United States Department of Agriculture

Forest Service

Southwestern Region

Environmental Assessment for

Heber-Reno/Morgan Mountain Sheep Driveways

Tonto and Apache-Sitgreaves National Forests

Figure 1. Original sheep driveways vicinity map

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Summary

The Heber-Reno/Morgan Mountain sheep driveways have been used to move sheep to and from winter grazing grounds to summer pastures above the Mogollon Rim since the late 1890s. This use began before the establishment of national forests. When the national forests were established, use of the driveways was authorized by Forest Service Manual (FSM) direction. Per *FSM 2234.13*, the Heber-Reno/Morgan Mountain sheep driveways are not grazing allotments. They are used for the movement of sheep between private land in the Queen Creek, Arizona, area and the Long Tom and Beehive/Sheep Springs allotments on the Apache-Sitgreaves National Forests (Apache-Sitgreaves NFs). This use is specific to about 80 miles of driveway on the Tonto National Forest (Tonto NF) and about 60 miles on the Apache-Sitgreaves NFs (figure 1).

This Environmental Assessment provides analysis and authority under *National Environmental Policy Act* (NEPA) for continued use of the driveways. Two alternatives to the Proposed Action were considered: No Action and Partial Use. This EA presents the results of an analysis of the direct, indirect, and cumulative environmental consequences of the No-Action, the Proposed Action, and the Partial Use alternatives**.**

Chapter 1 – Purpose and Need

This environmental assessment (EA) analyzes the effects of authorizing domestic sheep use on the Heber-Reno/Morgan Mountain sheep driveways on the Apache-Sitgreaves and Tonto NFs in connection with the Long Tom and Beehive/Sheep Springs allotments on the Apache-Sitgreaves NFs. The site-specific analysis is tiered to the Final Environmental Impact Statements (FEIS) and Records of Decision (ROD) for the Apache-Sitgreaves and Tonto National Forests‟ (NF) Land and Resource Management Plans (hereby referred to as forest plans). How the project meets forest plan direction is described in chapter 3, environmental consequences. The project record for the interdisciplinary analysis of the alternatives is documented and available for review at the Apache-Sitgreaves NFs. This analysis is consistent with the forest plans, as amended, and was developed in consideration of the best available science.

Background

The Heber-Reno Sheep Driveway is located on approximately 63 miles and 74,209 acres of the Tonto NF and approximately 20 miles and 4,430 acres of the Black Mesa Ranger District (RD) on the Apache-Sitgreaves NFs. The Morgan Mountain Sheep Driveway crosses the Lakeside and Springerville RDs on the Apache-Sitgreaves NFs, occupying approximately 23 miles and 16,930 acres. Driveways in the West were established in the 1890s, and formalized by law and Executive Order by 1916. The original driveway boundaries posted on the Tonto NF varied in width, sometimes up to 3½ miles to accommodate the many bands of sheep using the driveways. These driveways were used by as many as 400,000 domestic sheep twice a year in the early part of the twentieth century. In places, the driveways narrow to two hundred feet or less when passing through saddles. Today‟s limited number of sheep seldom widen out more than 100 feet while trailing.

On the Black Mesa RD, portions of the Heber-Reno Sheep Driveway are adjacent to the highway and seldom exceed two hundred feet in width. After the 2002 Rodeo-Chediski Fire, the route authorized was re-routed around the burned areas, which were rested from sheep trailing, grazing, and bedding until such time as resource conditions improved. In 2009, monitoring indicated that recovery was adequate and sheep resumed use of the original route in 2010.

The Morgan Mountain Sheep Driveway follows forest roads for much of its length across the Lakeside RD and seldom exceeds 100 feet in width. Where the driveway enters the Springerville RD, it is located about ten miles from the Beehive/Sheep Springs Sheep Allotment.

The driveways on the forests are used to access summer grazing allotments on the Apache-Sitgreaves NFs and winter grazing lands located on private property in the Salt River Valley and elsewhere. Approximately 8,000 permitted sheep, plus seven pack animals per band for the sheep herders/camp tender, are authorized on the Heber-Reno Sheep Driveway and approximately 4,000 sheep, plus seven pack animals per band for the sheepherders/camp tender, on the Morgan Mountain Sheep Driveway.

Each April, two to four 2,000-sheep bands (two bands per permittee), are authorized to cross the southern boundary of the Tonto NF in the Usery Pass area located on the Mesa RD. The Usery Pass portion of the driveway is heavily impacted by recreational activity including extensive Off-Highway Vehicle (OHV) use. While on the driveway, the sheep are expected to travel three to five miles per day. The sheep are herded in a northeasterly direction across the Mesa, Tonto Basin, and Pleasant Valley RDs on the Tonto NF to the Mogollon Rim. When the sheep are herded over the Mogollon Rim near Forest Lakes, those sheep permitted on the Long Tom Allotment exit the

Heber-Reno Sheep Driveway and remain on the Long Tom Sheep Allotment located on the Black Mesa RD (Apache-Sitgreaves NFs) while sheep destined for Springerville RD continue on.

The sheep permitted on the Beehive/Sheep Springs Allotment continue to be herded in a northeasterly direction on the Heber-Reno Sheep Driveway. They exit National Forest lands northeast of Heber and re-enter the Apache-Sitgreaves NFs onto the Morgan Mountain Sheep Driveway, on the Lakeside RD east of Show Low, Arizona. Sheep are then herded in an easterly direction on the Morgan Mountain Sheep Driveway, ending approximately June 1, at the Beehive/Sheep Springs Allotment located on the Springerville RD west of Springerville, Arizona (see Figure 1 for driveway locations).

During late summer, the permitted sheep are moved via the driveways from each livestock operator"s summer grazing allotments to their winter grazing pastures. The late summer trip is the reverse of the spring trip.

Use of the driveways is authorized for the two permitted livestock operators as livestock use permits, documented as part of their ten-year allotment grazing permits (FSM 2234.13). The management of the herded sheep, including protections for sensitive resources, is currently specified through Annual Operating Instructions (AOIs) that are prepared for the Long Tom and Beehive/Sheep Springs allotments in coordination with the livestock operators and six ranger districts on the two forests.

Purpose and Need for Action

The purpose of this project is to authorize use of the Heber-Reno and Morgan Mountain sheep driveways, in a manner that continues to balance permitted use with physical and biological resources.

There is a need to supplement the environmental analyses that were completed under the terms of the 1995 Recission Act for the Long Tom (in 2007) and Beehive/Sheep Springs (in 2002) sheep allotments, because associated use of the driveways was not analyzed in either analysis. There is a need to complete an environmental analysis of use of the driveways to comply with the Settlement Agreement and Order in the lawsuit "*The Fund for Animals et al. vs. Gale Norton*", 03/09/2004. There is a need to document existing management designed to protect riparian areas, southwestern willow flycatcher habitat, Mexican spotted owl habitat and camp sites in the term grazing permits, instead of in annual operating instructions as at present.

Proposed Action

In order to meet the purpose and need, the Apache-Sitgreaves and Tonto NFs are proposing to:

- Authorize the use of the Heber-Reno Sheep Driveway for 8,000 domestic sheep and up to 4,000 domestic sheep on the Morgan Mountain Sheep Driveway. Use would occur two times per year, spring and late summer. Annual trips would include the necessary pack stock for the sheep herders. Total travel time would not exceed 57 days, normally 31 days in the spring and 26 days in the fall.

- Incorporate an adaptive management strategy that would enable the Forest Service and individual grazing permit holders to respond to changing resource conditions or management objectives in compliance with Forest Service policy contained in *FSH 2209.13, Chapter 90*.

- Continue to authorize the driveway use through the existing allotment term permits-for Long Tom and Beehive/Sheep Springs.

- Manage driveway use through Annual Operating Instructions (AOIs) prepared in coordination with permittees and the ranger districts from the Apache-Sitgreaves and Tonto NFs. The AOIs would provide driveway entry and exit dates for each permittee and various instructions for the permittees to follow, while herding sheep along the driveways. AOIs designate bedding grounds (areas generally up to two acres where sheep rest/sleep), locations for counting of sheep, water haul locations, creek crossings, adjustments based on drought conditions, livestock shipping locations, and travel routes within the driveways on National Forest System lands.

- Continue to exclude all riparian areas, southwestern willow flycatcher critical habitat, Mexican spotted owl protected activity centers, and developed and dispersed recreation camping areas from use as bedding grounds or concentration areas.

- Continue to use historical channel crossings on the Tonto portion of the Heber-Reno, many of which are armored (rock and cobble or dry washes) or cross on road surfaces.[1]

- Identify water hauling locations annually through the AOIs, so that temporary trough locations differ each year. All riparian areas, southwestern willow flycatcher critical habitat, Mexican spotted owl protected activity centers, existing developed and dispersed camping areas, and main roads would be excluded from water haul locations.

- Use Tonto NF drought guidelines in the event drought conditions exist on the Tonto NF portion of the Heber-Reno Sheep Driveway. The guidelines would be used to determine if any modifications are needed in the AOIs to mitigate adverse drought effects on vegetative health, water availability, and soil conditions. On the Apache-Sitgreaves NFs, applicable Regional guidelines would be used to determine if any modifications to the AOIs are necessary to mitigate the same drought concerns.

Laws, Regulations and Forest Plan Consistency

Where consistent with other multiple use goals and objectives, there is Congressional intent to allow grazing on suitable lands. *(Multiple Use and Sustained Yield act of 1960, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976, Rescission Act of 1995.*

The Federal Land Policy and Management Act of 1976 under Title V – Rights of Way, grants current authority to establish or terminate livestock driveways to the Secretary of Agriculture for the Forest Service, which authority is delegated down to the Forest Supervisor level. Issuance and modification of term grazing permits involving driveways is delegated down to the District Ranger level *(FSM 2204.3)*.

It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans. *(FSM 2203.1, 36 CFR 22.2 (c))* The driveways are not given specific direction in either of the current Forest Land and Resources Management Plans.

It is Forest Service policy to continue contributions to the economic and social well being of the American people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood. *(FSM 2202.1.)*

[1] Most of these crossings have little to no riparian vegetation located at the crossings and no potential to produce riparian vegetation because they are dry washes, road surfaces, or cobble and boulder.

Standards and guidelines for general rangeland management, soils and watershed, terrestrial and aquatic wildlife, vegetation, and recreation are found within the management area prescriptions of the forest plans. The analysis area for the driveway on theTonto NF is located within management areas (MA) which include **3F** – (Lower Salt River Recreation Area) and **3I** – (General Management Area) on Mesa RD, **5D** – (Mogollon Rim/Sierra Ancha Area) and **5G** – (General Management Area) on Pleasant Valley RD and **6J** – (General Management Area) on Tonto Basin RD.

On the Apache-Sitgreaves NFs, the two driveways cross management areas (MA), which include: **01** (Forested Lands), (Black Mesa RD) 5-01, (Springerville RD) 6-01,and (Lakeside RD) 7-01, **02** (Woodlands), (Black Mesa RD) 5-02 and (Lakeside RD) 7-02, **03** (Riparian), (Springerville RD) 6-03 and (Lakeside RD) 7-03, **04** (Grasslands), (Springerville RD) 6-04. The desired condition and standards and guidelines for these management areas are described in the 1987 Apache-Sitgreaves National Forests‟ Plan, as amended. Neither Forests‟ Land Management Plans specifically address the sheep driveways or management of sheep along the driveways. How the proposal is consistent with applicable goals and objectives outlined in the forest plans is discussed by resource in chapter 3, environmental consequences. No plan amendment would be required for either Forest. Authorization for sheep driveways is provided in Forest Service Manual direction.

Decision Framework

The Forest Supervisors of the Tonto and the Apache-Sitgreaves National Forests are the deciding officials for this project. Given the purpose and need, the deciding officials review the analyses of the proposed action and the other alternatives, and determine:

Whether or not to authorize continued sheep use of all or part of the Heber Reno and Morgan Mountain Sheep Driveways; and

If deciding to authorize continued use, then to identify what management criteria or mitigations will be incorporated into the term grazing permits/crossing permits and the allotment management plans for the Long Tom, and Beehive/Sheep Springs allotments.

Public Involvement

The Proposed Action has been listed in the quarterly Apache-Sitgreaves and Tonto NFs‟ NEPA *Schedules of Proposed Actions* (SOPA) since December, 2007. The proposal was provided to the public and agencies for comment during the March 31 to April 20, 2008, scoping period. The Proposed Action was sent to 1,017 individuals and agencies. Twenty-four responses were received. On November 17, 2009, an updated Proposed Action was sent to 22 interested parties (those who had indicated interest in the project in 2008). Five responses were received. Most responders indicated they wanted their 2008 responses to be carried forward into the analysis. The permittees have participated annually in discussion of this analysis process since 2003 at their winter meetings in Springerville, Arizona, and at other developmental meetings. Arizona Game and Fish included them in development of the Collaborative Risk Assessment.

The proposal was sent to 33 Tribal contacts of the Tonto NF and ten Tribal contacts on the Apache-Sitgreaves NFs between March 31 and April 20, 2008. The Navajo Nation responded and voiced no concerns on the project. Coordination and consultation with the Tribes has been on-going. All Tribal contacts were sent the draft environmental assessment.

The legal notices for the preliminary Environmental Assessment were published on April 28, 2010, and posted on the Tonto NF‟s web site for the 30-day comment period. Previous

commentors were sent letters of notification on April 30, 2010. Seventeen letters were received during the comment period and analyzed.

Issues

Comments received during initial scoping were examined for key issues that are defined as those directly or indirectly caused by implementing the Proposed Action. Issues serve to highlight effects or unintended consequences that may occur from the Proposed Action and its alternatives, Comments that were identified as being: 1) outside the scope of the Proposed Action; 2) irrelevant to the decision to be made; or 3) conjectural and not supported by scientific or factual evidence were not addressed in detail. Comments on topics already decided by law, regulation, forest plan, or other higher level decision were so noted. Among the topics raised during scoping, the Forest Service identified the following key issues:

Issue #1: Bighorn sheep populations. Use of the driveways by domestic sheep may negatively affect bighorn sheep populations by spreading disease. **Response:** Alternative 1, No Action, addresses this issue by eliminating sheep use of the driveways. Alternative 2, the Proposed Action, addresses the issue by including mitigation to address the potential for interaction. Alternative 3, partial use, was developed to address the issue by eliminating the potential for domestic and wild sheep interaction within occupied bighorn sheep habitat while retaining partial use of the Heber-Reno sheep driveway. The indicator used to evaluate impacts to bighorn sheep populations is the potential for nose-to-nose contact (mucus exchange).

Issue #2a: Social. Use of the driveways predates the establishment of the national forests. Discontinuing the use of the driveways would negatively affect the traditional, cultural, and aesthetic values associated with its use. **Response**: Both the Proposed Action and Partial Use alternatives respond to this issue by retaining sheep use on all or part of the driveways. The indicator to evaluate social consequences is a qualitative discussion on how traditional, cultural, and aesthetic values could be affected by either continuing or discontinuing use of the driveways.

Issue #2b: Social. Having a native wildlife species occupying its habitat has social value. Continuation of use of the driveways by domestic sheep may negatively affect the bighorn sheep population and adversely affect social values. **Response**: The No-Action alternative addresses this issue by removing domestic sheep use from the driveways. A qualitative assessment of how each alternative affects the potential for disease transmission (potential risk to bighorn sheep population), bighorn sheep population and social values.will be used to evaluate environmental consequences.

Issue #3a: Economics. Eliminating domestic sheep as a potential source of disease threat to bighorn sheep where bighorns occur along the driveways may have a positive economic effect to the State-level economy, as related to hunting license receipts and other bighorn-related recreation, assuming the State takes actions to increase bighorn populations. **Response:** Alternative 1 (No Action) and Alternative 3 (Partial Use) respond to this issue by eliminating domestic sheep from occupied and nearby bighorn habitat. The indicators used are qualitative assessments of how each alternative potentially affects the State economy.

Issue #3b: Economics. Removing all or part of the driveways from domestic sheep use would have an adverse economic effect on the grazing permittees, from loss of permitted grazing authorizations, increased trucking costs and the need to find and pay for alternative feed sources for the days eliminated. **Response:** The Proposed Action alternative responds by authorizing domestic sheep use along the current length of the driveways. The indicators used are qualitative assessments of how each alternative potentially affects local economies and the permittees.

Chapter 2 - Alternatives

This chapter describes and compares the alternatives considered for the Heber-Reno/Morgan Mountain sheep drivewaysˮ project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision makers and the public. Some of the information used to compare the alternatives is based upon the design of the alternatives and some of the information is based upon the environmental and social effects of implementing each alternative.

Alternatives

Alternative 1- No-Action

The No-Action Alternative is the point of reference for evaluating action alternatives. Under the No-Action Alternative, sheep would not be authorized to use the Heber-Reno/Morgan Mountain sheep driveways. Alternative methods would be found to move the sheep from winter range near Chandler, AZ, to summer range on the Apache-Sitgreaves NFs, such as by truck. With the exception of allowing use of the driveways, domestic sheep use authorized in existing grazing permits on both forests would remain unchanged.

Alternative 2 – The Proposed Action

Minor Information Corrections and Modifications to Proposed Action since 2008 Scoping

The Proposed Action sent out for public comment in 2008 included applying burned area restocking guidelines to determine when soil and vegetation conditions improved to a level that the trailing, grazing, and bedding of sheep could resume in areas of the Heber-Reno Sheep Driveway that were burned in the 2001 Rodeo-Chediski Fire. Due to the amount of time and resource recovery that has passed since the fire, monitoring indicates this action is no longer relevant (Hughes, 2010). Any adjustments needed to annual operations would be addressed through the AOIs. The ability to adjust operations has been part of the Proposed Action since 2008 scoping and remains unchanged. The original Proposed Action included alternating riparian crossings on the Apache-Sitgreaves NFs. Due to the location of the crossings (little to no riparian vegetation present) and the short duration of sheep use (sheep are pushed through these areas and do not stop), this action was removed.

The Proposed Action

In order to meet the purpose and need, the Apache-Sitgreaves and Tonto NFs are proposing to:

- Authorize the use of the Heber-Reno Sheep Driveway for 8,000 domestic sheep and up to 4,000 domestic sheep on the Morgan Mountain Sheep Driveway. Use would occur two times per year, spring and late summer. Annual trips would include the necessary pack stock for the sheep herders. Total travel time would not exceed 57 days, normally 31 days in the spring and 26 days in the fall.

- Incorporate an adaptive management strategy that would enable the Forest Service and individual grazing permit holders to respond to changing resource conditions or management objectives in compliance with Forest Service policy contained in *FSH 2209.13, Chapter 90*.

- Continue to authorize the driveway use through the existing allotment term permits-for Long Tom and Beehive/Sheep Springs.

- Manage driveway use through Annual Operating Instructions (AOIs) prepared in coordination with permittees and the ranger districts from the Apache-Sitgreaves and Tonto NFs. The AOIs would provide driveway entry and exit dates for each permittee and various instructions for the permittees to follow, while herding sheep along the driveways. AOIs designate bedding grounds (areas generally up to two acres where sheep rest/sleep), locations for counting of sheep, water haul locations, creek crossings, adjustments based on drought conditions, livestock shipping locations, and travel routes within the driveways on National Forest System lands.

- Exclude all riparian areas, southwestern willow flycatcher critical habitat, Mexican spotted owl protected activity centers, and developed and dispersed recreation camping areas from use as bedding grounds.

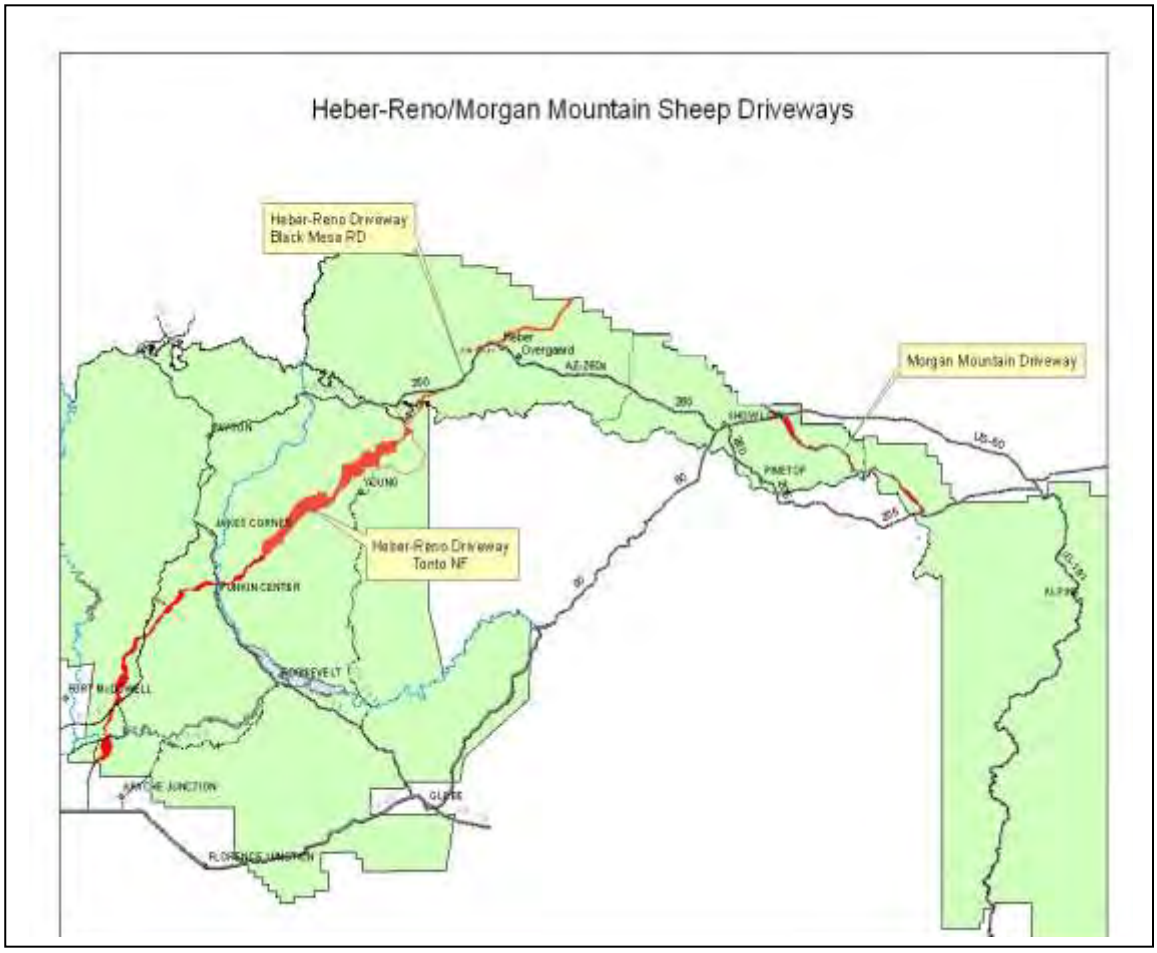
- Continue to use historical channel crossings on the Tonto portion of the Heber-Reno, many of which are armored (rock and cobble or dry washes) or cross on road surfaces.[2]

- Identify water hauling locations annually through the AOIs, so that temporary trough locations differ each year. All riparian areas, southwestern willow flycatcher critical habitat, Mexican spotted owl protected activity centers, existing developed and dispersed camping areas, and main roads would be excluded from water haul locations.

- Use Tonto NF drought guidelines in the event drought conditions exist on the Tonto NF portion of the Heber-Reno Sheep Driveway. The guidelines would be used to determine if any modifications are needed in the AOIs to mitigate adverse drought effects on vegetative health, water availability, and soil conditions. On the Apache-Sitgreaves NFs, applicable guidelines would be used to determine if any modifications to the AOIs are necessary to mitigate the same drought concerns.

[2] Most of these crossings have little to no riparian vegetation located at the crossings and no potential to produce riparian vegetation because they are dry washes, road surfaces, or cobble and boulder.

Figure 2. Alternative 2 – Proposed Action



Alternative 3 – Partial Use

Alternative 3 was developed to respond to key issue 1, disease transmission to bighorns. It also responds to issues 2 and 3. This alternative removes use by domestic sheep on the portion of the Heber-Reno Sheep Driveway that lies within bighorn sheep habitat (figure 3). This alternative would:

- Authorize the use of the Heber-Reno Sheep Driveway for 8,000 domestic sheep and up to 4,000 domestic sheep on the Morgan Mountain Sheep Driveway. Use would occur two times per year, spring and late summer. Annual trips would include the necessary pack stock for the sheepherders.

- Incorporate an adaptive management strategy that would enable the Forest Service and individual grazing permit holders to respond to changing resource conditions or management objectives in compliance with Forest Service policy contained in *FSH 2209.13, Chapter 90*.

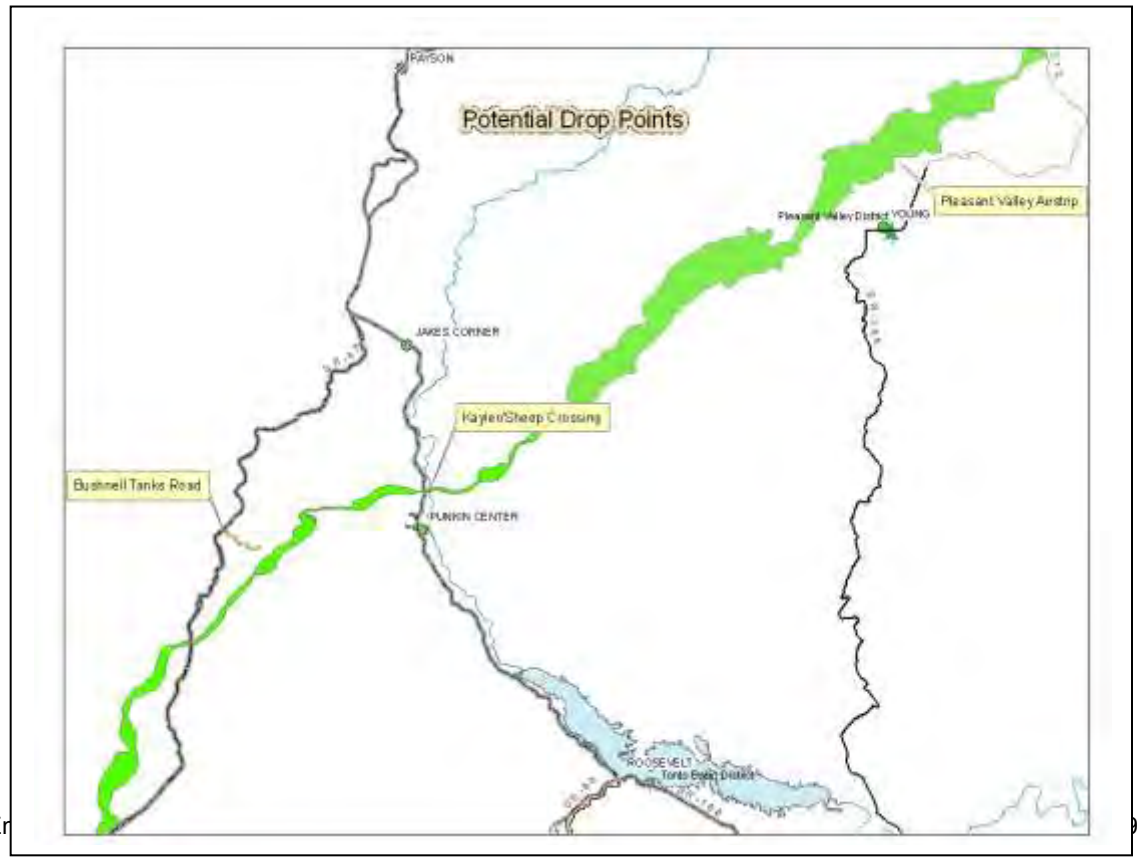
- Require the trucking of domestic sheep to a drop-off point north of the low-density, occupied bighorn sheep habitat along the Salt River. The following sites would be

potential shipping destinations: Bushnell Tanks turnoff (removes about 26 miles from the driveway), Punkin Center (Kayler/Sheep Crossing) (removes about 34 miles from the driveway), or Pleasant Valley Airstrip (removes about 44 miles from the driveway). Loading facilities would be necessary before these sites would be suitable, which would require additional site-specific environmental analysis following the final choice of shipping site. From that point, sheep would use the driveways to the Apache-Sitgreaves NFs (entering the Black Mesa and Lakeside RDs) using timeframes specified in the AOIs. In the fall, the sheep would exit the Apache-Sitgreaves NFs, be held in fenced pastures, and be herded down the driveways to a designated shipping location.

- Continue to add use of the driveways to the term grazing permits.
- Manage use of the driveways through AOIs prepared in coordination with the livestock operators and ranger districts of the Apache-Sitgreaves and Tonto NFs. The AOIs would provide driveways" entry and exit dates for each livestock operator and various instructions for the livestock operator to follow, while herding sheep along the driveways. AOIs designate bedding grounds (areas generally up to two acres where sheep rest/sleep), water haul locations, creek crossings, adjustments based on drought conditions, livestock shipping locations, and travel routes within the driveways on National Forest System lands.

The map below is a closeup of the central portion of the Heber-Reno sheep driveway on the Tonto N. F., showing the three potential shipping sites, one of which would become the new start of the driveway if Alternative 3 is chosen.

Figure 3. Alternative 3 – Partial Use



Mitigation Measures Common to Both Action Alternatives

The mitigation measures would be made part of the AOIs for the Long Tom and Beehive/Sheep Springs allotments. The permittees are responsible for having their employees follow the stated instructions in the AOI and/or any additional instructions from Forest Officers concerning use of the driveways. Failure to comply with these instructions would constitute a violation of the Term Grazing Permit and would be dealt with through the administrative process.

- Adaptive management for use of the driveways would be incorporated into and monitored through the AOI. Annually adjust, as needed, the number of livestock, the length of time spent within the driveways, and the time of year allowed on the driveways in allotments where livestock (cattle) use overlaps with sheep use of the driveways to meet forage utilization guidelines.

- As part of adaptive management, implementation and effectiveness monitoring would be conducted. Implementation monitoring determines if activities are implemented as designed. Effectiveness monitoring determines if management is effective in meeting the goals for desired resource conditions.

- The permittees would notify the ranger districts of the intended trailing route, overnight stops, bedding grounds, and when they come onto the ranger districts. Contingency routes and alternate bedding grounds would be identified. This information would be recorded on allotment maps in coordination with ranger district personnel.

- Permittees and their herders would be required to provide the Forest Service with prompt (within 24 hours) notification of interaction between wild sheep and domestic sheep. Notification procedures (including phone numbers/contact information for permittees, and use of satellite phones in backcountry settings) would be included (as needed) in AOI.

- The AOI would require periodic inventory of domestic sheep and addressing the management, retrieval, and disposition of stray domestic sheep on the forests during grazing and trailing periods. Every reasonable effort would be made to retrieve the strays.

- Sheep bands would maintain progress on a direct travel route through each ranger district. Herding techniques that promote the movement of sheep steadily in one direction would be used. The permittees would not add stops or camps for the purpose of securing additional forage or period of use on the driveways.

- Herders would confine sheep to the driveways at all times and keep them in a herd not more than one-quarter mile wide while trailing.

- The permittees would be required to provide for public safety, while trailing the sheep on/across established roads.

- Sheep would be kept out of all riparian areas except when crossing and watering. Herders would avoid allowing sheep to parallel streams to keep them off the banks. Crossings would be made perpendicular to the stream channel.

- Herders would not bathe themselves or wash their clothes directly in streams.

- Herder camps would be maintained free of trash and trash would be packed out, when camp is moved. All fires, if permitted, would be extinguished prior to leaving camp.

- Supplemental *weed-free* hay may be hauled as a main source of feed at each bedding ground. It may also be necessary to haul water to various locations. If watering troughs need to be used, locations of the troughs must receive prior approval by district range personnel.

- Fences that are cut or wire that is pulled up to access the trailing routes would be repaired immediately in a manner to prevent access by other grazing animals. Repaired fences will be restored to the previous wire spacing within five days. All gates opened to allow passage would be closed once the sheep are through. If a fence is lifted for the sheep bands to pass under, the herders would put the fence back after each passing.

- Range improvements would be in working order prior to sheep arriving at their locations.

- Forage Use/Utilization levels should not exceed 40 percent on herbaceous perennial vegetation.

- Sheep would not be permitted to graze within reforestation exclosures, riparian and spring protection exclosures, or campgrounds. Bedding grounds and salting locations would avoid areas susceptible to adverse soil and vegetative impacts associated with concentrated sheep use. Locations of concern would be identified through the AOI.

Any sheep that are left behind would be discovered to be missing, reported, gathered, and removed from the ranger district within five days. The permittee would notify the ranger district when removal is complete. Counts would be made at identified road crossings.

Mitigation by Ranger District per Annual Operating Instructions

Mesa RD, Tonto NF:

- The length of time on the ranger district shall not exceed 12 days per band.
- Sheep would be kept overnight at Bushnell Tanks, while on the Diamond Grazing Allotment. The two new **w**ater improvements located south of Bushnell Tanks would be avoided.
- To avoid possible contact with bighorn sheep, domesticated sheep using the driveways would not bed down or be held over within known bighorn sheep habitat.
- To avoid possible contact with bighorn sheep, domesticated sheep using the driveways will trail along the western portion of the driveway between Usery Pass and the Blue Point Bridge at the Salt River.

