restoration activities within the corridors of eligible or suitable wild river segments on the Apache-Sitgreaves National Forests will not include any tree cutting.	To protect the primitive character of eligible or suitable rivers classified as wild	Forest plan compliance
RS024	Temporary roads will not be constructed within inventoried roadless areas (IRAs) or within the corridors of eligible or suitable river segments classified as wild. Within corridors of eligible or suitable river segments classified as scenic, avoid constructing long stretches of conspicuous temporary roads paralleling the riverbank. Maps will be provided as needed.	To ensure that wild river segments and IRAs maintain their primitive characteristics and to protect the largely undeveloped character of scenic river segments	Forest plan compliance
SI001	Non-commercial tree thinning is allowed only as required to adjust fuel loads to implement a low- to moderate-severity burn to promote growth of deciduous trees and shrubs, such as aspen, cottonwood, willow, other deciduous species, and associated meadows.	To provide desired fire behavior and desired vegetation composition	Specialist recommendation
SI002	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
SI003	All snags will be maintained within the AMZ unless deemed a hazard tree that could be made available for stream restoration activities.	To provide habitat for snag-dependent wildlife and future coarse woody debris.	Specialist recommendation
SI004	To protect old growth trees, thinning from below is allowed. If conifers are even-aged pole, sapling, or mid-seral with no old growth trees, thin existing trees to the degree necessary to promote a low- to moderate-severity burn.	To facilitate desired fuel conditions for broadcast burning	Specialist recommendation
SI005	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.	To create grazing barriers and assure desirable vegetation response	Specialist recommendation
SI006	If in an existing grazing allotment, projects in this category shall be accompanied by livestock grazing practices that promote the attainment of moderate-severity burn objectives.	To facilitate desired fuel conditions for broadcast burning	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SI007	Exclosure fencing to prevent utilization of plantings by deer, elk, and livestock is permitted.	To provide desired vegetation composition in riparian areas	Specialist recommendation
SI008	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
SI009	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
SI010	Identified wildlife trees shall not be felled.	To maintain nest/roost habitat.	Specialist recommendation
SI011	Trees may be stockpiled for future instream restoration projects.	To facilitate riparian restoration activities	Specialist recommendation
SI012	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
SI013	<p>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:</p> <ul style="list-style-type: none"> <li>• What kind of site (potential natural vegetation, soils)?</li> <li>• Successional state of site?</li> <li>• Components that need to be restored?</li> <li>• How units may fit into the overall landscape mosaic?</li> <li>• Long-term goals and objectives?</li> </ul>	To maintain desired vegetation composition in riparian areas and wetlands	Forest Plan Compliance
SI014	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.	Forest plan compliance
SI015	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 (e.g. jackstraw barriers)	To facilitate riparian restoration	Specialist recommendation
SI016	Felled trees may be placed into stream channels and floodplains to promote channel aggradation as long as such actions do not negatively impact use of spawning gravels or increase width to depth ratios.	To facilitate riparian restoration	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SI017	On steep or south-facing slopes, where ground vegetation is sparse, leave felled juniper in sufficient quantities to promote reestablishment of vegetation and prevent erosion.	To provide soil resource protection in wetlands and riparian areas	Specialist recommendation
SI018	If seeding is a part of the action, consider whether seeding would be most appropriate before or after juniper treatment.		Specialist recommendation
SI019	Certified silviculturists and experienced botanists, ecologists, soil and water specialists or associated technicians shall be involved in designing riparian vegetation treatments.	To provide desired vegetation composition in riparian areas and wetlands	Specialist recommendation
SI020	Species to be planted will be of the same species that naturally occur in the project area. Acquire native seed or plant sources as close to the watershed as possible	To improve planting success.	Specialist recommendation
SI021	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
SI022	Sedge and rush mats should be sized to prevent their movement during high flow events.	To minimize streambank erosion	Specialist recommendation
SI023	Concentrate plantings above the bankfull elevation.	To provide desired vegetation composition in riparian areas	Specialist recommendation
SI024	Removal of native and non-native vegetation that will compete with plantings is permitted.	To provide desired vegetation composition in riparian areas	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-NFS inholdings.	To ensure that land owners 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 NFS lands.	Complies with policy in FSM 7152.03
SU003	Evaluate potential haul routes that may be needed through non-federal land and ensure easements are in place or obtained prior to use.	To prevent illegal trespass across lands with other ownership.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
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 right-of-ways.	Maintain natural appearance of landscape	Specialist recommendation
SU007	Implement a 100 foot buffer zone around weather stations and other meteorological facilities. No road construction or thinning is to occur within the buffer. Routine management activities (such as hazard tree removal) may still occur within the buffer zone.	To ensure that project activities do not interfere with meteorological data gathering.	Forest 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 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
SU010	Remove thinning slash from highway ROWs. If approved by the FS, chipped slash may be left onsite at a maximum depth of two inches, otherwise it 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	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.	Ensure proper authorization and permitting of in-woods processing sites	Forest plan compliance

