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August 11, 2016

Comments sent via email: 4FRI comments@fs.fed.us and U.S. Mail:
Coconino National Forest
Attn: Annette Fredette, 4FRI Planning Coordinator
1824 S. Thompson Street
Flagstaff, Arizona 86001

RE: Public Scoping for 4FRI Rim Country Project Proposed Action

Dear Ms. Fredette:

The Arizona Game and Fish Department (Department) appreciates the opportunity to work collaboratively with the United States Forest Service (USFS) as a cooperating agency on the Rim Country Environmental Impact Statement (EIS) for the Four Forest Restoration Initiative (4FRI) Rim Country Project (Project). The 4FRI Project has the potential to benefit Arizona's terrestrial and aquatic wildlife resources, as well as the people who use and value those resources. The Department looks forward to continued cooperation to make this landscape-scale project successful from planning to implementation, and provides the following comments on the Rim Country Proposed Action (PA).

General

The EIS is being developed through a diverse, multi-partner, multi-agency stakeholder group (SHG). The Department requests the USFS outline the collaboration and partnership of the SHG within the EIS as well as the Department's role as cooperating agency, member of the SHG, and Project Core Team.

The Department requests monitoring and adaptive management be included as essential components within the PA. Monitoring of terrestrial and aquatic wildlife and their habitat is necessary for determining if restoration activities are effective, and that treatments are managed adaptively to avoid and/or minimize the potential for negative impacts to species and/or the habitats. Aquatic habitat monitoring is particularly critical to ensure thinning and burning are not resulting in long-term negative impacts to watershed health. The Department has developed and implemented stream habitat monitoring techniques within the project area and would like to partner with USFS to continue to implement the appropriate monitoring techniques, as was done in the first 4FRI EIS with the multi-party monitoring board. The Department considers monitoring and adaptive management critical aspects of success for landscape scale restoration, and requests that the USFS continue engagement with the Department and the SHG to ensure these elements are appropriately incorporated and implemented.

The large tree and old tree implementation plans (LTIP/OTIP) were a product of discussions during the development of the first 4FRI EIS. The Department believes the Rim Country PA does not sufficiently emphasize the importance of these plans. The Department understands that the vegetative communities are more complex within the Project than those within the first 4FRI EIS, and that the criteria for preponderance of large young trees (PLYT) and high canopy-closure patches within the Project would be defined in close collaboration with the SHG. However, the Department requests that the EIS provide greater clarity with respect to application of the LTIP/OTIP, and place more emphasis on the wildlife value of presettlement and old growth trees.

Issues of clarity and consistency

(throughout) Will and would are used interchangeably for proposed actions. The use of "will" is perceived as predecisional; suggest use of "would" instead.

(throughout) Lack of definition of scale is an issue throughout the PA. For example, Table 7 (p 11) provides desired conditions, but does not indicate the scale for average basal area for cover types.

(throughout) Define cover types for clarity. The Department is specifically interested in definitions of grassland, savanna, meadow, wet meadow, and wetlands. We also requests that dry meadow be included and defined.

(p 3, paragraph 2) The purpose statement focuses on ponderosa pine, and does not mention other forest cover/habitat types present in the project area, even though they cover a broad area. Broaden appropriately.

(p 3, paragraph 3, under Forest Resiliency and Sustainability) The analysis area includes wet mixed-conifer with longer fire-return intervals; we request that this be addressed here as well.

(p. 3, paragraph 5) Savannah cover types have likewise been affected by woody encroachment.

(p. 3 paragraph 4, last sentence) It is unclear what species is referred to by "...variety of shapes and sizes of trees..."

(p. 4, paragraph 3) "structure" is listed twice in item (2).

(p. 4, paragraph 3, and p. 24) Under facilitative operations on non-target cover types, the Department believes that to restore ecosystem function within the project area, treatments of non-target cover types should be implemented to maintain desired conditions or move these cover types toward desired conditions. These non-target cover types are contributing to undesirable fire effects, degraded terrestrial and aquatic species habitat, and degraded condition and function of streams and springs within the project area. To exclude these cover types would prevent a comprehensive effort at restoration of ecosystem functions. Furthermore, these facilitative operations may require mechanical treatment, not solely fire.

(p. 5) Wet meadows are mentioned only under the Purpose and Need for Streams and Springs. Wet meadows are an integral component of a functioning headwater system. The Department

requests that wet meadows are specifically considered under Desired Conditions and Proposed Treatments for aquatic habitats.

(p. 5, paragraph 2) The Department requests clarification as to the need to include road decommissioning in the Project, and how the Project would be used to implement Travel Management Rule (TMR) decisions. The PA states there is a need to decommission unneeded routes identified during TMR, however, the PA later (p. 14) gives mileages of roads to be decommissioned for Apache-Sitgreaves National Forests, which have not yet finished TMR. Please provide more information and clarification as to the need and ability for the USFS to make changes to the transportation network outside of TMR.

(p. 6, Table 1) The Project analysis area includes >100,000 acres of juniper and pinyon-juniper woodland. Are these within the natural range of variability and meeting desired conditions? If not, why are they excluded from treatment?

(p. 8) Savannah types are mentioned in the text, but not included in summary tables.

(p. 8, paragraph 4) It is not clear what the percentages of historic incidence of dwarf mistletoe refer to (i.e., infected acreage, stands, or other geographic units?).

(pp. 8, 11, 14) Provide criteria for areas classified as being "understocked," and how this fits with overall restoration goals.

(p. 9) Define Regional Forester Sensitive species.

(p. 11 paragraph 3) Clarify circumstances for which planting would be necessary to meet desired conditions and restoration objections.

(pp. 11 – 12) Historically, some areas infected by dwarf mistletoe received intense silvicultural treatments (e.g., "sanitation") that were controversial and compromised aesthetics and wildlife habitat values. Restoration treatments should be done in consideration of the natural incidence of mistletoe and its value to wildlife and habitat. The Department requests that the scale and intensity of mistletoe treatments be more clearly defined. The statement that mitigations will be considered "where more than 20% of ponderosa pine trees or an aggregate of mixed conifer host species are infected" has little meaning without a reference to scale. The same comment applies to the Mechanical Treatment table (p. 24) where the 20% threshold is mentioned again; this may be a very low threshold in areas of low host species diversity. Please clarify or revise to address the discrepancy under differing circumstances.

(pp. 16 – 19, Figures 3 – 6) The figures provided by the PA are lacking in context and detail. Given the scale of the Project, we request that USFS publish figures online and include topographic features, so there will be sufficient detail for the public to comment in a meaningful and effective manner.

(p. 24) Under Weed and Release, reference is made to thinning where brush, juniper, and evergreen oak species are greater than 40% of the cover. The Department requests clarification on the scale and science/management basis for this number, and that the EIS address the following questions and concerns. Does this proposed thinning only apply to evergreen oaks,

and not other oak species? Would this apply only below the Mogollon Rim where evergreen oaks are abundant? The Department requests USFS provide a map of the areas that would be targeted for oak thinning. We anticipate discussions with the ID team to ensure we work towards mutual goals of fuel reduction and wildlife habitat management, given the importance of oaks (including patches of young oak, in some cases) for wildlife.

(p. 24) Even-aged shelterwood is a silvicultural system for sustained-yield and of uncertain relevance in a restoration context. The Department requests clarification as to its use and relevance in the Project. There is also a reference to the LTIP/OTIP here, which seems out of context especially given that this is the only reference to these plans within the PA.

Stronger emphasis on aquatic habitat restoration

In contrast to the first 4FRI EIS project area, the Rim Country project area contains an extensive aquatic environment. Riparian, wetland, and spring habitats are common in the project area and of tremendous importance to terrestrial and aquatic wildlife. The Department supports active improvement and restoration of these areas, but we are concerned that the PA does not sufficiently emphasize the aquatic restoration opportunities available. The aquatic treatments are confusing and lacking detail on proposed actions and locations. The Department has the following general and specific comments regarding aquatic habitat restoration.

(pp. 14 and 26) Define the difference between "riparian stream and stream channel restoration" and "stream habitat restoration." Does this distinction imply perennial versus ephemeral streams?

The Department has concerns with the method and accuracy of how riparian habitat was categorized. The "Stream Habitat and Stream Channel" restoration map provided to the Department upon request contains inaccuracies in classifications of streams. The PA does not explain how the 360 miles of stream habitat and 470 miles of non-riparian stream channels were identified. Please provide explanation of stream categorization. The Department would like to provide our expertise on the intermittent, ephemeral, and perennial nature of streams identified within the project area, but is unable to provide comment on the listed mileages without further explanation on methodology and a list of streams and their categories. We fully support the inclusion of restoring function to ephemeral and intermittent stream channels as outlined in the proposed action, and have attached a list of perennial streams (Attachment 1) that we are specifically requesting be included under stream restoration; this list was generated from an Arizona Department of Environmental Quality perennial stream layer. The USFS should consider the streams as the Department's priorities for stream habitat restoration within the Project. The Department requests that all of these streams and reaches be included, and used to calculate the stream restoration mileage.