Tonto Basin RD Tonto NF:

- The length of time on the ranger district shall not exceed a total of ten days.
- The following is a list of bedding grounds that should be used on the Tonto Basin RD portion of the driveway: (1) Reno Pass, (2) West side of Tonto Creek (no loafing in Tonto Creek Riparian Unit), and (3) Breeched tank on top of mountain.
- Herders would use the same bedding ground for each band. Each herder camp that is used in association with each bedding ground would be used for only night per band.

Pleasant Valley RD, Tonto NF:

- The maximum amount of time on the Pleasant Valley RD is 14 days per band.
- No bedding grounds would be located in these areas on the Pleasant Valley RD: (1) Within ½ mile of the Dutchman‟s Windmill at T9N, R13E, Section 33 (alternate bed grounds are located at Mailbox Mesa or West Cline Mesa); (2) Potato Butte Allotment common cattle-sheep use areas: T9N, R13E, Section 21, 22, 27, & 28; and (3) Saddle north of Ruth Tank at T9N, R13E, Section 10 (alternate bed grounds are located north of Steve Tank).
- No bedding or grazing within the fenced wildlife plot at Clay Spring in Naegelin Canyon.
- Camps would be used for only one night by each band.

Black Mesa RD, Apache-Sitgreaves NFs:

- The same bedding grounds would not be used in consecutive years. The permittee would coordinate bedding ground use with the Black Mesa RD.

Lakeside RD, Apache-Sitgreaves NFs:

- The permittee would contact the Lakeside RD three working days prior to livestock entry on the Morgan Mountain Sheep Driveway (both spring and fall). Current conditions and special instructions that are not identified in the AOI would be discussed at that time.
- The period of use on the stock driveway would be limited to the amount of time necessary for trailing.
- Concentration would be minimized at the gate when crossing Highway 60.
- Use of Porter Springs is as follows: (1) sheep would pass through the area with minimal use, and, (2) Sheep would not bed down anywhere near Porter Springs to allow for recovery.

Other Mitigation Measures Proposed Through the Collaborative Risk Assessment by Arizona Game and Fish Department

Mitigation measures were developed to minimize negative impacts to the driveways‟ resources in response to the alternatives that propose continued use of the driveways. The following mitigation measures were developed primarily from the Collaborative Risk Assessment (as shown in appendix B) provided by a task force that was led by Arizona Game and Fish Department (AZGFD) and representatives from Tonto and Apache-Sitgreaves NFs, U.S.D.A. Wildlife Services, AZ Department of Agriculture, Navajo Nation Tribal Wildlife DVM, Sheep Springs Sheep Company, Joseph Auza Sheep Company, Arizona Wildlife Federation, Arizona Desert Bighorn Sheep Society, and four veterinarians. Public comments on the proposal indicated that those mitigations should stay in place.

Additional mitigation by AZGFD may be applied, as needed, to reduce the risk to wild bighorn sheep. The primary area of risk, as defined in the Collaborative Risk Assessment, is within the designated low-density occupied bighorn habitat near Stewart Mountain on Mesa RD. The Heber-Reno Sheep Driveway crosses through the defined area in a valley west of Stewart Mountain for less than one mile. The domestic sheep cross through this area in less than an hour; however, to reduce the risk to wild bighorns (Holt, 2008):

- Aerial surveys of wild sheep may be conducted by AZGFD prior to domestic sheep entering the Heber-Reno Sheep Driveway, including the use of volunteers to haze wild sheep and locate domestic sheep strays on both driveways.

- A policy for removing wild sheep that have come into contact with domestic sheep would be developed by AZGFD, if needed.
- A Memorandum of Understanding (MOU) between the permittees, AZGFD, and the Arizona Department of Agriculture would be developed for the removal of stray domestic sheep, if needed.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in table 1 focuses on activities and where effects can be stated quantitatively or qualitatively for each alternative.

Table 1. Comparison of alternatives

Attribute	Alternative 1	Alternative 2	Alternative 3
Forest Plan and Policy Consistency	No direction in either forest plan. Not consistent with FS Policy (FSM 2202.1, 2203.1).	No forest plan direction exists for driveways. The continuation of use of the driveways would be consistent with Forest Service policy (FSM 2202.1, 2203.1)	
Purpose and Need	The Purpose and Need,which is to complete a supplemental analysis, would not be met.	The purpose and need, which is to complete a supplemental analysis, would be met.	
Threatened and Endangered (T&E) Species	All listings are no effect on T&E species and critical habitat. Leaves available cover and forage for wildlife.	All listings are either no effect or not likely to adversely affect T&E species and critical habitat found within the driveways. Proposed utilization levels leave 60+ percent forage.	

Attribute	Alternative 1	Alternative 2	Alternative 3
Forest Service Sensitive Species	No use of the driveways by domestic sheep: no impact to all sensitive species.	No impact or may impact, actions do not contribute to loss of viability of any native or desired non-native plant or any animal species or trends towards federal listing of any species. "May impact" determinations were made for 31 sensitive species.	No impact or may impact, actions do not contribute to loss of viability of any native or desired non-native plant or any animal species or trends towards federal listing of any species. "May impact" determinations were made for 25 sensitive species for Alt 3a and b; and 14 sensitive species for Alt 3c.
Management Indicator Species (MIS)	No use of driveways by domestic sheep: no effect on forest-wide trends for MIS habitat and populations.	Use of the driveways by domestic sheep would have no effect on forest-wide trends for MIS habitat and populations.	
Soils	Removal of sheep not likely to cause a detectable change in soil conditions except in bedding grounds. Complete rest from sheep, though not cattle, may allow more perennial plant cover to develop in bedding grounds.	Sheep move through the areas so quickly that little concentrated use would occur, except for bedding grounds. Most of the activity would take place when soils are dry and less susceptible to compaction. The areas most likely to have compaction concerns would be higher elevation areas on the Apache Sitgreaves NFs that remain wet longer. These areas, however, would be more likely to recover quickly from compaction because of strong freeze/thaw and shrink/swell cycles. In bedding areas protective vegetation can be reduced and surface soil structure destroyed. This can leave these areas more susceptible to wind and water erosion. These areas are flat, which reduces the risk of water erosion, and are less than 2 acres in size.	

Attribute	Alternative 1	Alternative 2	Alternative 3
Vegetation	Vegetative conditions are likely to remain static or improve	Vegetative conditions likely to remain static or improve slowly because most vegetative species respond positively to limited utilization. The potential for the spread of invasive plants would increase slightly with the use of the driveways by domestic sheep. Sites with disturbed soils, such as bedding grounds, are more likely to be colonized by invasive plants than sites where the soil is less disturbed and vegetation provides a good ground cover. Monitoring along the driveways has not found noticeable sheep-related weed population increases. Mitigation measures have been developed to reduce the potential of invasive plant species.	
Riparian and Hydrology	There would be no use of riparian species by sheep so no impacts.	There are minimal impacts due to a lack of riparian vegetation, armored crossings, and use of mitigation measures. Desired condition of the stream channel and riparian vegetation are expected to be maintained or achieved roughly as if no sheep were present.	
Migratory Birds	No use of driveways by domestic sheep would have no effect on migratory bird populations or their habitat.	Use of driveways by domestic sheep would have no effect on migratory bird populations or their habitat.	
Bald and Golden Eagles	No alternative would affect this species. There are no known bald or golden eagle nests in the area.	No alternative would affect these species. There are no known bald or golden eagle nests close enough to the driveways to be impacted.	
Heritage Resources	No use of driveways by domestic sheep would have no effect on heritage resources.	Continued use of the driveways by domestic sheep would have no effect to heritage resources. Trailed and bedded sheep would be restricted to the driveways.	

Attribute	Alternative 1	Alternative 2	Alternative 3
Social Values	Some forest users who currently enjoy knowing about or seeing livestock and a now-rare experience of seeing a sheep drive would no longer have that opportunity. Other forest users and wildlife advocates who disapprove of the presence of domestic sheep would gain some social benefits.	Some forest users who currently enjoy knowing about or seeing livestock and a sheep drive would gain some social benefit from continued use of the driveways. Other forest users and wildlife advocates who disapprove of the presence of domestic sheep would not.	Forest users on all or most of Mesa Ranger District or Tonto Basin Ranger District who enjoy knowing about or seeing livestock and a sheep drive would no longer have that opportunity in the southern portion of the driveways. Other forest users and wildlife advocates who disapprove of the presence of domestic sheep would gain some social benefits.

Attribute	Alternative 1	Alternative 2	Alternative 3
Economic Impacts	The AZGFD could potentially introduce additional bighorn sheep along the driveways in one or two locations on the Tonto NF, without the risk of potential domestic sheep-transmitted disease. There could be additional opportunities for recreationists to hunt or view bighorn sheep, if the reintroductions were successful in establishing a viable herd. The amount of additional hunting tags and associated income cannot be quantified and is speculative. There could be a loss of 4 jobs associated with the driveways. The two grazing permittees would have varying levels of adverse economic effects, with one receiving no direct additional costs because they use the driveway most years, and the other needing to hire trucks and purchase new feed for about 80 days. The Forest Service would no longer receive driveway grazing fees, about $3400 /year from the active permittee.	It is unlikely that AZGFD would introduce additional bighorn sheep along the driveways in one or two locations on the Tonto NF, due to the risk of potential domestic sheep-transmitted disease along with other biological and budgetary factors. There would not be additional opportunities for recreationists to hunt or view bighorn sheep in these areas as a result of successful introductions. There would not be any changes to the local economy and jobs. There would be no major changes to the costs of the two grazing permittees related to the driveways. The Forest Service would continue to receive driveway grazing fees, about $3400 - $5088 /year (one permittee or both).	The AZGFD could potentially introduce additional bighorn sheep along the driveways in one or two locations on the Tonto NF, south of Bushnell Tanks or Punkin Center, without the risk of potential domestic sheep-transmitted disease. There could be additional opportunities for recreationists to hunt or view bighorn sheep, if the reintroductions were successful in establishing a viable herd. The amount of additional hunting tags and associated income cannot be quantified and is speculative. There could be a loss of 4 jobs associated with the driveways, if both permittees abandoned driveway use completely. New loading facilities would be needed at the chosen southern end of the driveway, estimated to cost the Forest Service about $20,000. Grazing fees received could range from $0 to $1600/year form the active permittee.

Chapter 3 – Environmental Consequences

Chapter 3 summarizes the physical, biological, social, and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives, as presented in table 1 – Comparison of Alternatives in chapter 2. Chapter 3 complies with the implementing regulations (*40 CFR 1500-1508*) of the *National Environmental Policy Act* (NEPA) for analytic and concise environmental documents (*40 CFR 1502.2*).

Environmental resources could be affected in various ways during implementation of alternatives. The effect or impact is defined as any change or alteration in the environment's existing condition produced by the alternatives, either directly or indirectly. NEPA regulations (*40 CFR 1508.27 (a)*) refer to effects in terms of short- and long-term duration. For this analysis, short-term effects may be considered as occurring over a period of up to two years, while long-term effects are considered to be ten years or more. The analysis of effects for Alternative 2 (Proposed Action) and Alternative 3 under each resource is described with the assumption that adaptive management would be used as needed. Past, present and reasonably foreseeable actions that have been considered are addressed by each resource.

Monitoring

The objective of monitoring is to determine whether management is being properly implemented and if the actions are effective at achieving or moving toward desired conditions.

Effectiveness monitoring includes measurements to track condition and trend of upland and riparian vegetation, soil, and watersheds. Monitoring would be done following procedures described in the interagency technical reference (Sampling Vegetation, 1996), the *Region 3 Rangeland Analysis and Training Guide* and the *1988 R3 Range Analysis and Management Handbook* (U.S. Forest Service, 1997), or other directives as they are issued. These data are interpreted to determine if management is achieving desired resource conditions, if changes in resource condition are related to management, and if modifications in management are necessary. Effectiveness monitoring would occur at least once over the ten-year term of the grazing authorization or more frequently, if deemed necessary. Changes in riparian vegetation and stream channel geomorphology condition and trend will be measured at 5-to-10 year intervals. Protocols are described in the *Interagency Technical Reference* (1996), or the most current acceptable method (Burton, et al., 2008).

Implementation monitoring would occur annually and would include such things: as inspection reports, forage utilization measurements in key areas, livestock counts, and facilities inspections. Utilization measurements are made following procedures found in the *Interagency Technical Reference* (Utilization Studies, 1999) and with consideration of the *Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands*. Utilization measurements in riparian areas are made following the *Interagency Technical Reference* (1996), McBride and Grove (2002), and Burton, et al., (2008) or the most current acceptable method.

Utilization would be monitored on key forage species, which are native perennial grasses that are palatable to livestock. At a minimum, monitoring would include use in key areas, but may include monitoring outside of key areas. Data collection procedures and interpretation would consider guidance contained in the *Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands* (Smith, et al., 2005). Over time, changes in resource conditions or management may result in changes in livestock use patterns. As livestock use patterns change, new key areas may be established and existing key areas may be modified or abandoned in cooperation with the permittee.

The permittee would be encouraged to participate in monitoring activities. Records of livestock numbers, movement dates, and shipping records would be kept by the permittee and would be provided to the District Range Staff annually.

Adaptive Management

Adaptive management uses the results from monitoring to provide feedback to adjust management actions in order to achieve specific desired conditions over the long term. Management objectives are chosen that will be used to document if desired conditions are being achieved. The proposed action is designed to provide sufficient flexibility to allow for changes in management, when resource conditions show that changes are needed. Changes in management may include administrative decisions such as: the specific number of livestock authorized annually, specific dates for grazing, class of animal, or modifications in pasture rotations. However, such changes would not exceed the limits for timing, intensity, duration, and frequency defined in the term grazing permit. Adaptive management would be implemented through annual operating instructions, which would adjust livestock numbers and the timing of grazing so that use is consistent with current productivity and is meeting management objectives.

Adaptive management also includes monitoring to determine whether identified structural improvements are necessary or need to be modified. In the case that changing circumstances require physical improvements or management actions not disclosed or analyzed herein, further interdisciplinary review would occur. The review would consider the changed circumstances and site-specific environmental effects of the improvements in the context of the overall project. Based on the results of the interdisciplinary review, the District Rangers would determine whether correction, supplementation or revision of the EA is necessary in accordance with Forest Service Handbook direction at FSH 1909.15(18) and FSH 2209.13(96.1), or whether further analysis under NEPA is required.

Cumulative Effects Analysis

A cumulative effect is the effect on the environment that results from the incremental effect of the action when added to the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of the land ownership on which the other actions occur. An individual action when considered alone may not have a significant effect, but when its effects are considered in sum with the effects of other actions, the effects may be significant.

Cumulative effects were assessed in terms of how the alternatives would add to effects of past, present and reasonably foreseeable future activities along the driveways (Tables 2 and 3). Existing conditions by resource reflect the effects of past and present actions that have occurred in the project area. The specialists identified reasonably foreseeable future activities that overlap

in time and location of the driveways. The incremental effect of the actions in the alternatives was then analyzed.

Table 2. Past and Present Activities

Past and Present Activity Name	Timeframe	Location	Comments
Timber cutting	Since the 1880s up to about 2004	In ponderosa pine vegetation	Latest to take place were salvage sales in the Rodeo-Chedisky fire area
Mining activities	Since the 1880s	Very low density and scattered small locations	
Prescribed burning	From about 1975 to the present,	Most vegetation types except lowest desert	
Wildfires	Throughout history	All vegetation types, historically fewest in low desert areas	Largest was the 2002 Rodeo-Chedisky fire.
Road building and motorized recreation	Since the 1880s	All vegetation types	Most environmental effects in low deserts
Cattle grazing and past higher levels of sheep on the driveways	Since the 1880s, declining over time	All locations	Both cattle and sheep occupancy were higher to much higher in the past than at present
Road maintenance	ongoing	Periodically along all designated roads, some roads may not be maintained for several years	
Dispersed recreation	ongoing	Mostly along roads and streams	
Developed recreation	ongoing	PVRD- Airplane Flat and Canyon Creek campgrounds are within the driveway boundary	Sheep are kept out of the campgrounds

Noxious weed control activities	Ongoing, as found and prioritized. A-SNF has weed control NEPA, and TNF's NEPA is in progress	Mostly along roads and streams, where weeds commonly disperse	
Wild ungulate grazing	Since pre-history for both deer and elk. Levels declined on NFS land during Anglo settlement, then for elk have increased in recent decades	Deer species found project-wide, elk widespread on A-SNF and upper elevations of Tonto NF, spotty in lower elevations of Mesa and Cave Creek RDs	Elk grazing pressure has increased enough where they are widespread to start being of concern in riparian areas and aspen

Table 3. Reasonably Foreseeable Activities

Activity Name	Timeframe	Location	Comments
Prescribed burning	Annually on both Forests, but only intersecting with the driveways in occasional years	Most foreseeable is the Rodeo-Chediski prescribed burn, taking place over multiple years starting about 2012, also one for Greens Peak WUI on Springerville R. D.	
Cattle grazing, including environmental analysis of various allotments	Annually for grazing; foreseeable for environmental analyses of allotment management	All locations – nearest to complete analyses are for Hall and Greens Peak allotments, Springerville R. D.	Cattle grazing plus sheep grazing along the driveways generally don't exceed proper annual use
Wildfires	Not predictable in short-term	Possible in any location	Effects range from minimal to requiring several years of avoidance by livestock.
Roads and trails management	Being analyzed in 2011 and 2012 on both Forests, management is ongoing	All watersheds	Authorized use of roads and trails designed to be sustainable, unauthorized locations can result in resource damages.
Canyon Creek Aquatic Habitat	foreseeable	Five miles along	In-stream structures and other

Enhancement		Canyon Creek	improvements
Conversion of private land agricultural fields to development.	Ongoing	Warm winter areas used for sheep grazing part of the year	Puts economic pressure on both sheep permittees involved with the driveways.

Rangeland

Methodology

In 2003, Forest Service range conservationists rode along the driveways, conducting periodic range transects based on the Parker 3-Step method (White and McKinney 2003, in the project record). Severe drought conditions prevailed in the southwest from the mid 1990ʻs through 2006, with some of the driest conditions on record. Drought impacted rangeland conditions, particularly in forage production, vigor, loss of basal vegetation, and increased bare ground.

Sheep have different forage preferences than cattle. They tend to prefer forbs to grasses, and would utilize mostly cool-season grasses, if present, when they pass through the driveway in spring and fall. Using a forage preference cross-walk for sheep, as White and McKinney did, some key areas that would have rated fair for cattle rated only poor or very poor for sheep. Other areas rated poor or very poor for either cattle or sheep. Range condition is determined by methodology in the Forest Service Handbook 2209.21 for Parker Three-Step clusters and pace transects.

In 2008 through 2010, District range personnel provided driveway range existing condition reports for their Districts or the Apache-Sitgreaves NF.

Rangeland Existing Conditions

Cattle stocking within the Heber-Reno Sheep Driveway corridor was reduced due to drought and restocking is still at somewhat reduced levels on many allotments that overlap the corridor.

There is a lack of data regarding the proportional use of forage between wildlife, cattle, and sheep across the driveways. R. Chavez did calculate that sheep grazing on the driveways only accounted for 18 days per year or 11,103 acres of use by the sheep driveway on the Apache-Sitgreaves National Forest. That is equivalent to 0.5% of authorized forage use on the Apache-Sitgreaves National Forest (Chavez 2008). A similar ratio of sheep to cattle authorized use could be calculated for the Tonto N. F. Trampling damage may be found in portions of the driveway; however, most riparian areas show no sign of sheep trailing. As much as possible, sheep are pushed along roads at a rapid pace, so the animals have little time to graze or wander freely. The affected area ranges from a few hundred feet to fifty feet wide in any given year, and the exact routes within the driveways vary from year to year.

The driveways are not fenced or posted except on most of Pleasant Valley RD, where the driveway width averages 1.5 miles. The vast majority of land within the driveways are upland

vegetated, of which dense forest (spruce/fir, ponderosa pine, and piñyon/juniper) is a major component. Several riparian/wetland areas are used as watering sites; however, they are not used as bedding grounds.

The vegetation along most of the driveways has changed over decades from grasslands or savannas to pinyon/juniper or other woody species dominance, with associated increases in bare ground. Several changes have occurred on the range lands of both National Forests due to natural events (climatic events, lack of fire, etc.) and management actions (grazing, fire suppression, etc.) At the present time, the various ecosystems have reached relatively stable states, not easily reversible on a practical time scale without substantial inputs of funding and energy. The current woody canopy on primary rangelands along the driveway is greater than desired when compared to historic levels. Some acres are targeted for fuel reduction or grassland restoration, but they are in a great minority compared to the work that would be required to restore all the driveway watersheds to potential natural vegetation.

Heber-Reno Sheep Driveway

The Heber-Reno Sheep Driveway begins in the southwestern corner of the Mesa RD just north of the Usery Mountain Recreation Area, along Usery Pass Road, and continues in a northeasterly direction until it exits the district near Reno Pass. Elevation along the driveway ranges from 2,100 feet near its beginning, to approximately 4,600 feet near Reno Pass, where the driveway enters the Tonto Basin RD. Vegetation types along the driveway include Sonoran Desert scrub, semi-desert grassland, and chaparral.

The Mesa RD portion of the driveway is roughly 27 miles in length, and varies from less than one-quarter mile to three-quarter mile wide; however, as the bands of sheep are herded through the Heber-Reno Sheep Driveway, the width seldom exceeds 100 feet.

There are several primary bedding grounds on Mesa RD including: Usery Pass, south of the Lower Salt River (River), west of Sugarloaf Mountain, and Bushnell Tanks. To avoid possible contact and disease transmission between domestic and desert bighorn sheep populations, during the 2009 fall move and in 2010, the sheep bedded down north of State Road 87 (SR87) avoiding known bighorn habitat along the north side of the River (Stewart Mountain). This is very likely to become apermanent part of the annual instructions.

The driveway bisects two active cattle grazing allotments: Sunflower and Diamond. The Sunflower Allotment has been in non-use since 2002, for resource protection. The Diamond Allotment is currently (2010) authorized to run 142 head of cattle.

The 2003 range survey showed unsatisfactory vegetation and soil conditions, exacerbated by the drought. Northeastern portions of the Sunflower Allotment and roughly three-quarters of the eastern pastures of the Diamond Allotment, including the driveway, were affected by the 2005 Edge Complex Fire. Burn severity ranged from non-burned areas, to high severity, with the majority of acreage being classified as low-to-moderate severity. Pastures affected by the fire were rested for two growing seasons prior to returning livestock. Data collected in 2008 and 2009 show that perennial grass density increased, and shrub species, such as sugar sumac and turbinella oak, are recovering (Kessler, 2009).

The Heber-Reno Sheep Driveway enters the Tonto Basin RD through Reno Pass south of Mount Ord and exits the district near the headwaters of Horse Canyon, northwest of Picture Mountain. Mount Ord Pasture and Long Mesa Pasture lie west of Highway 188 along Reno Creek.

The 2003 range survey showed unsatisfactory vegetation and soil conditions, exacerbated by the drought. A large percentage of this area was burned over by the 2005 Edge Complex Fire. Some portions of the burn in the upper watershed of Reno Creek were of moderate-to-high severity, and vegetative recovery has been slow. Steeper slopes in the watershed were chaparral or semi-desert grassland, but the lower portions of Long Mesa Pasture contain some Sonoran Desert vegetation.

As the sheep leave Tonto Creek, they enter the Kayler Pasture and then the Lambing Pasture. Kayler Pasture contains Sonoran Desert vegetation at the lower elevations and soils are very erosive in the flats along Tonto Creek. Vegetation transitions to semi-desert grasslands for much of the two pastures, and finally to juniper grasslands mixed with chaparral near and north of Lambing Creek. The crossing at Lambing Creek is rocky and open.

The Heber-Reno Sheep Driveway crosses the Pleasant Valley RD from the southwest corner in the vicinity of Picture Mountain to the northeast corner near Canyon Creek. It varies in width from about one to two and three-quarter miles. Elevation ranges from about 4,500 to over 7,000 feet. Vegetation types along the route include piñyon/juniper, chaparral, juniper woodlands, ponderosa pine, riparian, and mixed conifer. The driveway north of Brady Canyon is fenced separately from the adjoining cattle allotments to the Naegelin Rim. North of the Naegelin Rim, only the east side of the driveway is fenced. The sheep driveway borders the Soldier Camp, Potato Butte, Diamond Butte, Marsh Creek, Young, Bar X, Red Lake, and OW cattle allotments.

The 2003 range survey showed unsatisfactory vegetation and soil conditions, exacerbated by the drought. In the nearly 30 years since combined use has been discontinued on most of the Pleasant Valley District, there has been considerable improvement in range condition over most of the driveway. Improvement in rangeland vegetation has mainly occurred in areas dominated by perennial grasses, and where tree canopy is not closed (Thiel, 2004). Perennial grass species encountered along the driveway are hairy grama, blue grama, threeawn, sideoats grama, squirreltail, mutton bluegrass, and weeping lovegrass. Cool season grasses (the latter three species listed) are less common than warm-season varieties. Production ranges from less than 100 lbs/acre in areas dominated by heavy tree or brush canopy to about 500 lbs/acre in open grassland areas.

Since the driveway was fenced and cattle were no longer allowed to graze in common with the sheep, there have not been reports of high utilization on the Pleasant Valley portions of the driveway. Bedding areas have experienced high use, however. Most bedding areas lack perennial forage plants since they have been over-utilized for many years. The bedding areas are typically one to three acres in size. Annual forbs and grasses in the bedding areas experience high use through consumption and trampling damage. In recent years, the permittee has been instructed to rotate bedding areas to allow rest and recovery for the forage resource. There are also areas where the permittee is forbidden to bed, such as Potato Butte saddle. This particular area has been used for bedding and trailing sheep for many years. There is an extensive erosion pavement in the saddle, and little perennial grass cover. This area will likely take decades for groundcover from perennial forage to increase substantially. Recent annual operating instructions (AOI) have documented that sheep are not authorized to bed here (Thiel 2004).

After leaving the Tonto NF and heading north, the driveway enters the Black Mesa RD on the Apache-Sitgreaves NFs at Sheep Creek Point. The driveway heads north on Forest System Road (FSR) #260B, and then skirts south of the private lands near Forest Lakes and trails on two track roads to Highway 260. The driveway crosses Hwy 260 at FSR 122 and continues northeasterly along Hwy 260 to about Porter Tank. The driveway then skirts private lands, then down an unnamed drainage of Black Canyon. Once in Black Canyon, the route goes about a mile up Black Canyon, crosses the wash and then goes easterly toward East Indian Tank. From East Indian Tank the route heads in an easterly direction, crossing Pierce Wash to Hwy 377. Once along Highway 377, the route heads north to the Black Mesa RD Boundary where the sheep leave National Forest System lands. The 2003 range survey showed unsatisfactory vegetation and soil conditions, exacerbated by the drought.

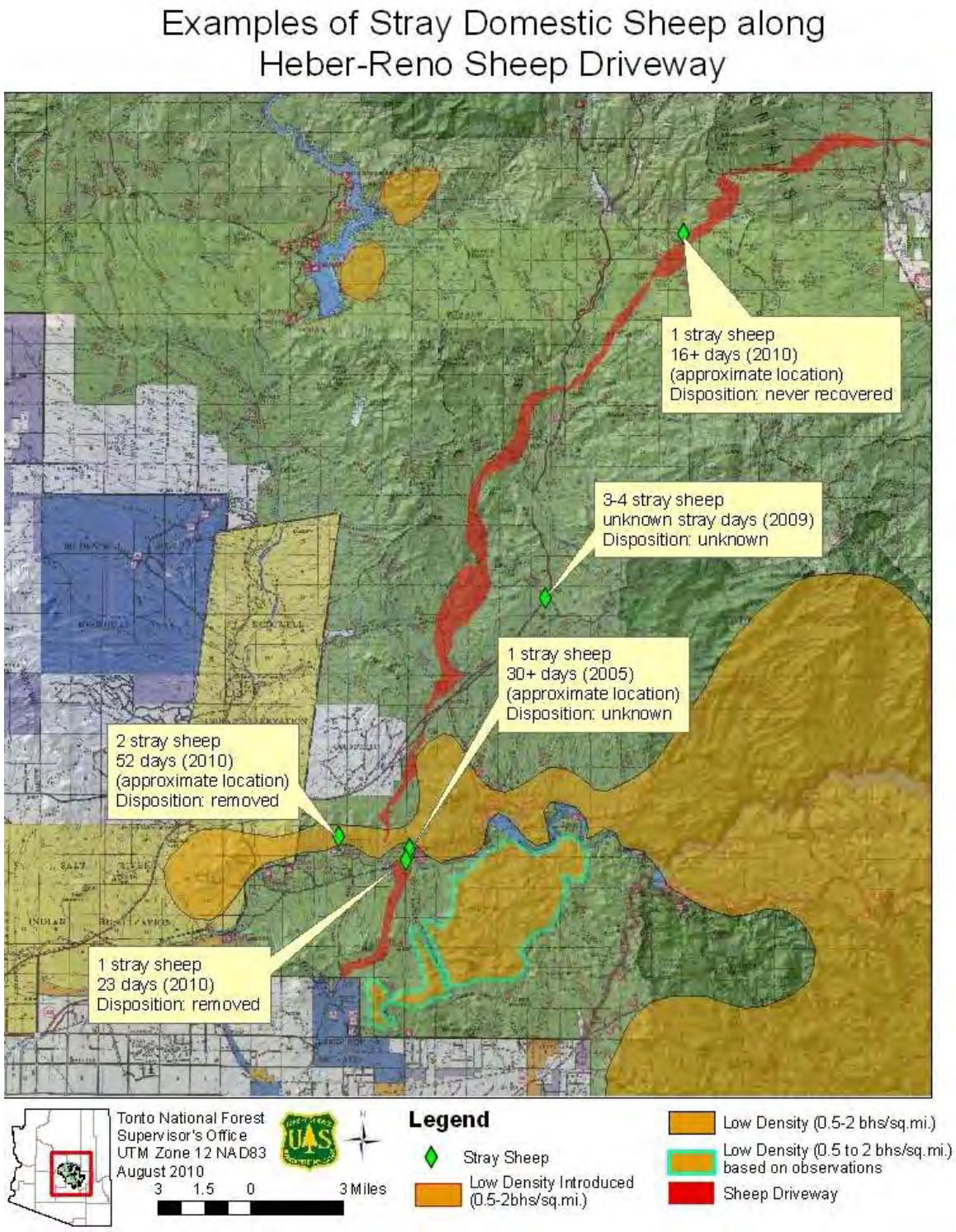
Domestic sheep strays. During trailing, a small number of sheep will stray from the herd. Table 2 lists sheep reported to have strayed from the driveway near bighorn sheep habitat. Some sheep are recovered while some are never recovered. We estimate that during the course of a one-way trailing event, about 5 stray sheep are never recovered through the course of the entire driveway.

Table 4. Stray domestic sheep sightings along the Heber-Reno Sheep Driveway (from AZGFD letter dated 8/22/2010)

Date	No. of Stray Sheep	Estimated Location	Approximate Days in „Stray“ Status	Disposition of Animals
06/17/10	2	North of Salt River near Phon D Sutton and north of Blue Point Bridge*	52	Removed by permittee on 06/24/10
05/26/10	1	West of Blue Point Bridge on Bush Hwy*	23	Removed by MCSO on 05/26/10
05/19/10	1	Four Peaks Road @ Hwy 87	16+	Unknown – Never recovered per permittee
10/01/09	3-4	Bushnell Tanks Area	Unknown	Unknown
12/06/05	1	South Side of Salt River near Blue Point Bridge*	30+	Unknown – no record available

Note: * denotes stray domestic sheep sighted near bighorn sheep habitat areas

Figure 4. Examples of stray domestic sheep along Heber-Reno Sheep Driveway



Morgan Mountain Sheep Driveway

Described from East to West, from Springerville RD through Lakeside RD, excluding private and State lands, the corridor starts at approximately 9,150 feet elevation near Sheep Camp Springs adjacent to Hwy 260. From here, the route heads northwest towards Swinborne Springs or farther west along the Forest boundary towards Udall Springs. Continuing along FSR 61, the sheep are driven at rapid pace toward Gillespie Flat where they follow FSR 8474, then FSR 8471, which turns into FSR 96 before it leaves Springerville RD, leading into Lakeside RD. The western-most three miles of Springerville RD are in extremely dense, mixed conifer and spruce-fir forest and the sheep do not leave the road. This portion of affected area is at most 50-feet wide. In total, the Springerville RD portion of the driveway entails approximately 12 miles.