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SU012	Through the Arizona Department of Environmental Quality (ADEQ), the operator of a 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 <a href="http://www.azdeq.gov/node/525">http://www.azdeq.gov/node/525</a> and <a href="http://www.azdeq.gov/permits-needed-timber-products-sector">http://www.azdeq.gov/permits-needed-timber-products-sector</a> . 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	Forest plan compliance
SU013	Support operations and facilities on 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	Forest plan compliance and specialist recommendation
SU014	The design, construction and operation of processing sites shall utilize practicable procedures for control of surface water runoff from facilities.	Ensure proper design and construction of in-woods processing sites	Forest plan compliance
SU015	Processing site equipment and vehicles shall be operated and maintained to minimize petroleum and lubricating products from entering soil or surface/ground waters.	Ensure proper design and construction of in-woods processing sites	Forest plan compliance
SU016	The contractor or permittee operating the 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.	Forest plan compliance



DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW001	All stream channels and riparian areas will be protected with Aquatic Management Zones (AMZs), 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 Forest Plan direction or other guidance documents. Where AMZ widths are not customized to site conditions and don't occur in Narrow-headed or Northern Mexican Garter Snake proposed critical habitat (see AQ021), 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. Lakes and reservoirs should follow the same default AMZ widths (150 feet) as those for perennial waters. AMZ's around other riparian features will be on a case-by-case basis and outlined in the projects plan-in-hand. See SW004 for acceptable activities within AMZ's)	To insure 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 forest plan direction AMZs can be customized by an ID team 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 ESA 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	Stream channels to be protected with a prescribed aquatic management zone (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.	Allows for a reduction in ground disturbance by limiting the number of passes required to extract material and turning of equipment. BMP ultimately aims to reduce the amount of disturbed area affected during operation and to retain as much as possible the filtering effect of the undisturbed ground.	Specialist recommendation
SW004	Accepted activities within AMZs include mechanical and conventional tree felling, yarding, 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 travel should not occur longitudinally through AMZ. Turning machines and skidding within AMZs should be minimized to the greatest extent possible. Landings, decking areas, machine or hand piles, temporary road installation and skidding across streams or wetlands are to occur outside of AMZs unless otherwise specified. Skidding across ephemeral or intermittent streams may occur at designated crossing under no-flow conditions. 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.	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW005	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 specialists. 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
SW006	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
SW007	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.	To provide for bank stability and minimize erosion and bank instability to streams or other aquatic habitats.	Forest plan compliance and specialist recommendation
SW008	Site-specific criteria whereby either fire is allowed to burn in AMZs will be solely driven by the need to maintain or improve riparian and stream habitat (with the exception of WUI areas, see SW015 below). A site-specific evaluation will be conducted by a specialist as a part of the burn plan for each unit where fire 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
SW009	Fire control lines shall only be constructed within AMZs if mutually agreed upon by the authorized FS officer, fuels specialist, watershed specialist, and biologist. 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
SW010	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 is allowed in the mature forest 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.	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW011	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 ID teams.	To ensure that the fire management objectives and water quality objectives for these reaches are appropriately balanced.	Specialist recommendation
SW012	As part of seeding or other revegetation activities, do not apply surface fertilizer within an AMZ.	To protect water quality	Forest plan compliance and specialist recommendation
SW013	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
SW014	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 travel paths to lessen soil disturbance, compaction, and impacts to vegetation. Temporary roads will not be built on slopes where grade, soil, or other features suggest a likelihood of excessive erosion or failure. Temporary roads areas will be restored to natural, preconstruction conditions as much as possible.	To minimize soil disturbance and reduce sedimentation and erosion in aquatic habitats.	Forest plan compliance and specialist recommendation
SW015	When altering spring developments or splitting flow, place troughs far enough away from groundwater-dependent ecosystems (GDEs), 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 (GDE) and minimize effects on these sensitive systems.	Specialist recommendation
SW016	All vehicle staging, fueling of vehicles, and storage of petroleum products would be done on a designated protected, upland site at least 150 feet outside of AMZs or from natural water bodies and wetlands. 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 spill prevention control and countermeasures plan (SPCC) would be prepared as per 40 CFR 112. All herbicides and pesticides servicing and storage will be on designated, approved, upland sites.	To protect soil/water resources and aquatic species from petroleum, herbicide and pesticide contamination.	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW017	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, Contractor shall conduct cleanup and restoration of the polluted site to the satisfaction of Forest Service. Contractor shall maintain all equipment operating on Sale 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 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 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.	Forest plan compliance