To clarify and simplify stream restoration treatments and locations, the Department requests that the two riparian restoration types identified by the PA be combined into one single restoration type, termed "stream habitat restoration." Per that request, we suggest the following two paragraphs be included under the PA's Purpose and Need to further clarify what constitutes stream habitat restoration within the project area:

"*Inclusion of stream habitat restoration projects in the project area is an integral part of restoring forest resiliency and ecosystem function. To return streams to functioning condition,*

incorporation of artificial structures is often the most effective method. High severity wildfire has been shown to negatively impact aquatic habitats and surrounding riparian vegetation and has resulted in decreased habitat complexity, increased water temperatures, and sedimentation, all of which contribute to overall declines in water quality and quantity. Enhancing and restoring aquatic habitat and riparian vegetation would promote the biodiversity of wildlife that inhabit the stream or utilize associated habitats. Incorporation of physical instream structures into broader watershed restoration will improve the overall efficacy of these ecosystem level treatments."

"*Stream habitat restoration projects in the project area should include instream habitat restoration to improve aquatic species habitat through inclusion of physical structures that would improve habitat heterogeneity.*" (see Attachment 2, a list of stream habitat restoration activities).

(throughout, but specifically pp. 4-5; p. 9, paragraph 4; p. 12, last paragraph) Aquatic habitat restoration under the Project would restore function and provide benefit to all aquatic species. The Department therefore requests that the PA remove adjectives that specify that restoration would benefit "sensitive" or "protected" aquatic species; and broaden the benefits of aquatic habitat restoration to include all "aquatic species."

(p.5, under Streams and Springs) In some circumstances, barriers are more effective than stream crossings for management activities. The Department requests the USFS work with the Department collaboratively to determine the need for fish passages for specific roads. We request that the sentence be changed to "Reducing road density and improving road and stream crossings (where desirable, and in conjunction with Department management objectives) would maintain natural flow regimes..."

(p. 5, under Streams and Springs) The Department requests inclusion of the sentence: "Instream habitat improvement also stabilizes streamside areas and restores functioning condition in the watershed by decreasing sediment mobilization, maintaining riparian vegetation, and increasing habitat complexity."

(p. 7, paragraph 1) Define the methods for the fire model used within the project area.

(p.14, last bullet) Change to "Construct up to 200 miles of protective barriers (including jack straw barriers and fencing) around springs, aspen, Bebb's willows, and big-toothed maples, as needed for restoration."

(p. 26, under Spring Restoration, Riparian Stream and Stream Channel Restoration, and Stream Habitat Restoration) Please provide more detail on proposed restoration activities for aquatic systems and potential "tools in the toolbox." See Attachment 2 for suggested activities for stream habitat restoration.

(p. 26, under Stream Habitat Restoration) Potential structures for stream channel restoration are listed in Attachment 2. Structures would be designed for each stream restoration project to improve the condition of the stream and stabilize the watershed, improving water quality and potentially improving water quantity through reconnection of the stream with the floodplain.

(p. 26, under Design Features) For aquatic species, the Department would like the EIS to emphasize the following general recommendations to improve aquatic habitat: retain large conifers and/or hardwood trees in riparian corridors; remove encroaching conifers from headwater meadows; and maintain existing/construct new exclosures where ungulate impacts are excessive to restore flow and protect aquatic habitat.

(p. 26, under Design Features) To protect watershed health in riparian areas as well as the Rim lakes, which are recreationally and economically important, we request that mutually agreed upon Best Management Practices (BMPs) be developed and implemented before and during treatments, including but not limited to projects that control erosion, minimize soil and ash outputs, and protect riparian areas from siltation during and after mechanical and burn treatments. Refer to the Department's *Preliminary Existing Conditions and Habitat Recommendations for the 4FRI Rim Country EIS* (Attachment 3), provided to the 4FRI core team in June 2016 for suggested BMPs to protect watershed health.

Broadening of the wildlife focus

The PA adequately addresses appropriate treatments for Mexican spotted owl (MSO) and northern goshawk (NOGO). However, we request that the EIS include treatments that create desired conditions for a broader range of wildlife species, not just sensitive or federally protected species. There is no single forest state that maximizes habitat value for all wildlife species, so habitat restoration needs to incorporate spatial heterogeneity, while also considering the requirements of federally protected species. The varying habitat requirements of different species underscores the need for forest restoration practices that are implemented at a site-specific scale, but applied to the landscape, to improve wildlife populations across the project area. Please refer to Attachment 3 for the Department's specific desired conditions for wildlife habitat based on species distributed within the project area.

The Department requests that the uneven-aged group selection (p. 23) to include additional techniques to protect and improve wildlife habitat components, including:

- Protect and promote development of large Gamble oak and other hardwood species
- Ensure retention of snags and downed logs
- Retain poorly formed, dead-topped, and lightning struck trees

The Department requests that mutually agreed upon BMPs (i.e., timing restrictions) are developed and implemented before and during treatments to minimize negative impacts to terrestrial wildlife from treatments.

Improving wildlife movement across the landscape

The Department has identified several activities not included in the PA that would improve or restore wildlife connectivity, movement, and distribution across the landscape. These include creating movement corridors for open canopy species, wildlife water developments or redevelopments, and fence construction or modifications.

The Department is pleased with the inclusion of grassland and meadow restoration in the PA, which would benefit pronghorn and other grassland-associated wildlife species. To restore functionality to grasslands and meadows, we anticipate that there may be a need to ensure connectivity between existing grasslands and meadows. The Department supports the need to retain old and large trees and high-canopy patches, and acknowledges that there will be further

discussion within the SHG to collaboratively identify the most accurate parameters for identifying the PLYT areas and the management techniques that will be appropriate therein. However, the Department requests flexibility within PLYT areas to restore intermontane meadow connectivity. As we did during the first 4FRI EIS, the Department will work with the 4FRI core team to identify meadows and grasslands that may require conifer removal, as well as potential corridors that may require thinning to facilitate movement among intermontane meadows and grasslands. Although this flexibility would allow a more intensive treatment in certain PLYT areas, the Department is not requesting an exception to remove old growth trees.

There is a need for up to 36 wildlife water developments or redevelopments within the project area to provide reliable and permanent sources of water in an even distribution across the landscape (Attachment 4). Existing waters in need of redevelopment (n=33) include USFS and Department waters. Examples of potential improvements include the need for creation of an apron, cleaning following sedimentation, damage repair following wildfire, restoring function to old, dilapidated waters, adjustments that improve access for wildlife, and improvements that bring the existing water up to the Department's Wildlife Water Construction Standards. Some waters that provide important amphibian habitat may require fencing to exclude livestock, or require restoration following livestock exclusion. New waters can create a more even distribution of wildlife across the landscape and reduce grazing pressure in high use areas. These new waters may be located in areas of importance for particular species or strategically placed to protect habitats of interest from native and nonnative ungulates. Additionally, in areas of aspen recruitment, waters can be placed to strategically pull elk away and facilitate further aspen recruitment. For new and existing wildlife water projects, the Department may have funding or may be interested in partnering with the FS for funding opportunities.

There is a need for up to 10 fence constructions or modifications that have been identified within the project area (Attachment 5). New fence projects are needed to exclude livestock and native ungulates from sensitive areas. Fence modifications (i.e., making improvements using the Department's Wildlife Compatible Fencing guidelines) have been identified in the project area to facilitate wildlife movement. These fence modifications will improve landscape permeability for elk, deer, and pronghorn, and in some cases are specific to known spring and fall pronghorn migration, an important ecological component of the ponderosa pine ecosystem. The Department may have funding for such projects, or may be interested in partnering with the FS to seek funding opportunities.

In conclusion, the Department expresses its strong support for the collaborative process being implemented by the 4FRI Project, a one-of-a-kind effort to restore function and resiliency of Arizona's forests, with considerable benefits to terrestrial and aquatic wildlife. We look forward to our continued partnership with USFS on the Rim Country Project.