Starting on the east side of Lakeside RD, the driveway is FSR 96 to Firebox Spring, where the route swings north along Brown Wash, which soon meets FSR 5. Following FSR 5 to the intersection with FSR 224, it then follows FSR 224 north about two miles to the Dripping Vat Spring Fire Road, which is FSR 3, heading northwest and west. From FSR 3 near Brown Creek the route continues west on FSR 267 until Marshall Flat. After following FSR 7R for about a half mile, the route leaves the road network, cuts across Marshall Flat, heads northwest towards Hog Spring Tank, and further toward the Nancy Tank/Penrod Tank area north of FSR 45. Continuing north, the route heads towards Bourden Tank, then heads northwest to where FSR 9057 meets Hwy 60. Here the sheep either cross the highway or are pushed through a box culvert to the north side of the highway depending on traffic. Once the highway is crossed, the sheep follow FSR 9054 northwest to FSR 918B, which is where the route leaves National Forest System land. Sheep continue over State and private lands, coming back onto national forest lands on Black Mesa RD entering the Heber-Reno Sheep Driveway. In total, the Lakeside RD portion of the driveway entails approximately 24 miles.

The sheep driveway runs through several different vegetation types on Lakeside RD. On the east end, most of the driveway runs through ponderosa pine with relatively sparse understory. This area has good groundcover from needlecast and understory vegetation. Bare soil is not common under ponderosa pine and the drainage network is generally in better shape than compared to lower elevation piñyon/juniper vegetation types. Below ponderosa pine, the remaining part of the driveway passes through piñyon/juniper and small sections of grassland before it leaves National Forest System lands at the northeastern corner of Lakeside RD. Piñyon/juniper is notorious for low ground cover in terms of understory and litter cover. Large spaces have no cover and are either bare ground or rock.

Soils are dominated by basaltic parent materials that often produce heavy clay contents, which have slow infiltration rates. Large rainfall events mostly run off, carrying loads of reddish brown silt. Compaction is a factor in basaltic soils; however, the clays most often have a high shrink/swell potential and wetting/drying cycles help de-compact soils. Soil compaction is caused by grazing when the soils are wet. A dry soil is much more resistant to compaction than a moist or wet soil. Compaction can be minimized by reducing the number of trips across an area. The length of time compaction will last will be less if soils have a large shrink-swell potential or if there are a lot of wet/dry cycles or freeze/thaw cycles .

The driveway crosses about ten miles of Springerville Ranger District. Upland watershed conditions on most of Springerville RD route are in good condition, in terms of ground cover. All vegetation types with tree canopies have good litter cover.

Invasive Plants

Use of the sheep driveways on the National Forests creates the potential for spread of invasive plants. Domestic sheep coming onto the Forests from fields where they graze in another part of the state are one possible vector. Croplands have soils that are constantly disturbed, resulting in a supply of weeds and weed seeds. Many agricultural weeds require more moist conditions than would be present on the National Forest, so are not a threat to wildlands. However, some weeds typical of crops, such as wild oats, Russian thistle, camelthorn, and several mustard species, could act invasively on the National Forests. Sheep brought onto the driveways before they are shorn have potential to transport weed seeds caught in their fleeces to locations along the driveways. An Australian Council set up for the management of noxious weeds in New South Wales experienced spread of weed seeds in sheep fleece. (Hawksbury River City Council, undated). A study in Montana found an average of 38 leafy spurge seeds per fleece, and approximately 17 viable weed seeds per animal, after grazing in leafy spurge-infested pastures. They concluded it was unlikely the weed seeds would fall out of the fleece (Olson, et al., 1997). However, Arizona has far more spiny shrubs such as mimosa, catclaw, mesquite, palo verde and cactus that can catch fleece and pull it off of sheep as they travel. No studies have been found that investigated the potential of sheep to spread weed seeds in Arizona. Sites with disturbed soils, such as bedding grounds, are more likely to be colonized by invasive plants than sites where the soil is less disturbed and vegetation provides a good ground cover. Feed brought in for sheep or pack stock could introduce invasive plants, unless it is certified weed free.

Scott Wood, Forest Archeologist, visited the portion of the Heber-Reno Sheep Driveway in the area of Boulder Mountain shortly after a band of sheep had passed through, and noted every sheep trail had bushes with large amounts of fleece pulled off the sheep by thorny vegetation (Scott Wood, 2010). However, during range analysis surveys along the length of the driveways in 2003, the surveyors did not note the presence of noxious weeds or exotic invasive species, and ocular observations have not discovered exotic plant populations along the driveways to be noticeably different than similar lands in the watersheds.

The Apache-Sitgreaves National Forests have completed environmental analyses for treating weeds wherever found and as prioritized Forestwide. The Tonto National Forest has a similar environmental analysis in progress. These two analyses include the area of the sheep driveways. The A-SNF‟s analysis is included in the project record.

Rangeland Direct, Indirect, and Cumulative Effects

As described in *Forest Service Handbook 2209.13, chapter 90, section 95*, if an alternative continuing driveway use is chosen, a monitoring plan for the driveways will be included as part of the Allotment Management Plans (AMPs) for the Long Tom and Beehive/Sheep Springs grazing allotments . These monitoring plans and their resultant Annual Operating Instructions to permittees will describe ways to monitor for avoidance of contact between domestic and bighorn sheep. The driveways are also grazed by cattle as parts of larger allotments, and monitoring for resource conditions is included in those allotment management plans.

Alternative 1 would end trailing sheep along the entire Heber-Reno/Morgan Mountain sheep driveways.

This alternative would leave existing cattle and wildlife grazing levels while eliminating domestic sheep grazing. Along the driveways, cattle are by far the major domestic livestock impact to the resources, because of the very great imbalance in occupancy time and amount of forage used. In most places along the driveways, existing cattle grazing plus the sheep grazing does not exceed a moderate use level of 40 percent. Authorized cattle use might be increased on some allotments where the Ranger District believes the small amount of forage allocated to sheep could be allocated to cattle.

The most noticeable current sheep effects have been to the bedding grounds used at night, each about one to three acres in extent. Areas that were used as sheep bedding grounds may recover perennial vegetative cover over time. Due to fluctuation of precipitation on the allotment, plant diversity and density may increase in some areas and decrease in other areas. Except for the Sonoran Desert vegetation, the most productive soils would support plant communities with tall vigorous grasses, which would benefit ground cover, reduce wind and water erosion and improve water quality. Blue grama, a warm season species, would continue to increase dominating most plant communities except for the desert and highest elevations. Establishment of cool season species are likely to occur but not in great amount. Soils with shallow gravelly surface vegetation may not change much in plant diversity and density.

No measurable vegetation changes are expected to occur with this alternative outside the bedding grounds. On non-desert and non-high elevation grassland, blue grama is expected to remain the dominant herbaceous species in absence of livestock grazing, and the excessive occurrence of junipers, pines and other woody species are the main limit on increasing herbaceous vegetation. In most areas along the driveways, plant composition has not changed greatly over 45 years with moderate grazing impacts. The ecosystems have mostly stabilized, and are unlikely to make major transitions even if livestock grazing is completely removed, barring a tree-killing wildfire or some other way of removing excess woody vegetation.

The direct and indirect effects of this alternative, when combined with other past, present, or reasonably foreseeable actions (see Tables 2 and 3) are not likely to result in significant effects to the environment.

Alternative 2 would allow permitted sheep to continue trailing on the driveways twice a year. The direct and indirect effects of sheep trailing, bedding, and light grazing would continue to occur. Because trailing sheep are moving, forage use from sheep varies from a trace to 20 percent depending on how fast they are traveling. Effects to rangeland would likely be temporary in nature because 1) bedding grounds recover to an extent between trips and do not contribute to runoff or erosion, 2) utilization of available forage is light, and 3) trailing impacts are short term. Bedding grounds (one-to-three acres in size) would continue to hair over with annual grasses and forbs between trips. The bedding grounds are located in flat areas, thus reducing the risk of erosion. The direct and indirect effects of this alternative, when combined with other past, present, or reasonably foreseeable actions (deer and elk populating the watersheds, dispersed recreation including camping, OHV, hunting, sightseeing, and livestock grazing continuing with forage utilization limited to 40 percent per year) are likely to result in no effect.

Holechek et al. (2006) said that permanent removal of grazing would not necessarily lead to differences in perennial forage species changes. Courtois et al. (2004) found “few changes in vegetation characteristics between the inside and outside of [livestock] exclosures have occurred in 65 years, indicating that recovery rates have been similar under moderate grazing and [total

livestock] exclusion." Thirty-to-forty percent utilization is considered moderate. Cattle stocking within the Heber-Reno Sheep Driveway corridor was reduced due to drought and restocking is less original permitted numbers on most allotments that adjoin the driveway corridor.

The direct and indirect effects of this alternative, when combined with other past, present, or reasonably foreseeable actions (see Tables 2 and 3) are not likely to result in significant effects to the environment.

Alternative 3 would retain use of the Heber-Reno Driveway starting/ending at some point on the Mesa, Tonto Basin, or Pleasant Valley RDs, eliminating domestic sheep use below the selected drop-point of Bushnell Tanks Road, Kayler/Sheep Crossing, or Pleasant Valley Airstrip. Effects to rangeland would likely be temporary in nature because 1) bedding grounds recover to an extent between trips and do not contribute to runoff or erosion, 2) utilization of available forage is light, and 3) trailing impacts are short term. Bedding grounds (one-to-three acres in size) will continue to hair over with annual grasses and forbs between trips. Bedding grounds below the drop point may recover perennial vegetative cover over time. The bedding grounds are located in flat areas that do not contribute to runoff or erosion.

Holechek et al. (2006) said that permanent removal of grazing would not necessarily lead to differences in perennial forage species changes. Courtois et al. (2004) found "few changes in vegetation characteristics between the inside and outside of [livestock] exclosures have occurred in 65 years, indicating that recovery rates have been similar under moderate grazing and [total livestock] exclusion." Thirty-to-forty percent utilization is considered moderate. Cattle stocking within the Heber-Reno Sheep Driveway corridor was reduced due to drought and restocking is less original permitted numbers on most allotments that adjoin the driveway corridor.

The direct and indirect effects of this alternative, when combined with other past, present, or reasonably foreseeable actions (see Tables 2 and 3) are not likely to result in significant effects to the environment.

Air Quality

Air Quality Existing Condition

Apache-Sitgreaves National Forest – Air quality within the region is currently impacted by area industries including a wood pellet plant at Show Low, a pulp milland biomass plant near Snowflake, and several coal-fired power plants, near Holbrook, St. Johns, and Springerville. Prevailing winds are from the southwest, so all these facilities are downwind of the driveways. All of Coconino, Navajo and Apache Counties are classed as air quality attainment areas (satisfactory condition) by the Arizona Department of Environmental Quality (ADEQ 2009). Class 1 Airshed Areas are associated with wilderness areas. The only Class 1 airshed on the Forest is around the Mount Baldy Wilderness area (ADEQ 2009).

Tonto National Forest – The area of this National Forest is currently impacted by all the activities in the greater Phoenix Metropolitan Area, which makes the eastern half of Maricopa County a non-attainment area for ozone, and smaller portions in non-attainment for PM10 particulates and carbon monoxide. In Gila County, there is a small area of non-attainment for PM10 centered

around Payson, which is approximately 40 miles west of the driveway (ADEQ 2009). The Class 1 areas on the Forest are around the Superstition, Sierra Ancha and Mazatzal Wilderness areas, each nine or more miles from the driveway (R3 FSM2580.5).

A Class 1 airshed requires the highest level of protection under the federal Clean Air Act passed in 1963 (PL 91-604) as amended in 1977 (PL 95-9) and reaffirmed in 1990 amendments. The intent of the Clean Air Act Class 1 areas is to "preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value." Class 1 designation allows virtually no degradation in air quality.

On a more local basis in the project area, air quality is impacted bydust from incidental vehicle travel on unpaved roads, and very occasional pulses from prescribed burning and wildfires. Vehicle dust settles out relatively quickly. Particulates from fires, especially long-lasting wildfires, can create moderate to heavy impacts during the days they are burning.

When the sheep are trailed along the driveways, they kick up perceptible amounts of dust. The effects are limited to a few hundred feet downwind, and do not last longer than a few minutes past the time it takes the sheep to pass a given point. The use is assumed to conform with all applicable state implementation plans and maintenance plans for non-attainment areas and areas classified as maintenance (40 CFR 93.153c(ii and xi).

Given the low amount of direct effects and no indirect effects on air quality, there are no cumulative effects.

Riparian Resources and Water Quality

Riparian Resources and Water Quality Existing Condition

Water Sources

Waters on the allotment were located using the water points layer in the forest"s Geographic Information System (GIS), revised with input from the ranger district staffs. This layer contains springs, tanks and wells. Waters were identified by the ranger district staffs as those used by the sheep. Tonto Basin RD does not have waters specifically designated for sheep, so the list includes all waters on the district within the sheep driveway boundaries. Several have been inventoried or have information provided by the ranger districts, as indicated under comments (table 1a, Appendix A).

Water Quality

The Arizona Department of Environmental Quality (ADEQ) evaluates the water quality status of waters within the state in a *Nonpoint Source Assessment Report* (2008). Several streams that cross the Heber-Reno Sheep Driveway have been evaluated by ADEQ (Table 2a. Appendix A).

Designated uses for non-ephemeral, unlisted tributaries above 5,000 feet are aquatic and wildlife-cold water fisheries (A&Wc), fish consumption (FC), and full body contact recreation (FBC).

Designated uses for non-ephemeral, unlisted tributaries below 5,000 feet are aquatic and wildlife-warm water fisheries (A&Ww), fish consumption (FC), and full body contact recreation (FBC). Designated uses for ephemeral, unlisted tributaries are aquatic and wildlife-ephemeral water fisheries (A&We) and partial body contact recreation (PBC) (ADEQ, 2008).

Monitoring has determined that Canyon Creek is "attaining all uses." Spring Creek was listed as "attaining some uses" because monitoring for *E. coli* bacteria was "inconclusive" for FBC due to insufficient data. The remaining uses were "attaining" standards.

The Salt River was monitored at four sites. It is "attaining" standards for the uses FC, DWS, AgI, and AgL. It did not meet the standards in 10 of 23 samples for dissolved oxygen (DO) for A&Wc. ADEQ has proposed changing the use to A&Ww; however, the reach would remain "impaired" for this use. Monitoring for *E. coli* bacteria was "inconclusive" for FBC, so ADEQ will perform further monitoring. The overall assessment is "impaired," which means management cannot further degrade the stream for the impaired pollutant (DO). The standard for DO for A&Wc is 7 mg/L. Low levels of oxygen may result in fish mortality. Oxygen depletion can have several causes including an over abundance of algae or an increase in organic waste entering the water. More data is needed to identify sources and TMDLs have been scheduled to be initiated in 2010 (ADEQ, 2008).

On the Apache-Sitgreaves N. F., none of the streams crossed by the Heber-Reno or Morgan Mountain sheep driveways have been determined to be impaired by ADEQ.

Climate

Climate on the Heber-Reno Sheep Driveway is characterized by a bimodal precipitation pattern with about 60 percent occurring as frontal systems in the winter from December to March and about 40 percent occurring as monsoons in the summer from July to September. Summer storms can be more intense than winter storms, but are generally of shorter duration and smaller extent.

There are three climate gauges located near the Heber-Reno Sheep Driveway. Pleasant Valley Ranger Station gage is near the north end of the driveway. The period of record is 1964-present and the average annual precipitation is 22 inches (WRCC, 2008 and NOAA, 2009). The data indicates all of the last ten years (1999-2008) except 2008 have had below average precipitation, with 2002 being below 50 percent of average and 2008 being almost double (40 inches). Punkin Center gage is near the middle of the driveway. The period of record is 1973-present and the average annual precipitation is 19 inches (WRCC, 2008). The most recent years that have adequate data to analyze are 2000-2004, all of which had below average precipitation, with 2002 being below 50 percent of average. At the same gage, the same years (2000-2004) have seen warmer than average temperatures (WRCC, 2008). Stewart Mountain is near the south end of the driveway. The period of record is 1948-present and the average annual precipitation is 14 inches (WRCC, 2008 and NOAA, 2009). The data indicate seven of the ten year period (1999-2008) have had below average precipitation, with 2002 being below 50 percent of average (NOAA, 2009). At the same gage, the years 1999-2005 (the most recent years that have adequate data to analyze) have seen warmer than average temperatures (WRCC, 2008).

Wild and Scenic Rivers

Segments of three streams (Canyon Creek, Spring Creek, and Salt River) that cross the Heber-Reno Sheep Driveway have been classified as potentially eligible recreational rivers for inclusion

into the National Wild and Scenic Rivers System (USFS, 1993). The Outstandingly Remarkable Values (ORVs) are listed in table 3a in Appendix A. There are criteria established to describe these ORVs (table 4a in Appendix A).

Stream Channel Crossing Areas

Some of the site data were obtained with the specific purpose of monitoring the annual effects of sheep crossing stream channels on the Heber-Reno Sheep Driveway. Prior to 2003, there was little documentation of the effects of sheep trailing in the Forest Service records.

All of the stream crossings on the Tonto NF portion of the Heber-Reno Sheep Driveway were evaluated (Table 5, below). Some were determined to have low sensitivity to potential impacts from sheep because of lack of riparian vegetation or low potential to support riparian vegetation. The stream crossings determined to have moderate to high sensitivity to potential impacts from sheep, support riparian vegetation and/or vulnerable stream banks or have the potential to support riparian vegetation. The risk to these streams is not to their entire reaches, but to the short segments within the driveway corridor where the sheep actually cross. Visual observations indicate that the sheep use riparian areas primarily to water. They do not loiter or bed in riparian areas. Based on existing utilization monitoring, most impacts to riparian vegetation appear to be limited and of short duration.

Table 5: Summary of stream reaches on the National Forests

Site Sensitivity	*Stream Name*	*Flow Regime*	*Comments*
Tonto N. F. Streams			
Low	Reno Creek	Intermittent	Lacks riparian vegetation within the driveway.
Low	Cloudburst Canyon	Ephemeral	Obligate riparian vegetation not observed in 2009.
Low	Rock Creek	Perennial	Steep-walled canyon with bedrock at confluence with Spring Creek. According to McKinney and White sheep did not enter Rock Creek in 2003.
Low	Salt River	Perennial	Crossing dominated by cobble, without alterable streambanks or greenlines. Flow is regulated. Heavy recreation impacts. Sparse riparian veg.
Low	Tonto Creek	Intermittent	Creek is unstable and braided at crossing; trailing effects are considered short-term and minimal.

Site Sensitivity	*Stream Name*	*Flow Regime*	*Comments*
Low	Naegelin Canyon (Cyn)	Intermittent	Channel dominated by overstory of conifers and oaks with scattered broadleaf riparian trees and coarse sediments. Rated as impaired. Stream has low potential for change. Sheep trail up FR 411, paralleling the creek, rather than in the creek due to the rockiness of the channel (Mark Pederson, personal communication, 2010). Sheep drink from creek when water is present, which is infrequent.
Low	Otero Cyn	Intermittent	Sheep did not access in either 2003 or 2005.
Low	Sycamore Cyn	Intermittent	In 2003 the sheep crossed a dry area where there is little riparian vegetation and no alterable banks.
Moderate to High	Sycamore Creek, west of Sugarloaf Mountain	Perennial	Sheep trail up creek from gauge area along road and in channel. Small areas of developing greenline exist where herbaceous emergent vegetation is capturing sediment; most of channel is dominated by coarser sediment. Impacts from historic grazing, on-going recreation pressure and off-road vehicles could obscure the impacts of sheep browsing riparian vegetation and trailing.
Moderate to High	Sycamore Creek, above Dos S Ranch	Perennial	Cover and diversity of riparian vegetation increasing. Potential for some impacts. In 2005, sheep crossed Sycamore Creek at bedrock section south of designated driveway with few impacts.
Moderate to High	Lambing Creek	Perennial	Few riparian trees near crossing, many emergent and streambank herbaceous species. Areas of alterable greenline, high potential for streambank development. In 2005, impacts from sheep trailing were limited to less than a 100-foot wide area, and had little effect on channel condition.
Moderate to High	Gun Creek	Intermittent	Confined low gradient channel over bedrock. Supported dense emergent and riparian herbaceous species. Potential to develop streambanks, floodplain features, and perennial water.
Moderate to High	Spring Creek	Perennial	Has alterable greenlines, and developing streambanks, with high potential for recovery.

Site Sensitivity	*Stream Name*	*Flow Regime*	*Comments*
Moderate to High	Canyon Creek	Perennial	Densely vegetated. According to the OW Ranch Manager, the sheep cross on the road.
Moderate to High	Walnut Creek	Perennial	Riparian vegetation appears to be in transition with an upward trend. Saplings and pole size trees are the dominant age class. The herbaceous component has high canopy cover and species diversity. Appears to be vulnerable to impact.
Apache-Sitgreaves N. F. Streams			
Low to moderate	Black Canyon	Intermittent	This area has some riparian species, such as cottonwoods and willows, but is mainly a rocky/hardened crossing area that receives minimal impacts from sheep.
Low	Pearce Wash	Intermittent	This area has very little riparian species within the wash. This is a wide, wash area that is currently in nonfunctioning condition, but is closer to a non-riparian area. The crossing is mainly made up of rocks and gravel. There are minimal to no impacts from the sheep in this wash.
Moderate to High	Brown Creek	Perennial	The sheep follow FSR3 and cross the creek on a cement hardened crossing in the road. Riparian species are present in the creek such as cottonwood, willow and sedges. Effects from the sheep are minimal to this area.
Moderate to High	Sepulveda Creek	Intermittent	Wide, flat, with meadow components. Sheep don‟t stay here long enough to cause more than minimal impacts.
Moderate	Vernon Creek	Intermittent	Wide, flat, with meadow components. Sheep don‟t stay here long enough to cause more than minimal impacts.

Floodplains

Executive Order 11988 requires the Forest Service to provide leadership and take action to minimize adverse impacts associated with occupancy and modification of flood plains and reduce risks of flood loss; minimize impacts of floods on human safety, health and welfare; and restore and preserve the natural and beneficial values served by floodplains. Executive Order 11990 requires the Forest Service to take action to minimize destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.

The only location along the driveways that might be considered to have floodplains is the crossing of Black Canyon creek on Black Mesa Ranger District. Tonto Creek and Gun Creek on the Tonto N. F. have potential to develop floodplains as they recover, as do Pearce Wash, Brown Creek, Sepulveda Creek and Vernon Creek on the Apache-Sitgreaves N. F. Under all alternatives, floodplain function would be maintained.

Direct, Indirect, and Cumulative Effects

How streams could be impacted by sheep in general: A number of factors can change the stability and function of streams including: direct channel disturbances or riparian vegetation changes, and changes in stream flow or sediment regime. Excessive grazing, trampling, and trailing impacts can destabilize and break down stream banks, cause mechanical damage to shrubs and small trees, reduce or eliminate woody seedlings and saplings, expose soils, eliminate or shift native herbaceous species to weedy or exotic species with reduced root systems, and cause widening or incision of stream channels (Trimble and Mendel, 1995). These changes may lead to loss of stream stability and function. Maintaining native, obligate riparian plants is extremely important to many streams because of their resistance to the erosive energy of flowing water (Clary and Kruse, 2003). Herbaceous riparian vegetation is especially important to stabilizing stream bank, point bar and floodplain deposits. Development of these features is critical to the channel restoration process.

Stream channels and riparian areas can be affected indirectly by watershed condition or stream channel conditions above and below the stream reach. Soil compaction, decreased infiltration, and loss or alteration of upland vegetation can cause increased runoff and higher peak flows, leading to channel adjustments and decrease in stream function (Gori and Backer, 2005).

These direct and indirect effects resulting from current management, in addition to historic impacts and upstream impacts, can act singly or cumulatively to alter riparian vegetation and stream channels. This area was considered settled and fully stocked with cattle by 1890. There have been many accounts of the overgrazing and subsequent drought and flood events that occurred throughout central and southeastern Arizona. Roads and unauthorized OHV use are a source of sediment to stream channels which, when combined with sediment from poor upland conditions and sediment introduced during channel adjustments, can cause a stream to be overloaded with sediment and inhibit stream function.

Climate change presents additional considerations. According to the Arizona Drought Monitor Report (ADWR, 2010), Arizona remains in a long-term drought, which has likely had an effect on the driveways. According to NOAA National Climatic Data Center data, there has been a marked upward trend in the globally averaged annual mean surface temperature, since the mid-

1970s (Shein, 2006). Models used by Seager, et al., (2007) to predict how climate change will affect the southwestern United States indicate that this region has begun the transition to a drier climate, which may continue into the 21st century. However, the models are too broad-scale to predict how climate change might affect the monsoons, which contribute 40 percent of the total annual precipitation received on the Tonto National Forest (Lenart, 2005).

The criteria used to evaluate alternatives would be the number of stream channels determined to be moderate-to-high sensitivity stream reaches, which could be potentially impacted by sheep. The sensitivity to impacts on these streams is not in their entire reaches, but in the short segments within the driveways‟ corridors where the sheep actually cross.

Alternative 1 – No Action. Under this alternative, there would be no domestic sheep use of the driveways, on either the Tonto or the Apache-Sitgreaves N. F.s.

Direct Effects of Alternative 1: Under Alternative 1 there would be no impacts to water quality from sheep trailing. Stream channel and riparian area recovery are considered optimal when the direct effects of sheep trailing are eliminated (Clary and Kruse, 2003). The potential for and rate of recovery are variable and difficult to predict. The most rapid recovery can be expected in small watersheds with perennial surface or subsurface flow, an existing source of native riparian herbaceous and woody vegetation, and availability of fine sediments. Climate and the timing of flood events would also affect recovery. There would be a beneficial impact under alternative 1 to riparian, watersheds, and water quality.

Indirect Effects of Alternative 1: The No-Action Alternative provides the most rapid increase of upland vegetative cover, shifts in species diversity, and improvement of soil condition. The indirect effects of rest from sheep trailing would facilitate the most rapid recovery of riparian areas.

Cumulative Effects of Alternative 1: This alternative would eliminate the direct and indirect effects of domestic sheep trailing to the moderate-to-high risk stream reaches, though existing cattle effects would remain as as present. Because of the limited areas impacted by the sheep and the cumulative effects of historic, recent, and on-going management activities, it is difficult to predict if eliminating the direct effects of sheep trailing at the crossings would allow riparian vegetation and stream channel recovery of the reaches. The direct and indirect effects of this alternative, when combined with other past, present, or reasonably foreseeable actions (see cumulative effectsTables 2 and 3), should contribute to reaching desired conditions at the fastest rate. There would be a beneficial cumulative effect.

Alternative 2 – Proposed Action. This alternative would authorize use of the Heber-Reno and Morgan Mountain Sheep Driveways for 8,000 domestic sheep twice per year, spring and late summer, not to exceed 57 days total travel time annually.

Direct Effects of Alternative 2: The proposed action intends to mitigate the direct effects of domestic sheep grazing in stream channels by excluding all riparian areas from use as bedding grounds, providing alternative waters away from riparian areas, using only designated creek crossings, and adhering to the riparian utilization guidelines. The riparian use guidelines would also apply to cattle grazing within the driveway on the Tonto NF (Grove and McBride, 2002). It is expected that the sheep would be in the riparian area for such a limited time that they would not reach use guidelines; however, they would still be in effect. These mitigation measures should be effective for the entire moderate-to-high sensitivity stream reaches. If the mitigation measures are

successful, riparian area utilization guidelines are followed, and sheep are moved when use guidelines are met, riparian area and stream channel condition should be maintained or improved.

Indirect Effects of Alternative 2: Because the sheep move through the areas quickly, the indirect effects on riparian areas from impacts to the uplands are expected to be negligible. Under Alternative 2 the proposed mitigation measures and best management practices should be effective in protecting water quality of the stream reaches within the sheep driveways.

Cumulative Effects of Alternative 2: If the mitigation measures are followed, the direct and indirect effects of this alternative, when combined with other past, present, or reasonably foreseeable actions (see Table 2 and 3), are likely to result in moving toward or attaining desired conditions for all of the moderate-to-high sensitivity stream reaches, but at a slower rate than Alternative 1.

Alternative 3 - Partial Use This alternative is similar to Alternative 2, but removes use of the Heber-Reno Sheep Driveway by domestic sheep within low-density, occupied bighorn sheep habitat.

Direct Effects of Alternative 3: This alternative proposes to use similar mitigation measures to Alternative 2 with additional mitigation to protect bighorn sheep. To avoid bighorn sheep habitat, the domestic sheep would enter the driveway at Bushnell Tanks, Punkin Center, or the Pleasant Valley airstrip and travel north. When traveling south, they would exit at those same points. If entering and exiting at Bushnell Tanks, the sheep have the potential to impact all the moderate-to-high sensitivity stream reaches. If entering and exiting at Punkin Center, the sheep have the potential to impact all the moderate-to-high sensitivity stream reaches except Sycamore Creek. If the sheep enter and exit at the Pleasant Valley airstrip, the sheep and cattle have the potential to impact Canyon Creek only. If the mitigation measures are followed and sheep are moved when use guidelines are met, riparian area and stream channel condition should be maintained or improved.

If the sheep enter and exit at Bushnell Tanks, the direct effects would be the same as Alternative 2. If the sheep enter and exit at Punkin Center, the direct effects would be the same as Alternative 2 for all moderate-to-high sensitivity stream reaches except Sycamore Creek, which would be the same as Alternative 1. If the sheep enter and exit at the Pleasant Valley Airstrip, the direct effects would be the same as Alternative 2 for Canyon Creek and the same as Alternative 1 for the remainder of the moderate-to-high sensitivity stream reaches.

Indirect Effects of Alternative 3: Because the sheep move through the areas quickly, the indirect effects on riparian areas from impacts to the uplands are expected to be negligible. Under Alternative 3 the proposed mitigation measures and best management practices should be effective in protecting water quality of the stream reaches within the sheep driveways.

Cumulative Effects of Alternative 3: If the mitigation measures are followed, the direct and indirect effects of this alternative, when combined with other past, present, or reasonably foreseeable actions (see Tables 2 and 3), are likely to result in moving toward or attaining desired conditions for all of the moderate-to-high sensitivity stream reaches, but at a slower rate than Alternative 1.

Social and Economic

Social Affected Environment – Livestock grazing has been part of the Southwest culture for about 400 years, since the entry of the Spanish explorers, missionaries and settlers, but expanded greatly in the late 1800s. Ranchers have been using the Driveways and surrounding public lands since the late 1800s. As many as 1,000,000 sheep were in Arizona in the early 1900s (Barstad 1988). As the economy of Arizona and the U. S. changed, domestic sheep use of National Forest System lands lessened, to the point that now we are analyzing two ranching families" use of the Driveways to trail 8000 ewes. These two families along with other residents and recreationists see continued use of the Driveways as maintenance of a historic public land use and a picturesque reminder of a valued history.

Hunters, many recreationists, and the Arizona Department of Game and Fish (ADGF 2010) place greater value on protecting bighorn sheep and other wildlife from adverse consequences of encountering domestic sheep, and would favor a partial or complete stop to trailing domestic sheep along the Driveways. Large sheep driveways are uncommon in Arizona and are a marked contrast to the urban environment. Some recreationists have indicated that they enjoy seeing the sheep and/or enjoy knowing a traditional activity is still taking place. Others feel that sheep or cattle grazing is an intrusion on their experience, and may not enjoy seeing sheep or feel that domestic livestock eat forage that could be allocated to wildlife instead. Some individuals are concerned about the potential risk of transmission of various respiratory diseases from domestic sheep to bighorn sheep.

Social Environmental Consequences – Alternative 1 would end trailing sheep along the entirety of the Driveways. The two permittee families and like-minded people would feel it as a loss. People opposed to grazing sheep or livestock generally on National Forests would be pleased, especially for the opportunity of possible introductions of new bighorn sheep populations on the lower Tonto National Forest.

Alternative 2 would keep sheep trailing along the Driveways very much as in current management. The permittee families and like-minded people would be pleased at retention of a historic use. People opposed to grazing sheep or livestock generally on National Forests would have no change from the existing situation. There would be no additional opportunities to encounter bighorn sheep near the Driveway route on the lower Tonto N. F. from new introductions, though existing populations may spread. There would be no new direct or indirect effects to any involved interests.

Alternative 3 would retain use of the Driveway starting at some point on the Tonto Basin or Pleasant Valley R. D.s, eliminating domestic sheep use south of the chosen point. At least one permittee family and like-minded people would be pleased at retention of a historic use. The active Driveway permittees are unlikely to be as content due to having to find oher options for transporting the sheep either partway or all the way to the allotments. People opposed to grazing sheep or livestock generally on National Forests would be to varying extents pleased, especially for the opportunity of encountering possible introductions of new bighorn sheep populations on the lower Tonto National Forest.

Social Cumulative Impacts

Cumulatively, no past or present activities (see Table 2) appear to measurably affect the social aspects of any alternative beyond those discussed in the direct and indirect effects. The Schedules

of Proposed Actions for the two National Forests were reviewed for reasonably foreseeable actions (see Table 3), but none seemed to have effects that would measurably affect the social aspects of this alternative.

Economic Affected Environment – The permittees – Both permittee families, by the nature of running sheep in the Southwest, use pasturage scattered over one or more states to feed and keep the sheep in good condition. Some pastures are owned by the families, others are leased or are on permitted grazing allotments.