SW018	No temporary roads, storage areas, camp sites, landings, machine piles and/or skidding will occur on dry or wet meadows in a project area. Skidding in meadows may occur for the sole purpose of removing meadow encroaching trees. All meadow locations identified during the layout phase of a project sale will be clearly labeled on contract maps for protection.	To minimize impacts to meadow systems and improve implementation.	Specialist recommendation
SW019	Heavy equipment, vehicle operation, road construction, staging areas, stockpile areas, piling of slash, fence construction, fire lines, and other operational activities shall not be allowed in springs, seeps, or any other Groundwater-dependent Ecosystem (GDE), unless it is for the benefit or protection of the GDE or development of the springs.	To maintain or improve the integrity of springs and other GDEs and minimize effects on these sensitive systems.	Forest plan compliance and specialist recommendation
SW020	At spring development restoration sites, place watering troughs far enough from a stream 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
SW021	Spring developments should not disturb the spring orifice (point where water emerges). Spring head boxes should be placed in a location that will cause the least amount of disturbance to the soils and vegetation of the GDE. 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 GDE's and minimize effects on these sensitive systems	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW022	Formerly used skid trails should be utilized where properly located. 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
SW023	Closed skid trails and roads must have adequate runoff and erosion control features. Slash is the preferred method for diverting water if of sufficient quantity and size is available to maintain complete contact with the ground. Berms should be removed to allow water off of skid trails and roads in to restore the natural grade of the slope as much as possible. Otherwise construct water bars and lead out ditches. Waterbars should not be more than 2 feet deep and need at least a 10-foot lead-out. Waterbars are only to be implemented with equipment with an articulating blade (no skidders), or by hand to remove berms, seeded, mulched, and cross-ripped. All berms and depressions (i.e., 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 runoff and sediment delivery into stream channels.	Forest plan compliance and specialist recommendation
SW024	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 runoff and sediment delivery into stream channels.	Forest plan compliance and specialist recommendation
SW025	Scarification or 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
SW026	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, rack and pile. All piling equipment must be equipped with a brush rake to minimize disturbance to the soil surface.	Rough piling minimizes disturbance to existing ground cover and the surface soil.	Specialist recommendation
SW027	Slash can be placed on skid trail and travel corridors to drive on to reduce rutting and soil disturbance from mechanized equipment.	To reduce potential for rutting and compaction along mechanical equipment travel courses.	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW028	Seed mixes for erosion control on site disturbed locations can include any of the following 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 NFs' Terrestrial Ecosystem Surveys (TES) to identify species to be utilized. Where appropriate and feasible, protect site with a variety of methods (e.g., 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.	Forest plan compliance
SW029	Mechanical crushing of lopped slash can only occur on 0–25 percent slopes.	Incorporate slash into the soil to promote long term soil productivity.	Forest plan compliance
SW030	Slash and/or chips can be scattered on landings to help minimize the formation of rills and gullies.	Minimize the concentration of runoff and sediment delivery into stream channels.	Specialist recommendation
SW031	Skid trail stream crossings will not be allowed unless pre-approved by the authorized FS officer with consultation from a watershed specialist for perennial and intermittent streams. Ephemeral streams crossings will be authorized by the FS officer. Crossings will be at right angles to channel and drainage banks. 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
SW032	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.	Forest plan compliance
SW033	Temporary roads are not allowed to cross perennial or ephemeral streams. Culverts, temporary bridges, low-water crossings, or log-fords will be required on all skid crossings on all streams that will have flowing water during the life of the temporary crossing. Skid trail crossings will be removed and restored when no longer needed. Any fill material will be removed and the channel and stream banks restored to a pre-project condition.	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.	Forest plan compliance and specialist recommendation
SW034	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 unless specialized equipment capable of adverse skidding without creating adverse soil impacts is utilized.	To prevent soil displacement	Specialist recommendation
SW035	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

<b>DF/BMP/M&amp;CM Number</b>	<b>Description</b>	<b>Primary Purpose</b>	<b>Basis</b>
SW036	During cable thinning operation, 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
SW037	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 (i.e. full suspension).	To prevent adverse effects to water quality	Specialist recommendation
SW038	During cable thinning, 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
SW039	Landings and decks should be clearly designated on the timber sale project plan.	To aid in implementation of project.	Specialist recommendation
SW040	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.	Forest plan compliance and specialist recommendation
SW041	Heavy ground disturbance activity areas (landings, major skid trails, unsurfaced haul roads, etc.) and excessive ground disturbance in any location (i.e., 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.	Forest plan compliance and specialist recommendation
SW042	Skid trails, landings, and temporary roads are to be closed and have erosion control measures implemented as outlined in SW033 post-treatment and landings are to be scarified and seeded with a certified weed-free mix of primarily native, perennial grasses. The Coconino NF 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.	Forest plan compliance and specialist recommendation