Sincerely,

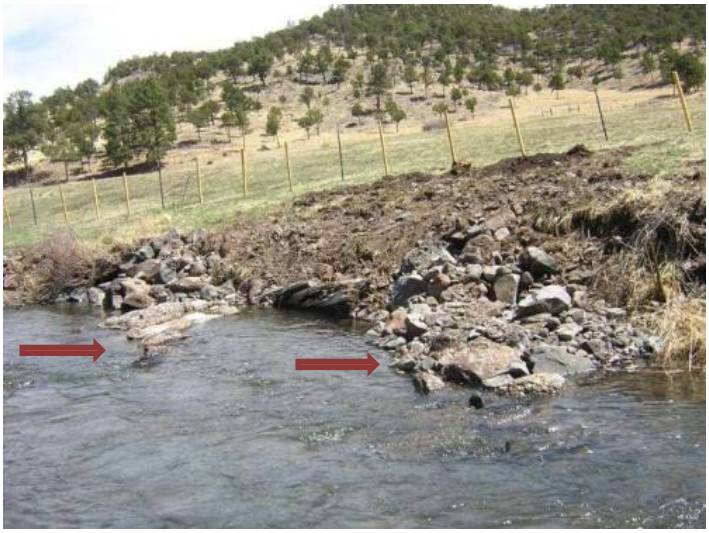
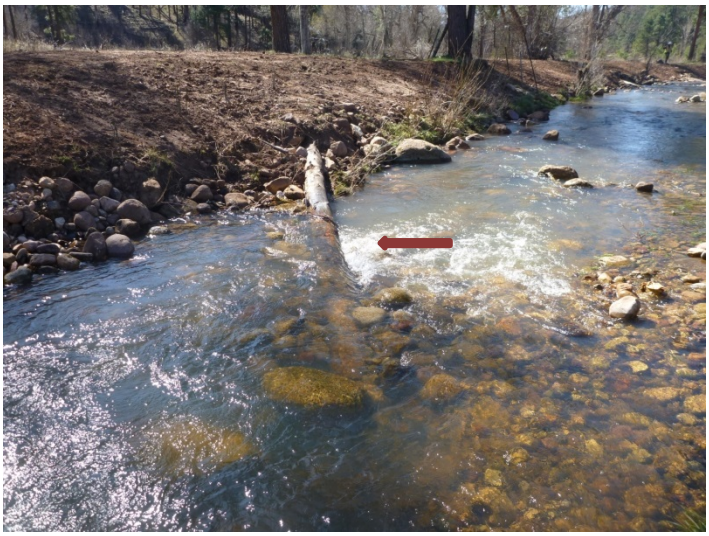
Joyce Francis

Joyce Francis
Habitat, Evaluation, and Lands Branch Chief

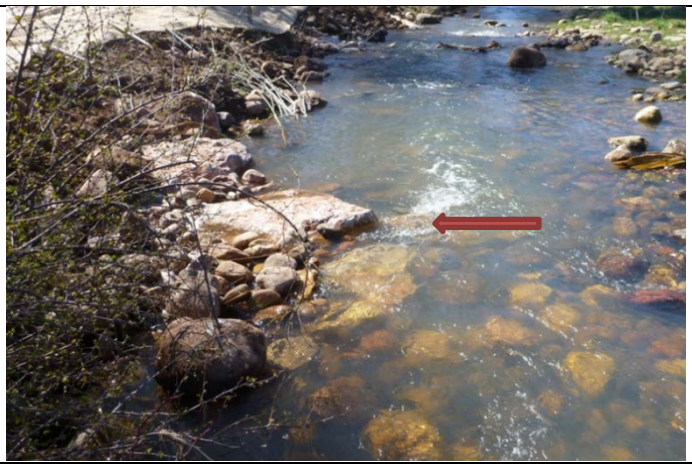
Attachment 1. Perennial streams to be included under aquatic restoration treatments

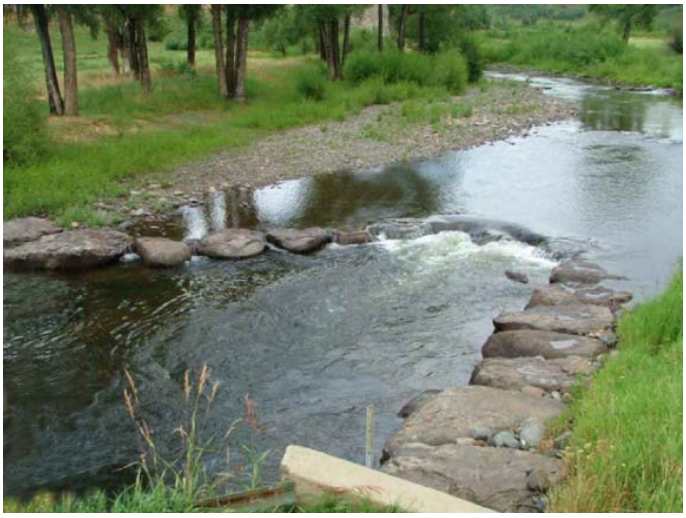
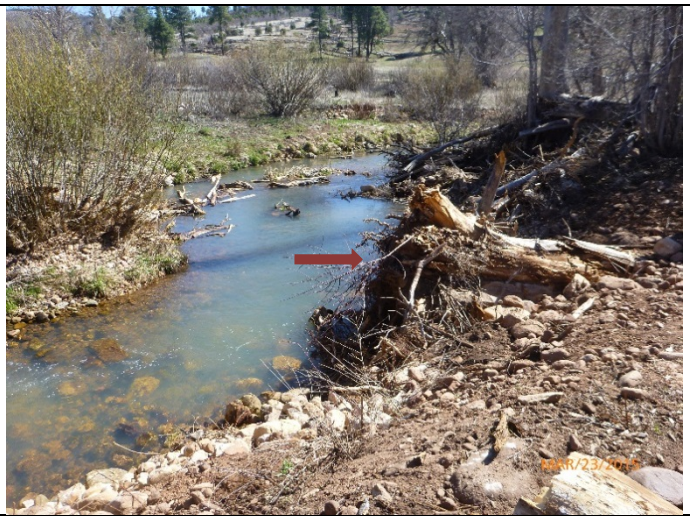
		Downstream		Upstream	
AGFD Region	Stream	Easting	Northing	Easting	Northing
6	Pine Creek	458367	3803349	463633	3812288
6	Webber Creek	467635	3803576	468900	3809371
6	Bray Creek	467958	3804060	469368	3808838
6	Sycamore Creek	462414	3799157	461710	3803258
6	Chase Creek	474283	3806610	472867	3810169
6	East Verde	467065	3795623	474951	3810783
6	Dude Creek	476363	3805826	478616	3809269
6	Bonita Creek	477922	3800889	481021	3807365
6	Ellison Creek	474229	3801301	484832	3806190
6	Tonto Creek	493465	3793515	491167	3806136
6	Dick Williams Creek	491104	3802224	492821	3804795
6	Horton Creek	491497	3799944	494523	3803348
6	Christopher Creek	496247	3796241	498736	3799600
6	Haigler Creek	503464	3786702	501530	3784908
6	Gordon Canyon	495239	3785043	507319	3791852
6	Canyon Creek	518287	3792939	518886	3789898
1	Willow Creek	500189	3833323	499986	3803783
1	Woods Canyon Creek	510156	3801949	500922	3802902
1	Chevelon Creek	510157	3801950	513202	3793304
1	Willow Springs Creek	510157	3801950	511346	3797273
1	Show Low Creek	593972	3781610	591742	3784641
1	Big Spring Wash				
1	Thompson (In Show Low)	598935	3777245	603336	3776211
1	Brown Creek	618045	3779728	610130	3790745
2	East Clear Creek	500189	3833323	469582	3809686
2	General Springs Creek	483067	3823624	480932	3821553
2	Barbershop Canyon	485082	3823209	481188	3808409
2	Miller Canyon	478102	3823170	472793	3811632
2	East Miller Canyon				
2	West Miller Canyon				
2	Dane Canyon	486606	3816256	482855	3808329
2	Houston Draw				
2	Yeager Canyon	486880	3824949	484486	3807483
2	Bear Canyon	481260	3821842	481430	3821215
2	East Bear Canyon				
2	West Bear Canyon				
2	Leonard Canyon	496322	3831334	495468	3828479
2	West Leonard Canyon				
2	Middle Leonard Canyon				
2	East Leonard Canyon				
2	Kehl Canyon	473421	3807771	473047	3809844