For the one permittee family which actively uses the Driveways, the trips provide about 80 days each year of a favorably-priced source of forage for their sheep. The other permittee family has been able to stay in sheep growing without using their option to graze along the Driveways. Instead, they have chosen each year to truck the sheep to their allotment.

Fees for using the Driveways in most years bring in about $2,785 to the federal government, most of which comes back to the Counties and to the Forest Service for improvement work. Full permitted Driveway use would bring in about $5,090 per year. The Forest Service has never quantified the amount needed to manage the driveways, but it very likely exceeds the fees generated. There is no mandate from Congress that providing grazing opportunities to ranchers on National Forest System land produce more in fees than the cost of proper management.

Full permitted use of the Driveways is calculated to generate the equivalent of about four fulltime jobs per year, and current use is calculated to generate about two fulltime jobs. In actuality, both permittees keep from four to six people each working with the sheep operation during the spring and summer when they are on the Forests, including the Driveways.

The impact of the allotments on three segments of the economy is shown in Table 6, which follows. The segments include: 1) economic contributions to the local economy, 2) number of jobs provided, and 3) annual grazing fee receipts. The data is derived from estimated expenditures per animal unit in a 1997 survey of Forest grazing permittees, who indicated they spent an average of $25,050 in direct expenses for their operations in the counties of their headquarters and of their allotments. Divided by an average of 845 owned head of adult cattle reported for Forest permittees, this amounts to an average of $29.64 spent per head for the total ranch operation (derived from Cosgrove 1998). Since five sheep are counted the same as one cow for billing and animal units, this amounts to $5.93 per sheep. The driveways‟ maximum permitted sheep number is multiplied by the dollar per sheep figure. This is multiplied by 1.4 to match the economic multiplier effect used for watchable wildlife activities. used by Southwick Associates in 2002 (Southwick 2002).

Jobs provided is the total jobs directly and indirectly supported by the livestock operation. This is assumed to be 1.14 jobs per 100 animal years or 0.00095 jobs/head month (HM). So, 4,335 HMs from the maximum permitted sheep use of the driveways lead to 4 yearlong jobs generated. This index was developed for the 1995 permit issuance project by the Forest Service‟s Regional Office. Only the Forest Service HMs are being used for this calculation. In actuality, permittees keep at least two people and sometimes more with each of their two bands of sheep, from the time they start up the driveways in spring, through grazing the allotments and returning via the driveways at summer‟s end.

Table. 6 Economic Aspects of Using the Driveway

Current Contribution to the Economy	$75,175
Current Jobs Provided	4
Grazing Fee Receipts @ $1.35/HM (5 sheep)	$3378

The Driveways pass through two game managements units where bighorn sheep are hunted, Unit 22 and Unit 24B. One to three bighorn sheep tags are offered annually in each unit (ADGF 2009).

ADGF takes the threat of fatal disease transmission from domestic sheep to bighorn sheep seriously and has indicated that there will be no introductions of bighorns in areas within or adjacent to domestic sheep allotments (Shroufe, 1996, ADGF, 2010). They did report that the risk of disease transmission would be very low from the driveways overall, and low even in the Mesa Ranger District where the domestic sheep pass through occupied bighorn habitat (ADGF, 2008).

In Arizona in 2001, hunting and fishing expenditures totaled at least 958.5 million dollars, which provided an economic benefit of 1,340 million dollars to the state economy, supporting 17,190 full- and part-time jobs (Silberman, 2003). Some of these hunting dollars are attributable to bighorn sheep; however, the percentage and quantity are unknown, as is the amount contributed to the local economies. In addition, it is too speculative to estimate a possible increase in bighorn sheep hunting dollars, should introductions of bighorn sheep within the project area be successful. AZDGF would likely increase bighorn sheep populations along the lower Driveway if sheep use on the lower Tonto N. F. were ended, with associated economic benefits to the Department hunting tag sales and to the businesses that cater to hunters and fishers. Those businesses are worth millions of dollars in economic effects to Arizona, and support over 17,000 jobs. The amount related to current bighorn sheep hunting is unquantifiable, though each hunting tag sold to an Arizona resident can result in about $3,930 of direct spending for the state economy, and sold to a non-resident can result in direct spending of about $13,543, at least partly in Arizona. We do not know the proportion of tag sales between residents and non-residents.

AZGFD donates two licenses yearly to the Arizona Desert Bighorn Sheep Society. Between 1984 and 2006, the fund averaged about $250,000 per year (ADBBS, 2007). These funds were designated to improve habitat mostly by providing water sources, with minimal costs to the AZGFD or the land management agencies where the targeted habitat exists.

Economic Effects

Alternative 1 -- Alternative 1 would end trailing sheep along the entirety of the Driveways. For the one permittee family that uses the Driveway, they would have to feed their sheep for 80 days and truck them to the allotments at a combined yearly cost of $70,000 at minimum (Dobson, 2007). They might convert to all cattle ranching rather than support the additional sheep operation costs. The other sheep permittee family would have no direct costs as a result. Both permittees would have an indirect loss from the removal of Driveway authorization from their

term permits, as a loss of permit value. The active Driveway permittees‟ current sheep herders would probably stay employed by them if the permittees stayed in sheep. If the Beehive and Sheep Springs allotment completely converted to cattle, likely fewer employees would be needed.

There would be a loss of grazing fees to the Forest Service for Driveway use, up to maximum of $5,088 if both permittees decided to abandon the Driveway. The Forest Service would no longer have to administer sheep use of the Driveway, which would save more funds than the fees bring in. (It is not required that a use of National Forest System lands bring in more revenue than needed to administer that use.)

Cumulatively, the AZDGF would likely feel justified in introducing bighorn sheep in one or two new locations along the Driveways, with some addition to future bighorn hunting tags as a partial consideration. Effects to hunting businesses would likely be deferred, very small, and unquantifiable, though each additional tag sold would result in at least $3,930 to the state economy. The continuing conversion of alfalfa and grain fields to subdivisions in Arizona‟s warm winter counties makes winter forage increasingly less available at economical prices for sheep growers such as both permittees, putting financial stress on their operations.

Alternative 2 -- Alternative 2 would keep sheep trailing along the Driveways very much as before. Direct, indirect and cumulative effects to the two permittee families, their employees, the AZDGF or hunting businesses are described in the affected environment section.

Alternative 3 -- Alternative 3 would retain use of the Driveway starting at some point on the Tonto Basin or Pleasant Valley R. D.s, eliminating domestic sheep use below the chosen point. For the one permittee family that uses the Driveway, they would have to feed their sheep for up to 23 days, and truck them to the allotments at a combined yearly cost of $10,560 up to $25,320 at minimum. They might convert to all cattle ranching. The other sheep permittee family would have no direct costs as a result.

Both permittees would have an indirect loss from the removal of part of the Driveway authorization from their term permits, as a loss of permit value. The active Driveway permittees‟ current sheep herders would probably stay employed by them if the permittees stayed in sheep. If the Beehive and Sheep Springs allotment completely converted to cattle, likely fewer employees would be needed.

The Tonto National Forest would likely have to bear the cost of building a new livestock handling and loading facility at the new driveway start/stop point. This would be about $20,000. There would be a loss of grazing fees to the Forest Service for Driveway use, up to maximum of $5089 if both permittees decided to abandon the Driveway. The Forest Service would no longer have to administer sheep use of part or all of the Driveway, depending on permittee decisions whether or not to continue use of the Driveway. This would result in undetermined savings, likely more than the driveway grazing fees bring in if the entire driveway use is discontinued.

Cumulatively, the AZDGF would likely feel justified in introducing bighorn sheep in one or two new locations along the Driveways, with some addition to future bighorn hunting tags as a partial consideration. Effects to hunting businesses would likely be deferred, very small, and unquantifiable, though each additional tag sold would result in at least $3,930 to the state economy. The continuing conversion of alfalfa and grain fields to subdivisions in Arizona‟s

warm winter counties makes winter forage increasingly less available at economical prices for sheep growers such as both permittees, putting financial stress on their operations.

Environmental Justice

As required by law and Executive Order 12898 from 1994, all Federal actions should consider potentially disproportionate effects on minority or low-income communities. Potential impact or change to low-income or minority communities within the proposed action area should be considered. Where possible, measures should be taken to avoid negative impacts to these communities or mitigate the adverse effects.

The opportunity to comment on this environmental analysis was published in the Forest Service Schedule of Proposed Actions, posted on the Forest‟s website, and invited by mail to possible interested parties. An interdisciplinary team of Forest Service personnel looked at the social, economic, and environmental impacts of this project and determined that none of the alternatives considered in this analysis would have a disproportionate impact on any minority or low income population in the immediate area, within surrounding counties, in the eastern Arizona region, or nationally.

One of the two sheep ranching permittee families involved in this environmental analysis can be categorized as Hispanic, being descended from a Spanish Basque man who emigrated about 1915.

Heritage

Regulatory Framework

Cultural resources represent the tangible and intangible evidence of human behavior and past human occupation. Cultural resources may consist of archaeological sites, historic age buildings and structures, and traditional use areas and cultural places that are important to a group‟s traditional beliefs, religion or cultural practices. These types of resources are finite and nonrenewable.

The primary legislation governing cultural resource management is the National Historic Preservation Act (NHPA) of 1966, as amended. Section 106 requires federal agencies take into consideration the effects of their undertakings on historic properties, which are defined in 36 CFR 800.16(l) as any district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP. The “Section 106 review process,” entails five steps: 1) determining whether the proposed action is an undertaking that has the potential to affect historic properties); 2) identifying historic properties; 3) evaluating the significance of historic properties; 4) assessing effects; and 5) consulting with interested parties (including Native People), the SHPO, and the ACHP. Section 110 (Federal Agencies‟ Responsibility to Preserve and Use Historic Properties) of the NHPA provides direction to federal agencies to establish programs and activities to identify and nominate historic properties to the NRHP and to consult with tribes.

The Southwestern Region has a programmatic agreement with the Advisory Council on Historic Preservation (ACHP) and State Historic Preservation Officers (SHPOs) that stipulates the Forest Service‟s responsibilities for complying with NHPA. This agreement provides for the development of standard consultation protocols for common or special undertakings. The

Southwestern Region has developed a standard consultation protocol for range management as Appendix H of the PA. By following the procedures of the protocol the ACHP and the SHPOs have agreed that the Forest Service will satisfy legal requirements for the identification, evaluation, and treatment of historic properties. The ASNF and TNF are complying with the protocol for range management in lieu of standard consultation in the PA and the Council‟s regulations (36 CFR 800).

Methodology

The following discussion and recommendations resulted from a review of the various descriptions of the alternatives and an assessment of the potential impacts each could have to cultural resources on the forests. The analysis used the ASNF and TNF site and survey GIS layers, Forest Service INFRA database, and review of existing site records stored at each forests supervisor‟s office. The criteria used for establishing the area of potential effect (APE) for cultural resources was based on the boundaries of the proposed driveways. Applicable maps were generated through geographic information system (GIS) analysis to determine the areas surveyed and sites within the APE. A total of 240 project surveys are represented in the GIS heritage survey layers. For sites that fell within the APE, the existing site record was reviewed to identify any known grazing-sensitive sites and for adverse impacts resulting from grazing and the movement of stock. Site types identified as being grazing-sensitive per Appendix H may include, but are not limited to ruins with free-standing walls, historic structures, and traditional cultural properties. In locations where livestock are likely to be attracted to or congregate, rock shelters and rock art sites may also be sensitive sites. These latter mentioned sites are not being considered sensitive for this analysis based on the movement and management of sheep across the driveways. A total of 75 prehistoric sites include structures, most of which are comprised of a single course of masonry above the ground surface and/or stable rubble mounds. A total of six historic structures and the remains of four historic homesteads are located within the APE. No traditional cultural properties have been indentified by the Tribes that would be affected. The cultural resources specialist report can be found in the project record and contains additional information on the analysis.

Existing Condition

Historic Descriptions

Sheep driveways are themselves unique types of historic properties that played a significant role in Arizona history and in the development of the American sheep industry. Sheep driveways can be classified as “rural landscapes or historic districts,” but unlike most historic properties, sheep driveways do not simply represent a single event or time period from the past. They are created and maintained by the continuation of their original historic use and thus are still evolving in a cumulative manner. The National Register defines a district as a concentration, linkage or continuity of sites, building, structures or objects that are linked historically by function, theme or physical development or aesthetically by plan.

The Arizona SHPO has informally recognized the Heber-Reno and Morgan Mountain Stock Driveways as historic districts that are comprised of individual historic archaeological sites, structures and objects that are considered eligible for the National Register of Historic Places under Criterion A. The driveways are significant at the state level for their association with significant events in Arizona‟s history, contribution to the development of Arizona‟s sheep

industry, commerce and historic trails. Additional archival research may reveal the driveways are significant under Criterion A on a national level because of their association with the Stock Homestead Raising Act of 1916. The Heber Reno and Morgan Mountain driveways were part of a series of driveways that were designated across the western United States by the Secretary of Interior for the purpose of public use to move stock. Specific sites within the driveways may also be eligible under Criterion A and D, for their association with Basque commercial sheepherding and settlement in Arizona.

Portions of the Heber Reno and Morgan Mountain driveways were established and withdrawn by Stock Driveway Withdrawal Order 10 (Arizona 1).When National Forest boundaries were established or modified the preexisting rights and easements were recognized by the executive proclamations. Over the decades sections of the Heber-Reno and Morgan Mountain driveways that were withdrawn from entry and reserved for public use as stock driveways were revoked but remained as administratively designated driveways (DOI 1968; Federal Register 1982).

In 1917, almost 1.5 million sheep grazed Arizona‟s ranges and driveways (Barstad 1988:39). Documents indicate that as many as 400,000 sheep may have utilized the Heber Reno driveway, and prior to World Word II approximately 65,000-120,000 sheep annually used the driveways. A significant reduction in the numbers of sheep on the driveways occurred after WWII. Use of the driveways decreased when the demand for wool dramatically dropped after WWII with the advent of synthetic fibers and when trucking became more economical to transport livestock. Based on existing records the period of significance for the driveways would be 1900-1960. Basque settlement and land use are documented in central Arizona, the Flagstaff area and the White Mountains. The driveways are directly linked with the development of Basque commercial sheep herding and settlement of Arizona.

The earliest maps in forest records show the location of the driveways in 1940. Review of LaRue‟s original 1918 map of Arizona stock driveways may assist in determining the original designated driveway routes (Barstad 1988:23). The forest service has rerouted segments of the Heber Reno driveway to meet management purposes and other legal decisions (i.e. land exchanges). Approximately three miles of the Heber-Reno driveway was rerouted several miles away from the historic driveway route (Arizona Wool Growers Association 1965). Additional archival research is necessary to determine if segments of the Heber Reno driveway on the TNF have also been rerouted over time and do not retain their integrity of location and association with the period of significance.

The integrity of the physical characteristics of the driveways have been significantly altered during the last century by modern structures (i.e. large power lines, highways), land management activities (i.e. timber harvesting, chaining, pushing),fires, and recreational off highway vehicle use. National Register characteristics such as the setting and feeling of the driveways may no longer retain enough integrity and do not contribute to the significance of the driveways.

Affected Environment

The Heber-Reno and Morgan Mountain Sheep Driveways were established in the 1890‟s (pre forest designation) and encompass an area of 95,569 acres. The Heber-Reno/ Morgan Sheep Driveways consist of 74,209 acres located on the TNF and 21,360 acres located on the ASNF. Archaeological inventory surveys have been conducted for 240 projects within the Heber-Reno and Morgan Mountain Driveways. As a result 17,220 acres of the driveways have been sampled

surveyed, of which 7,217 acres were intensively surveyed (3,267 on the TNF and 3950 on the ASNF). The majority of past surveys were conducted for commercial fuel wood and timber sales and hazard fuel reduction projects. A number of small surveys have been conducted for range and wildlife improvements, recreation, road improvements and closures. Results of the various surveys and studies conducted in the Analysis Area do show a long period of human usage, extending back into the Archaic Period several thousand years ago.

Although the Heber Reno driveway bisects a portion of the Tonto NF known to have been heavily occupied by Apache groups, Apache occupation was always transitory in scope, and evidence of their presence is restricted to occasional artifact assemblages with identifiable Apache artifacts and locations containing hornos or roasting pits. Known historic use of the area is primarily confined to military activities during the Apache wars and subsequent ranching, which began as the Apache threat dwindled in late 1870s and early 1880s. Several of these in-holdings are still active ranches. Other remaining historic sites include logging railroad features with associated camps, transportation routes (e.g. military wagon roads), and widely scattered features associated with sheep herding, depression era improvements projects, Forest Service administrative use, and homesteading. Evidence of mining is very limited, primarily restricted to the southern portion of the Pleasant Valley RD, where there was some exploration for gold. However, this activity appears to be largely restricted to the latter part of the 20th century.

A total of 205 archaeological sites, the Globe-Holbrook Highway 12, the General Crook Trail, and the Heber-Reno and Morgan Mountain Driveways have been identified within the project area (165 sites on the TNF and 40 sites on the ASNF). The National Register status of the 205 sites is as follows: one site AR-03-12-06-1130 is listed on the NRHP, 45 sites are eligible and five sites are ineligible for the NRHP (with prior SHPO concurrence). The eligibility status remains unevaluated for 154 sites. Segments of the Globe-Holbrook Highway 12 and the General Crook Trail have been determined eligible for the NRHP. The stock driveways are eligible for listing on the NRHP as historic districts comprised of contributing sites. Site types identified as being grazing-sensitive may include, but are not limited to ruins with free-standing walls, historic structures, and traditional cultural properties. In locations where livestock are likely to be attracted to or congregate, rock shelters and rock art sites may also be sensitive sites.

The majority of the archaeological sites identified within the driveways are prehistoric limited activity areas and habitation structures such as artifact scatters (n=37), and field houses (n=71). In addition, other site types found within the driveways include: roomblocks (n=4), rockshelters (n=4), storage cave (n=1), pithouse (n=1), agricultural (n=11), artifact scatters with roasting or rock alignment features (n= 8), petroglyphs (n-=3). Six sites are Apache period or have Apache components present. Thirteen sites are historic, consisting of the remains of homesteads (n=4), log cabins (n=6), an Anglo pictograph site, segments of railroad networks, historic irrigation ditches associated with the OW Ranch and the Chamberlain Trail (FDR 200), which was constructed by the Civilian Conservation Corp, one historic ditch associated with Sponseller Lake, and several trash scatters. Nine historic sites, four of which are multi-component have been identified that are directly related to Sheep Driveway activities represented by camp areas, wooden corrals, Basque dendroglyphs, a dipping vat, and a large rock corral, one which has rock piles which may be driveway markers or Basque “stone boys” (harri mutilak). Several of these possible driveway markers have also been identified as isolated features, particularly in the area south of the Naegelin Rim. Prior to1991 (Stein) stone boys had not been recorded in Arizona.

Previous Impacts to Cultural Resources

The majority of the cultural resources are located in open or exposed locations. Subsequent centuries of exposure to a variety of formation processes (wildfires, wind and water erosion) have resulted in deterioration of the sites, particularly the organic components such as wooden construction elements. Both driveways are located within grazing allotments. Grazing activity has occurred on the forest since the 1880s. Rancher‟s built homesteads and range improvements such as fences and water catchments. The lands that were selected for homesteads and construction of water catchments were often located in the same areas utilized prehistorically. Impacts from grazing include trampling of the ground surface altering and damaging the spatial surface information and breaking artifacts; trailing that causes gullying and compaction resulting in erosion that removes and re-deposits cultural materials; denuding the ground surface of vegetation by over-grazing resulting in loss of soil and increased erosion and exposure of surface artifacts.

Direct and indirect impacts from livestock have occurred to sites on the forests. In the 1940s, Arizona was estimated to have over 687,000 head of sheep (Barstad 1988:3). Forest permits dating to the early 1900‟s reveal that large numbers of sheep, cattle and horses grazed and crossed forest system lands. In 1917, almost 1.5 million sheep grazed Arizona‟s ranges and driveways (Barstad1988:39). Documents indicate that as many as 400,000 sheep may have utilized the Heber Reno driveway, and prior to World Word II approximately 65,000-120,000 sheep annually used the driveways. A significant reduction in the numbers of sheep on the driveways occurred after WWII. Records document that 30,215 sheep used the driveways in 1966. The following year the numbers dropped to less than half with use at 12,624 sheep (Arizona Wool Growers Association 1966). For the last several decades permittees are authorized for 8000 sheep on the Heber-Reno and 4000 sheep on the Morgan Mountain Driveways. A portion of the Heber-Reno stock driveway is within the Heber Wild Horse Territory. Impacts to cultural resources from wild horses may have occurred and are similar to impacts caused from cattle grazing.

Other management actions such as historic logging, transportation and utility corridors have previously impacted the characteristics of setting and feeling of eligible cultural resources. Based on the previous intensive livestock use (cattle and sheep), the possible adverse affects to cultural resources from grazing within the driveways have already occurred and are now part of the existing condition. All of the archaeological sites that were identified by the Forest Service were documented after WWII. The site‟s eligibility to the NRHP and physical integrity were based on the conditions at the time the site was documented, well after any impacts that may have occurred to the site from past intensive range practices.

Heritage Direct, Indirect, and Cumulative Effects

The SHPO and the ACHP recognize in the range management protocol that historic properties on forests within the Southwestern Region have been subjected to grazing for hundreds of years, at levels much higher than current grazing practices, and that some degree of impacts may have already occurred. Under the regulations (36 CFR 800) an adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property‟s location, design, setting, materials, workmanship, feeling, or association.

The effects from the use of the driveways on cultural resources vary by any number of factors. Surfaces can be disturbed by the removal of vegetation from grazing and trailing, sometimes

resulting in increased soil erosion, and surface artifacts can be broken and displaced by trampling both along the trails and in areas of concentrated use. Most of the potentially affected cultural resources along the driveways are prehistoric artifact scatters with minimal masonry features and architecture with few free standing walls. Generally, these site types are "not sensitive" to the impacts from grazing and livestock traveling across the landscape. On the other hand, there are ephemeral archaeological sites in the area as well, particularly Protohistoric Apache camps and agave roasting areas. It is possible that some of these sites have already been lost to the use of the driveways, but it is almost literally impossible to know since many of those sites are extremely fragile.

The effects to archaeological sites from the massive drives seen along the Heber-Reno and Morgan Mountain in years past have already caused any significant damage that could have been done. Documents indicate that as many as 400,000 sheep may have utilized the driveways and prior to World Word II approximately 65,000 sheep continued to travel and graze the driveways. A significant reduction in the numbers of sheep on the driveways occurred after WWII. All of the archaeological sites that were located by the Forest Service within the driveways were identified and documented after WWII. The site‟s eligibility to the NRHP and physical integrity were based on the conditions at the time the site was documented, well after any impacts that may have occurred to the site from past intensive range practices. The use of the driveways will have no effect to the General Crook Trail and the Globe to Holbrook Route 12. Trailing and bedding sheep does not have the potential to affect the significant characteristics of the General Cook Trail or Route 12.

For the last several decades permittees are authorized for only 8000 sheep on the Heber-Reno and 4000 sheep on the Morgan Mountain Driveways, a significant reduction in numbers compared to the historic use. None of the site records indicate any adverse effects occurring to sites as a result of using the Heber-Reno and Morgan Mountain driveways. No information from employees, permittees or others indicate that there are any known instances where site specific damage was occurring to sites as a result of use of the driveways.

Alternative 1 has the potential to affect the character and use of the driveways that make them significant for the NRHP. Not authorizing the use of the driveways would change the use (purpose) of those historic properties and associated cultural traditions associated with the driveways. Based on existing information, if the Forest Service does not authorize use of the driveways it would not adversely affect the significance and characteristics that make the driveways eligible to the NRHP. Eliminating the use of the driveways would reduce the potential for other cultural resources to be directly affected by sheep trampling and indirect effects caused from the removal of vegetation, but these effects would not be eliminated. The driveways are located in permitted grazing allotments.

Both Alternatives 2 and 3 authorize use of the driveways. Authorizing the continued use of the driveways at current or reduced levels may affect cultural resources but those levels are not expected to result in adverse impacts to the significant characteristics that make the driveways and sites eligible to the NRHP.

The cumulative effects on cultural resources should take into account all surface-altering actions that have occurred or are likely to occur within the forests. Current and previous Forest Service management activities, public resource procurement and recreational use and natural processes have impacted cultural resources. Within the Forests, other planned or reasonably foreseeable

activities that may affect cultural resources are listed in the current Schedule of Proposed Actions (SOPA). Prior to any actions or ground-disturbing activities that have the potential to affect the character or use of cultural resources, the ASNF and TNF ensures compliance with the NHPA by following the stipulations of the PA. If cultural resources are located within the project areas, avoidance or appropriate mitigation measures are implemented to achieve a determination of no effect or no adverse effect to cultural resources. This proposed action will not result in a cumulative adverse effect to cultural resources.

The most recent listings of the National Register of Historic Places have been consulted and one archaeological site appears on the Register, 45 sites are eligible for nomination to the Register, and 154 sites unevaluated for the Register were identified within the area of potential effect. Of the 45 sites eligible for the NRHP, two sites were determined to be eligible during this analysis for their association with the driveways: AR-03-01-07-225 and AR-03-12-05-00511 (see Sullivan & Griffith 2005). The proposed use of the stock driveways is not increasing the number of sheep or days of use from current levels, which are substantially lower than historic levels that occurred for over 70 years. Based on historic use of the driveways and the existing conditions the proposed alternatives will have no adverse effects to cultural resources. This project is in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended. Consultation with the Arizona State Historic Preservation Office (SHPO) for this project‟s effects to heritage resources and compliance with Section 106 of the National Historic Preservation Act has been completed (ISA report is located in the project record-2010-01-30). SHPO concurred with the Forest‟s determination of no adverse effect on heritage resources.

Contemporary American Indian Uses

Western Apache and Yavapai groups are known to have traditional ties to lands that encompass the Heber Reno Driveway and currently use the area for cultural and religious purposes. The Hopi are also known to traditionally collect resources on the ASNF for religious purposes. The areas of collection have not been specifically identified. The following tribes were consulted regarding the proposed action: Ft. McDowell Yavapai Indian Nation, Gila River Indian Community, Hopi Tribe, Navajo Nation, Pueblo of Zuni, Salt River Pima-Maricopa Indian Community, San Carlos Apache Tribe, Tonto Apache Tribe, White Mountain Apache Tribe, Yavapai-Apache Nation, Yavapai-Prescott Tribe. At present, the Tribes have not expressed concerns or identified sacred or traditional cultural places that would be affected by the alternatives.

Wildlife, Fisheries and Rare Plants

This analysis focuses on federally listed species, Forest Service sensitive species, migratory birds, and management indicator species. Direct and indirect effects are described for each species, and cumulative effects are presented at the end of the section for all species. The specialist reports for wildlife, fish and rare plants contain detailed information on the habitats, populations, and effects, and can be found in the project record. Biological evaluations (BE) and a biological assessment (BA) were prepared and are also in the project record. Cumulative effects on all wildlife species can be found at the end of the wildlife, fisheries, and rare plants section.

The Forest Service consulted on the 11 forest plans for the Southwestern Region pursuant to Section 7 of the Endangered Species Act, and a biological opinion was issued in 2005 (USDA FS 2005). It has been determined that implementation of any proposed alternative in this analysis would be consistent with the region wide biological opinion.

Federally Listed Threatened, Endangered, and Proposed Species, and Potential and Designated Critical Habitat

Threatened, endangered, and proposed species are designated under the authority of the Endangered Species Act (ESA) of 1973, as amended. The act requires consultation (or conference for proposed species) with the Secretary of the Interior whenever a Federal action affects a species listed under the act, or if the action affects designated critical habitat. Informal consultation was completed and concurrence with the determinations of effect made in the Biological Assessment was obtained from USFWS on August 4, 2010.

There are 19 federally listed species with habitat on the ASNFs and/or Tonto NF. Nine of these species have habitat within the project area. Critical habitat has been designated for three of these species. No proposed species occur on the forests. The ten species with no habitat in the project area are: Arizona cliffrose, Gila Chub, Loach Minnow, Desert Pupfish, Spikedace, Razorback Sucker, Gila Topminnow, Woundfin, Arizona Hedghog, and Colorado Pikeminnow. These ten species were not analyzed in detail. The nine species that were analyzed in detail are listed in Table 8.

Table 7. Federally threatened, endangered, and proposed species on the Apache-Sitgreaves NFs and the Tonto NF with habitat in the project area.

Species	ESA Status	Habitat and Distribution
Mexican wolf *(Canis lupus baileyi)*	Experimental/nonessential	On ASNF's, reintroduced to the forests in 1998. The primary and secondary recovery zones for Mexican wolf are located within the forests. No suitable habitat in Tonto NF.
Southwestern willow flycatcher *(Empidonax traillii extimus)*	endangered with critical habitat	On ASNF's, nest at two sites near Greer on the Little Colorado River and one site near Alpine on the San Francisco River. Critical habitat designated for the East Fork, West Fork, and mainstem of the Little Colorado River on the Springerville Ranger District. Occurs on TNF on all districts. Breeds in CCRD, GRD, TBRD.
Mexican spotted owl *(Strix occidentalis lucida)*	threatened with critical habitat	On ASNF's, present in the Basin Range West and Upper Gila Mountains recovery units. Approximately 354,000 acres protected and restricted habitat, and 142 protected activity centers (PACs). On TNF, occurs on GRD, MRD, PRD, PVRD, TBRD.

Species	ESA Status	Habitat and Distribution
Chiricahua leopard frog *(Rana chiricahuensis)*	threatened	On ASNF's, scattered occurrences with known populations near Nutrioso, Coleman, Campbell Blue, Dix, and Hannagan Creeks, and the San Francisco River. On TNF, historic sightings between 1992 and 2009 at 8 sites. Four sheep watering areas occur within CLF habitat on the TNF.
Apache Trout *(Oncorhynchus apache)*	Threatened	On ASNF's, approximately 5 existing populations and 19 streams identified for recovery and reintroduction of the species; 19 watersheds covering 145,591 acres; Not known to occur on TNF.
Bald Eagle *(Haliaeetus leucocephalus)*	Threatened (Forest Service Sensitive on ASNF's)	On the TNF, found in large trees or cliffs near water with abundant prey. Elevation varies. A small resident population can be found in central AZ, while a wintering population is found in both central and northern Arizona. Breeding pairs are found on the CCRD, GRD, MRD, and TBRD on the Tonto along the Verde and Salt Rivers, and Roosevelt Lake. On the ASNF's, bald eagles are year-round residents with 3 known nest sites.
Lesser long-nosed bat *(Leptonycteris curasoae yerbabuenae)*	Endangered	Not known from the ASNF's. On TNF, occurs in desert scrub habitat with agave and columnar cacti present as food plants. 1,600-11,500 ft. Ranged from central Arizona and southwest New Mexico through much of Mexico to El Salvador. CCRD, GRD, MRD, TBRD. There are no confirmed reports of individuals.
Little Colorado spinedace *(Lepidomeda vittata)*	Threatened with critical habitat	On ASNF's, three populations and two streams identified for recovery and reintroduction of the species; five watersheds covering 341,373 acres; Not known from the TNF.
Yuma Clapper rail *(Rallus longirostris ymanensis)*	Endangered	Not known from ASNF's. On TNF, found in fresh water and brackish marshes at elevations below 4500 ft. Occurs on CCRD, MRD, and TBRD. Tonto Creek at Roosevelt Lake, Verde River south of Needle Rock, and Goldfield.

Affected Environment

Mexican Wolf

Wolves are top predators that have flexibility in using different prey and habitats. Historically, wolves occupied every habitat in the northern hemisphere that supported populations of ungulates. Mexican wolves historically inhabited Arizona and New Mexico (USFWS 2010). In 1998, Mexican wolves were reintroduced on the Apache-Sitgreaves National Forests at the Alpine and Clifton Ranger Districts. In 2008, seven wild packs produced litters, marking the seventh consecutive year in which wild-born wolves bred and raised pups in the wild (USFWS 2010). The

2008 end-of-year count confirmed 52 Mexican wolves within 10 packs (5 in Arizona and 5 in New Mexico), and 6 single wolves. The growth of the population is a positive sign that the reintroductions were successful.

Wolf packs establish territories in which they hunt for prey. Historically, Mexican wolves were associated with montane woodlands characterized by sparsely to densely forested mountainous terrain and adjacent grasslands in habitats found at elevations of 4,000 to 5,000 feet where ungulate prey were numerous. Home ranges are around 180 square miles with core use areas averaging 23 square miles (Interagency Field Team, 2005). There is existing wolf habitat forest wide covering 2.1 million acres and of this area, 1.6 million acres are currently open to motorized cross-country travel.

Released wolves and their offspring are designated as a nonessential, experimental population under Section 10(j) of the Endangered Species Act. As such, these Mexican gray wolves will be treated as a species proposed to be listed under section 4 of the Endangered Species Act.

The nearest portion of the driveway is located approximately 30 miles from the primary Recovery Zone and primary release sites. Disturbance to primary release site, den sites, or reestablishment effort will not occur from the driveway. There are 2 known den sites from 2007 and 2008 near the driveway on the Springerville Ranger District which is in the secondary recovery zone. One den site is approximately 5 miles away and the other is adjacent to where the driveway ends and the sheep reach their destination on the Beehive/Sheep Springs Allotments.