<b>DF/BMP/M&amp;CM Number</b>	<b>Description</b>	<b>Primary Purpose</b>	<b>Basis</b>
SW043	In meadow and grassland restoration sites where trees are being removed, designate skid trails in order to limit disturbance from skidding. Where material is not being removed, do not skid logs in meadows or grasslands, lop and scatter or manually remove slash from meadow; these are the preferred methods of treating slash. Do not machine pile within meadows or grasslands.	To minimize impacts to streams and soils in meadows from tree thinning operations.	Forest plan compliance
SW044	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.	Forest plan compliance
SW045	The authorized FS contract team member AND a watershed specialist will verify that the contractor has properly implemented the project watershed BMPs and erosion control measures prior to the closure of the project contract. In evaluating acceptance the following definition will be used by the FS: "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 CORs will 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 T&E and sensitive species aquatic habitat	Specialist recommendation
SW046	Wet Meadows, springs, seeps or other wet features where mechanized equipment is to be excluded will be designated as "protected areas" be clearly labeled on task order, contract, or agreement maps and marked on the ground. Any features discovered during the layout phase of a project will also be included on task order or contract maps and boundaries shall be delineated on the ground during layout.	Soils and vegetation in wet meadows, dry meadows, springs, seeps or other sources where the presence of water is indicated will be protected from disturbance which could cause adverse effects on water quality, quantity, wildlife and aquatic habitat.	Specialist recommendation
SW047	Tree falling methods in designated protected areas and other sensitive areas such wet meadows, or around springs, seeps, should have the minimal impact to soils as possible. Methods for removal and end-lining will be determined on a case-by-case by the authorized FS officer after consultation with a watershed specialist.	Wet meadows, springs, seeps, and other wet areas have soil types with low soil weight-bearing strength due to permanently or seasonally high moisture contents and inherent soil characteristics which make them highly prone to detrimental soil compaction and topsoil displacement.	Specialist recommendation



DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW048	Vegetation treatment in dry meadows will be treated in a site-specific manner to be determined by a watershed specialist in consultation with the project ID team.	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
SW049	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 (e.g., 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. 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
SW050	All ground disturbing activities using heavy equipment must be done under conditions which maintain soil condition (i.e. avoiding excess rutting, compaction, and displacement).	Insure that mechanical operations do not take place when ground conditions are such that detrimental soil compaction and topsoil displacement can occur.	Specialist recommendation
SW051	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. Slope gradients of 20 percent or more will be considered on a case-by-case basis. Any rutting that occurs must be rehabilitated at the soonest time practical.	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.	Forest plan compliance and specialist recommendation

<b>DF/BMP/M&amp;CM Number</b>	<b>Description</b>	<b>Primary Purpose</b>	<b>Basis</b>
SW052	At landings and within 75 feet of landings, rutting depths greater than 10 inches will not be allowed. Skidders shall not be turned on roads. Landings on slopes 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.	Forest plan compliance and specialist recommendation
SW053	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.	Forest plan compliance and specialist recommendation
SW054	For any other locations (e.g., 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.	Forest plan compliance and specialist recommendation
SW055	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
SW056	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 400 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
SW057	Coarse woody debris will be managed to achieve forest plan direction and specialist recommendations. These recommended levels may be lower in WUI areas. Ponderosa Pine Forest: 3 to 10 tons/acre (For Tonto NF: Refer to Forest Plan) Dry Mixed Conifer: 5 to 15 tons/acre (For Tonto NF: Refer to Forest Plan) For facilitative operations or other activities that may occur in non-target vegetation types (E.g., Pinyon-Juniper, Wet Mixed Conifer), refer to the applicable forest 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).	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW058	Burn plans will be designed to minimize fire intensity in riparian areas that have a PFC rating of Nonfunctional or Functional-at-Risk with a downward trend.	These systems may lack the vegetation to adequately dissipate energy and protect stream banks, therefore retaining the vegetative cover is necessary.	Specialist recommendation
SW059	Limit the areal extent of mechanical treatment which may occur in a subwatershed (HUC12) 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 large scale disturbance such as a fire and/or in a nonfunctioning condition. If exceeding these percentages by either treatment type or in combination, perform a cumulative watershed effects evaluation 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
SW060	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
SW061	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.	To guide streambank restoration treatments.	Specialist recommendation
SW062	Road erosion control, such as lead-out ditches or water bars, shall be constructed to hydrologically disconnect road surface runoff from stream channels.	Minimize the concentration of runoff and sediment delivery into stream channels.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW063	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.	Forest plan compliance and specialist recommendation
SW064	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 shall discharge to stable areas where the outflow will quickly infiltrate the soil and not develop a channel to a stream.	To provide for stable and serviceable roads and trails that do not adversely affect soils, surface water quality or aquatic habitats.	Specialist recommendation
SW065	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.	Forest plan compliance and specialist recommendation
SW066	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 AQ018). 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