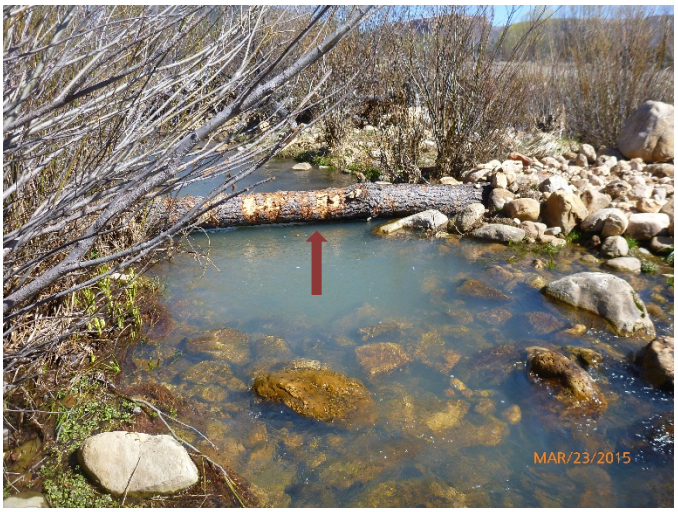
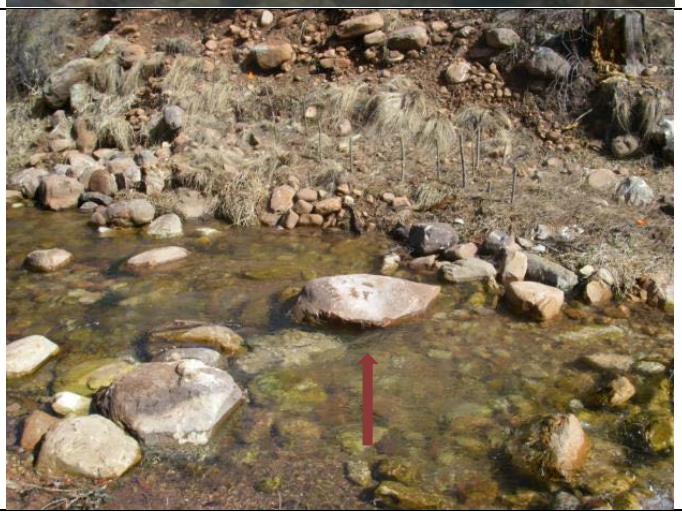
Attachment 2. Stream Restoration Activities[1]

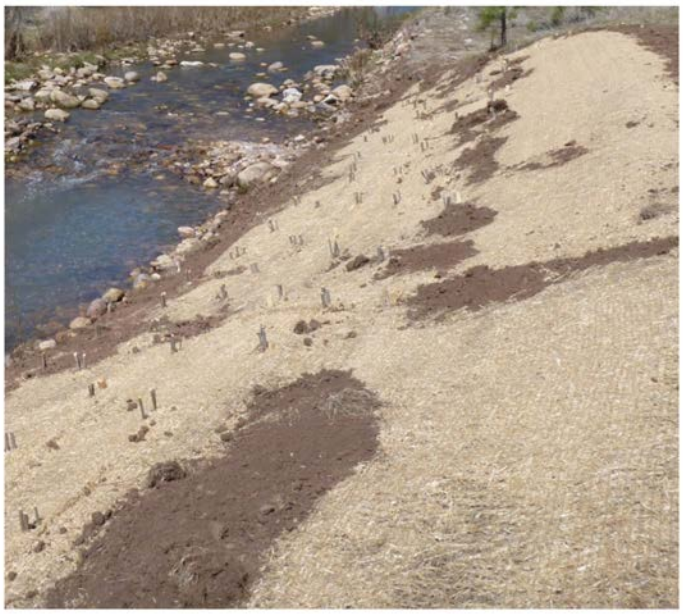
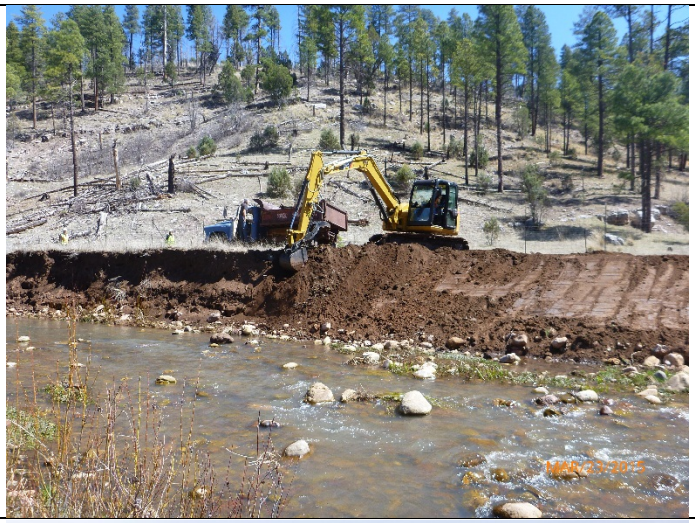
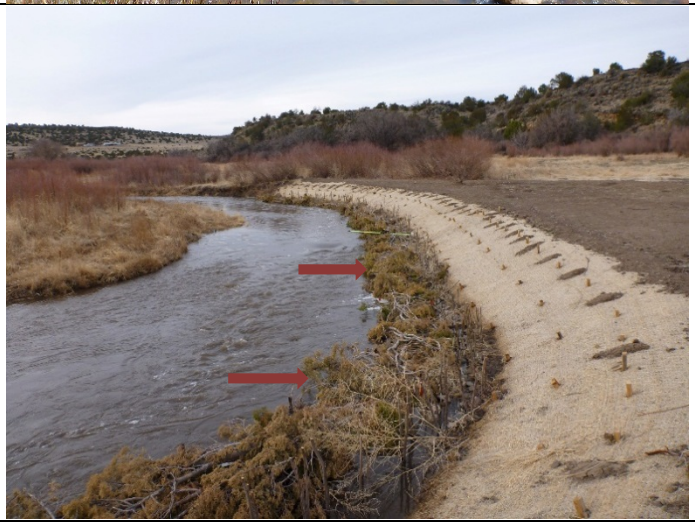
Rock stream barb	Provides both bank protection and fish habitat features along the outside of a bend. It is a rock structure which extends from the bank at an upstream angle. The rock stream barb is bank full height when it leave the bank and then slopes down towards the bed of the stream. The barb is keyed into the bank five feet, and should not extend over one third the stream width into the stream. The barb serves to slow velocities along the outside of the bend and create a slow water habitat. Several barbs can be used in succession along the outside of meanders.	
Log barb	Provides both bank protection and fish habitat features along the outside of a bend. It consists of a single, medium to large sized tree trunk buried in the bank and sloped upstream and down towards the bed of the stream. The end in the river should be buried in the substrate or held in place with ballast boulders. The barb should not extend over one third the stream width into the stream. The barb serves to slow velocities along the outside of the bend and create a slow water habitat. By building the barb from a log the downstream side can provide a hollow, overhung area for fish hiding. Currents created by the barb should maintain the pool over time. Several barbs can be used in succession along the outside of meanders.	

[1] *(courtesy of Natural Channel Design, Inc.)*

Boulder dart	Provides bank protection along the outside of meanders, however the main purpose is to break up high velocities along the bank, provide vertical structure, and create small scour pockets that promote deeper habitat. Boulder darts consist of 12 to 24 inch diameter rocks dug into the bed of the stream and extending to 75% of bank full elevation. Flows over the dart will maintain the deeper pocket.	
Boulder clusters	Creates heterogeneous currents and velocities in homogenous riffles and runs. They can provide vertical cover in midstream or bank side habitats. Large boulders are placed in a group to breakup high velocities and create low velocity resting habitat with vertical structure. Boulder clusters can be installed midstream or along the shoreline. They are best used in groups of densely spaced multiple clusters to provide short reaches of complex habitats.	
J-hook vane	Provides both bank protection and fish habitat features along the outside of a bend. It is a rock structure, which extends from the bank at an upstream angle, curving around to end perpendicular to the channel. The J-hook is bank full height when it leaves the bank and slopes down towards the bed of the stream. Large boulders can be placed near the mid-stream end of the vane to create low velocity resting habitat and should not extend over one-half the stream width into the stream. The barb serves to slow velocities along the outside of the bend and create a slow water habitat. Several barbs can be used in succession along the outside of meanders	

Cross-vane weir	Provides grade control as well as helping to center and concentrate flows. It provides and maintains deeper pool habitat as well as hiding and feeding habitat. The vanes extend upstream from bank full height down into the substrate at a low slope and low angle. The lowest point of the vane forms the thalweg of the stream and the vane arms define the bank full width of the stream. The vane is formed of large rocks sized to withstand high shear stress and is built on footer rocks imbedded in the stream substrate. Cross-vane weirs can be used in succession to form pool drop sequences that provide grade stability to the stream	
Root wad	Root wad structures are the trunks of large mature trees embedded in the stream bank with the attached root wad extending out into the stream. The buried tree trunk anchors the structure and the mass of roots slows stream velocities along the bank, creates a scour pocket in the stream bed, and provides structural habitat for fish. The number of root wads to be installed is dependent on the availability of suitable trees. Trees can be damaged or downed wood but should be structurally sound.	
Log overhang	Provide overhead cover along the bank by creating a hollow portion of the bank. A section of sound log is installed on footer rocks and cabled and ballasted into place with anchor rocks. Large rock are placed along the face of the log to break up flows and provide additional hiding and feeding areas. Log overhangs must be placed in a manner so that a swimmable overhang is always available at the lowest flows. Additionally, there must be some current passing through the overhang to prevent it from filling with fine sediments. Log overhangs can be built	

	utilizing hand crews and minimal tools.	
Cross-over log	The cross-over log structure is a large log perpendicular to the flow of the stream and extending from one stream bank to another. The log can be held in place by both the attached root wad and upper limbs, or ballasted with large rocks. The trunk of the tree should be at or slightly above water level at base flow. The trunk and roots of the tree form vertical and overhead structure and help to form variable stream velocities, which maintain different substrate size distributions in the channel. The stream would likely shift crossover logs during large flows; and they would likely create new habitat where they come to rest.	
Large Roughness Elements (LRE)	Large immobile boulders placed along the stream bank or in the center of flow to break up velocities and created heterogeneous flow patterns. They provide resting and hiding habitat close to feeding lanes. LRE's are generally very large boulders strategically placed to narrow the flow path or break up high velocities. LRE's should be sized to be immobile under all but the largest flows.	
Mini weir	Small structures built of larger boulders that create high velocity flow paths that maintain midstream pocket water for holding and feeding access. Two larger rocks form the edges of the weir and a low center rock allows flows to pass over. Velocities increase in the flow over region and for a small pocket of pool habitat below. Mini weirs do not span the entire stream and be utilized multiple times within the same riffle to create multiple small pockets of fish habitat.	