Southwestern Willow Flycatcher

The historical breeding range of the southwestern willow flycatcher covered southwestern states including Arizona. The flycatcher‟s current range is similar to the historical range, but the quantity of suitable habitat within that range is much reduced from historical levels. From 1996 to 2007, AGFD conducted surveys for southwestern willow flycatchers in Arizona, including the White Mountains. Three nesting sites were documented on the forests with numbers of nest territories ranging from a high of 14 documented in 1995 to a low of 2 in 2002 (USFWS 2002). Flycatcher‟s nest at two sites near Greer on the Little Colorado River headwaters (Springerville Ranger District), and at one site near Alpine on the San Francisco River headwaters (Alpine Ranger District).

On the ASNF‟s, there are two breeding sites on the Springerville Ranger District (Greer and River Reservoir). The nests are approximately 6 miles from where the sheep driveway ends. There is no occupied, unoccupied suitable, or potential habitat in the action area on the ASNF‟s.

Critical habitat has been designated on 21.8 miles (1,931 acres) for the East Fork and West Fork, and the main stem of the Little Colorado River, on the Springerville Ranger District. Primary constituent elements are riparian habitat in a dynamic successional riverine environment for nesting, foraging, migration, dispersal, and shelter that comprises: trees and shrubs including willows, box elder, tamarisk, Russian olive, buttonbush, cottonwood; dense riparian vegetation with thickets of trees and shrubs ranging in height from 6 to 98 feet. Lower stature thickets (6-13 feet) found at higher elevation riparian forests and tall stature thickets found at middle and lower elevation riparian forests; areas of dense riparian foliage from the ground up to approximately 13 feet or dense foliage at the shrub level, or as a low, dense tree canopy; sites for nesting that contain a dense tree or shrub canopy with densities ranging from 50 to 100 percent; dense

patches of riparian forests interspersed with small openings of water or marsh, or shorter/sparser vegetation creating a mosaic not uniformly dense. Patch size may be as small as 0.25 acre.

On the Tonto NF, the Heber-Reno Sheep Driveway crosses designated critical habitat at Tonto Creek. There are 40 acres critical habitat within the project area on the TNF. The habitat at Tonto Creek is contiguous with the habitat associated with Roosevelt Lake. The Roosevelt Lake flycatcher population is large, extensive, and likely essential, or at least very important, to the recovery of the species. Arizona Game and Fish Department, the U.S. Geological Survey, the U.S. Forest Service, and Northern Arizona University have conducted research and monitoring of flycatchers at Roosevelt Lake since1996. During this monitoring, Ellis and others (2008) have conducted surveys 0.5 miles north (Haufer Wash Site) and 1.75 miles south (Punkin Center Site) of the driveway. In addition, the Forest Service has conducted surveys at Quartz Ledge.

The sightings and Quartz Ledge seem to generally consistent each year, and willow flycatchers tend to set-up territories near standing water. The driveway is about 0.4 miles south of the breeding southwestern willow flycatchers. The area where the driveway crosses Tonto Creek tends to lack standing water.

Mexican Spotted Owl

Range for the Mexican spotted owl (MSO) extends from southern Utah and central Colorado south through the mountainous regions of the Southwest, including Arizona. Many populations occur in relatively isolated mountain ranges, sometimes separated by large expanses of non-forested habitats. More than half the U.S. population occurs in the Upper Gila Mountains Recovery Unit in Arizona (covers the ASNFs) and New Mexico (USFWS 1995).

On the ASNF‘s, this species is in the Basin Range West and Upper Gila Mountains Recovery Units. The forests contain 1,004,019 acres of MSO designated critical habitat. There are 27,484 acres of critical habitat in the project area on the ASNFs and 6,567 acres on the TNF. The primary constituent elements essential to conservation include physical and biological features that support nesting, roosting, and foraging, and include:

- a range of tree species, including mixed conifer, pine-oak, and riparian forests, composed of tree sizes reflecting different ages of trees, 30 to 45 percent of which are large trees with a trunk diameter of 12 inches or more when measured at 4.5 feet from the ground;
- a shade canopy created by tree branches covering 40 percent or more of the ground;
- large snags with a trunk diameter of at least 12 inches when measured at 4.5 feet from the ground;
- elements related to maintenance of adequate prey species such as high volumes of fallen trees and other woody debris; a wide range of tree and plant species, including hardwoods; and adequate levels of residual plant cover to maintain fruits, seeds, and allow plant regeneration;
- elements related to canyon habitat such as the presence of water (often providing cooler and higher humidity than surrounding areas), clumps or stringers of mixed conifer, pine-oak, pinyon-juniper, and/or riparian vegetation; canyon walls containing crevices, ledges, or caves; and a high percent of ground litter and woody debris (USFWS 2004).

Spotted owls use a wide variety of habitats for foraging including open and non-contiguous forests, pure ponderosa pine stands, pinyon-juniper woodlands, small openings, and rocky slopes (Ganey and Balda 1994). Analysis of MSO pellets collected from Chevelon District showed that Peromyscus mice and Neotoma spp. (woodrats) were the most abundant food items consumed (DeRosier and Ward 1994). Rocky outcrops are often mentioned as habitat for these prey species (USFWS 1995). Voles (Microtus spp.) and a variety of other small mammals, birds, reptiles, and arthropods are also considered important prey items (Ganey 1992, Ward and Block 1992).

The Heber-Reno and Morgan Mountain Driveways includes a portion of the Jersey Canyon MSO Protected Activity Center (PAC) (#030105010) on the Black Mesa Ranger District. The sheep are also trailed through a portion of the Gillespie MSO PAC (#03010617) on the Springerville Ranger District.

Occupied, restricted, and critical MSO habitat exists along the driveway in forested, steep canyon drainages, steep slopes, and dense forest canopy where very little if any sheep grazing occurs**.** Although grazing would not directly affect MSO habitat, trampling, compaction, and grazing could affect prey base habitat**.** On the Tonto NF, two MSO recovery units exist; the Upper Gila Mountain Recovery Unit and the Basin and Range-West Recovery Unit. Most PACs are associated with the Mogollon Rim and the Mazatzal, Sierra Ancha, and Pinal mountain ranges. The Heber-Reno Sheep Driveway crosses MSO habitat and runs adjacent to 4 PACs in the Pleasant Valley RD. The 2002 Rodeo-Chedeski fire burned the Valentine-Lower and Rose PACs, and both have limited habitat for MSO. This is supported by the limited responses we received between 2002 and 2007. There are 2 bedding grounds and 4 watering areas that occur within MSO habitat. They are: the Naeglin Rim Bedding ground, Colcord Ridge Bedding Ground, Unnamed dirt tank, Clay Springs Tank, Naeglin Canyon Watering Site, and Trick Tank.

Chiricahua Leopard Frog

The Chiricahua leopard frog is found in central and southeastern Arizona and in west-central and southwestern New Mexico. In Mexico, the species is found in northern Sonora, the Sierra Madre Occidental of Chihuahua, and northern Durango. The species was historically widely distributed on the Coronado, Gila, and Apache-Sitgreaves NFs. The largest number of extant localities is on the Coronado NF. The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially Rana montezumae) in the southern part of the range of the Chiricahua leopard frog (USFS 2004).

Chiricahua leopard frogs are habitat generalists that can adapt to a variety of wetland situations. Their habitat includes lakes, rivers, streams, springs, ponds, and man-made structures such as reservoirs, stock tanks, and acequias. This frog is documented at elevations of 1,000-2,710 m (3,281-8,890 ft). The species uses permanent or nearly permanent pools and ponds for breeding and most sites that support populations of this frog will hold water yearlong in most years. The frog is rarely found in aquatic sites inhabited by non-native fish, bullfrogs, or crayfish, although in complex systems or large aquatic sites, this species may occur in the presence of low densities of non-native predators (USFS 2004).

Per the species Recovery Plan (2007), eight Recovery Units (RUs) have been established for the maintenance of frog metapopulations throughout the species range. The RUs are designed to promote species recovery efforts at a smaller more manageable level than rangewide. The RUs are areas in which frog metapopulation dynamics function or can function as the species recovers. Within these RUs, management areas (MAs) have also been delineated

to include all extant populations as well as other sites with the highest potential for recovery, including sites where habitat restoration and establishment of frog populations will likely occur or has already occurred. This project occurs within RUs 5 and 6. No MAs occur on the driveway alignment. The closest population of Chiricahua leopard frog in RU 5 is on the Tonto National Forest in the Cherry and Crouch Creek area near Young (10+ miles from driveway alignment). The closest population in RU6 is in the Black River headwaters on Alpine Ranger District of the Apache-Sitgreaves National Forest, approximately 20 miles from the sheep driveway. The extant populations are in watersheds not affected by the sheep driveway use.

Potential habitats exist in the driveway action area (421 acres on the ASNFs and 1,929 acres on the TNF), but no known occupied or likely to be occupied habitat exists in the action area on the ASNFs. On the Tonto NF, sheep will visit 4 watering areas within CLF habitat. They are: Unnamed Tank, Clay Springs Tank, Naeglin Canyon Watering Site, and Trick Tank. The closest known breeding site the Heber-Reno driveway is Cherry Creek. The Cherry Creek breeding CLF population is 3.4 miles downstream through an intermittent and perennial stream, and 2.25 miles upstream through an intermittent stream from the sheep driveway.

Apache Trout

The Apache trout is one of two trout native to Arizona. It now occupies less than 5 percent of its historic Arizona range, occurring in Apache, Graham, and Greenlee counties. This major reduction in range is attributable to habitat alteration and species competition with brown and brook trout species.

The Apache trout is found in the White Mountains of northeastern Arizona, where it is restricted to streams of the upper Salt, Blue, and Little Colorado drainages. The Apache trout has been introduced and established outside of its range in several streams in the Pinaleno Mountains in southeastern Arizona and in the North Canyon on the Kaibab Plateau in northern Arizona (Haynes and Schuetze 1997).

Apache trout spawn from March through mid-June constructing their spawning nests (redds) at downstream ends of pools in a variety of depths, velocities, and gravel compositions, and only after water temperatures reach 46.4º F. Eggs hatch in 30 days. Fry emerge from redds after another 30 days, moving downstream at night (Haynes and Schuetze 1997). Apache trout feed on terrestrial insects and adult and nymph stages of aquatic insects such as caddis flies, mayflies, midges, and beetles (Haynes and Schuetze 1997). Apache trout prefer cool, clear, high-elevation streams and rivers, although they may have historically ranged down into larger streams. Large individual trout live in pools, while smaller ones prefer cover and structure such as overhanging trees or brush in runs and riffles (Haynes and Schuetze 1997).

The species is not present on the driveway but is present downstream in Mineral Creek on the Springerville District of the Apache-Sitgreaves National Forest, approximately 5 miles from the driveway via the Udall Draw drainage.

Bald Eagle

Bald eagles usually occur along sea coasts, lakes, and rivers. Nesting sites are usually isolated high in trees, on cliffs, or on pinnacles, with a commanding view of the area and in close proximity to water.

Bald eagles summer and winter throughout Arizona. Roost sites are of primary concern for the bald eagle across its winter range (Steenhof 1978, Grubb and Kennedy 1982). Stands protected by small draws or drainages, and miles from daytime loafing and foraging locations are often selected for roost sites. Bald eagles typically roost in live trees within dense stands of ponderosa pine and often have several roost sites in their winter home range (Grubb et al. 1989). Bald eagles are opportunistic foragers and often roost communally near a significant food source (Steenhof et al. 1980). Bald eagles typically winter over large areas centered around major river drainages or an assembly of lakes. Major winter food items of the bald eagle include coots and other waterfowl, cottontails, jackrabbits, and large mammal carrion (Grubb and Kennedy 1982). Wintering eagles (200-300) arrive in Arizona in November and peak numbers are observed in January and February (Todd 1978). Generally most eagles have migrated out of the state by April. The birds are widely scattered and are normally seen only as solitary individuals or in small groups (Grubb and Kennedy 1982). The greatest numbers of wintering eagles are found along the Mogollon Rim east though the White Mountains and are found in all fifteen counties of Arizona. Sightings over other areas of the districts are usually associated with carrion.

Only two known nests have been documented on the Districts that the driveway crosses. On the Springerville Ranger Districts a pair of bald eagles have nested at Crescent Lake from 2003-2009, which is approximately 16 miles to the southeast of the project area. The pair of eagles failed in 2003, 2005, 2006, and in 2008. In 2004 and 2009, the pair successfully fledged one young and in 2007 the pair successfully fledged 2 young. Also, a pair of eagles nested at River Reservoir in 2008, but failed. The nest at River Reservoir is approximately 7 miles to the southeast of the project area. On the Black Mesa Ranger District an active next exists at Woods Canyon Lake which is approximately five miles northwest of the driveway. The nest was discovered in 2008 and the birds nested but failed to have any successful young. In 2009 they successfully reared 1 fledgling. There is a closure order around the nest site that is in effect from March 1 – August 31.

No roosts have been located within or adjacent to the analysis area although potential roosting locations are present throughout this area. Potential perching, roosting, and foraging habitat is present in the project area but it is marginal because there are no reservoirs, larger rivers, or streams within or adjacent to the project area. Nesting habitat is associated with large lakes, reservoirs, and rivers which are not present within the project area.

Nesting populations are increasing throughout the U.S. The largest populations are found in Alaska and Canada, as well as significant populations in the Pacific Northwest, the Great Lakes States, and the Southeast Coast. A small resident population of approximately 40 pairs nests along the Salt, Verde, Gila, Bill Williams, Agua Fria, San Pedro, and San Francisco rivers and along Tonto and Canyon creeks.

Bald eagle habitat occurs throughout the 2 driveways (21,361 acres on the ASNFs and 74,180 acres on the TNF), but the primary breeding habitat occurs on Tonto NF. The driveway will only cross 4 perennial waterways (bridge over Salt River, Sycamore Creek, Spring Creek, Canyon Creek), where bald eagles may forage nearby. The closest potential nesting sites to the driveway in Tonto NF are Goldfield (1.4 miles), Bulldog (2.2 miles), Blue Point (2.3 miles), and Sheep (2.8 miles).

Lesser Long-nosed Bat

Lesser long-nosed bats prefer mainly desert scrub habitat in the U.S. portion of its range. In Mexico, the species occurs within high elevation pine-oak and ponderosa pine forests. Altitudinal

range is from 480-3,450 m (1,600-11,500 ft). Roosting sites include caves, abandoned mines, and unoccupied buildings at the base of mountains where agave, saguaro, and organ pipe cacti are present.

This species forages at night on nectar, pollen, and fruit of paniculate agaves and columnar cacti. Lesser long-nosed bats range from central Arizona and southwest New Mexico through much of Mexico to El Salvador. The number of occupied roost sites and the number of individuals per colony have recently declined drastically. These bats are seasonal (April -September) residents of southeastern Arizona, and possibly extreme western Arizona (Cochise, Pima, Santa Cruz, Graham, Pinal and Maricopa counties, Arizona).

Potential habitat occurs within the Mesa Ranger District portion of the Heber- Reno Driveway (24,111 acres on the TNF). However, there have been no documented roosts or individuals within TNF. This species does not occur on the ASNFs.

Little Colorado Spinedace

The Little Colorado spinedace is endemic to the Little Colorado River and its northern flowing tributaries. The historical distribution is similar to the current distribution with the exception that the species may have possibly occurred in the Zuni River watershed south of Gallup, New Mexico (Sublette 1990).

In the mid-1980s, Little Colorado spinedace were taken from 11 localities in the Little Colorado River mainstem, East Clear Creek and associated tributaries, Chevelon Creek, and Nutrioso Creek. Additional sites have included Silver Creek, Show Low Creek, Leonard Canyon and tributaries, and Rudd Creek.

Surveys in the late 1990s in Silver Creek and Show Low Creek documented spinedace in Silver Creek just upstream of its confluence with the Little Colorado River. Spinedace were not collected in Show Low Creek.

Designated critical habitat includes 31 miles of East Clear Creek (Coconino County, Arizona) from its confluence with Leonard Canyon upstream to Blue Ridge Reservoir, and from the upper end of Blue Ridge Reservoir to Potato Lake; 8 miles of Chevelon Creek (Navajo County, Arizona) from the confluence with the Little Colorado River upstream to the confluence of Bell Cow Canyon; and 5 miles of Nutrioso Creek (Apache County, Arizona) from the Apache-Sitgreaves NFs‟ boundary upstream to Nelson Reservoir Dam. Critical habitat designation includes only the stream course. The primary constituent elements of critical habitat include clean, permanent flowing water with pools and a fine gravel or silt-mud substrate (USFWS 1997).

Their populations are believed to be declining due to alteration of habitat through reduced streamflow and predation and/or competition with non-native fishes. Predation occurs mainly from rainbow trout and green sunfish. The nearest population of Little Colorado spinedace on the ASNFs is over 22 miles downstream, via the Fish Creek drainage, in the Little Colorado River in Eagar, AZ. No designated critical habitat is in the action area.

Yuma Clapper Rail

This species occurs along the Colorado River (Yuma, La Paz, and Mohave counties, Arizona), from Lake Mead to Mexico; on the Gila and Salt rivers upstream to the area of the Verde

confluence (Maricopa and Pinal counties, Arizona); at Picacho Reservoir (Pinal County, Arizona); and on the Tonto Creek arm of Roosevelt Lake (Gila County). It may be expanding into other suitable marsh habitats in western and central Arizona.

On the TNF, it inhabits freshwater or brackish stream-sides and marshlands under 1372 m (4,500 ft) elevation. It is associated with dense riparian and marsh vegetation. It requires a wet substrate, such as a mudflat, sandbar, or slough bottom that supports cattail and bulrush stands of moderate to high density adjacent to shorelines. There is one record of a Yuma Clapper Rail at Roosevelt Lake about 10 miles downstream of the sheep driveway crossing, where some potential habitat occurs. There is 1,929 acres of habitat within the project area on the TNF. This species does not occur on the ASNFs.

Direct and Indirect Effects

All Species – Alternative 1

Under alternative 1, there would be no sheep trailing on the driveways. There would therefore be no effect (NE) to any federally listed, threatened, endangered, and proposed species or potential and designated critical habitat.

Mexican Wolf

Alternative 2

The primary recovery zone and release sites for the Mexican gray wolf, are located approximately 30 miles from the driveway, therefore, no direct effects from the proposed action are anticipated. The secondary recovery zone is located within the boundaries of the Springerville Ranger District. Two known den sites from 2007 and 2008 are located near the driveway; one approximately five miles, and one adjacent to the Beehive/Sheep Springs Allotments The sheep driveway is not likely to jeopardize this experimental, nonessential population in the primary recovery zone because the Mexican gray wolves from this zone are unlikely to occur in the driveway. Livestock grazing is not likely to jeopardize (NLJ) this experimental, nonessential population. The Final rule to establish this population states wolves are not expected to be adversely affected by most of the current land uses (USFWS? 1/24/98) which includes grazing. With the implementation of proposed grazing utilization standards, the prey base will not be reduced by the action. The habitat of Mexican gray wolves is unlikely to be affected by incidental grazing activity associated with the trailing of sheep.

Alternatives 3a, b and c

Direct and indirect effects from implementation of Alternative 3 are expected to be similar, if slightly reduced from those described for Alternative 2.

Southwestern Willow Flycatcher

Alternative 2

Sheep begin trailing northward in April. Because flycatchers begin arriving on the breeding grounds in late April and early May, sheep will most likely pass through Tonto Creek prior to the arrival of most flycatchers. However, it is possible that some overlap between sheep and flycatchers could occur. If overlap occurs, sheep and their herders may temporarily

(approximately 45 minutes) disturb flycatchers from carrying out breeding activities such as nest building. But based on survey data and limited dense understory and standing water, it appears as though nesting southwestern flycatcher are unlikely to be in the area.

Sheep could trample and consume young woody and herbaceous riparian vegetation. However, because sheep naturally prefer to travel in open areas and because sheep are not present long enough to significantly browse, there is minimal impact on riparian vegetation. Sheep may also degrade pools by increasing pool turbidity via hoof action. However, sheep avoid traveling through pools and drink from the shoreline. Consequently, turbidity through hoof action is minimal. Therefore, for southwestern willow flycatcher, this alternative is not likely to adversely affect (NLAA) this species.

Critical Habitat - The proposed action affects the Primary Constituent Elements (PCE) related to riparian habitat in a dynamic successional riverine environment (for nesting, foraging, migration, dispersal, and shelter) in the following ways:

(a) Trees and shrubs that include Gooddings willow (*Salix gooddingii*), coyote willow (*Salix exigua*), Geyers willow (*Salix geyerana*), arroyo willow,(*Salix lasiolepis*), red willow (*Salix laevigata*), yewleaf willow (*Salix taxifolia*), pacific willow (*Salix lasiandra),* boxelder (*Acer negundo*), tamarisk (*Tamarix ramosissima*), Russian olive (*Eleagnus angustifolia*), buttonbush (*Cephalanthus occidentalis*), cottonwood (*Populus fremontii*), stinging nettle (*Urtica dioica*), alder (*Alnus rhombifolia, Alnus oblongifolia*, *Alnus tenuifolia*), velvet ash (*Fraxinus velutina*), poison hemlock (*Conium maculatum*), blackberry (*Rubus ursinus*), seep willow (*Baccharis salicifolia*, *Baccharis glutinosa*), oak (*Quercus agrifolia*, *Quercus chrysolepis*), rose (*Rosa californica, Rosa arizonica*, *Rosa multiflora*), sycamore (*Platinus wrightii*), false indigo (*Amorpha californica*), Pacific poison ivy (*Toxicodendron diversilobum*), grape (*Vitus arizonica*), Virginia creeper (*Parthenocissus quinquefolia*), Siberian elm (*Ulmus pumila*), and walnut (*Juglans hindsii*). The PCE is present where sheep cross Tonto Creek because there are cottonwoods, willow, and seep willow, sycamore at the crossing. The proposed action will minimally affect the PCE because sheep cannot access foliage from mature trees and sheep do not significantly browse seedlings of these species.

(b) Dense riparian vegetation with thickets of trees and shrubs ranging in height from 2 m to 30 m (6 to 98 ft). Lower-stature thickets (2 to 4 m or 6 to 13 ft tall) are found at higher elevation riparian forests and tall-stature thickets are found at middle- and lower elevation riparian forests. This area of Tonto Creek contains trees and shrubs taller than two meters in dense thickets. The PCE is present in the project area. The proposed action will minimally affect the PCE because sheep prefer to avoid thick areas.

(c) Areas of dense riparian foliage at least from the ground level up to approximately 4 m (13 ft) above ground or dense foliage only at the shrub level, or as a low, dense tree canopy; The PCE is present in the project area. The proposed action will minimally affect the PCE because sheep prefer to avoid thick areas.

(d) Sites for nesting that contain a dense tree and/or shrub canopy (the amount of cover provided by tree and shrub branches measured from the ground) (i.e., a tree or shrub canopy with densities ranging from 50 percent to 100 percent); Tonto Creek has some areas of dense tree and/or shrub canopies in the project area. The PCE is present in the project area. The proposed action will minimally affect the PCE because sheep prefer to avoid thick areas.

(e) Dense patches of riparian forests that are interspersed with small openings of open water or marsh, or shorter/sparser vegetation that creates a mosaic that is not uniformly dense. Patch size may be as small as 0.1 ha (0.25 ac) or as large as 70 ha (175 ac). This area of Tonto Creek is not uniformly dense and occasionally has standing water. However, this area can dry completely. While the PCE is occasionally present in the project area, it is not present during dry summers. The proposed action will minimally affect the PCE because sheep will drink a minimal and immeasurable amount of open water and sheep will avoid dense areas.

The proposed action affects the PCE related to prey in the following way:

(1) A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, including: flying ants, wasps, and bees; dragonflies; flies; true bugs; beetles; butterflies/moths and caterpillars; and spittlebugs. The PCE is likely occasionally present. However, because pools of water are not always present, insect prey is likely sparse. The proposed action will minimally affect the PCE because sheep will drink a minimal and immeasurable amount of open water.

Therefore, for southwestern willow flycatcher, this alternative is not likely to adversely affect (NLAA) critical habitat for this species.

Alternatives 3a, b, and c

Direct and indirect effects from implementation of Alternative 3 are expected to be similar, if slightly reduced from those described for Alternative 2.

Mexican Spotted Owl

Alternative 2

Occupied and restricted habitat exists along the driveway in forested, steep canyon drainages, steep slopes, and dense forest canopy. However, the trailing of the sheep does not go through any known spotted owl nesting areas due to steep slopes, down/dead material, and the lack of forage.

Grazing or browsing sheep may affect prey availability by reducing cover or changing the herbaceous structure. However, the 40% utilization level is conservative enough to avoid the level of take. Conservative use guidelines for upland and riparian areas will provide the woody and herbaceous vegetation cover necessary for rodent prey species In addition, what impact there is to MSO habitat is expected to be minimal because the sheep are pushed through very rapidly.

On the Tonto NF, the driveway will not pass through any MSO PACs. Therefore, we don‟t expect herding activities such as noise, dust, dogs, or other factors to disturb breeding MSO because these actions will be too far from breeding MSO to detect.

The driveway passes through potential foraging areas for MSO, which may disturb foraging owls. However, we expect disturbance to foraging owls to be extremely unlikely because sheep activity will occur during the day when MSO are typically inactive. Grazing/browsing activities at bedding grounds may affect MSO habitat. However, there is little to impact because the bedding area and the surrounding area lacks understory.

On the Apache-Sitgreaves NF, the Heber-Reno and Morgan Mountain Driveways includes a portion of the Jersey Canyon MSO PAC (#030105010) on the Black Mesa Ranger District. The

sheep are also trailed through a portion of the Gillespie MSO PAC (#03010617) on the Springerville Ranger District.

The small portion that the sheep are trailed through in the Gillespie PAC is extremely dense mixed conifer and spruce-fir forest and the sheep are pushed down the road as there is no room to leave the road. This portion of affected area is at most 50-feet wide.

A portion of the driveway is adjacent to the edge of the Jersey Canyon PAC along the right of way fence on Highway 60. The sheep are trailed through rapidly along the right of way fence as they are then pushed across the highway so the sheep are just on the edge of the PAC for a very short time. Although spotted owls may be affected by sheep trailing in the driveways, the effects are not expected to be adverse as the sheep are pushed through very rapidly. Although the driveways traverse through portions of 2 MSO PAC"s spotted owl prey habitat is not expected to be significantly altered.

Therefore, for Mexican spotted owl, this alternative is not likely to adversely affect (NLAA) this species.

Critical Habitat - The proposed action affects the Primary Constituent Elements (PCE) related to forest structure in the following ways:

(1) A range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 percent to 45 percent of which are large trees with a trunk diameter of 12 inches (0.3 meters) or more when measured at 4.5 feet (1.4 meters) from the ground.

(2) A shade canopy created by the tree branches covering 40 percent or more of the ground; and we expect both of these PCEs to be present throughout portions of the driveway. However, we do not expect grazing/browsing sheep to directly impact these PCEs because sheep cannot access foliage from mature trees. Tree seedlings may occur throughout the driveway, but sheep move to quickly, and do not browse enough of the seedlings to make a measurable impact to seedlings. Few to no tree seedlings occur in bedding areas and nearby areas that are not used for bedding. The proposed action will have no effect on the PCEs.

(3) Large dead trees (snags) with a trunk diameter of at least 12 inches (0.3 meters) when measured at 4.5 feet (1.4 meters) from the ground. We expect this PCE to be present throughout portions of the driveway. However, we do not expect grazing/browsing sheep to directly impact this PCE because sheep do not eat dead trees. Tree seedlings, which eventually could become snags, may occur throughout the driveway, but sheep move to quickly, and do not browse enough of the seedlings to make a measurable impact to seedlings. Few to no tree seedlings, which would become snags, occur in bedding areas and nearby areas that are not used for bedding.

The proposed action affects the PCEs related to maintenance of adequate prey species in the following ways:

(1) High volumes of fallen trees and other woody debris; We expect this PCE to be present throughout portions of the driveway. Grazing/browsing sheep will not directly impact this PCE because sheep do not eat fallen trees and other woody debris. In addition, they will

avoid areas cluttered areas that impede movement. Therefore, they will not displace fallen trees or other woody debris. The proposed action will have minimal effect on the PCE.

(2) A wide range of tree and plant species, including hardwoods; and Tree seedlings and plants may occur throughout the driveway, but sheep move quickly, and do not browse enough of the seedlings to make a measurable impact to tree seedlings and other plants. Few to no tree seedlings, which would become mature plant species, occur in bedding areas and nearby areas that are not used for bedding. The proposed action will have minimal effect on the PCE.

(3) Adequate levels of residual plant cover to maintain fruits, seeds, and allow plant regeneration. The proposed action will have minimal effect on the PCE because moving sheep will not have enough time to browse plant cover.

The proposed action affects the PCE related to canyon habitat in the following ways:

(1) Presence of water (often providing cooler and often higher humidity than the surrounding areas); Sheep may drink from surface water at crossings. But sheep will not drink enough water to impact humidity of the surrounding area. The proposed action will have no effect on the PCE.

(2) Clumps or stringers of mixed conifer, pine-oak, pinyon-juniper, and/or riparian vegetation; Clumps or stringers of plants may occur in canyons through the driveway, but sheep move quickly, and do not browse enough of these plants to make a measurable impact to tree seedlings and other plants. The proposed action will have minimal effect on the PCE.

(3) Canyon wall containing crevices, ledges, or caves; and Sheep will not traverse crevices, ledges or caves, and sheep will not bed in canyon habitat. Therefore, the proposed action will have no effect on the PCE.

(4) High percent of ground litter and woody debris and sheep will avoid trampling woody debris. They normally travel through previously open areas. The proposed action will have minimal impact to the PCE.

Therefore, for Mexican spotted owl, this alternative is not likely to adversely affect (NLAA) critical habitat for this species.

Alternatives 3a, b, and c

Direct and indirect effects from implementation of Alternative 3 are expected to be the same as those described for Alternative 2.

Chiricahua Leopard Frog

Alternative 2

Direct effects of traveling sheep in Chiricahua leopard frog (CLF) habitat could include trampling of adults, eggs, tadpoles, or breeding habitat. But because 1) recent surveys found no CLF nearby watering areas and 2) the nearest known breeding population (Cherry Creek) is over 4 miles away across land in a different 6th code watershed, we expect direct impacts to CLF extremely unlikely to occur. The sheep driveway crosses 2 intermittent streams, which are connected through 5.65

miles of intermittent and perennial streams to the nearest known breeding site (Cherry Creek), and therefore CLF are extremely unlikely to disperse to the sheep stream crossings. Indirect effects could include soil compaction, which will increase surface runoff resulting in excess sedimentation in riparian areas and dirt tanks. However, because use only occurs twice a year, and use occurs in different 6th code watersheds (or downstream) from breeding CLF populations, impacts to CLF habitat within the same watershed, will be minimal and hard to detect.

Therefore, for Chiricahua leopard frog, this alternative is not likely to adversely affect (NLAA) this species.

Alternative 3a, b, and c

Direct and indirect effects from implementation of Alternative 3 are expected to be similar, if slightly reduced from those described for Alternative 2.

Apache Trout

Alternative 2

Based upon known distribution and survey information, Apache trout are present in the action area but not on the driveway alignment itself. No direct effects to Apache trout will occur with the implementation of this alternative. Indirect effects are unlikely given the short duration that the driveway will be utilized each year. Increased sedimentation levels resulting from seasonal vegetation removal and trampling by sheep will not measurably impact occupied habitat downstream.

Therefore, for Apache trout, this alternative is not likely to adversely affect (NLAA) this species.

Alternatives 3a, b, and c

Direct and indirect effects from implementation of Alternative 3 are expected to be the same as those described for Alternative 2.

Bald Eagle

Alternative 2

Disturbances from humans can lead to injury, a decrease in productivity, or nest abandonment through a variety of ways. First, activity can flush an adult from their nests, which could cause unnecessary exposure to nestling. Second, older nestlings may be startled by loud or intrusive human activities, and prematurely jump from the nest before they are able to fly or care for themselves. Third, human disturbances may also disrupt the adults‟ foraging and feeding schedule for young. However, the spring (in fall, they are not nesting) trailing activity is highly unlikely to cause adults to flush or older nestlings to prematurely jump from the nest because the sheep driveway is too far for the eagles make an impact. Fraser and others (1985) found that bald eagles flushed when a pedestrian was within 0.6 miles from the nest. The driveway is 1.4 miles from the nearest nest at Goldfield. Disrupting the foraging schedule of the adults is also unlikely because sheep will not be trailing along lake shores, which are primary foraging habitat for the bald eagle. And they will only cross 4 perennial waterways, which can be secondary foraging habitat. The exposure to potentially foraging eagles in perennial waterways will be minimized because sheep will cross perpendicular to stream channels within 45 minutes.

Therefore, for bald eagles, this alternative is not likely to adversely affect (NLAA) this species.