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW067	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 interdisciplinary team (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
SW068	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.	To rehabilitate all disturbed areas from aquatic and watershed restoration treatments, minimize erosion and sedimentation to aquatic habitats and potential effects on species.	Forest plan compliance
SW069	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
SW070	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
SW071	Prior to construction/ site preparation, critical riparian vegetation areas, wetlands, and other sensitive sites will be clearly delineated to minimize ground disturbance, erosion, and sedimentation to aquatic habitats. Project specific BMP's will be implemented prior to construction when specified.	To minimize ground disturbance in aquatic and associated habitats during site preparation and sedimentation to aquatic habitats.	Specialist recommendation
SW072	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 (e.g., 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

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW073	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.	Forest plan compliance and specialist recommendation
SW074	Disturbance to streambank vegetation should be minimized in all project activities.	To protect riparian vegetation and stream channel stability.	Specialist recommendation
SW075	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
SW076	Heavy equipment will be commensurate with the project and operated in a manner that minimizes adverse effects to the environment (e.g., 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.	Forest plan compliance and specialist recommendation
SW077	Placement of lop / scatter material or piling for burning will occur outside of fragile or sensitive soil types.	Minimize disturbance of sensitive soil.	Specialist recommendation
SW078	In rock pit areas, soil and vegetation disturbance would be avoided to the extent practicable. Clear only the area needed for expansion of the pit.	Prevents impacts to soil, vegetation, and wildlife.	Specialist recommendation
SW079	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.	Forest plan compliance and specialist recommendation
SW080	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
SW081	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

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
SW082	Where there is topsoil that is first removed to access the aggregate material source, this soil shall be stockpiled for reclamation. Soil would be stockpiled in stratum and replaced so that the "A" horizon is back on the surface.	To facilitate reclamation efforts.	Specialist recommendation
SW083	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
SW084	Replace topsoil, revegetate, and reclaim mined areas pit as soon as possible once pit use is discontinued.	To protect soil and water resources.	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
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

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
TR006	Road maintenance through the timber sale 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 (e.g., 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 will be decommissioned, using any one or combination of appropriate methods, by the purchaser/contractor when mechanical treatments are finished.	To protect long-term soil productivity and water quality and ensure that temp roads do not become de facto new roads.	Specialist recommendation
TR009	If trees need to be removed for temporary road construction, avoid old trees unless necessary to prevent additional habitat degradation. Avoid removal of large trees, as well as oaks and aspens where feasible.	To minimize adverse effects on forest structure and habitat, and to minimize road disturbance from temporary roads and need for fills in stump holes.	Specialist recommendation
TR010	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
TR011	Do not borrow road fill or embankment materials from the stream channel or meadow surface on road maintenance or stream crossing projects. Compact (compress) the fill dirt.	to minimize disturbance in drainage systems, sediment production within channels, and changes to channel morphology that will alter aquatic habitats	Specialist recommendation
TR012	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