Seeding with erosion control fabric and mulch	Includes spreading of native seed mix of grasses and forbs specific to the soil type and location. The native seed mix should include a mix of both cool and warm season grasses to ensure good generation at any time of year. The seed mix should be installed over areas with sufficient vegetative cover to prevent erosion. Seeding with fabric and mulch to prevent erosion should be done in coordination with gully control, trail maintenance and changes in management or traffic patterns that allow disturbed areas time to recover.	
Bank sloping	Bank sloping consists of excavating steep eroding banks to a less steep slope that can support establishment of vegetation and lessen erosion. An excavator removes the steep portion of the bank from the toe upwards. This can be accomplished without working in the live stream or causing excess erosion. This will create a banks that can support vegetation and minimize the loss of mature trees along the top of the bank.	
Brush revetment	Promotes the storage of sediment along the toe of the bank by slowing stream velocities, especially on the outside of meanders. Build-up of sediment along the toe allows establishment of vegetation and strengthens stream banks. Brush revetment consists of stout evergreen limbs Juniper limbs or recycled Christmas trees fastened together to provide a continuous row along the toe of the bank. The limbs slow velocities and trap sediment. When the toe is established, the limbs either rot or become buried in sediment.	

Preliminary Existing Conditions and Habitat Recommendations for the 4FRI Rim Country EIS – June 2016

Arizona Game and Fish Department

Introduction

As Cooperating Agency in the development of the Four Forest Restoration Initiative (4FRI) Rim Country Environmental Impact Statement (EIS), the Arizona Game and Fish Department (Department) was asked to provide expertise on existing conditions for fish and wildlife within the Rim Country EIS boundary. In response, members of the Department's 4FRI interdisciplinary (ID) team, along with a member of the Department's Geographic Information Systems (GIS) program, organized workshops within the Department's Regions 1 (Pinetop), 2 (Flagstaff) and 6 (Mesa) to capture site-specific information on aquatic and terrestrial wildlife, and other resources of importance to the Department, from within the Rim Country EIS boundary. The following document represents the current and best available data and information on populations, and desired future conditions relative to those known existing populations, at the time of this document (June 2016).

Because there is no single forest state that maximizes habitat value for all species, some contradictions exist in treatments or desired conditions recommended for various species within this document. The Department has begun to identify core areas for particular species, and corresponding recommendations for desired conditions for these areas of interest. The different habitat requirements of species underscores the need for forest restoration practices that are implemented at a site-specific scale, but applied to the landscape, to restore heterogeneity, return the forest to its natural range of variability, and improve wildlife populations on the landscape-level.

The Department has not examined how these preliminary treatment recommendations might overlap with Mexican spotted owl Protected Activity Centers (PACs). We recognize the potential for limitations on activities within PACs; the data and recommendations provided herein are not intended to contradict or supersede any requirements decided through consultation with U.S. Fish and Wildlife Service.

Methods

The workshops included staff from Terrestrial, Aquatic, and Law Enforcement programs, and others as needed. The purpose of the workshops was to 1) begin mapping existing data and knowledge of wildlife and habitat, 2) make recommendations for site-specific areas that would benefit target species from burning, thinning, and/or restoration treatments within the EIS boundary, and 3) provide a synthesis of habitat restoration recommendations that would benefit wildlife and/or lessen impacts during treatment implementation. These data and recommendations can be used to inform the EIS analysis and identify projects for inclusion in the 4FRI Rim Country National Environmental Policy Act (NEPA) documents. The Department recognizes that because this is an initial effort, and because we do not have data or knowledge for the entire EIS boundary, there are areas outside of our site-specific recommendations that will also benefit from treatment. At this time the Department does not have specific knowledge of these areas but will be providing updates as we get relevant information.

An ArcGIS online project map (projected in North American Datum of 1983 [NAD 83], Zone 12) was developed for this effort that included reference layers containing the best available data from various sources (U.S. Forest Service [USFS], U.S. Fish and Wildlife Service [USFWS], Department, etc. (reference layer can be provided upon request)). During the workshops, Department biologists identified multiple features on the map, including 1) wildlife resource data (i.e., point locality data for heron rookeries and other species that are not necessarily tracked in our Heritage Data Management System (HDMS)) 2) areas recommended for specific treatments/desired future conditions (i.e., canopy opening in a conifer-encroached meadow) and 3) locations of wildlife habitat projects and restoration activities that the Department would like included under the Rim Country NEPA (i.e., water catchments). In most cases, wildlife resource data informed a recommendation to use a specific treatment or desired future condition.

The fish and wildlife resource data that informed the recommendations/desired future conditions were categorized as either core wildlife areas or movement areas, and include (but are not limited to):

- Wildlife movement corridors
- Turkey roosting sites
- Heron rookeries
- Areas of importance to a particular species or suite of species

Recommended wildlife habitat projects/restoration activities may include (but are not limited to):

- New/restored wildlife waters
- Elk/livestock exclosures (to protect riparian areas, aspen, etc.)
- Riparian/stream modification/restoration work
- Fence modification to improve wildlife movement/safety
- Meadow or grassland restoration
- Browse seeding
- Willow planting
- Juniper removal
- Targeted treatment of undesirable vegetation

After each workshop, the Department's 4FRI representatives summarized the information on the maps into the current document, with further expertise from the Terrestrial and Aquatic Wildlife branches and information from current scientific literature. For each species, we have provided a summary of the known population status within the EIS boundary, any Critical Habitat, specific habitat recommendations, desired future conditions, and restoration activities the Department would like included under the Rim Country NEPA.

For aquatic species, many of the recommendations for habitat improvement or protection are similar among species, and include measures to retain large and hardwood trees in riparian corridors, erosion control, sedimentation prevention, and headwater and spring restoration and protection. In early 2016, the Department's aquatic wildlife biologists fulfilled a data request from A-S biologist Stephanie Coleman for aquatic species survey data, habitat survey data, and anticipated projects in the near and long term that may require NEPA. Those species data and project lists are not contained in the current effort.

Existing Conditions and Habitat Recommendations by Species

Abert's Squirrel

Existing Conditions

TNF/A-S/CNF

Distributed throughout the EIS boundary where ponderosa pine type occurs.

Preferred Habitat and Recommendations

In ponderosa pine type, they are positively associated with interlocking trees. Uneven aged management should provide large cone crop trees and groups of smaller trees. Manage tree groups at >5 trees/group.

Branching structure and mistletoe provide important nesting and hiding structure. Where nests are observed, retain nest trees and create tree groups that provide interlocking canopies around these trees.

Provide winter core areas of high canopy cover approximately 2-10 acres in size, consistent with home range sizes observed by the Department in numerous studies. In winter core areas, provide interlocking canopy throughout the pine type at a group level.

NEPA Projects

None at this time.

Arizona Gray Squirrel

Existing Conditions

TNF/A-S/CNF

On TNF, populations can be found in the Sierra Ancha and on the south Mogollon Plateau. Uncommon on the CNF.

Preferred Habitat and Recommendations

Arizona gray squirrels select nesting for their ability to provide protection from predators and the elements as well as access to food. Maintaining large trees with closed canopies, and downed logs should be considered. One study showed that nest density is 2.6 times higher in riparian areas than in adjacent pine-oak woodland. Retaining all mast producing trees within 0.5 km of riparian areas is recommended.

NEPA Projects

None at this time.

Arizona Toad

Existing Conditions

TNF, A-S, and CNF

This species has been petitioned for listing under the Endangered Species Act. While the Department does not have population data, opportunistic data from Department biologists and scientific collecting permits suggest that populations continue to persist across their historical range in Arizona. Within and adjacent to the EIS boundary, the Department has observational data of Arizona toads spanning 2003-2015 from Chevelon, East Clear, Cherry, and Canyon creeks and their tributaries, as well as the East Verde River. The species breeds in shallow springs and backwater areas void of fish.

Preferred Habitat and Recommendations
Same as for fish; prevent erosion and siltation.

NEPA Projects
None at this time.