Alternatives 3a, b, and c

Direct and indirect effects from implementation of Alternative 3 are expected to be similar, if slightly reduced from those described for Alternative 2.

Lesser Long-nosed Bat

Alternative 2

This species forages at night on nectar, pollen, and fruit of paniculate agaves and columnar cacti. Because sheep do not consume this vegetation type, and will be traveling during the day, no direct or indirect effects are anticipated. Furthermore, although this species habitat occurs within the Mesa RD portion of the driveway, this species hasn't been confirmed as occurring on the District.

Therefore, for the lesser long-nosed bat, this alternative is not likely to adversely affect (NLAA) this species.

Alternatives 3a, b, and c

Direct and indirect effects from implementation of Alternative 3 are expected to be similar, if slightly reduced from those described for Alternative 2.

Little Colorado Spinedace

Alternative 2

The probability of Little Colorado spinedace (spinedace) occurring within the action area is very small. ASNF has not documented spinedace within the driveway, and it is unlikely that the known spinedace population, located 22 miles downstream, would disperse upstream to the action area. Additionally, indirect effects, such as increased sedimentation in the Fish Creek drainage will not affect the downstream population, due to populations distance from the crossing.

Therefore, for the little Colorado spinedace, this alternative is not likely to adversely affect (NLAA) this species.

Alternatives 3a, b, and c

Direct and indirect effects to Little Colorado spinedace from implementation of Alternative 3 are expected to be the same as those described for Alternative 2.

Yuma Clapper Rail

Alternative 2

Although potential habitat for Yuma clapper rail may occur in Tonto Creek through the life of this consultation, it is highly unlikely that the potential habitat will develop into suitable habitat because frequent flash flooding will scour any developing cattail areas. Only young cattail plants in small patches are likely to occur across Tonto Creek. These patches are too small and thin to support Yuma clapper rail. If suitable habitat does eventually develop to support Yuma clapper rail, watering sheep do minimal impact to the habitat. Sheep are limited to the shoreline edge, and do not appear to browse cattails.

Based on this, the proposed action is not likely to adversely affect the Yuma clapper rail.

Alternatives 3a, b, and c

Direct and indirect effects on Yuma clapper rail resulting from implementation of Alternative 3 are expected to the same as those described for Alternative 2.

Table 8. Summary of determinations of effect for federally listed species and critical habitat by alternative.

Species	Alternative 1	Alternative 2	Alternative 3a	Alternative 3b	Alternative 3c
Mexican wolf	Not likely to jeopardize[3]	Not likely to jeopardize	Not likely to jeopardize	Not likely to jeopardize	Not likely to jeopardize
Southwestern willow flycatcher	NE[4]	MANLAA[5]	MANLAA	MANLAA	NE
Mexican spotted owl	NE	MANLAA	MANLAA	MANLAA	MANLAA
Chiricahua leopard frog	NE	MANLAA	MANLAA	MANLAA	MANLAA
Apache Trout	NE	NE	NE	NE	NE
Bald Eagle	NE	MANLAA	MANLAA	MANLAA	MANLAA
Lesser long-nosed bat	NE	MANLAA	MANLAA	MANLAA	MANLAA
Little Colorado spinedace	NE	NE	NE	NE	NE
Yuma Clapper rail	NE	MANLAA	MANLAA	MANLAA	NE

[3] Not likely to jeopardize the continued existence of this species.

[4] NE – No effect.

[5] MANLAA – May affect, not likely to adversely affect.

Forest Service Sensitive Species

Affected Environment

The forests received the Southwestern Region (R3) Regional Forester‟s Sensitive Species list, dated September, 2007 (USDA FS 2007d). Sensitive species are defined as plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by: (a) significant current or predicted downward trends in population numbers or density, or (b) significant current or predicted downward trends in habitat capability that would reduce a species‟ existing distribution (FSM 2670.5).

There are 88 sensitive species on the ASNFs and the Tonto NF. Of these, there are 49 sensitive species with potential suitable habitat in the project area. These 49 species were analyzed in detail. The 39 species that do not have habitat in the project area are: California leaf-nosed bat, spotted bat, white-nosed coati, southern red-backed vole, Arizona montane vole, Navajo Mogollon vole, Clark‟s grebe, Western barking frog, Parker‟s coelloepus riffle beetle, netwing midge, fossil springsnail, Greene milkweed, villous groundcover milkvetch, Gila thistle, yellow ladys-slipper, wizlenii gentian, heathleaf wild buckwheat, Ripley wild buckwheat, Arizona bugbane, Fish creek fleabane, Mogollon fleabane, Toumey groundsel, Pima Indian mallow, Hualapai milkwort, Arizona phlox, Salt River (Gila) rockdaisy, Eastwood alum root, Galiuro sage, Mt. Dellenbaugh sandwort, Chihuahuan sedge, Cochise sedge, horseshoe deer vetch, Aravaipa woodfern, Mogollon hawkweed, heart-leaf groundsel, Maguires beardtongue, Davidson‟s cliff-carrot, Parish‟s alkali grass and Mogollon clover. These 39 species were not analyzed in detail.

The sensitive species list can be found in the project record. Table 10 summarizes the Forest Service Sensitive species, their habitat and status on the Tonto and ASNFs that occur within the project area**.**

Table 9. Forest Service Sensitive Species analyzed for this project.

Common Name/Species	Habitat Type	Habitat within Project Area [6]	Population Status on Forests
AMPHIBIANS			
Arizona Toad *(Bufo microscaphus)*	River canyons or foothill streams. Slower water or pools where the tree canopy is relatively open.	Not documented in the project area on ASNFs or TNF. Approximately 2,350 acres of potential or suitable habitat present within the project area.	Forest Service Sensitive, G3/G4, S3, S4
Lowland Leopard Frog *(Rana yavapaiensis)*	Aquatic systems in desert grasslands to pinyon juniper; rivers, permanent streams, permanent pools in intermittent streams, beaver ponds, cienegas (wetlands), and springs, In lotic habitats, concentrated at springs, near debris piles, at heads of pools, and near deep pools associated with root masses. Shallow water with emergent and perimeter vegetation provides basking habitat and deep water, root masses, undercut banks, and debris piles provide refuge from predators and potential hibernacula.	No habitat on ASNF. On TNF, found on all districts. Potential and suitable habitat on approximately 1,929 acres within the project area.	Forest Service Sensitive, G4, S4
BIRDS			

[6] The acres represented in Table X include all areas within the habitat types described. Although some surveys have been done, complete surveys for all sensitive species have not been completed in the project area. In general, these species have very specific habitat requirements and exist on microsites within the larger habitat types described above, so actual acreage of habitat within the project area is expected to be much less than the acreages exhibited here.

Common Name/Species	Habitat Type	Habitat within Project Area [6]	Population Status on Forests
Bald Eagle *(Haliaeetus leucocephalus)*	Sonoran Riparian Scrubland and Sonoran Interior Strand, Sonoran Desertscrub biome-Arizona Upland subdivision, Interior Chaparral biome, and Great Basin Conifer Woodland biome. Rocky Mountain and Madrean Montane Conifer Forest. Nests usually on cliff ledges, rock pinnacles, and in cottonwood tree, but have been found in junipers, pinyon and ponderosa pines, sycamores, willows, snags.	No breeding areas within project area on ASNFs, but wintering habitat exists. On TNF, breeding habitat adjacent, but not within driveway. Foraging habitat exists on approximately 95,541 acres within the project area.	Forest Service Sensitive, G5, S2/S1/S3/NR
Zone-tailed Hawk *(Buteo albonotatus)*	Arid open country, especially open deciduous or pine-oak woodland. Wooded canyons and tree-lined rivers along middle slopes of desert mountains. Nests in small trees in lower desert, giant cottonwoods in riparian areas and mature conifers in high mountain regions; often selects nest site close to cliff or steep hillside.	Foraging areas occur on both the ASNF and TNF, while breeding areas only occur on the TNF. Approximately 2,071 acres of breeding habitat and 95,541 acres of foraging habitat exists within the project area.	Forest Service Sensitive, G4, S2/S3/S3
Northern Goshawk *(Accipiter gentilis)*	Wide variety of forest types including deciduous, coniferous and mixed forests. Typically nest in mature or old-growth forests, commonly in ponderosa pine.	Foraging habitat exists throughout the project area. The driveway goes through or is adjacent to breeding areas on the ASNF. No breeding areas exist within or adjacent to the driveway on the TNF. Approximately 22,873 acres of breeding and foraging habitat occurs within the project area.	Forest Service Sensitive, Management Indicator Species, G5, S3/S2
Common Black-hawk *(Buteogallus anthracinus)*	Obligate riparian nester, dependent on mature, relatively undisturbed habitat supported by a permanent flowing stream. Groves of trees are preferred over single trees.	Approximately 2,350 acres of potential and suitable habitat exists within the project area.	Forest Service Sensitive, G4G5, S3/S2

Common Name/Species	Habitat Type	Habitat within Project Area [6]	Population Status on Forests
American Peregrine Falcon *(Falco peregrines anatum)*	Steep, sheer cliffs overlooking woodlands, riparian areas or other habitats supporting avian prey species in abundance. Presence of an open expanse is critical. Sonoran, Mohave, and Great Basin desertscrub up through areas of Rocky Mountain and Madrean Montane Conifer Forest.	No eyries located within the project area. Foraging habitat occurs in areas along the driveway. Approximately 2,350 acres of foraging habitat exists in the project area.	Forest Service Sensitive, G4T3, S4/S2
Western Yellow-billed Cuckoo *(Coccyzus americanus occidentalis)*	Willow, cottonwood, and mesquite. In Arizona, nesting (successfully) in mesquite and hackberry.	No suitable habitat within the project area on the ASNF. Habitat on the TNF includes documented sightings near Roosevelt Lake and Tonto Creek. Approximately 1,929 acres of potential and suitable habitat exists within the project area.	Federal Candidate, Forest Service Sensitive, G5T3 , S3, S3, S5, S4
Burrowing Owl (Western) *(Athene cunicularia hypugaea)*	Open, well-drained grasslands, steppes, deserts, prairies, and agricultural lands, often associated with burrowing mammals. Great Basin Shrubsteppe with open to dense stands of shrubs and low trees. Chihuahuan Desert Scrub of open stands of creosote bush and large succulents.	Grassland habitats within the project area include suitable and potential habitat for burrowing owls. Approximately 24,117 acres of potential habitat exist within the project area.	Forest Service Sensitive, G4T4, S3/S3/S2
Northern Gray Hawk *(Asturina nitida maximus)*	Mixed broadleaf deciduous riparian	No suitable habitat on the ASNF. Potential and suitable nesting and foraging habitat occurs on the TNF. It is estimated that 943 acres of habitat occurs within the project area.	Forest Service Sensitive, G4T4Q, S3/SAB
Abert's Towhee *(Pipilo aberti)*	Cottonwood-willow with a dense understory of shrubs, mesquite woodland. Remnants of riparian woods and shrubs, marshes, and exotic vegetation, including salt cedar, mixed exotic-native habitat.	No suitable habitat for this species occurs within the project area on the ASNF. On the TNF, habitat is expected to occur on approximately 1,929 acres within the project area.	Forest Service Sensitive, G3G4, S3
INVERTEBRATES			

Common Name/Species	Habitat Type	Habitat within Project Area [6]	Population Status on Forests
Ferris' Copper *(Lycaena ferrisi)*	Meadows and cienegas near the foodplant *Rumex hymeospalus*.	This species does not occur on the TNF. It has not been documented within the project area, but potential habitat exists on the ASNF portion of the driveway. Approximately 279 acres of potential habitat exists within the project area.	Forest Service Sensitive, G1, S1/S2
MAMMALS			
Merriam's Shrew *(Sorex merriami leucogenys)*	Cool, grassy places, often in association with the Mexican vole, *Microtus mexicanus*, and near coniferous forests. They are usually found in dry places, often not far from water, but not along streams. Grasslands, shrublands, and pinyon-juniper Woodlands.	No suitable habitat occurs on the TNF. On the ASNF, suitable habitat exists. It is estimated that there is approximately 4,272 acres of habitat within the project area.	Forest Service Sensitive, G5, S3/S2
Allen's Lappet-browed Bat *(Idionycteris phyllotis)*	Ponderosa pine, pinyon-juniper, Mexican woodland and riparian areas of sycamores, cottonwoods and willows, white fir and in Mohave desertscrub. Boulder piles, cliffs, rocky outcrops or lava flows. Roosts in caves and abandoned mineshafts.	Has not been documented within the project area, but habitat exists throughout the project area on both the ASNF and TNF. Approximately 47,313 acres of potential habitat exists within the project area.	Forest Service Sensitive, G3G4N3, S2/S2
White Mountains Chipmunk *(Tamias minimus arizonensis)*	Open short grass subalpine fields to open grass-sedge meadows.	Does not occur on the TNF. Suitable and potential habitat exists throughout the project area on the ASNF. Approximately 1,594 acres of habitat within the project area.	Forest Service Sensitive, G5T2NR, SNR

Common Name/Species	Habitat Type	Habitat within Project Area [6]	Population Status on Forests
White Mountains Ground Squirrel *(Spermophilus tridecemlineatus monticola)*	Open short grass subalpine fields to open grass-sedge meadows. Subalpine grassland.	Does not occur on the TNF. Suitable and potential habitat exists throughout the project area on the ASNF. Approximately 1,594 acres of habitat within the project area.	Forest Service Sensitive, G5TN3, S3
Arizona Gray Squirrel *(Sciurus arizonensis arizonensis)*	Dense, mixed broad-leaf forested canyon bottoms and drainage ways within large stature conifer forests. Prefers riparian areas with alder, ash, cottonwood, sycamore trees.	Does not occur on the TNF. Suitable and potential habitat exists throughout the project area on the ASNF. Approximately 421 acres of habitat exists within the project area.	Forest Service Sensitive, GN4, S4/S2
Springerville Silky Pocket Mouse *(Perognathus flavus goodpasteri)*	Volcanic Grasslands, prairies of sandy, gravelly, or rocky areas with sparse vegetation of various grasses and forbs. Not restricted to a specific plant association.	Does not occur on the TNF. Potential habitat exists on the ASNF in the project area. Approximately 4,272 acres of habitat exists within the project area.	Forest Service Sensitive, G5TN3, S3
Long-tailed Vole *(Microtus longicaudus)*	Grassy meadows and flats, along boggy stream bottoms, cienegas, openings in coniferous forests, and along roadsides. Also on steep slopes with bunchgrasses.	No suitable or potential habitat within the project area on the TNF. On the ASNF, potential and suitable habitat is present. Approximately 1,594 acres of suitable or potential habitat exists within the project area.	Forest Service Sensitive, GN5, S4/S4

Common Name/Species	Habitat Type	Habitat within Project Area [6]	Population Status on Forests
Meadow (New Mexico) Jumping Mouse *(Zapus hudsonius luteus)*	Grassy areas at high elevations, grass and scrubby willows within a few feet of a stream above 8000 feet elevation. Prefer the higher banks of creeks, areas bordered or overhung by willows, but above high water level.	No suitable or potential habitat within the project area on the TNF. On the ASNF, potential and suitable habitat is present. Approximately 1,594 acres of suitable or potential habitat exists within the project area.	Federal Candidate, Forest Service Sensitive, G3TN2, S2
Greater Western Mastiff Bat *(Eumops perotis californicus)*	Desert scrub, oak woodland, pine-oak woodland, pinyon-juniper, mixed conifer	No suitable or potential habitat for this species occurs within the project area on the ASNF. On the TNF, suitable habitat is present on approximately 24,111 acres within the project area.	Forest Service Sensitive, G5T4N3, S1
Pale Townsend's Big-eared Bat *(Corynorhinus townsendii pallescens)*	Upper and lower Sonoran desert scrub, cliffs	No suitable or potential habitat for this species occurs within the project area on the ASNF. On the TNF, suitable habitat is present on approximately 24,111 acres within the project area.	Forest Service Sensitive, GTN4, S3
Western Red Bat *(Lasiurus blossevillii)*	Mixed broadleaf deciduous riparian, sonoran desert scrub	No suitable or potential habitat for this species occurs within the project area on the ASNF. On the TNF, suitable and potential habitat is present on approximately 26,040 acres within the project area.	Forest Service Sensitive, G5N4, S2
Desert Bighorn Sheep *(Ovis Canadensis Mexicana)*	Precipitous and rocky desert ranges. Mountain ranges are typically of broken rock, scarred with numerous gullies. Vegetation is rarely thick or tall. Bighorn often use the highest ridges on such mountains as lookouts. 3000 - 4000 ft.	Desert bighorn sheep do not occur on the ASNF. On the TNF, approximately 35 acres of suitable habitat exists within the project area.	Forest Service Sensitive, G3, S1
Rocky Mountain Bighorn Sheep *(Ovis Canadensis Canadensis)*	Rocky, rugged mountain terrain.	No suitable or potential habitat occurs within the project area on the ASNF. On the TNF, approximately 35 acres of suitable habitat exists within the project area.	Forest Service Sensitive, G4, S1

Common Name/Species	Habitat Type	Habitat within Project Area [6]	Population Status on Forests
REPTILES			
Mexican Gartersnake *(Thamnophis eques megalops)*	Riparian, cienega, and marsh areas in desert grassland, and occasionally in desert and lower oak woodland habitats.	Suitable habitat on both the TNF and ASNF. Approximately 2,350 acres of suitable habitat within project area.	Forest Service Sensitive, G3T3, S2S3/S1S2
Narrow-headed Gartersnake *(Thamnophis rufipunctatus)*	Pinyon-juniper and pine-oak woodland into ponderosa pine forest; in permanently flowing streams, sometimes sheltered by broadleaf deciduous trees. Important components of bank vegetation include shrub-sized and sapling Arizona alder (the most conspicuous species), velvet ash, willows and canyon grape. 2440 – 8080 ft.	No habitat within the project area on the TNF. On the ASNF, potential habitat exists in the project area. Approximately 4,984 acres of potential habitat within the project area.	Forest Service Sensitive, G3T3, S2S3
Reticulate Gila Monster *(Heloderma suspectum suspectum)*	Most common in wetter, rocky paloverde-saguaro desert scrub foothills, bajadas and canyons than in the drier, sandier creosote bush-burr sage association locales, seeming to avoid open flats and agricultural areas. Less frequently in desert-grassland and rarely in oak woodland <4100 ft.	No habitat on the ASNF. On the TNF, suitable habitat exists at elevations below 4,100 ft. Approximately 27,208 acres of habitat exists within the project area.	Forest Service Sensitive, G4T4, S4
Maricopa leaf-nosed snake *(Pyllorhynchus browni lucidus)*	Upland rocky or sandy desert dominated desertscrub with mesquite, saltbush, creosote bush, paloverde and saguaro. 1000-3000 ft.	No habitat on the ASNF. On the TNF, suitable habitat exists at elevations between 1,000 and 3,000 ft. Approximately 27,208 acres of habitat exists within the project area.	Forest Service Sensitive, G5T2, S2
Sonoran Desert Tortoise *(Gopherus agassizii (Sonoran Population))*	The Sonoran population of the desert tortoise occurs primarily on rocky slopes and bajadas of Mojave and Sonoran desertscrub. Caliche caves in incised, cut banks of washes (arroyos) are also used for shelter sites, especially in the Lower Colorado River Valley subdivision. Shelter sites are rarely found in shallow soils. 510-5300 ft.	No habitat on the ASNF. On the TNF, suitable habitat exists at elevations below 5,300 ft. Approximately 27,208 acres of habitat exists within the project area.	Forest Service Sensitive, G4T4, S4
PLANTS			

Common Name/Species	Habitat Type	Habitat within Project Area [6]	Population Status on Forests
Goodding's Onion *(Allium gooddingii)*	Moist shaded canyon bottoms in mature coniferous Forest.	Does not occur on the TNF. Potential habitat exists within the project area on the ASNF. Approximately 5,385 acres of potential habitat occur within the project area.	Forest Service Sensitive, G4, S3S4, S1
White Mountains (Mogollon) paintbrush *(Castilleja mogollonica)*	Moderately drained sites within high-elevation wet grassy meadows and cienegas associated with permanent or intermittent creeks.	Does not occur on the TNF. Potential habitat exists within the project area on the ASNF, but the species has not been documented there. Approximately 1,873 acres of potential habitat exists within the project area.	Forest Service Sensitive, G1Q, S1
Arizona Sneezeweed *(Helenium arizonicum)*	Ponderosa pine forest; Madrean pine-oak woodland; pinyon-juniper woodland; Great Basin grassland; semidesert grassland; interior chaparral	Does not occur on the TNF. Species has been documented northwest of the sheep driveway, but has not been found within the project area. Suitable and potential habitat exists on approximately 13,961 acres within the project area.	Forest Service Sensitive, G3, S3
Arizona Sunflower *(Helianthus arizonensis)*	Madrean pine-oak woodland; pinyon-juniper woodland; Great Basin grassland; semidesert grassland	Does not occur on the TNF. Potential habitat exists within the project area on approximately 7,602 acres the ASNF.	Forest Service Sensitive, G4, SNR, S4?
Arizona Alum Root *(Heuchera glomerulata)*	Ponderosa pine forest; mixed conifer with frequent fire forest; Montane/subalpine grassland	No records of this species for the TNF. Potential habitat exists within the project area on the ASNF. Approximately 11,057 acres of potential habitat occurs within the project area.	Forest Service Sensitive, G3, S3/S1
Blumer's Dock *(Rumex orthoneurus)*	Pinyon-juniper woodland	Potential habitat for this species occurs throughout the project area. Approximately 35,243 acres of potential habitat exists within the project area.	Forest Service Sensitive, G3, S3/S2?

Common Name/Species	Habitat Type	Habitat within Project Area [6]	Population Status on Forests
Arizona Willow *(Salix arizonica)*	Wetland/cienega; mixed broadleaf deciduous riparian forest; montane willow riparian area	Does not occur on the TNF. Species does not occur within the project area, but potential habitat exists on 279 acres within the project area on the ASNF.	Forest Service Sensitive, G2G3, S2/S1
Bebb's Willow *(Salix bebbiana)*	Pinyon-juniper woodland; ponderosa pine forest; mixed conifer with frequent fire forest	Does not occur on the TNF. Potential habitat exists within the project area on the ASNF on approximately 279 acres.	Forest Service Sensitive, G5, SNR/SNR
Mogollon Clover *(Trigolium longipes ssp. Neurophyllum (=T. neurophyllum))*	Mixed broadleaf deciduous riparian forest; montane willow riparian area; cottonwood-willow riparian area	No suitable or potential habitat exists within the project area.	Forest Service Sensitive, G2, S2/S2
Hohokam Agave *(Agave murphyi)*	Gentle bajada slopes, benches or terraces above major drainages with prehistoric habitations and/or agricultural sites. 1300-2400 ft.	Does not occur on the ASNF. Not known to occur within the project area, but potential habitat occurs on approximately 24,111 acres within the project area on the TNF.	Forest Service Sensitive, G2, S2
Tonto Basin Agave *(Agave delamateri)*	Cobbly and gravelly, deep and well-drained soils. South and southwest facing slope edges and atop benches, occasionally on northeast facing gentle slopes. 2300-5100 ft.	Does not occur on the ASNF. Not known to occur within the project area, but potential habitat occurs on approximately 24,111 acres within the project area on the TNF.	Forest Service Sensitive, G1G2, S1
Mapleleaf False Snapdragon *(Mabrya acerifolia)*	Occurs on rock overhangs, on shaded cliffs and rock ledges. 1800 - 3350 ft.	Does not occur on the ASNF. Not known to occur within the project area, but potential habitat occurs on approximately 24,111 acres within the project area on the TNF.	Forest Service Sensitive, G2, S2
FISH			
Roundtail Chub *(Gila robusta)*	Cool to warm waters of rivers and streams, often occupy the deepest pools and eddies of large streams. 1000-7500 ft.	Species does not occur within the project area on the ASNF or TNF. No suitable or potential habitat within the driveway.	Forest Service Sensitive, G3, S2

Common Name/Species	Habitat Type	Habitat within Project Area [6]	Population Status on Forests
Little Colorado Sucker *(Catostomus sp. 3)*	Rocky pools and riffles of creeks and small to medium rivers with abundant cover.	Does not occur on the TNF. Species not found within the project area, but suitable and potential habitat exists downstream of the project area.	Forest Service Sensitive, G2, S2
Headwater Chub *(Gila nigra)*	Medium-sized streams in large, deep pools often associated with cover such as undercut banks or deep places created by trees or rocks. 3,000-6,700 ft	No suitable or potential habitat within the project area on the ASNF. On the TNF, suitable or potential habitat exists on up to 1,929 acres within the project area.	Forest Service Sensitive, UNK, UNK
Longfin Dace *(Agosia chrysogaster)*	Found in streams and springs. Found in shallow water with sandy bottoms. Elevation low desert (1,000) to clear brooks (5,000 ft).	Found on both the ASNF and TNF. Approximately 2,071 acres of potential and suitable habitat exists within the project area.	Forest Service Sensitive, G4, S3
Desert Sucker *(Catastomus clarki)*	Occurs in desert streams at elevations of 1,000 ft to streams at 6,800 ft. During daytime desert sucker use pools and in evening move into riffles to feed.	No suitable or potential habitat within the project area on the ASNF. On the TNF, potential and suitable habitat exist on approximately 1,929 acres within the project area.	Forest Service Sensitive, G3, S3
Sonora Sucker *(Catastomus insignis)*	Occurs in Salt and Verde River Systems below 6500 ft. Sonora sucker use pools and slow moving runs. Adults move into riffles and margins at night to feed.	No suitable or potential habitat within the project area on the ASNF. On the TNF, potential and suitable habitat exist on approximately 1,929 acres within the project area.	Forest Service Sensitive, G3, S3
Bluehead Sucker *(Catostomus discobolus discobolus)*	Occupy a wide range of habitats, from headwater streams to large rivers. Usually found in moderate to fast flowing waters above a rubble-rock substrate in the main current.	Does not occur on the TNF. Species is not present within the project area, but suitable and potential habitat occurs downstream of the project area.	Forest Service Sensitive, S3

Bighorn sheep

The desert and Rocky Mountain bighorn sheep are listed as sensitive species for the Tonto National Forest. Throughout the driveways" project area, desert bighorn sheep habitat is absent except for about 35 acres of low-density bighorn sheep area that overlaps the driveway west of Saguaro Lake within Mesa Ranger RD of Tonto NF (Figures 5, 6, and 7). Bighorn sheep density data were obtained from AZGFD. AZGFD classified low-density habitat as 0.5 to 2 sheep per square mile.

Domestic sheep also travel along the driveway near bighorn sheep habitat within the same area. There is some historic habitat about seven miles from the driveway in Chevelon Canyon on the Apache-Sitgreaves NFs. Bighorn sheep were noted as present in Chevelon Canyon in the 1870s (Nelson, 1911).

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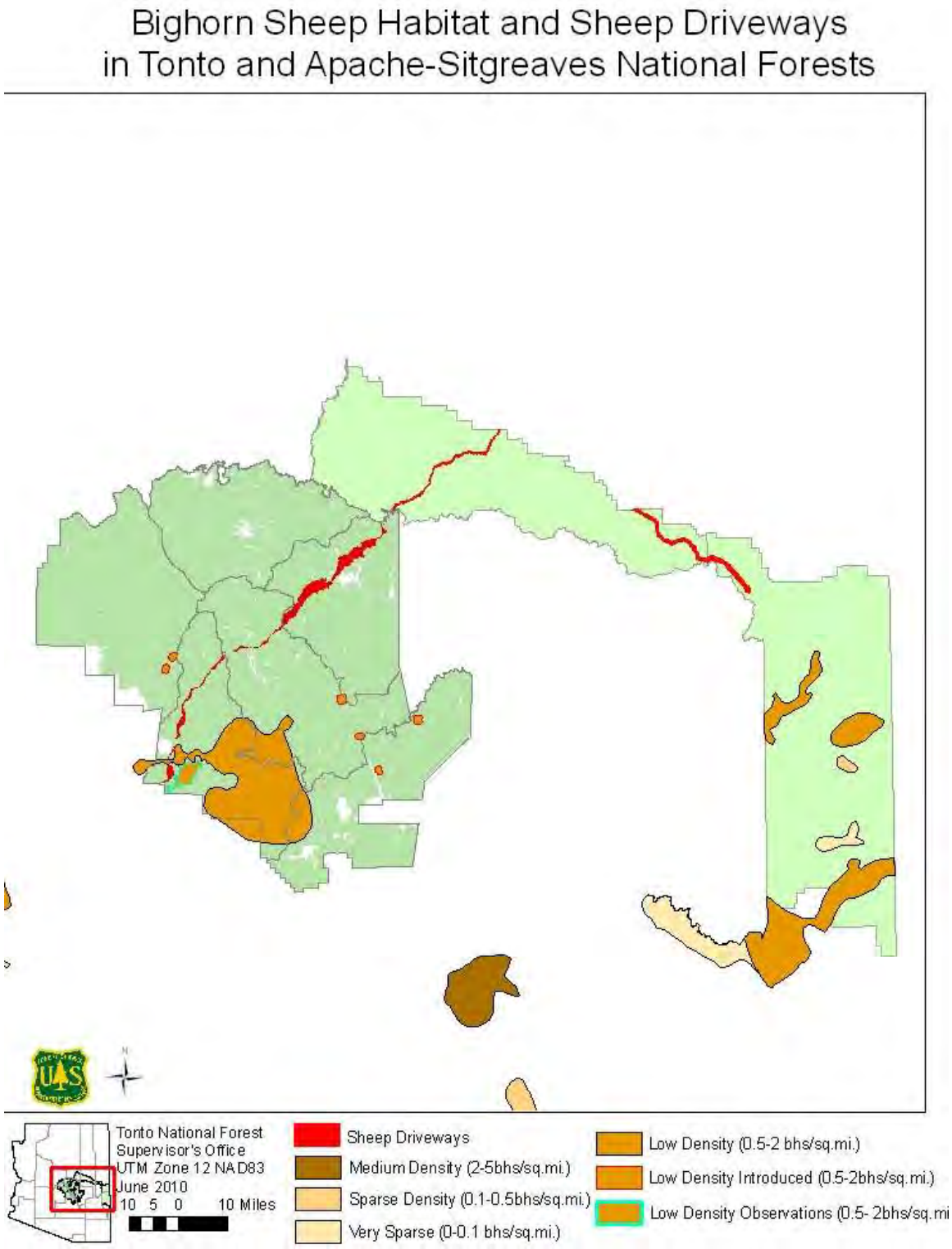

Figure 5. Sheep driveways relative to bighorn sheep habitat in Tonto and Apache-Sitgreaves NFs.

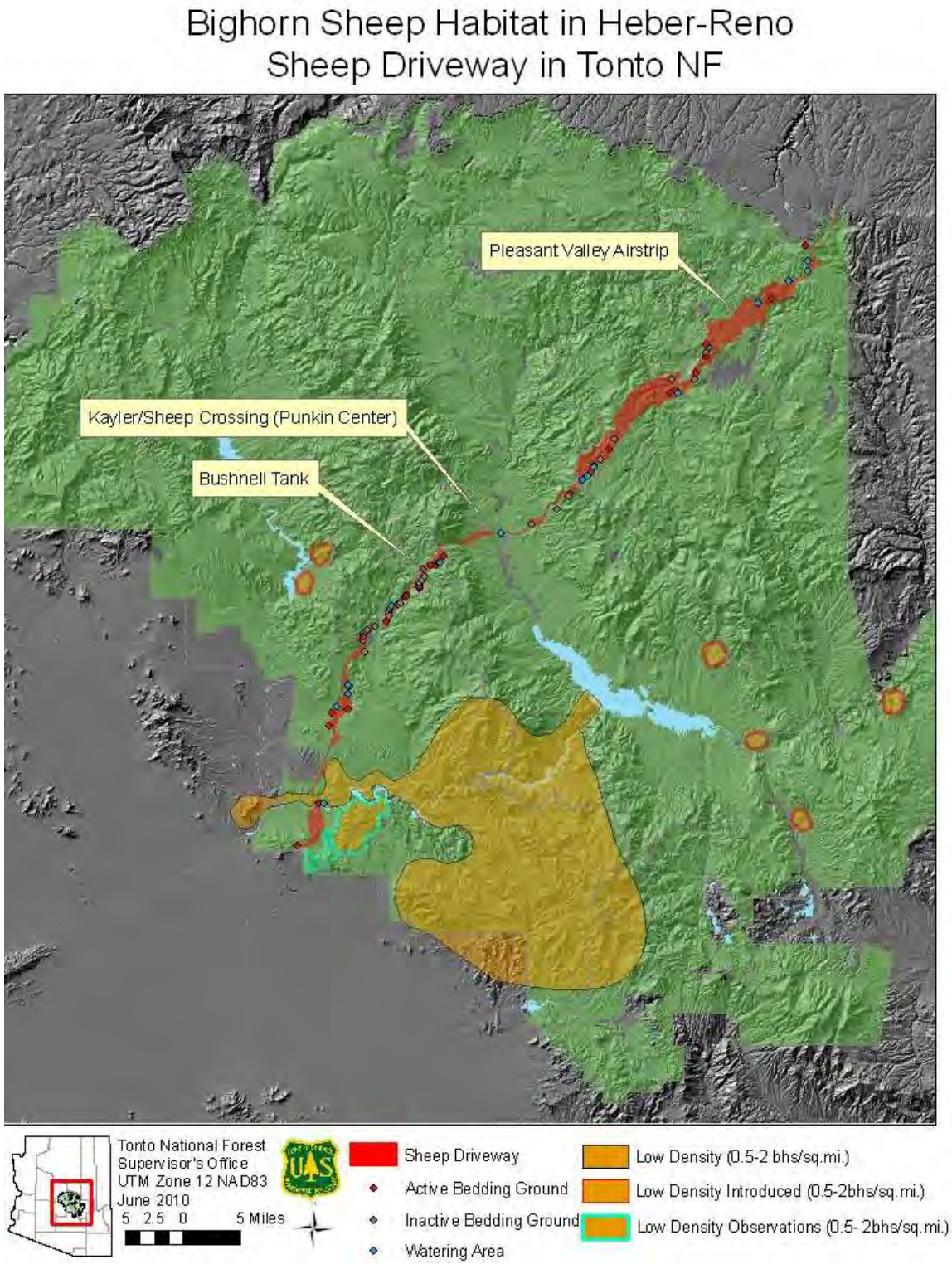

Figure 6. Heber-Reno Sheep Driveway, Alternative 3 possible drop points, bedding grounds, watering areas, and bighorn sheep habitat within Tonto NF.