<b>DF/BMP/M&amp;CM Number</b>	<b>Description</b>	<b>Primary Purpose</b>	<b>Basis</b>
TR013	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
TR014	When deemed necessary in order to prevent potential damage to buried utilities, the Forest Service shall 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
TR015	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	Trees greater than 24 inches in diameter would not be cut in Mexican spotted owl recovery and protected habitat except in overriding management situations such as for human safety.	to minimize adverse effects on Mexican spotted owls while restoring Mexican spotted owl habitat, contribute towards the recovery of the owl, and to comply with ESA and direction in the 2012 MSO Recovery Plan, pp. 268-269	Forest plan compliance and specialist recommendation
WL002	Mexican spotted owl protected activity centers (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 MSO Recovery Plan	To minimize adverse effects on Mexican spotted owls while restoring Mexican spotted owl habitat, contribute towards the recovery of the owl, and to comply with ESA and direction in the 2012 MSO Recovery Plan, tables C.1, C.2, and C.3	Forest plan compliance and specialist recommendation
WL003	Coordinate and implement management activities within Mexican spotted owl protected activity centers (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 towards the recovery of the owl, and to comply with ESA	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
WL004	<p>In Mexican spotted owl recovery foraging/non-breeding habitat, follow the most current Mexican spotted owl Recovery Plan and incorporate the following guidelines:</p> <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>	<p>To minimize adverse effects to Mexican spotted owls and contribute towards the recovery of the owl while restoring Mexican spotted owl habitat.</p>	<p>Forest plan compliance and specialist recommendation</p>
WL005	<p>In Mexican spotted owl protected activity centers (PACs), springs, riparian and stream restoration, temporary road construction, obliteration, relocation, and maintenance, would not occur during the breeding season (March 1 to August 31), if occupied.</p>	<p>To minimize adverse effects on Mexican spotted owls while restoring Mexican spotted owl habitat, contribute towards the recovery of the owl, and to comply with ESA</p>	<p>Forest plan compliance and specialist recommendation</p>
WL006	<p>In occupied Mexican spotted owl protected activity centers (PACs) with currently nesting owls, no mechanical or prescribed fire treatments or road or trail maintenance would occur during the breeding season (March 1 to August 31).</p>	<p>To minimize adverse effects to Mexican spotted owls and comply with ESA and the 2012 MSO Recovery Plan, table C.1 while restoring Mexican spotted owl</p>	<p>Forest plan compliance and specialist recommendation</p>
WL007	<p>Hauling would generally avoid Mexican spotted owl protected activity centers (PACs) during the breeding season (March 1 to August 31) unless specific analysis has documented that this would not lead to adverse effects. Thinning equipment would remain greater than or equal to 0.25 miles from PAC boundaries during breeding season unless topographic features would limit noise; trucks would drive less than or equal to 25 miles per hour in PACs.</p>	<p>To minimize adverse effects on Mexican spotted owls while restoring Mexican spotted owl habitat, contribute towards the recovery of the owl, and to comply with ESA</p>	<p>Forest plan compliance and specialist recommendation</p>
WL008	<p>In Mexican spotted owl protected activity centers (PACs), no new wire fencing would be constructed in PACs 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.</p>	<p>To minimize adverse effects to Mexican spotted owls and contribute towards the recovery of the owl while restoring Mexican spotted owl habitat.</p>	<p>Specialist recommendation</p>