Band-tailed Pigeon

Existing Conditions
TNF, A-S, and CNF
Large populations previously existed in the Sierra Ancha Mountains where encroachment of locust is now occurring.

Preferred Habitat and Recommendations
Nest are typically placed in conifers, 15-40 feet up, often in areas of lower tree density such as clearings or forest edges. Leave elderberry trees but target locust for removal. Maintain large trees and snags for roosting and loafing along ridgetops that overlook steep canyons, particularly those adjacent to areas containing high numbers of berry-producing shrubs and oak species for forage. Multi-layer forest with an understory of berry-producing shrubs should be encouraged. Shrub understory should include manzanita, madrone and elderberry if associated with the treatment site.

Leave large trees around water. As with turkey recommendations, leave ½ - 1 acre patches of regeneration for nesting.

NEPA Projects
None at this time.

Bats

Existing Conditions
TNF, A-S, and CNF
Distributed throughout the project boundary.

Preferred Habitat and Recommendations
Retain large, old, dense tree groups; patches of Gambel's oak; patches of snags

NEPA Projects
None at this time.

Bighorn Sheep (Desert and Rocky Mountain subspecies)

Existing Conditions
TNF
See map for known habitat blocks within TNF.

Preferred Habitat and Recommendations
Thinning and fire treatments within known movement corridor to connect habitat blocks (see map for locations).

NEPA Projects
None at this time.

Black Bear

Existing Conditions
Black bears are distributed throughout the EIS boundary.

Preferred Habitat and Recommendations
Black bear are generalist, but select habitat according to food and cover resources in both ponderosa pine and mixed conifer communities. They prefer steep slopes with horizontal cover and mid-level canopy. Mature trees surrounded by vertical and horizontal cover provide important security cover for bears, especially females with cubs. Ponderosa pine community is important in summer and fall. Perennial water sources are important for prime black bear habitat.

For travel corridors, maintain a denser overstory (>50%) on steep slopes and riparian areas. Follow topography in riparian corridors to create a buffer in which conifers are thinned to promote riparian vegetation while maintaining high overstory cover for hiding and travel.

For bedding, feeding, and denning, maintain optimum bear security cover and mesic micro-habitats for production on steep, north-facing slopes in dry mixed conifer. Mid and overstory canopy cover should be maintained at >50% and horizontal cover at >28%.

Logs and slash should be left scattered to provide decaying coarse woody debris important for horizontal cover and as substrate for many detritivorous insects upon which bears feed.

Enhance uneven aged stands and create horizontal cover, which is important for security.

Retain oak in groups, patches, inter-spaces, and openings.

NEPA Projects
None at this time.

Chiricahua Leopard Frog

Existing Conditions

TNF

The Mogollon Rim-Verde Recovery Unit (RU) is within the EIS boundary; contained within this are the Upper Verde River, West Mogollon, Haigler and Tonto Creek Management Areas (localized boundaries for active Chiricahua leopard frog management). Designated Critical Habitat can be found within two separate RUs within portions of Crouch, Gentry, Cherry, Ellison and Lewis Creeks, Parallel Canyon, and several unnamed drainages.

A-S

The Mogollon Rim-Verde and Gila White Mountain Recovery Units are within the boundary. The East Clear Creek and Alder Creek-West Chevelon Canyon Management Units are within the boundary. There are no known occurrences within the boundary.

CNF

No populations within the footprint.

Preferred Habitat and Recommendations
No specific recommendations at this time.

NEPA Projects
Ensure flexibility for projects such as tank cleanouts, spring enclosures, livestock exclosures on tanks, removal of invasive species and/or enhancements.

Deer (Mule and White-tailed)

The Department combined recommendations for the two species due to similarities in treatments and habitats.

Existing Conditions

TNF/A-S/CNF

Mule and white-tailed deer are distributed throughout the EIS boundary.

Preferred Habitat and Recommendations
Refer to the map for the important areas delineated for deer.

Deer are primarily browsers, with a majority of their diet comprised of forbs (weeds) and browse (leaves and twigs of woody shrubs). Management of forested habitats should be structured to increase amount of high quality forage at critical times of year.
As an uneven-aged stand management strategy, selection harvesting maintains some level of canopy cover either in a uniform distribution (single tree selection) or by leaving small gap

openings (group selection) throughout the stand. There is usually a wide variety of tree age classes represented in an uneven-aged stand, ranging from saplings and poles to late-seral or old-growth trees.

The presence and condition of the shrub component is important to many factors affecting mule deer populations. Shrubs occur mostly in early successional habitats, and therefore disturbance is key to maintaining high quality deer habitat. Although weather patterns, especially precipitation, drive deer populations in the short-term, only landscape-scale habitat improvement will make long-term gains in mule deer abundance in many areas.

Develop a mosaic of habitats that provide shrub cover and forage (shrubs, forbs, grasses, small woody plant species, acorns). Promote oak through release. Create openings to promote growth of forbs and grasses, with small openings for browse release. A mosaic across the landscape includes forests of early succession, mixed-aged classes, old growth, and a healthy understory of forbs, shrubs, and grasses. Fire providing early successional stage stands is important for deer.

Water increases habitat quality; distance to water is an important variable in their habitat.

NEPA Projects
Wildlife water creation and improvements – several tanks were damaged after fire and heavy precipitation and need repair; see map

Dusky Grouse

Existing Conditions
A-S/CNF
Distributed in A-S within footprint. Dusky grouse were introduced in Chevelon Canyon in CNF from 2008-2011, within the footprint. There have been few observations of the species since the last introduction in 2011.

Preferred Habitat and Recommendations
None at this time.

NEPA Projects
None at this time.

Eagles (Bald and Golden)

Existing Conditions
Distributed throughout the EIS boundary on TNF, A-S, and CNF.

Preferred Habitat and Recommendations
Within 1 mile of nest, plan activities outside of the breeding/nesting season for thinning. For prescribed burn, avoid conditions creating dense smoke at nest sites. Coordinate with the Department's HDMS and raptor programs prior to implementation of treatments.

NEPA Projects
None at this time.

Elk

Existing Conditions
Elk are distributed throughout the project boundary. They are a generalist species, with water being the main limiting factor for their habitat.

Preferred Habitat and Recommendations
Refer to the map for the areas of importance identified for elk. The recommendations for elk are similar as for deer, and include mechanical thinning and fire. Disturbance, including thinning, creation of openings, and prescribed fire, enhances the understory and improves the quantity and quality of forage for elk. Maintain early succession created by existing burns. Promote oak release and restore meadows to facilitate shrub response. Protect patches of deciduous tree regeneration and shrub thickets occurring in the understory. These areas are particularly important because they provide cover from the weather and predators.

NEPA Projects
Wildlife water improvements, modifications of fences for permeability (i.e., wildlife friendly); see map.

Gila Species Complex

The Department recognizes roundtail chub (*Gila robusta*), headwater chub (*Gila nigra*), and Gila chub (*Gila intermedia*) as a species complex rather than comprised of the three discrete species.

Existing Conditions
CNF
Occur in the upper headwater of Walker Creek watershed. *Gila* sp. also occur in East Clear Creek downstream of Horse Crossing until the stream becomes intermittent, within the boundary; just outside the boundary, they occur in Wet Beaver and West Clear creeks, and the headwaters of Fossil Creeks.

Preferred Habitat and Recommendations
Remove encroaching conifers from headwater meadows. Protect riparian areas from siltation during and after treatments. Restore flow and protect aquatic habitat by maintaining existing ungulate exclosures and constructing new exclosures where ungulate impacts are excessive. Implement erosion control projects. Forest thinning and burning should minimize soil and ash outputs. Other native species benefitted: Sonora sucker, desert sucker, speckled dace, bluehead sucker, Little Colorado sucker.

NEPA Projects
None at this time.

Gila Trout

Existing Conditions

TNF

Occur in Dude Creek and East Verde River (occupied recovery stream) with potential future populations in Chase Creek (potential recovery stream) and Ellison Creek (potential recreational populations-not considered for recovery).

Preferred Habitat and Recommendations

Maintain or increase stream discharge through protection of springs or headwaters through forest thinning, ungulate exclosures, and riparian planting. Stabilization and improvement on instream habitat through addition of large woody debris and planting of native riparian vegetation. Minimize siltation during and after treatments.

NEPA Recommendations

Ensure that streams are included in potential instream restoration, in the event that future projects are desired to improve stream habitat.

Great Blue Heron

Existing Conditions

A-S and CNF

Rookeries at Woods Canyon Lake and CC-Cragin Reservoir. No rookeries are known from TNF within the boundary.

Preferred Habitat and Recommendations

Retain large trees in and adjacent to rookeries and buffer around rookeries during implementation of thinning and prescribed fire activities to minimize disturbance during nesting season, April through June. Coordinate with Department's Terrestrial Wildlife Branch prior to treatment implementation for current locality data.

NEPA Projects

None at this time.