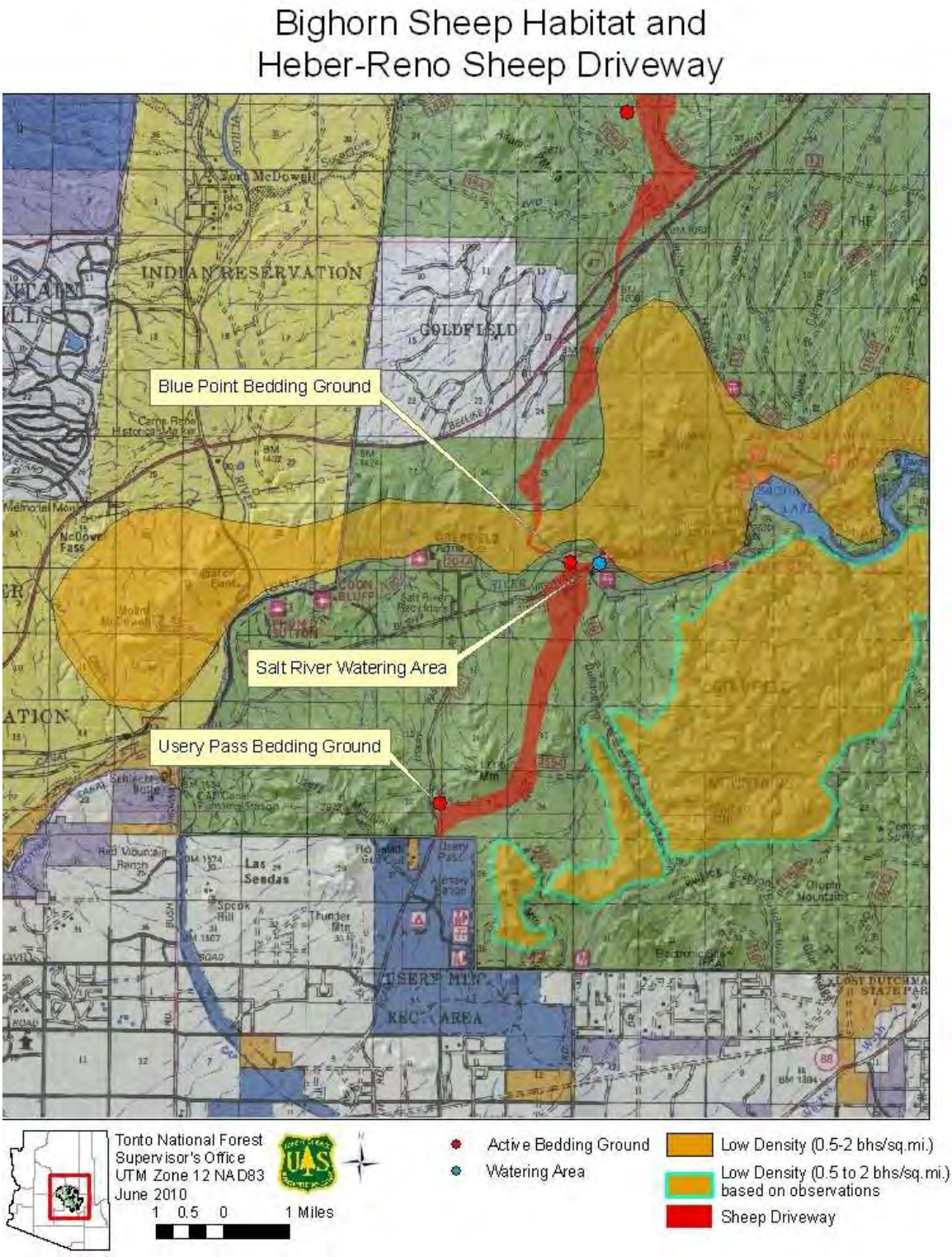

Figure 7. Heber-Reno Sheep Driveway, bedding grounds, watering area, and bighorn sheep habitat within Tonto NF, Mesa and Tonto Basin Ranger Districts

Direct and Indirect Effects – Forest Service Sensitive Species

Alternative 1 – All Forest Service Sensitive Species

No effect would occur for any Forest Service Sensitive species or their habitat if Alternative 1 was implemented because no action would occur.

Alternative 2

General Wildlife and Habitat

Trailing sheep would disturb resident wildlife or their habitat while traveling through the sheep driveways; however, we expect these minimal and temporary impacts to be negligible effects to wildlife and their habitat because of the limited time sheep would be spending in a given area.

Amphibians

Amphibians that are dependant on riparian habitats within the Sheep Driveway action area may be directly and indirectly impacted by trampling and compaction and not necessarily utilization of forage as the sheep move through the area so quickly. The effects from trampling and compaction help contribute to the poor and very poor range condition across the majority of the driveways.

Direct disturbance could include trampling by sheep resulting in injury or mortality of individuals. Habitats could be altered with forage removal and increased sedimentation thereby making the habitats less suitable. Sedimentation impacts should not be significant given the frequency of the disturbances by sheep and that most of the driveway crosses intermittent and ephemeral drainages, rather than perennial streams. Impacts would only occur over a small percentage of the species‟ total range, thereby lessening adverse effects as a whole.

Indirect effects are improbable since species are either unlikely to be present in the action area, or are several miles downstream. Sedimentation impacts to instream habitat from driveway use are not expected to be at a level to alter suitable or occupied habitat downstream.

Birds

Sheep may incidentally trample or dislodge nestlings or eggs of some breeding bird species traveling across habitats listed in that may occur along the driveways. However, it is highly unlikely because: 1) a small proportion of those species nest within reach of traveling sheep (that is, ground- and shrub-nesting birds), and 2) the nesting period for most of those species fall outside the time when sheep would be using the driveways. Consequently, we expect an insignificant and amount of eggs, nestlings, or nests to be incidentally destroyed during the project for Alternative 2.

Invertebrates

Invertebrates may be impacted by the trailing of sheep on the driveways through short-term displacement of individuals and destruction of sensitive vegetative species. These impacts should

not be to the extent that affects species viability. If present on the driveway, species may be impacted by sheep through direct disturbance or trampling, compaction, or consumption.

Indirect impacts to the species are not expected to be measurable due to the limited extent of sheep impacts in habitat for these species and the limited time sheep are present along portions of the driveway with suitable habitat for these species.

Reptiles

There may be short-term impacts to potential and suitable habitat for reptiles from sheep trailing. If present on the driveway, species may be impacted by sheep through trampling, compaction, or consumption. Indirect impacts could include impacts to potential habitat, but these are not expected to be measureable due to the limited time sheep spend along the driveway and the retention of adequate stubble heights adjacent to habitat for these species.

Rare Plants

Sheep may graze or browse plants, which may kill or retard growth. However, because of the limited amount of time in any given area, we expect the plants to be minimally browsed. The exception is the bedding grounds, which we expect to be impacted. But bedding grounds are located away from riparian areas, where many forest sensitive species occur. Sheep may also trample plants. But because sheep generally prefer to trail in open areas, we expect trampling to be minimal.

Mammals (Excluding Bighorn Sheep)

There may be short-term impacts to potential and suitable habitat for mammals from sheep trailing. If present on the driveway, species may be impacted by sheep through trampling, compaction, or consumption. Indirect impacts could include impacts to potential habitat, but these are not expected to be measureable due to the limited time sheep spend along the driveway and the retention of adequate stubble heights adjacent to habitat for these species.

Snags that are used for roosting by Allen‟s lappet browed bats along the driveway will not be affected by the trailing of sheep. Cliffs, rock outcrops, boulder piles, and other habitat components will not be affected and will continue to provide habitat to mammals along the driveway. Trampling, compaction, and grazing by the sheep could impact prey species habitat for some mammals, but these impacts are expected to be minor and short-term due to the short duration of trailing and the high use of roads for trailing sheep. Impacts on mammals related to sheep use of the driveway are not expected to be measurable.

Bighorn Sheep

Alternative 2 may increase the chances of domestic sheep passing on diseases to bighorn sheep. Viruses, parasites, and bacteria can weaken or kill bighorn sheep. However, domestic sheep are currently vaccinated for Clostridial diseases, and blue tongue virus. And domestic sheep are given ivermectin or Dectomax® to control parasite infestations. Fecal samples are also taken and tested for evidence of parasitism by a veterinarian hired by the domestic sheep permittees.

Of the potential diseases that domestic sheep can pass on to bighorn sheep, Pasteurella /Mannheimia (respiratory pneumonic disease) can be the most devastating to bighorn sheep. Pasteurella/Mannheimia can lead to acute to chronic bighorn sheep die-offs, and Pasteurella/ Mannheimia can result in low to 100% mortality (Garde and others 2005). In the past, Pasteurella

/Mannheimia has caused many bighorn sheep die-offs in many western states . Recently, about 400 bighorn sheep have died from disease outbreaks in Nevada, Montana, Utah, Washington (Associated Press, 2010). Although Pasteurella/Mannheimia are known to occur in bighorn sheep populations having no known association with domestic sheep (Goodson 1982), the majority of documented bighorn sheep die-offs occurs after contact with domestic sheep (Foreyt and Jessup 1982, Martin and others 1996). Consequently, there is a strong circumstantial link between domestic sheep presence and the subsequent spread of Pasteurella/Mannheimia to bighorn sheep.

The correlation is further supported by controlled experiments that demonstrate that bighorn sheep can contract the disease from domestic sheep disease carriers. When bighorn sheep are exposed to diseased domestic sheep, Foreyt (1989) and Callan and others (1991) found that the bighorn sheep can contract the disease and die. Consequently, a single incidence of transmission could have devastating consequences to the native bighorn sheep populations.

There are several scenarios where domestic sheep can pass on Pasteurella/Manheimia to bighorn sheep while on the driveways. The first scenario is when domestic sheep travel through bighorn sheep habitat. Sheep could leave M. haemolytica on vegetation as they walk and incidentally browse vegetation because M. haemolytica can survive in straw up for about 24 hours (Burriel 1997). The amount of risk is directly dependent on how much browse is available in that area. If there is no suitable browse, domestic sheep are less likely to leave M. haemolytica on vegetation.

The second scenario where domestic sheep can pass on Pasteurella/Manheimia is when bighorn sheep drink downstream of drinking domestic sheep because M. haemolytica can survive in water for 3 days (Burriel 1997). On the lower portion of the Heber-Reno Driveway, if we assume the river travels 3 miles an hour, we expect infected water will take 3 hours to travel to Granite Reef. After Granite Reef, some water is diverted into a canal, and the remaining water flows toward Tempe Town Lake. We assume that potentially infected water will no longer be available to bighorn sheep after Granite Reef because: 1) the canal heads west and away from bighorn sheep habitat toward human activity, and 2) there is closer, readily available water (CAP canal and uninfected new water from Salt River). We believe the risk of bighorn sheep contracting diseases from water is minimal because 1) the disease agents are substantially diluted from the large volume of water, and 2) the exposure time 8 miles downstream of the watering area is limited in any given area for 45 minutes.

The third scenario where domestic sheep can pass on Pasteurella/Manheimia to bighorn sheep is when domestic sheep are at their evening bedding grounds when bighorn sheep are stationary for 10 hours. During this time, domestic sheep ewes in estrus may attract bighorn rams as far as 2 miles away (Desert Bighorn Council 1990), and domestic sheep may spread Pasteurella/ Manheimia to bighorn sheep through nose-to-nose contact.

Arizona Game and Fish Department and the Tonto NF conducted a qualitative risk assessment (Holt, 2008) to determine the risk of nose-to-nose contact between domestic and bighorn sheep along the Heber-Reno Driveway. A variety of factors were considered, which included: domestic sheep strays, frequency of domestic sheep counts on driveway, number of days domestic sheep are on the driveway, terrain, bighorn sheep population/distribution, wild bighorn sheep ram: ewe ratio, timing of wild bighorn sheep translocations/reintroductions, domestic sheep herding activity, location/distance of wild sheep from domestic sheep during use of the driveways. The group concluded that depending on alternatives, the risk would range from no risk to low risk. The Table (10) below lists the risk assessments based on alternatives (Holt, 2008).

Table 10. Summary of ratings of likelihood of nose-to-nose contact between domestic sheep and bighorn sheep by alternative (Holt 2008).

Alternatives	Alt 1	Alt 2	Alt 3
Risk category	No risk	Low risk	Very low risk

On the lower part of the Heber-Reno Driveway, the two closest bedding grounds to bighorn sheep habitat are Blue Point and Usery Pass. However, it is unlikely that bighorn sheep would visit these bedding grounds for several reasons. First, the 2 bedding grounds are not in bighorn sheep habitat; the bedding grounds are located on flat ground. Bighorn sheep generally prefer rugged topography to escape predators. Second, 1 mile and 0.34 miles of non-bighorn sheep habitat (flat ground) separate the Usery Pass and Blue Point bedding ground from bighorn sheep habitat. Although bighorn sheep are known to disperse between mountain ranges across long, flat desert floors, it is not a common activity. Third, the Salt River is a natural barrier between the Blue Point bedding ground south of the river and bighorn sheep north of the river. However, it is conceivable that bighorns can find and cross the bridge. Last, human activity around the area are likely to scare bighorn sheep away. Herders and dogs guard the sheep at night. In addition, a high degree of recreational activity occur at Blue Point (rafters, fisherman, vehicles) and Usery Pass (heavy OHV use) to discourage bighorn sheep visitors. There are no documented cases of domestic sheep contact with wild bighorn sheep that have resulted in die-offs in the history of or in areas near the driveways (Holt 2008).

Despite the low risk and the lack of documented bighorn sheep die-offs throughout the history of the driveways, there is still some risk, which is difficult to express in qualitative assessments. Clifford and others (2009) have attempted to quantify some of the risk in sheep grazing allotments in populations of endangered Sierra Nevada Bighorn sheep in California. They developed a spatial disease transmission model to quantitatively assess the risk of respiratory disease transmission from domestic to bighorn sheep. Clifford and others (2009) found that even if risk was reduced to 2% per year, their model predicted a 50% probability of a catastrophic respiratory disease outbreak during the next 10 bighorn sheep generations (70 years). Although there are differences between the Sierra Nevada model and Alternative 2 (for example, the risk of disease transmission is significantly less for trailing sheep relative to grazing sheep), Clifford and others (2009) demonstrates that even low risk events may manifest themselves over longer periods of time.

Alternative 3a, 3b, and 3c

General Wildlife and Habitat, Birds, and Plants

Direct and indirect effects would be similar to those described for alternative 2, but to a lesser degree because transporting the sheep over portions of the driveway would have less impacts.

Bighorn Sheep

Alternative 3a, b and c address issues related to bighorn sheep and the potential for nose-to-nose contact with domestic sheep by providing transportation of domestic sheep around areas potentially occupied by bighorn sheep to several potential dropoff points further along the sheep driveway. Although it would not reduce the risk to “none”, implementation of Alternative 3

would reduce the risk of disease transmission between domestic sheep and bighorn sheep on the Heber-Reno Sheep Driveway to "very low", compared to the "low" risk of disease transmission expected if Alternative 2 was implemented (Table 11). Based on this, Alternative 3 may impact individual desert and Rocky Mountain bighorn sheep, but is not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing.

Reptiles

There may be short-term impacts to potential and suitable habitat for reptiles from sheep trailing. If present on the driveway, species may be impacted by sheep through trampling, compaction, or consumption. Indirect impacts could include impacts to potential habitat, but these are not expected to be measureable due to the limited time sheep spend along the driveway and the retention of adequate stubble heights adjacent to habitat for these species.

Rare Plants

Sheep may graze or browse plants, which may kill or retard growth. However, because of the limited amount of time in any given area, we expect the plants to be minimally browsed. The exception is the bedding grounds, which we expect to be impacted. But bedding grounds are located away from riparian areas, where many forest sensitive species occur. Sheep may also trample plants. But because sheep generally prefer to trail in open areas, we expect trampling to be minimal.

Summary of Determinations of Effect for Forest Service Sensitive Species

Table 11. Summary of Effects Determinations for Forest Service Sensitive Species.

	Alternative 2	Alternative 3a	Alternative 3b	Alternative 3c
Amphibians				
Arizona Toad	MAII[7]	MAII	MAII	MAII
Lowland Leopard Frog	MAII	MAII	MAII	NI[8]
Birds				
Zone-Tailed Hawk	MAII	MAII	MAII	MAII
Northern Goshawk	MAII	MAII	MAII	MAII
Northern Gray Hawk	MAII	NI	NI	NI
Common Black-Hawk	MAII	MAII	MAII	MAII

[7] MAII – May adversely impact individuals, but is not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing.

[8] NI – No impact.

	Alternative 2	Alternative 3a	Alternative 3b	Alternative 3c
American Peregrine Falcon	MAII	MAII	MAII	MAII
Western Yellow-Billed Cuckoo	MAII	MAII	MAII	NI
Abert‟s Towhee	MAII	MAII	MAII	NI
Bald Eagle	MAII	MAII	MAII	MAII
Burrowing Owl	NI	MAII	MAII	MAII
Invertebrates				
California Floater	NI	NI	NI	NI
Ferris‟ (Arizona) Copper	NI	MAII	MAII	MAII
Fish				
Desert Sucker	MAII	MAII	MAII	MAII
Headwater Chub	MAII	NI	NI	NI
Longfin Dace	MAII	NI	NI	NI
Roundtail Chub	MAII	NI	NI	NI
Sonora Sucker	MAII	NI	NI	NI
Little Colorado Sucker	MAII	MAII	MAII	MAII
Bluehead Sucker	MAII	MAII	MAII	MAII
Mammals				
Western Red Bat	MAII	NI	NI	NI
Allen‟s Lappet-Browed Bat	MAII	MAII	MAII	MAII
Pale Townsend‟s Big-Eared Bat	MAII	MAII	MAII	MAII
Greater Western Mastiff Bat	MAII	NI	NI	NI
Rocky Mountain Bighorn Sheep	MAII	MAII	MAII	MAII
Desert Bighorn Sheep	MAII	MAII	MAII	MAII

	Alternative 2	Alternative 3a	Alternative 3b	Alternative 3c
Springerville Pocket Mouse	MAII	MAII	MAII	MAII
White Mountains Ground Squirrel	MAII	MAII	MAII	MAII
New Mexican Jumping Mouse	MAII	MAII	MAII	MAII
Merriam‘s Shrew	MAII	MAII	MAII	MAII
Long-Tailed Vole	MAII	MAII	MAII	MAII
White Mountains Chipmunk	MAII	MAII	MAII	MAII
Arizona Gray Squirrel	NI	NI	NI	NI
Southern Red-Backed Vole	NI	NI	NI	NI
Arizona Montano Effect Vole	NI	NI	NI	NI
Navajo Mogollon Vole	NI	NI	NI	NI
Reptiles				
Reticulate Gila Monster	MAII	MAII	MAII	NI
Sonoran Desert Tortoise	MAII	MAII	MAII	NI
Maricopa Leaf-Nosed Snake	MAII	MAII	MAII	NI
Mexican Gartersnake	MAII	MAII	MAII	NI
Plants				
Tonto Basin Agave	MAII	MAII	MAII	NI
Hohokam Agave	MAII	MAII	MAII	NI
Arizona Alum Root	NI	NI	NI	NI
Mapleleaf False Snapdragon	MAII	NI	NI	NI

	Alternative 2	Alternative 3a	Alternative 3b	Alternative 3c
Blumer‟s Dock	MAII	MAII	MAII	MAII
Goodding‟s Onion	MAII	MAII	MAII	MAII
Arizona Willow	NI	NI	NI	NI
Bebb‟s Willow	MAII	MAII	MAII	MAII
Arizona Sneezeweed	MAII	MAII	MAII	MAII
Arizona Sunflower	MAII	MAII	MAII	MAII
Greene Milkweed	NI	NI	NI	NI
Villous Groundcover Vetch	NI	NI	NI	NI
White Mountains Paintbrush	NI	NI	NI	NI
Gila Thistle	NI	NI	NI	NI
Yellow Lady‟s Slipper	NI	NI	NI	NI
Heathleaf Wild Buckwheat	NI	NI	NI	NI
Wislizeni Gentian	NI	NI	NI	NI
Mogollon Hawkweed	NI	NI	NI	NI
Heartleaf Groundsel	NI	NI	NI	NI
Maguire‟s Beardtongue	NI	NI	NI	NI
Davidson‟s Cliff Carrot	NI	NI	NI	NI
Parish‟s Alkali Grass	NI	NI	NI	NI
Mogollon Clover	NI	NI	NI	NI

Management Indicator Species

The Tonto NF Plan (USDA 1985) identifies 27 MIS species representing nine vegetation types and the habitat features they are intended to monitor. Four of these are analyzed in depth for this

project due to habitat being present in the project area (canyon towhee, horned lark, savannah sparrow, ash-throated flycatcher) . The Apache-Sitgreaves forest plan (as amended) identifies 17 MIS species to monitor the health of the forests‟ ecosystems (USDA FS 1987a). The forest plan provides direction on managing quality habitat for MIS by management area (MA). Eight of these are analyzed in depth for this project due to habitat being present in the project area (elk, antelope, cinnamon teal, Mexican spotted owl, wild turkey, northern goshawk, mule deer, aquatic macroinvertebrates).

Table 12. Management indicator species considered for this analysis.

Species (Forest)	Habitat Type (Indicator of)	MA (ASNF)/vegetation type (TNF)	Analyzed in Detail? (yes/no)	Reason for exclusion from detailed analysis
Abert's Squirrel TNF and ASNFs	Early succession (ponderosa pine interlocking canopies)	MA1/Ponderosa Pine-Mixed Conifer	TNF and ASNF - No.	Habitat exists in the project area, but sheep grazing does not affect forest structure of conifers or foraging habitat.
Elk TNF and ASNFs	Early succession (grassland, deciduous riparian, ponderosa pine, spruce fir wet mixed conifer)	MA 1, 2, 4/Ponderosa Pine-Mixed Conifer	TNF – No. ASNF - Yes.	TNF – Project alternatives do not affect general forest conditions. ASNF - Not applicable (NA)
Aquatic Macroinvertebrates TNF and ASNF	Riparian (wetland/cienega)	MA3/Aquatic	TNF – No. ASNF - Yes.	TNF – Project alternatives do not affect water quality. ASNF - NA
Mule Deer ASNF only	Early succession (spruce fir wet mixed conifer, ponderosa pine and pinyon juniper habitat components)	MA 1, 2	TNF – NA ASNF - Yes.	NA
Antelope ASNF only	Early succession (woodland, grasslands, deciduous riparian)	MA 2, 4	Yes.	NA
Northern Goshawk (TNF and ASNFs)	Late succession (old growth)	MA1/Ponderosa Pine-Mixed Conifer	TNF – No. ASNF - Yes.	TNF – Project alternatives do not affect vertical diversity. ASNF - NA

Species (Forest)	Habitat Type (Indicator of)	MA (ASNF)/vegetation type (TNF)	Analyzed in Detail? (yes/no)	Reason for exclusion from detailed analysis
Pygmy Nuthatch (TNF and ASNFs)	Late succession (snags in old growth ponderosa pine)	MA1/Ponderosa Pine-Mixed Conifer	TNF and ASNF - No.	Habitat exists in the project area, but sheep grazing does not affect snag development or retention.
Wild Turkey (TNF and ASNFs)	Late succession (wetland/cienega, ponderosa pine, riparian areas, and grasslands)	MA1/Ponderosa Pine-Mixed Conifer	TNF – No. ASNF - Yes.	TNF – Project alternatives do not affect vertical diversity. ASNF - NA
Red Squirrel (ASNFs only)	Late succession (spruce-fir and wet mixed conifer)	MA1	No.	Habitat exists in the project area, but sheep grazing does not affect forest structure of conifers or foraging habitat.
Mexican Spotted Owl (ASNFs only)	Late succession (snags and mature forests)	MA1	Yes.	NA
Yellow-Bellied Sapsucker (red-naped sapsucker) (ASNFs only)	Aspen snags (mixed broadleaf deciduous)	MA1	No.	Minimal habitat exists in the project area, but sheep grazing does not affect snag development or retention.
Plain Titmouse (TNF and ASNFs)	Snags (pinyon-juniper)	MA2/Pinyon-juniper (woodland)	TNF and ASNF - No.	Habitat exists in the project area, but sheep grazing does not affect forest structure .
Hairy Woodpecker (TNF and ASNFs)	Snags (all forest habitat types)	MA1/Ponderosa Pine-Mixed Conifer	TNF and ASNF - No.	Habitat exists in the project area, but sheep grazing does not affect snag development or retention.

Species (Forest)	Habitat Type (Indicator of)	MA (ASNF)/vegetation type (TNF)	Analyzed in Detail? (yes/no)	Reason for exclusion from detailed analysis
Lincoln's Sparrow (ASNFs only)	High elevation riparian (montane willow)	MA3	No.	No montane willow habitat within the project area.
Lucy's Warbler (ASNFs only)	Low elevation riparian (mixed broadleaf deciduous)	MA3	No.	No low elevation riparian habitat within the project area.
Yellow-Breasted Chat (ASNFs only)	Low elevation riparian (cottonwood-willow)	MA3	No.	No low elevation riparian habitat within project area.
Cinnamon Teal (ASNFs only)	Wetlands (wetland/cienega)	MA 11	Yes.	NA
Violet-green Swallow (TNF only)	Cavity nesting habitat	Ponderosa Pine/Mixed Conifer	No.	Project alternatives do not affect cavity nesting habitat.
Western Bluebird (TNF only)	forest openings	Ponderosa pine/Mixed Conifer	No.	Project alternatives do not affect forest openings because sheep will not remove trees.
Ash-throated Flycatcher (TNF only)	ground cover	Pinyon-juniper (Woodland)	Yes.	NA
GrayVireo (TNF only)	tree density	Pinyon-juniper (Woodland)	No.	Project alternatives do not affect tree density.
Townsend's Solitaire (TNF only)	juniper berry production	Pinyon-juniper (Woodland)	No.	Project alternatives does not affect juniper berry production.
Common Flicker (TNF only)	snags	Pinyon-juniper (Woodland)	No.	Project alternatives do not affect snags.

Species (Forest)	Habitat Type (Indicator of)	MA (ASNF)/vegetation type (TNF)	Analyzed in Detail? (yes/no)	Reason for exclusion from detailed analysis
Spotted Towhee (TNF only)	shrub diversity	Chaparral	No.	Project alternatives do not affect successional stages of pinyon-juniper.
Savannah Sparrow (TNF only)	grass species diversity	Desert-grassland	Yes.	NA
Horned Lark (TNF only)	vegetation aspect	Desert-grassland	Yes.	NA
Black-throated Sparrow (TNF only)	shrub diversity	Desertscrub	No.	Project alternatives do not affect shrub diversity.
Canyon Towhee (TNF only)	ground cover	Desertscrub	Yes.	NA
Bald Eagle (TNF only)	general riparian	Riparian – Low Elevation (1500-3500 feet)	No.	Project alternatives do not affect general riparian.
Bell's Vireo (TNF only)	well-developed understory	Riparian – Low Elevation (1500-3500 feet)	No.	Project alternatives do not affect well-developed understory.
Summer Tanager (TNF only)	tall, mature trees	Riparian – Low Elevation (1500-3500 feet)	No.	Project alternatives do not affect tall, mature trees.
Hooded Oriole (TNF only)	medium-sized trees	Riparian – Low Elevation (1500-3500 feet)	No.	Project alternatives do not affect medium-sized trees.
Arizona Gray Squirrel (TNF only)	general riparian	Riparian – High Elevation (3000 feet plus)	No.	Project alternatives do not affect general riparian.
Warbling Vireo (TNF only)	tall overstory	Riparian – High Elevation (3000 feet plus)	No.	Project alternatives do not affect tall overstory.

Species (Forest)	Habitat Type (Indicator of)	MA (ASNF)/vegetation type (TNF)	Analyzed in Detail? (yes/no)	Reason for exclusion from detailed analysis
Western Wood Pewee (TNF only)	medium overstory	Riparian – High Elevation (3000 feet plus)	No.	Project alternatives do not affect medium overstory.
Common Black-hawk (TNF only)	riparian streamside	Riparian – High Elevation (3000 feet plus)	No.	Project alternatives do not affect riparian streamside.

Table 13. Summary of MIS considered in detail including habitat and population trends within the project area.

Species (Forest)	MA (ASNF)/vegetation type (TNF)	Acres habitat (MA acres from forest plan)	Acres habitat within analysis area	Habitat Trend	Population Trend
Elk	MA1/Ponderosa Pine-Mixed Conifer	TNF – NA ASNF - 1,577,778	TNF – NA ASNF – 11,743	TNF – NA ASNF - Upward, but declining in open grasslands	TNF – NA ASNF - Stable to slightly decreasing
Aquatic Macroinvertebrates	MA 1, 2, 4/Ponderosa Pine-Mixed Conifer	ASNF – 15,762	ASNF – 279	ASNF - Declining	ASNF - Declining
Mule Deer	MA3/Aquatic	TNF – NA ASNF - 1,577,778	TNF – NA ASNF – 16,668	TNF – NA ASNF - Upward	TNF – NA ASNF - Declining
Antelope	MA 1, 2	TNF – NA ASNF - 252,269	TNF – NA ASNF – 4,272	TNF – NA ASNF - Upward	TNF – NA ASNF - Stable

Species (Forest)	MA (ASNF)/vegetation type (TNF)	Acres habitat (MA acres from forest plan)	Acres habitat within analysis area	Habitat Trend	Population Trend
Northern Goshawk	MA 2, 4/Ponderosa pine-Mixed Conifer	TNF – NA ASNF - 626,989	TNF – NA ASNF – 6,359	TNF – NA ASNF - Stable, but declining	TNF – NA ASNF - Stable
Wild Turkey	MA1/Ponderosa Pine-Mixed Conifer	TNF – NA ASNF - 989,516	TNF – NA ASNF – 11,743	TNF – NA ASNF - Upward	TNF – NA ASNF - Stable
Mexican Spotted Owl	MA1/Ponderosa Pine-Mixed Conifer	ASNF - 1,004,019	ASNF – 11,743	ASNF - Declining	ASNF - Stable
Cinnamon Teal	MA1	ASNF – 15,762	ASNF - 279	ASNF - Upward	ASNF - Stable
Ash-throated flycatcher	MA1	TNF – 1,413,986	TNF – 22,051	TNF – Static	TNF – Increasing
Savannah Sparrow	MA1	TNF – 316,894	TNF – 4,093	TNF – Upward/Static	TNF – Increasing
Horned Lark	MA2/Pinyon-juniper woodland	TNF – 316,894	TNF – 4,093	TNF – Upward/Static	TNF – Increasing
Canyon Towhee	MA1/Ponderosa pine-mixed Conifer	TNF – 896,771	TNF – 8,077	TNF – Downward/Static	TNF – Increasing

Environmental Consequences for MIS

Direct and indirect effects are provided here by alternative, and cumulative effects are found for all wildlife at the end of the section. Effects to the Mexican spotted owl were covered in the "Federally Listed Threatened, Endangered, and Proposed Candidate Species and Designated Critical Habitat" section. Effects to the northern goshawk were covered in the "Forest Service Sensitive Species" section.

Consistency with Forest Plan Direction

For all MIS species, under alternative 1, based on existing trends, this alternative would achieve forest plan objectives for habitat and population trends. For all MIS species, under alternatives 2 and 3, the issuance of a grazing permit for the Heber-Reno/Morgan Mountain Sheep Driveways as proposed would maintain or improve habitat and population trends from that shown in Table 13. These improvements would result in achieving forest plan objectives for habitat and population trends.

Alternative 1 – All MIS

No effect would occur for any management indicator species or their habitat if Alternative 1 was implemented because no action would occur. Population and habitat trends for all management indicator species would remain the same as described in Table 13.