<b>DF/BMP/M&amp;CM Number</b>	<b>Description</b>	<b>Primary Purpose</b>	<b>Basis</b>
WL009	In Mexican spotted owl protected activity centers (PACs), road maintenance would not occur during the nesting season (Effective March 1 to August 31), if occupied.	To minimize adverse effects on Mexican spotted owls while restoring Mexican spotted owl habitat , contribute towards the recovery of the owl, and comply with ESA	Forest plan compliance and specialist recommendation
WL010	All stands included in the proposed mechanical treatments for Mexican spotted owl protected activity centers (PACs) would be hand-marked for thinning, and prescriptions and marking would be coordinated with the US 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
WL011	Fireline associated with preventing fire from entering Mexican spotted owl protected activity centers (PACs) and/or core areas would be constructed outside the nesting season.	To minimize adverse effects to Mexican spotted owls while restoring Mexican spotted owl habitat, contribute towards the recovery of the owl, and comply with ESA.	Forest plan compliance and specialist recommendation
WL012	In Mexican spotted owl protected activity centers (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 towards the recovery of the owl, and comply with ESA.	Forest plan compliance and specialist recommendation
WL013	Survey all potential spotted owl areas including protected, recovery nest/roost, and other forest and woodland types within the implementation area plus the area ½-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.	To minimize adverse effects to Mexican spotted owls while restoring Mexican spotted owl habitat, contribute towards the recovery of the owl, and comply with ESA.	Forest plan compliance and specialist recommendation
WL014	Coordinate burning spatially and temporally to limit smoke effects on nesting Mexican spotted owls, particularly for protected activity centers (PACs) with nests in low-lying areas (Effective March 1 to August 31).	To minimize the effects to Mexican spotted owls and comply with ESA	Forest plan compliance and specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
WL015	In Mexican spotted owl protected activity centers (PACs), recovery nest/roost, goshawk post-fledging family areas, no old trees of any species would be cut during the creation of temporary roads.	To protect and retain old trees and maintain or develop key habitat components	Specialist recommendation
WL016	In northern goshawk nest stands, burn plans covering areas with nesting 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 goshawks while restoring goshawk habitat.	Forest plan compliance and specialist recommendation
WL017	Fuels in 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.	Forest plan compliance and specialist recommendation
WL018	In northern goshawk post-fledging family areas (PFAs), thinning activities would not occur in occupied PFAs during the breeding season unless the district biologist can document that effects would not trend to listing or loss of viability.	To minimize disturbance to goshawks while restoring goshawk habitat.	Specialist recommendation
WL019	Hauling will not occur within post-fledging family areas (PFAs) during the breeding season (March 1 through September 30) unless monitoring determines the PFA is not occupied, or the nest is 1/4 mile away, topographically isolated, or as determined by a wildlife biologist.	To minimize disturbance to goshawks	Specialist recommendation
WL020	In northern goshawk post-fledging family areas (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 if specific analysis has documented that effects will not trend to listing or loss of viability.	To minimize disturbance to goshawks while restoring goshawk habitat.	Forest plan compliance and specialist recommendation
WL021	In northern goshawk post-fledging family areas (PFAs) road construction, obliteration, relocation, and maintenance would not occur during the breeding season (March 1 to September 30) if occupied, or as determined by a wildlife biologist.	To minimize disturbance to goshawks while restoring goshawk habitat.	Forest plan compliance and specialist recommendation
WL022	In bald and golden eagle nest sites, mechanical treatments within 300-yards of bald or golden eagle nest trees would only occur outside of the breeding season (January 1st to August 31st) or if the nest is inactive.	To minimize disturbance to eagles while restoring forest habitat.	Specialist recommendation
WL023	In bald and golden eagle nest sites, burn plans would be coordinated with the district wildlife biologist to ensure nesting eagles would not be adversely affected from smoke.	To minimize disturbance to eagles while restoring forest habitat.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
WL024	No project activities would occur within 500 feet of confirmed bald eagle communal roost sites from October 15 – April 15.	To minimize disturbance to eagles while restoring forest habitat.	Specialist recommendation
WL025	If new Mexican spotted owl protected activity centers (PACs) are established in areas with planned or ongoing 4FRI activities then existing design features related to MSO protection would apply to management activities.	To minimize adverse effects to Mexican spotted owls while restoring Mexican spotted owl habitat	Forest plan compliance and specialist recommendation
WL026	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 will retain all large and old trees along ridges and slopes above the pine and pinyon-juniper transition zone and will be implemented to contribute to development/recruitment of groups and clumps of large and old trees.	To minimize disturbance to turkeys while restoring forest habitat.	Forest plan compliance and specialist recommendation
WL027	Manage prescribed fire to retain ponderosa pine and roosting cover for turkeys.	To minimize disturbance to turkeys while restoring forest habitat.	Forest plan compliance and specialist recommendation
WL028	No mechanical treatment would occur within 300 yards 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
WL029	No dominant or co-dominant trees would be cut 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
WL030	Protect active raptor nest sites from disturbance by project-related activities by restricting activities during nesting season as specified in the applicable forest 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.	Forest plan compliance and specialist recommendation
WL031	All non-Forest Service personnel involved in thinning and 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 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 towards the recovery of the owl, and comply with ESA.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
WL032	A 300-foot buffer for mechanical treatment with heavy equipment should be designated around known bat colonies (use AGFD 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
WL033	Only low intensity fire will occur in Chiricahua Leopard Frog occupied habitats or suitable habitat within reasonable dispersal distance from occupied sites as defined in the species recovery plan.	Minimize disturbance while restoring forest conditions.	Forest plan compliance and specialist recommendation
WL034	In native leopard frog occupied sites (streams, tanks, etc.), frog dispersal distances should be considered when establishing an appropriate AMZ. In general, a 650-foot or designated along logical topographic breaks no-treatment buffer (no thinning, no direct ignition) is reasonable for leopard frog dispersal. Designated skid trail crossings through the buffer zone are allowed. Mechanical equipment may reach into the AMZ with coordination between the TSA/COR and biologist to meet objectives. In leopard frog dispersal habitat, a 200-foot protection zone (100 feet either side of the stream) would be established around designated stream courses. There would be no thinning and no direct ignition within the protection zones. Designated skid trail crossings through the buffer zone are allowed. Fall burning and burn plans should be coordinated with district wildlife biologists.	Minimize disturbance while restoring forest conditions.	Forest plan compliance and specialist recommendation
WL035	In springs identified for restoration, springs would be surveyed for leopard frogs prior to implementation of restoration activities.	Minimize disturbance while restoring springs and spring habitat.	Forest plan compliance and specialist recommendation
WL036	Do not use tanks for water sources that are known to have populations of northern, lowland, and/or Chiricahua 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.	Minimize disturbance while managing fire.	Forest plan compliance and specialist recommendation
WL037	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
WL038	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.	Maintain key but limited wildlife habitat components while restoring forest structure.	Forest plan compliance