Little Colorado Spinedace

Existing Conditions

A-S

Within A-S, they occur in Willow Creek (downstream of Bear Canyon Lake) and in Chevelon Canyon.

CNF

Within CNF, Little Colorado Spinedace are known to occur within East Clear Creek, with Critical Habitat designated up and downstream of C.C. Cragin Reservoir on East Clear Creek, totaling 31 miles. The Department has been introducing spinedace into headwater streams of East Clear Creek, and they exist in West Leonard and Dine's Tank. The Department has

supplemented into Yeager Canyon, Dane Canyon, Bear Canyon, and has plans to stock them into other waters within the East Clear Creek watershed.

Preferred Habitat and Recommendations
Remove encroaching conifers from headwater meadows. Protect riparian areas from siltation during and after treatments. Restore flow and protect aquatic habitat by maintaining existing ungulate exclosures and constructing new exclosures where ungulate impacts are excessive. Implement erosion control projects. Forest thinning and burning should minimize soil and ash outputs. See map for specific locations.

NEPA Projects
Expansion of ungulate exclosure at Houston Canyon**.**

Mearns' Quail

Existing Conditions
TNF/A-S
They are distributed throughout the EIS boundary; populations are increasing due to openings from recent large fires.

CNF
Mearns' quail is not found within the footprint on CNF.

Preferred Habitat and Recommendations
Mearns' quail rely heavily on oak-grassland or pine-grassland savannahs. They rarely occur in other habitat associations, except during years of peak abundance. Areas with high grass diversity and grass cover height associated with a tree overstory of oak (e.g., Arizona white oak [*Quercus arizonica*] or Emory oak, [Q. emoryi].) or pine (*Pinus* spp.), are best for this species. Perennial bunchgrass species are most often used for cover and nesting. These grasses are warm-season species, produced during periods of summer monsoon moisture (July-September).

Mearns' quail depend on hiding cover for defense from predators, for nest construction and for thermal protection in all stages of their life cycle. Overstory trees provide security, thermal cover and a microclimate conducive to forb production. Rarely are Mearns' quail located more than a few dozen yards from trees (Brown 1989). Stromberg (1990) reported Mearns' quail were most often found within 20 yards (18.2 m) of oak trees, but there are many examples of this species existing in areas devoid of oaks. Brown (1982) recommended that overstory canopy cover be maintained at no less than 20 percent and that 30 percent was optimum. Bristow and Ockenfels (2000) reported Mearns' quail selected for overstory canopy of 26 to 75 percent, with optimal levels occurring between 26 and 50 percent.
Maintain a mosaic of high grass diversity, primarily made up of perennial bunch grass species with an over story canopy between 26 and 50 percent that is comprised of oak and pine species within current and adjacent occupied areas.

NEPA Projects
None at this time.

Merriam's Wild Turkey

Existing Conditions
TNF/A-S/CNF
Merriam's wild turkeys are distributed throughout the EIS boundary on all 3 Forests. They use ponderosa pine, mixed conifer, and pinyon juniper; habitat selection is based mainly on habitat structure and food base, rather than vegetative community. On CNF, known winter roosting areas were identified in Game Management Unit (GMU) 5A and south of Stoneman Lake in GMU 6A (refer to map).

Preferred Habitat and Recommendations
During spring, summer, and fall, turkeys are distributed throughout all vegetative communities, including mixed conifer forest. They move to lower elevations to the edge of ponderosa pine/pinyon-juniper in winter after heavy snow. Winter range for turkeys within the EIS boundary is 5,700-6,800 foot elevation. Uneven-aged management is recommended. Maximize within and between stand diversity by maintaining a distribution of habitats across basal areas and DBH categories.

Facilitate deciduous tree regeneration and shrub thickets occurring in the understory for protection from predators.

Natural canopy openings are important for creation of shrub understory and invertebrate prey. Multiple small openings (<.15 acre) are better than one large opening. Openings located in mesic or alluvial sites are the most productive.

For slopes >30%, which are important for nesting, thinning and prescribed fire should be restricted during the nesting season (1 Apr-1Jul). Maintain overstory canopy cover at >60%. For nesting sites and security cover, leave 5-6 tons/acre of slash in patchy distributions with occasional patches 10-12 feet in diameter. Do not pile the slash and leave branches intact.

In ponderosa pine, higher BA stands should be located near openings to provide cover. Manage for >30 trees/group.

In pine-oak, maintain oaks growing in the arborescent form in a patchy distribution. Protect mature oaks because they produce acorns for forage. Additionally, oak thickets growing in the shrub form should be protected because of their value as nesting and escape cover, as well as a source of mast.

In mixed conifer, emphasize uneven-aged management that increases habitat diversity and patchiness.

Pinyon-juniper is important throughout turkey range and near water sources. Mature stands with varying degrees of canopy closures >40% furnish seeds and berries and provide cover. Stands with <40% canopy closure contain more understory vegetation that adds to the forage base. Ponderosa pine stringers extending into pinyon-juniper habitats allow more of this habitat to be used by turkeys, particularly during severe winters.

Roost sites. Roost sites are an important year-round turkey habitat component. The focus of roost site management is recognition of the structural characteristics of roost trees and roost sites. Acorns, juniper berries, pinyon nuts, and ponderosa pine nuts are major winter food sources.
Winter roosts are on slopes and tops of knolls (see map for known roosts) and encompass at least ¼ acre area. Winter roosts will need retention of large (18" DBH) trees. Leave ½ - 1 acre patches of regeneration and many small openings for foraging. Maintain good overhead cover with multiple small openings, and facilitate shrub growth. Trees with layered horizontal branches spaced at 2-3 feet intervals will allow turkeys easy access into the tree. There should be an unobstructed flight path into and out of the tree from the uphill side.

Within ¼ mile radius of winter roost sites in pinyon-juniper areas, use lighter thinning treatments. These areas supply pinyon nuts and juniper berries for food, as well as cover and protection from the weather and predators. In particular, turkeys frequent pinyon-juniper areas after heavy snowfall because the snow depth is less under the dense canopies.

Turkeys obtain water from natural and artificial water sources, as well as from vegetation and dew on plants. Escape cover within 100 feet of water sources should be provided as well as travel corridors to the water sources.

NEPA Projects
None at this time.

Mexican Gray Wolf

Existing Conditions
The project boundary includes Zones 1 and 2 of the 10(j) area. Release sites will likely occur within the project boundary.

Preferred Habitat and Recommendations
Provide 1 mile buffer around active den sites during the denning season (from mid-April to mid-June). Coordination with the Department's wolf biologists for locations on release and den sites will be necessary as the project develops and prior to treatment implementation.

NEPA Projects
None at this time.

Mexican Spotted Owl

Existing Conditions

Designated Critical Habitat and PACs occur within the EIS boundary. The Department does not have the most up-to-date data on PACs.

Preferred Habitat and Recommendations

None at this time.

NEPA Projects

None at this time.

Narrow-headed Gartersnake

Existing Conditions

TNF

Proposed Critical Habitat, in three units, falls within portions of Tonto, Haigler, Canyon and the East Verde River within the EIS boundary. Recent observations indicate existing populations within Haigler and Canyon creeks.

A-S

Proposed critical habitat includes Canyon and Carrizo creeks within the EIS boundary, but there are no recent records of the species within the Forest.

Preferred Habitat and Recommendations

Perform initial clearance surveys to temporarily move individuals out of harm's way in riparian areas known to contain populations, or within proposed Critical Habitat, prior to in stream restoration work (i.e., moving or repositioning of boulders). Modifications to stream channel should be done during winter to avoid impacts to active snakes, if possible.

When possible, hand thin in riparian corridors to remove encroaching conifers. Within the stream bed, try to retain flood debris piles. Forest thinning and burning should minimize soil and ash outputs. Protect and increase streamflow to prevent siltation from forest treatments.

Restore flow by managing existing exclosures, and erosion control.

NEPA Projects

Ensure flexibility for projects such as tank cleanouts, spring enclosures and/or enhancements.

Neotropical Migratory Birds

Existing Conditions

TNF/A-S/CNF

Breed throughout the EIS footprint spring through fall.

Preferred Habitat and Recommendations
Manage to increase aspen and maple communities, through methods including fencing, jack strawing, ripping and burning. Manage for dense groups of trees, and uneven aged trees within groups. Retain oaks in groups, patches, inter-spaces, and openings.

NEPA Projects
None at this time.

Northern Goshawk

Existing Conditions
TNF/A-S/CNF
There are known post-fledging family areas (PFAs) within the project boundary.

Preferred Habitat and Recommendations
None at this time.

NEPA Projects: None at this time.

Northern Leopard Frog

Existing Conditions
CNF
Campbell, Jones, and Foster springs are important year-round habitat for NLF and other spring-associated species.

Preferred Habitat and Recommendations
Protect and restore springs, and maintain perennial water through restoration.