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WL039	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.	Maintain key but limited wildlife habitat components while restoring forest structure.	Forest plan compliance
WL040	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 (i.e., the living dead) in ponderosa pine habitat.	Maintain key but limited wildlife habitat components while restoring forest structure.	Specialist recommendation
WL041	In pinyon-juniper cover type, snags 8 inches and greater in diameter at root collar would be managed for an average of 5 per acres, 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.	Forest plan compliance and specialist recommendation
WL042	Snags: Emphasize retention of snags exhibiting loose bark to provide habitat for roosting bats.	Maintain key but limited wildlife habitat components while restoring forest structure.	Forest plan compliance and specialist recommendation
WL043	<p>For wildlife cover and stand heterogeneity in ponderosa pine cover type: Gambel oak, juniper and pinyon species would not be cut with the following exceptions: seedling/sapling, young and mid- aged pinyon and juniper up to 11 inch diameter at the root collar may be cut within a 50 foot radius of individual or groups of old ponderosa pine (as defined in the old tree implementation strategy); and when there is no other option to facilitate thinning operations (skid trail and landing locations).</p> <p>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.</p> <p>Manage for large 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.</p> <p>In areas of savanna restoration and wildland-urban interface pinyon-juniper mechanical treatment, seedling/sapling, young and mid-aged pinyon and juniper may be cut.</p>	Maintain a range of structure conditions (i.e., wildlife habitat heterogeneity) while restoring forest conditions.	Specialist recommendation
WL044	Burn Plans and Ignition Techniques: Apply fire prescriptions to maintain forest plan levels of coarse woody debris.	Maintain a range of structure conditions (i.e., wildlife habitat heterogeneity) while restoring forest conditions.	Specialist recommendation

DF/BMP/M&CM Number	Description	Primary Purpose	Basis
WL045	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
WL046	Defer thinning in a ¼ mile radius around known 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
WL047	In-channel structures: Consist of porous channel-spanning structures comprised of biodegradable vertical posts (beaver dam support structures) approximately 0.5 to 1 meter apart and a height intended to act as the crest elevation of an active beaver dam. Variation of this restoration treatment may include post lines only, post lines with wicker weaves, construction of starter dams, reinforcement of existing active beaver dams, and reinforcement of abandoned beaver dams (Pollock et al. 2012).	To maintain or provide for future beaver (and associated species) habitat.	Forest plan compliance and specialist recommendation
WL048	Place beaver dam support structures in areas conducive to dam construction as determined by stream gradient or historical beaver use.	To maintain or provide for future beaver (and associated species) habitat.	Forest plan compliance and specialist recommendation
WL049	Place beaver dam support structures in areas with sufficient deciduous shrub and trees to promote sustained beaver occupancy.	To maintain or provide for future beaver (and associated species) habitat.	Forest plan compliance and specialist recommendation
WL050	Beaver habitat restoration activities may include planting riparian hardwoods (species such as willow and alder) and building exclosures (such as temporary fences) to protect and enhance existing or planted riparian hardwoods until they are established.	To maintain or provide for future beaver (and associated species) habitat.	Forest plan compliance and specialist recommendation
WL051	Temporarily restrict human access and disturbance-causing land-use activities within a 1-mile radius around active Mexican gray 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 (IFT) 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 IFT equipment (cameras, etc.) on Forest.	Forest plan compliance and specialist recommendation
WL052	Rock pits within ½ mile of MSO recovery and protected habitat would be surveyed to protocol to determine occupancy by owls before operations are initiated, unless a wildlife biologist determines this restriction is unnecessary.	To avoid or minimize potential impacts to MSOs.	Forest plan compliance and specialist recommendation
WL053	No ground disturbance from rock pit development or operation would occur in known protected activity centers (PACs), or within 1/4 miles of nests and roosts	To avoid or minimize potential impacts to MSOs.	Forest plan compliance and



DF/BMP/M&CM Number	Description	Primary Purpose	Basis
	during the nesting season, unless a wildlife biologist determines this restriction is unnecessary.		specialist recommendation
WL054	Material hauling from rock pits in or within ¼ miles of occupied PACs would occur outside of the Mexican spotted owl nesting season unless a wildlife biologist determines this restriction is unnecessary.	To avoid or minimize potential impacts to MSOs.	Forest plan compliance and specialist recommendation
WL055	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 30th unless a wildlife biologist determines this restriction is unnecessary.	To minimize impacts to Northern goshawk	Forest plan compliance and specialist recommendation
WL056	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 goshawk activity in the area and determine additional mitigations, if necessary, to limit impacts to nesting goshawks.	To avoid or minimize potential impacts to nesting Northern goshawk	specialist recommendation
WL057	Prior to reinitiating operations in rock pits where standing water is pooled, a wildlife 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	Forest plan compliance and specialist recommendation