NEPA Projects
At Foster Spring, a livestock fence is needed to protect sensitive riparian habitat and species. A livestock water may also keep livestock out of sensitive riparian habitat.

Campbell Spring needs restoration of function of the spring.

The Jones Spring needs restoration and a livestock exclosure.

Northern Mexican Gartersnake

Existing Conditions
TNF
Proposed Critical Habitat falls within a portion of Tonto Creek within the EIS boundary. Individuals were found in Tonto Creek near Gisela in 2010; however this location is more than 16 miles outside of the EIS boundary.

A-S
No recent records or designated critical habitat within the EIS boundary.

CNF
A population of NMGS occurs in the Verde River, well outside the EIS boundary (i.e., below 5000 ft.)

Preferred Habitat and Recommendations
Perform initial clearance surveys to temporarily move individuals out of harm's way in riparian areas known to contain populations, or within proposed Critical Habitat, prior to in stream restoration work. Modifications to stream channel should be done during winter to avoid impacts to active snakes, if possible.

When possible, hand thin in riparian corridors to remove encroaching conifers. Within the stream bed, try to retain flood debris piles. Forest thinning and burning should minimize soil and ash outputs. Protect steams from siltation resulting from forest treatments.

Restore flow by managing existing exclosures, and erosion control.

NEPA Projects
Ensure flexibility for projects such as tank cleanouts, spring enclosures and/or enhancements

Pronghorn

Existing Conditions
TNF
None identified within the EIS boundary

A-S
Limited distribution north of Highway 260.

CNF
There are multiple groups of pronghorn within Cedar Flat that intermingle. Cedar Flat has been identified as a core area for pronghorn. Spring and fall migration area in a corridor Willow Valley to Buck Mountain.

Preferred Habitat and Recommendations
Maintain and/or restore existing grassland meadow openings through removal of encroaching conifers. Maintain and/or restore montane meadow connectivity through removal of trees, including pinyon-juniper and large young trees where travel corridors are identified (see map). Encourage heavy thinning for browse release. When creating openings or restoring meadows, slash should be chipped or cut to less than 18" height. Encourage fence modifications with the bottom wire at 18" and smooth to improve permeability for movements.

NEPA Projects
Creation of a new water in CNF, which will benefit pronghorn and other large game (uncertain if this is already planned). Fence modifications to existing fences in Willow Valley corridor (see map).

Spikedace

Existing Conditions
TNF
Critical Habitat is designated within Spring and Rock creeks, bordering the EIS boundary.

Preferred Habitat and Recommendations
Protect riparian areas from siltation and ash during and after treatments.

NEPA Projects
None at this time.

Wildlife waters
- Wildlife waters for development or redevelopment have been identified on the map.
- Travel corridors to the water are important escape cover for deer and turkey.
- Maintain partial cover along tanks edge for deer and turkey.

Linkages/connectivity
- For travel corridors, maintain a denser overstory (>50%) on steep slopes and riparian areas for bear and other closed canopy species. Follow topography in riparian corridors to create a buffer that follows drainages, in which conifers are hand thinned to promote riparian vegetation, while maintaining overstory high cover for hiding and travel.
- The Coconino County linkage analysis, which covers parts of CNF within the EIS boundary, is provided on the map for reference. Linkages identified through this process for A-S are not at a scale useful for forest planning. For TNF, Department staff identified key corridors within the footprint during the workshops (see map).

Fences
- Fence modification or construction in wildlife corridors will follow the most current Department recommendations for wildlife-friendly fencing. For example, a typical fence designed to facilitate pronghorn movement will possess a non-barbed bottom wire raised to a height for at least 18 inches off the ground; the top two wires will be at least 12 inches apart; the top wire of the fence will be no more than 42 inches high; and goat bars or elk jumps will be installed to facilitate wildlife crossing. In high elevation areas, use wooden stays instead of wire for handling snow loads.

Relevant and/or Cited References (see attachments)

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Attachment 4. Wildlife water developments or redevelopments recommended for inclusion under Rim Country EIS.

Water Name	Responsible Agent	Easting	Northing	Species Targeted	Other Species Benefitted	Comments
Coal Spring #415	AGFD	555040	3797753	elk	deer, turkey	insufficient storage capacity following burn
New Water Mountains #1	AGFD	546264	3799204			redeveloped to meet current AGFD water standards
Pinedale #2	AGFD	545132	3799592			redeveloped to meet current AGFD water standards
Black Canyon	AGFD	532754	3808177			redeveloped to meet current AGFD water standards
Little Pocket Pothole	AGFD	526920	3819220			place new catchment near existing pothole
Grapevine Pothole	AGFD	522360	3819828			place new catchment near existing pothole
Durfee Draw #505	AGFD	518176	3818578	elk	deer, turkey	redeveloped to meet current AGFD water standards
Turkey Pothole #1004	AGFD	520662	3824774			place new catchment near existing pothole
Long Draw #504	AGFD	513523	3817140			Joe to check if this was redeveloped
Creswell #921	AGFD	507560	3825779			redeveloped to meet current AGFD water standards
Tentground Point #431	AGFD	502309	3830225			redeveloped to meet current AGFD water standards
Tillman #503	AGFD	506067	3830811			redeveloped to meet current AGFD water standards
Pius Spring #269	AGFD	500061	3818444			redeveloped to meet current AGFD water standards
Windfall Spring #341	AGFD	466536	3814736			redeveloped to meet current AGFD water standards
Payson #4 - #565	AGFD	470249	3805158			redeveloped to meet current AGFD water standards
Payson #5 - #566	AGFD	470253	3803110			redeveloped to meet current AGFD water standards
Payson #3- #564	AGFD	465663	3803389			redeveloped to meet current AGFD water standards
Payson #1- #562	AGFD	461694	3801370			redeveloped to meet current AGFD water standards
Lakeside #2 - #569	AGFD	599534	3779622			redeveloped to meet current AGFD water standards
Lakeside #1 - #508	AGFD	618269	3786239			redeveloped to meet current AGFD water standards
Hidden Catchment	USFS			elk, mule deer, turkey		Needs new apron or redeveloped to meet AGFD standards
283-C East Catchment	USFS			elk, turkey		Needs new apron or redeveloped to meet AGFD standards
Brown Creek Catchment	USFS			elk		Needs new apron or redeveloped to meet AGFD standards
East Buckskin Tank	USFS	539992	3799807	northern leopard frog		historic northern leopard frog site; no longer reliably has water- may need fencing and vegetation
Section 20 Tank	USFS	519979	3817482	elk	deer, turkey	dirt tank that needs cleaning/improvement
unk existing tank	USFS/permittee			elk	deer, turkey	dirt tank needing cleaning/improvement
unk existing tank	USFS/permittee			elk	deer, turkey	dirt tank needing cleaning/improvement
new water		523382	3823608	elk	pronghorn, deer	identified as a new water need
new water		523007	3821068	elk	pronghorn, deer	identified as a new water need
existing water		486369	3758189	elk, deer, bear, turkey		tank heavily used by wildlife; damaged after fire
wash and tank		538972	3797508	northern leopard frog		tank historically used by northern leopard frogs; tank was sedimented after Rodeo-Chedeski fire, needs cleaned out
existing spring		453602	3847965	northern leopard frog		frogs and other spring associated wildlife use for hibernation and summer dispersal; needs restoration and livestock need to be kept out of sensitive riparian habitat
existing water		486094	3761236	elk, deer, bear, turkey		tank was damaged after fire during heavy precip; heavily used by
existing water		485446	3760598	elk, deer, bear, turkey		tank was damaged after fire during heavy precip; no longer holds water
non functional water		491977	3829209	small game and nongame		convert non functional tank to catchment
new water		488481	3843300	elk	pronghorn, mule deer, whitetail, javelina	

Attachment 5. Fencing projects recommended for inclusion under Rim Country EIS

Treatment Recommendation	Reason for Treatment	Start Easting	Start Northing	End Easting	End Northing	Seasonal Description	Species Targeted	Other Species Benefitted	Comments
Fence modification	protect/improve movement area	456681	3835584	466975	3833216	spring and fall migration	pronghorn	elk	set back fence to wildlife standards
Fence modification	protect/improve movement area	522188	3815311	526818	3815279		elk	deer	
Fence modification	protect/improve movement area	527288	3812626	522686	3806220		elk	deer	
Fence modification	protect/improve movement area	521885	3811785	527249	3812547		elk	deer	
Fence modification	protect/improve movement area	521697	3799081	530359	3808960		elk	deer	
Fence modification	protect/improve movement area	529822	3812792	532513	3809877		elk	deer	
Fence modification	protect/improve movement area	465169	3835581	466227	3833004	spring and fall migration	pronghorn	elk	set back fence to wildlife standards
Fence modification	protect/improve movement area	525573	3806401	532828	3813965				

*refer to recommendations provided to 4FRI core team on June 9, 2016 for GIS layer that contains these 8 modification projects