Elk

Alternative 2

Summer and winter elk habitat exists on the driveways. Alternative 2 would have effects to elk, including competition for forage and disturbance associated with sheep herding. Competition for forage between elk and domestic sheep during the summer is typically limited because of limited dietary overlap. Competition can increase in the late summer and fall, if elk diets shift toward a higher dependence on forbs (Nelson 1982, pages 423-425).

The sheep are trailed across the 3 ASNFs ranger districts in generally 9 days. They spend 4 days trailing across the Black Mesa Ranger District, 3 days to trail across the Lakeside Ranger District, and 2 days to trail across the Springerville Ranger District. Along much of the route they are trailed on or adjacent to roadways. Much of the disturbance is generally from trampling and compaction and not necessarily utilization of forage as they move through so quickly. The effects from trampling and compaction help contribute to the poor and very poor range condition across the majority of the driveways.

The disturbance effect of a large sheep herd and its associated sheepherders, dogs, and pack animals can be substantial to elk. Elk typically move out when a large flock of sheep is moved into an area (Nelson 1982). Elk have been found to stay at least ½ mile from sheep bands, which can affect their foraging behavior and the distance they must travel to water. Alternative 2 will cause localized disturbance to elk but are not expected to affect population numbers or trends. Since sheep on the driveways are trailed through very rapidly and do not graze in steep drainages

or dense tree stands, this type of elk hiding cover will not be affected, although elk may need to move within or between cover areas to maintain a preferred distance from the sheep bands.

Alternative 2 would not result in a measurable change in elk habitat or population trends on the A-S National Forests.

Alternative 3
Direct and indirect effects on elk resulting from implementation of Alternative 3 are expected to the same as those described for Alternative 2.

Aquatic Macroinvertebrates

Alternative 2
Alternative 2 would have the potential to directly affect macroinvertebrates within the driveway alignment. Although the extent of use is not well documented, macroinvertebrates have the potential to be present throughout the driveway in perennial habitats.

Sheep could, under alternative 2, affect macroinvertebrates by eating and trampling suitable habitat near riparian areas. All creek crossings will be rotated so that each crossing receives a minimum of a 5-year rest. This mitigation measure is expected to help improve macroinvertebrate habitat. These areas are still affected by livestock and wild ungulate use. These areas are on allotments that should have current or proposed livestock management strategies to help maintain or improve existing satisfactory or unsatisfactory riparian conditions. Improved riparian conditions will benefit aquatic macroinvertebrates by maintaining lower stream temperatures, providing increased quantities of detrital food sources and maintain better water quality and greater channel stability as sedimentation levels decline. Additionally improved watershed conditions will reduce sedimentation within the drainage basins maintaining or improving aquatic macroinvertebrate habitat conditions

Although alternative 2 may have localized impacts to the macroinvertebrates that are within the driveway, this alternative will not affect the Forest-wide population or habitat trend.

Alternative 3
Direct and indirect effects on aquatic macroinvertebrates resulting from implementation of Alternative 3 are expected to the same as those described for Alternative 2.

Mule Deer

Alternative 2
Alternative 2 would authorize domestic sheep to continue trailing on the driveways. Summer and winter range deer habitat exists on the driveways and the trailing of domestic sheep would directly affect mule deer by creating competition for forage and water and by causing disturbance.

Mule deer and domestic sheep generally have greater dietary overlap than mule deer and cattle (Longhurst et al. 1982, Peek and Krausman 1996), although mule deer diets vary widely between seasons and years (Peek and Krausman 1996). This can result in competition when forage is lacking. When sufficient forage of all species is available to sheep and mule deer, there is not competition (Peek and Krausman 1996). With the exception of the Rodeo-Chediski fire area, the browse component is sparse along the driveway across the 3 ASNFs ranger districts. Therefore, competition for forage between deer and sheep will be very minimal.

Alternative 2 would result in some disturbance to mule deer. While on the driveways, 4,000 head of sheep, their associated herders, dogs, and pack animals would cause disturbance and possible displacement to mule deer in the immediate vicinity. This disturbance would occur where sheep are grazing and bedding areas and would be local in nature. It is likely that deer would move a short distance from areas where sheep are and then move back into the area after the sheep have moved on.

The implementation of Alternative 2 would not result in a measurable deviation from the current Forest-wide mule deer population trend. The alternative also would not affect the Forest-wide mule deer habitat trend.

Alternative 3

Direct and indirect effects on mule deer resulting from implementation of Alternative 3 are expected to the same as those described for Alternative 2.

Pronghorn Antelope

Alternative 2

Pronghorns occur in very limited numbers among the driveways across the 3 ASNFs districts. Alternative 2 presents a potential for several effects to the pronghorn population along the driveways, even though the population within and near the driveways is small and has limited suitable habitat. These affects include competition for food and water, disturbance associated with sheep grazing and herding, and parasites shared by domestic sheep and pronghorns.

For those pronghorn that use the driveways, domestic sheep present a higher level of forage competition than cattle. Dietary overlap between domestic sheep and pronghorns can be significant, as both species prefer forbs and shrubs (Yoakum et al. 1996). Dietary overlap between these two species tends to be highest when forbs are most available and lowest when they are least available. Alternative 3 will continue the trailing of sheep along the driveways. Competition between sheep and pronghorns for forage will persist but may be less pronounced because of the use of roads for trailing of the sheep and the short duration, as they are trailed through very quickly.

Domestic sheep and pronghorns share many parasites. Parasites common to pronghorns and domestic sheep have been implicated in the illness and deaths of pronghorn fawns in some areas of the Western United States (Yoakum et al. 1996). The negative effects to the pronghorn population of shared parasites will persist as long as domestic sheep remain trailing on the driveways. There would be a minor threat of parasites being shared with the domestic sheep due to the small duration of the driveway and the likeliness of the pronghorn to displace from the area while the driveways are being used.

Alternative 2 would result in periodic disturbance to antelope. While on the driveways, 4,000 head of sheep, their associated herders, dogs, and pack animals would cause disturbance and possible displacement to pronghorns in the immediate vicinity. This disturbance would be short in duration as the sheep trail through very quickly. The sheep are trailed across the 3 ASNFs ranger districts in generally 9 days. They spend 4 days trailing across the Black Mesa Ranger District, 3 days to trail across the Lakeside Ranger District, and 2 days to trail across the Springerville Ranger District. Along much of the route they are trailed on or adjacent to roadways. Much of the disturbance is generally from trampling and not necessarily utilization of forage as they move through so quickly. The effects from trampling, is contributing to the poor and very poor range condition across the majority of the driveways.

Because so few pronghorns use the driveways, implementing alternative 2 would have no effect to the Forest-wide population or habitat trend.

Alternative 3

Direct and indirect effects on pronghorn antelope resulting from implementation of Alternative 3 are expected to the same as those described for Alternative 2.

Northern Goshawk

Alternative 2

Goshawks could be directly affected by alternative 2 because of disturbance associated with sheep herding. The trailing of the sheep goes through portions of 2 Post-Fledgling Family Areas (PFA) and adjacent to 1 more. The herding of sheep goes through a portion of the Shipping Goshawk PFA (#030105028) on the Black Mesa Ranger District. The herding goes through a portion of the Turkey Mountain Goshawk PFA (#030107008) and adjacent to the Brown Creek Goshawk PFA (#030107017) on the Lakeside Ranger District.

The trailing of the sheep on the Lakeside Ranger District is on roads through the Goshawk PFA's, which would likely cause minor short-term disturbances to goshawks in the area. Goshawks typically nest in drainages and are usually incubating eggs or attending to nestlings in May and early June or attending to nestlings and fledglings from mid June through September. Dust, noise, and the presence of sheepherders, and dogs would be sources of potential disturbance. The disturbance would be very limited due to the trailing on the roads and the very short duration of the disturbance as they are trailed through very quickly. Since sheep would trail along the roads through the PFA's the disturbance would be away from known nest sites and of limited duration.

Goshawks may be indirectly affected by domestic sheep grazing through the removal of vegetative cover needed by prey species. Guidelines for the management of goshawk habitat in the Southwest (Reynolds et al. 1992) recommend that utilization of grasses and forbs should average 20% by weight and not exceed 40% in any area. The driveways go through livestock allotments and utilization levels would meet this guideline. With the trailing of sheep being of such short duration this alternative is not expected to adversely affect the needed cover and forage to support a healthy population of rabbits, rodents, and other goshawk prey species.

Implementation of this alternative could have an effect on goshawks in or near the driveways, but the effects would not be adverse. This alternative would not cause changes in the Forest goshawk population or habitat trends.

Alternative 3
Direct and indirect effects on northern goshawks resulting from implementation of Alternative 3 are expected to the same as those described for Alternative 2.

Wild Turkey

Alternative 2
Sheep trailing proposed in alternative 2 would affect turkeys by removing some cover and forage and potentially disturb foraging, nesting, and loafing turkeys.

Merriam‟s Turkey occur throughout the area, however, turkeys tend to concentrate along the draws and canyons on the driveways. Feeding turkeys seek out small forest openings typically surrounded by structurally diverse areas that provide adequate cover from predators. Turkeys require nesting sites characterized by steep slopes, typically in canyons, which have shrubs and high overhead and horizontal cover. Turkeys roost selectively in dense stands of large conifer trees (mainly ponderosa pine), often in association with drainages and riparian habitat.

Grasses provide cover for adults and poults during nesting and young-rearing seasons and grass seedheads are an important source of food in the fall and early winter (Wakeling 1991). Mast, another important food source, will not be affected directly by sheep grazing but sheep browsing on oak seedlings could affect future mast production.

Sheep grazing and associated herding would cause a limited level of disturbance to turkeys. Alternative 2 will cause localized disturbance to turkeys but are not expected to adversely affect their behavior. Since sheep on the driveways do not graze in steep drainages or dense tree stands, this type of hiding cover will not be affected, although turkeys may need to move within or between cover areas to maintain a preferred distance from the sheep bands. Movement between cover areas could increase the vulnerability of individuals to predators and hunters. Although alternative 2 may have small effects to the turkeys within the driveways, this alternative will not affect the Forest-wide population or habitat trend.

Alternative 3
Direct and indirect effects on wild turkey resulting from implementation of Alternative 3 are expected to the same as those described for Alternative 2.

Mexican Spotted Owl

Alternative 2
Sheep trailing as described in this alternative would have no direct effects to Mexican spotted owls but could have indirect effects through the alteration of prey species habitat. The Heber-Reno and Morgan Mountain Driveways includes a portion of the Jersey Canyon MSO Protected Activity Center (PAC) (#030105010) on the Black Mesa Ranger District. The sheep are also trailed through a portion of the Gillespie MSO PAC (#03010617) on the Springerville Ranger District.

The removal of vegetation by domestic sheep can have indirect effects to Mexican spotted owls. Woody and herbaceous vegetation provide important cover for MSO prey species. The trailing of sheep and grazing can remove enough forage and cover to affect prey species abundance and composition in Mexican spotted owl foraging areas (USDI 1995). These measures are expected to promote and maintain woody and herbaceous cover needed by MSO rodent prey species and provide enough residual biomass to allow prescribed natural and ignited fires to burn so that the risk of catastrophic wildfires would be reduced. Mexican Spotted Owl PAC"s are excluded from sheep bed-ground locations and water hauling areas.

The trailing of the sheep does not go through any known spotted owl nesting areas due to steep slopes, down/dead material, and the lack of forage. Although the driveways traverse through portions of 2 MSO PAC"s spotted owl prey habitat is not expected to be altered. Although spotted owls may be affected by sheep trailing in the driveways, the effects are not expected to be adverse or cause changes to Forest-wide MSO population or habitat trends.

Alternative 3

Direct and indirect effects on Mexican spotted owls resulting from implementation of Alternative 3 are expected to the same as those described for Alternative 2.

Cinnamon Teal

Alternative 2

Alternative 2 would have potential to directly affect cinnamon teal. Although the extent of use is not well documented, cinnamon teal are known to periodically use large stock tanks, lakes, wetlands, and water accumulated in gravel pits as summer habitat in this area. Nesting has not been documented on the Districts but could occur near larger stock tanks, lakes, and wetlands. Stock tanks in this area are considered marginal habitat because they are typically small (< ½ acre) and do not have sufficient emergent and sub-emergent vegetative cover preferred by cinnamon teal. Several wetlands and stock tanks on the driveways have been surveyed for amphibians since 2001. Nesting cinnamon teal have not been observed during these surveys.

Sheep could, under alternative 2, affect cinnamon teal by eating and trampling suitable nesting habitat near stock tanks and wetlands. This mitigation measure is expected to help improve cinnamon teal habitat in areas that have the highest potential for nesting, although these areas will still be impacted by livestock and wild ungulates. Stock tanks would receive heavy use while sheep are trailed through but the use would be very short in duration as the sheep would be herded to new areas frequently. Cinnamon teal nesting around stock tanks could have their nest trampled by sheep or be flushed from the nest, which increases the probability of nest predation and nest abandonment.

Adult and fledgling teal using stock tanks or small wetlands could be disturbed by the presence of sheep and their herders. Sheep could also reduce the amount of vegetative cover in and around stock tanks which could increase the risk of predation, especially of young teal.

Because the amount of suitable nesting habitat on the driveways is limited and nesting has not been documented, it is expected that the Forest-wide population and habitat trends for this species would not be altered by this alternative.

Alternative 3

Direct and indirect effects on cinnamon teal resulting from implementation of Alternative 3 are expected to the same as those described for Alternative 2.

Ash-throated Flycatcher, Savannah Sparrow, Horned Lark and Canyon Towhee

Alternatives 2 and 3

Implementation of Alternatives 2 and 3 are expected to have no effect on population or habitat trends for Ash-throated flycatcher, savannah sparrow, horned lark and canyon towhee. This is largely due to the limited amount of habitat affected for these species found within the project area, as well as the lack of measurable effects on these habitat types related to sheep grazing.

Migratory Birds

Arizona Partners in Flight (APIF) identifies physiographic areas and high priority migratory bird species by broad habitat types. The forests are in Bird Conservation Regions 34 (Sierra Madre Occidental) and 16 (Southern Rockies/Colorado Plateau). The U.S. Fish and Wildlife Service released its "Birds of Conservation Concern Report" (BCC) in 2008 (USFWS 2008). This analysis considers birds from both the BCC report and PIF high priority species. There is one identified important bird area (IBA), the Blue River Complex designated by the National Audubon Society, and one recognized IBA, the Upper Little Colorado River Watershed.

A total of 53 species have been identified on the forests, and 12 of these are discussed in the Threatened and Endangered, Sensitive Species and MIS sections and will not be discussed further here. They are: Western yellow-billed cuckoo, Southwestern willow flycatcher, common black hawk, Mexican spotted owl, northern goshawk, bald eagle, peregrine falcon, burrowing owl, red-naped sapsucker, Bell‟s vireo, juniper titmouse, and Lucy‟s warbler. Table 14 summarizes the 41 migratory birds considered in this analysis with a description of their habitats and effects under alternatives 2 and 3. Five of these birds are listed for two different habitat components so appear twice on the table. More detailed information is provided in the wildlife specialist report found in the project record.

Under all alternatives, there would be no direct or indirect effect to range wide populations of any migratory bird species. Under alternative 1, due to no trailing of sheep, there would be no effect to migratory birds. Under alternatives 2 and 3 the effects are described by species in Table 14.

Important Bird Areas

There is one identified IBA, the Blue River Complex designated by the National Audubon Society, and one recognized IBA, the Upper Little Colorado River Watershed on the ASNFs. There are no IBAs near the Sheep Driveway on the ASNF‟s. There are 3 IBAs located within Tonto National Forest. They are the Cave Creek IBA, Salt and Verde Riparian Ecosystem IBA (not finalized), and the Arnett Creek portion (not finalized) of the Boyce Thompson-Arnett Creek. There is also a designated overwintering area at Roosevelt Lake. However, none of these IBAs or the overwintering area occur within the driveway. Therefore, no IBAs will be affected by the project.

Table 14. Summary of migratory birds by habitat within the analysis area and effects by alternative.

Veg type	Species	Habitat	Habitat Impacts	Effects – Alts 2, 3a, 3b, and 3c
Mixed conifer, ponderosa pine, ponderosa pine/gambel oak	Northern goshawk	See sensitive species		
Mixed conifer, ponderosa pine/gambel oak	Mexican spotted owl	See TES		
Mixed conifer, ponderosa pine, spruce-fir, aspen, pinyon-juniper, oak woodlands	Flammulated Owl	Prefers ponderosa pine forests with some undergrowth of oaks.	Overstory vegetation will not be altered. Trampling, compaction, and light grazing could affect insects. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing possible. No adverse effects expected.
Mixed conifer, ponderosa pine, pinyon-juniper, oak woodlands	Lewis‟s Woodpecker	Open country with scattered trees, attracted to burned over areas of Douglas-fir, pinyon-juniper, riparian and oak woodlands.	There will be no loss of snag habitat resulting from implementation of any alternative proposed for this project, so habitat suitability will not be affected for this species.	No adverse effects expected.
Mixed conifer, ponderosa pine, pinyon-juniper, oak woodlands	Peregrine Falcon	See sensitive species		
Mixed conifer, ponderosa pine, pinyon-juniper, oak woodlands	Golden Eagle	Open country from barren areas to coniferous forests, needs large trees and cliffs for roosting and perching	Suitable cliff and isolated large tree habitat present within/adjacent to driveway. Sheep trailing will not alter these features.	No adverse effects expected.
Douglas fir, ponderosa pine	Olive sided flycatcher	Forest openings and edges-needs mature pines and snags.	Overstory vegetation will not be altered. Trampling, compaction, and light grazing could affect insects. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Douglas fir, ponderosa pine, spruce-fir, aspen	Williamson‟s Sapsucker	Uses different tree species for cavity nests	There will be no loss of snag habitat resulting from implementation of any alternative proposed for this project, so habitat suitability will not be affected for this species.	No adverse effects expected.
Ponderosa pine, Douglas fir, maple, oak, aspen	Cordilleran Flycatcher	Dense canopy, mid-late succession forests, snags.	Saplings and larger trees will not be altered by sheep trailing. Trampling, compaction,	Short term disturbance associated with sheep

Veg type	Species	Habitat	Habitat Impacts	Effects – Alts 2, 3a, 3b, and 3c
			and light grazing could affect insects. Impacts are expected to be minimal and short term.	trailing possible. No adverse effects expected.
Ponderosa pine	Purple Martin	Large snags in or near open areas. Low number of snags in area, species not observed in area.	There will be no loss of snag habitat resulting from implementation of any alternative proposed for this project, so habitat suitability will not be affected for this species.	No adverse effects expected.
Ponderosa pine, and oak woodlands	Grace"s Warbler	Pine-oak forests	Saplings and larger trees will not be altered by sheep trailing. Trampling, compaction, and light grazing could affect insects. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing possible. No adverse effects expected.
Ponderosa pine, pinyon-juniper, spruce-fir	Virginia"s Warbler	Ponderosa pine with scrubby brush interspersed with pinyon juniper	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Grassland	Short-eared owl	Open fields, meadows, pastures, canyons, with an abundant of rodents	No extensive open grasslands with large population of burrowing rodents present.	No adverse affects expected.
Grassland	Ferruginous hawk	Wintering, forage on prairie dogs, rabbits	Marginal habitat present along the driveway. No large population of burrowing rodents present on the driveway.	No adverse effects expected.
Grassland	Prairie Falcon	Open treeless terrain with cliffs for nesting	Suitable cliff habitat present within/adjacent to driveway. Sheep trailing will not alter these features.	No adverse effects expected.
Grassland	Swainson"s hawk	Migrating- found during shorter period of time, more dependent on insects, and smaller prey than ferruginous.	Marginal habitat present along the driveway. Impacts are expected to be minimal and short term and integrity of habitat will be maintained.	No adverse effects expected.
Grassland	Burrowing owl	See sensitive species		

Veg type	Species	Habitat	Habitat Impacts	Effects – Alts 2, 3a, 3b, and 3c
Grassland	Northern Harrier	Open country wet meadow, swamps, prairies, and plains	Marginal habitat present along the driveway. Impacts are expected to be minimal and short term and integrity of habitat will be maintained.	No adverse effects expected.
Grassland	Grasshopper sparrow	Breeding diet of grasshoppers and insects, winter diet grass seeds	No pure grassland without trees or emergent shrubs in project area.	No adverse affects expected
High Elevation Riparian	Common black-hawk	See sensitive species		
High Elevation Riparian	Southwestern willow flycatcher	See TES		
High Elevation Riparian	MacGillivray ″s warbler	Mesic/marshy willow thickets, wet meadow edge, nests under shrubs, needs dense understory	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing possible. No adverse effects expected.
High Elevation Riparian	Red-faced warbler	Maple, oak, sycamore, willow; dense mid-story, Steep, sloping canyons, ground nester	Overstory vegetation will not be altered. The trailing of sheep does not occur on steep slopes.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Riparian woodlands	Yellow-billed Cuckoo	See sensitive species		
Pinyon-Juniper	Gray Flycatcher	Pinyon pine, juniper with open ponderosa overstory	Overstory vegetation will not be altered. Trampling, compaction, and light grazing could affect insects. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Pinyon-Juniper	Pinyon-Jay	Pinyon juniper and ponderosa pine; need extensive stands for foraging.	Overstory vegetation will not be altered. Grazing will not affect food source.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.

Veg type	Species	Habitat	Habitat Impacts	Effects – Alts 2, 3a, 3b, and 3c
Pinyon-Juniper	Gray Vireo	Dense pinyon-juniper stands on moderate to steep slopes.	Overstory vegetation will not be altered. Trampling, compaction, and light grazing could affect insects. Impacts are expected to be minimal and short term.	No adverse effects expected.
Pinyon-Juniper	Black-throated Gray Warbler	Mid to late pinyon woodland with shrubby openings; not found where juniper becomes dominant	Saplings and larger trees will not be altered by sheep trailing. Trampling, compaction, and light grazing could affect insects. Impacts are expected to be minimal and short term.	No adverse effects expected.
Pinyon-Juniper	Juniper Titmouse	See MIS		
Spruce-Fir	Pine Grosbeak	Open/disturbed areas near forests. Upper canopy using high cone producing trees.	Overstory vegetation will not be altered. Grazing will not affect food source.	No adverse effects expected.
Aspen	Red-naped Sapsucker	See MIS		
Ponderosa Pine	Cassin‟s Finch	Open coniferous forests	vegetation will not be altered. Trampling, compaction, and light grazing could affect insects. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing possible. No adverse effects expected
Ponderosa Pine	Olive Warbler	Prefer forests with gambel‟s oak component	vegetation will not be altered. Trampling, compaction, and light grazing could affect insects. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing possible. No adverse effects expected
Spruce-fir	Swainson‟s Thrush	Dense spruce-fir where forest openings occur	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing possible. No adverse effects expected
Spruce-fir	Golden-crowned Kinglet	Mature spruce-fir forests with closed canopies	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing possible. No adverse effects expected
Pinyon-juniper Woodland	Brewer‟s Sparrow	Based in shrublands and areas dominated by big sagebrush	Saplings and larger trees will not be altered by sheep trailing. Trampling, compaction,	No adverse effects expected.

Veg type	Species	Habitat	Habitat Impacts	Effects – Alts 2, 3a, 3b, and 3c
			and light grazing could affect insects. Impacts are expected to be minimal and short term.	
High Elevation Grassland	Chestnut-collared Longspur	Arid, short to mixed grass prairie	No pure grassland without trees or emergent shrubs in project area.	No adverse affects expected
Semi-desert Grassland	Cassin˝s Sparrow	With scattered shrubs, yuccas or low trees	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Semi-desert Grassland	Bendire˝s Thrasher	Favor relatively open grassland, shrubland or woodland	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Low Elevation Riparian	Veery	Inhabit damp deciduous forests	Overstory vegetation will not be altered. The trailing of sheep does not occur on steep slopes.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Low Elevation Riparian	Elf Owl	Occupy subtropical thorn woodland and riparian forests	Overstory vegetation will not be altered. The trailing of sheep does not occur on steep slopes.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Low Elevation Riparian	Yellow Warbler	Breed most commonly in wet deciduous thickets	Overstory vegetation will not be altered. The trailing of sheep does not occur on steep slopes.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Ponderosa Pine Forest/Ponderosa-Gambel˝s Oak Forest	Olive Warbler	Primarily pure ponderosa pine forest	vegetation will not be altered. Trampling, compaction, and light grazing could affect insects. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing possible. No adverse effects expected.
Ponderosa-Gambel˝s Oak Forest/Mixed Conifer Forest	Band-tailed Pigeon	Douglas fir, white fir, ponderosa pine, often some aspen and Gambel˝s oak.	vegetation will not be altered. Trampling, compaction, and light grazing could affect insects. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing possible. No adverse effects expected.

Veg type	Species	Habitat	Habitat Impacts	Effects – Alts 2, 3a, 3b, and 3c
Mixed Conifer Forest	Golden-crowned Kinglet	Douglas fir, white fir, ponderosa pine, often some aspen and Gambel‟s oak.	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing possible. No adverse effects expected.
Sonoran Desertscrub (Arizona Upland Biome)	Bendire‟s Thrasher	Paloverde, ironwood, mesquite, catclaw, acacia, saguaro, cholla, barrel cactus, prickly pear, creosote bush, jojoba, and crucifixion thorn	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Sonoran Desertscrub (Arizona Upland Biome)	Canyon Towhee	Paloverde, ironwood, mesquite, catclaw, ac acia, saguaro, cholla, barrel cactus, prickly pear, creosote bush, jojoba, and crucifixion thorn	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Sonoran Desertscrub (Arizona Upland Biome)	Costa‟s Hummingbird	Paloverde, ironwood, mesquite, catclaw, ac acia, saguaro, cholla, barrel cactus, prickly pear, creosote bush, jojoba, and crucifixion thorn	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Sonoran Desertscrub (Arizona Upland Biome)	Elf Owl	Paloverde, ironwood, mesquite, catclaw, ac acia, saguaro, cholla, barrel cactus, prickly pear, creosote bush, jojoba, and crucifixion thorn	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Sonoran Desertscrub (Arizona Upland Biome)	Gila Woodpecker	Paloverde, ironwood, mesquite, catclaw, ac acia, saguaro, cholla, barrel cactus, prickly pear, creosote bush, jojoba, and crucifixion thorn	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Sonoran Desertscrub (Arizona Upland Biome)	Gilded Flicker	Paloverde, ironwood, mesquite, catclaw, acacia, saguaro, cholla, barrel cactus, prickly pear, creosote bush, jojoba, and crucifixion thorn	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.

Veg type	Species	Habitat	Habitat Impacts	Effects – Alts 2, 3a, 3b, and 3c
Sonoran Desertscrub (Arizona Upland Biome)	Phainopepla	Paloverde, ironwood, mesquite, catclaw, acacia, saguaro, cholla, barrel cactus, prickly pear, creosote bush, jojoba, and crucifixion thorn	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Marshlands, cienegas, ponds, and lake edges	Yuma Clapper Rail	Bulrush, sedges, pondweeds, cattail, duckweed, saltgrass	Overstory vegetation will not be altered. Shrub component may receive light browsing in some areas. Impacts are expected to be minimal and short term.	Short term disturbance associated with sheep trailing possible. No adverse effects expected.
Interior Riparian Deciduous Forests and Woodlands	Northern Beardless Tyrannulet	Sycamore, cottonwood, willow, ash, walnut, bigtooth maple, hackberry, cypress, juniper, oak	Overstory vegetation will not be altered. The trailing of sheep does not occur on steep slopes.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Interior Riparian Deciduous Forests and Woodlands	Yellow Warbler	Sycamore, cottonwood, willow, ash, walnut, bigtooth maple, hackberry, cypress, juniper, oak	Overstory vegetation will not be altered. The trailing of sheep does not occur on steep slopes.	Short term disturbance associated with sheep trailing and grazing possible. No adverse effects expected.
Sonoran riparian deciduous forest and woodlands	Bald Eagle	See TES		
Sonoran riparian deciduous forest woodlands/Sonoran riparian scrubland (dry wash)	Bell‟s Vireo	See MIS		
Sonoran riparian scrubland (dry wash)	Lucy‟s Warbler	See MIS		

Cumulative Effects for All Wildlife, Fisheries and Rare Plants

Cumulative effects include any past, present, and future foreseeable projects that have any potential effects that could accumulate with the alternatives to impact any species or potential or suitable habitat. Under alternative 1, there is not expected to be any impacts to wildlife, fisheries, or rare plants, so there would be no cumulative effects. Under alternatives 2 and 3, impacts associated with sheep trailing as described above for each species, include temporary disturbance from sheep presence, trampling, compaction, and grazing. The impacts from past and present activities (Table 2) have been described under the affected environment sections for wildlife, fisheries and rare plants. Future activities (Table 3) such as treating invasive plants could act to improve conditions for rare plants and may help to off-set any temporary impacts from sheep trailing. Livestock grazing activities in areas where sheep are trailing may add to disturbance levels to wildlife, fish, and rare plants, however since the sheep are moving along the driveway in a short time frame, these cumulative effects are not expected to be significant. Arizona Game and Fish hopes to reintroduce Rocky Mountain Bighorn sheep in Hell's Gate Wilderness and Chevelon Canyon (Dave Dorum, 2010). Alternatives 2 & 3 would preclude AZGFD plans to reintroduce sheep in these areas.

Chapter 4 - Consultation and Coordination

The Forest Service consulted the following individuals, Federal, state and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

Local Government

City of Chandler
City of Globe
City of Mesa
City of Scottsdale
Central Arizona Council of Governments
Gila County Board of Supervisors
Gila County Cooperative Extension Service
Gila County Emergency Services
Globe Chamber of Commerce
Heber-Overgaard Chamber of Commerce
Heber-Overgaard Fire Department
Navajo County Board of Supervisors
Navajo County Department of Public Works, Carol Fraley
Office of the Governor of Arizona
Town of Cave Creek
Town of Fountain Hills
Town of Miami

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Arizona State Department of Transportation
Arizona State Land Department
Arizona State Office of Attorney General
Arizona State Parks Department
Arizona State University
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Honorable Linda Binder, Arizona House of Representatives
Honorable Barbara Blewster, Arizona House of Representatives
National Park Service, Southern Arizona
U.S. Senator Jon Kyl
U.S. Senator John McCain
University of Arizona
University of Arizona at Northern Arizona University
U.S. Army Corps of Engineers
U.S.D.A., Animal and Plant Health Inspection Service
U.S. Bureau of Reclamation
U.S. Fish and Wildlife Service
U.S.D.A. Natural Resources Conservation Service (NRCS)

Tribes

Ft. McDowell Yavapai Nation
Gila River Indian Community
Ramah Navajo Chapter
San Carlos Apache Tribe
Yavapai-Apache Nation
The Hopi Tribe
The Navajo Nation
Ft. McDowell Indian Community
Pueblo of Zuni
Salt River Pima-Maricopa Indian Community
Tonto Apache Tribe
Yavapai-Prescott Tribe
The Hopi Tribe Preservation Office
White Mountain Apache Tribe

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Arizona Desert Bighorn Sheep Society, David McCasland
Arizona Off-Highway Vehicle Association
Arizona Public Service
Arizona Wilderness Coalition
Arizona Wildlife Federation
Center for Biological Diversity
Central Arizona Project
Dow Chemical
Forest Guardians
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Maricopa Audubon Society
Mogollon Sportsman‟s Association, Richard Henry
National Wildlife Federation
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Salt River Project
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The Nature Conservancy
The Wildlife Society – AZ Chapter
Trout Unlimited
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Gary Barcom
Wild Sheep Foundation
Scott Bender
Arizona Desert Bighorn Sheep Society, Inc
Ray Kohls
Jim Unmacht
Joe Del Re

Please contact the Apache-Sitgreaves NFs for a complete list of the 1,017 individuals and organizations included in the scoping mailing list.

Chapter 5 – References

Arizona Desert Bighorn Sheep Society (ADBSS). (2007). Bighorn sheep special tag history. Retrieved on March 15, 2010, from http://www.adbss.org/Special_Tag_Fund_data.pdf.

Arizona Department of Environmental Quality (ADEQ). (2008). Draft 2006 integrated 305(b) Assessment and 303(d) listing report. Retrieved from http://www.azdeq.gov/environ/water/assessment/assess.html

Arizona Game and Fish Department (AZGFD). (2004). Performance report, Project W-53-M-54. Wildlife disease investigations: To investigate game animal disease outbreaks; (a) Bighorn sheep disease epizootic in the Silver Bell Mountains, southern Arizona. 28 pp.

Arizona Game and Fish Department. (2006). Kanab Creek Wilderness Area bighorn sheep health assessment disease results and discussion. AZGFD, unpublished. 6 pp.

Arizona Game and Fish Department (AZGFD). (2008). Heber-Reno/Morgan Mountain Domestic Sheep Driveway collaborative risk assessment. Unpublished. March 12, 2008. Available at Tonto and Apache-Sitgreaves national forests‟ Supervisors‟ Offices.

Arizona Game and Fish Department (AZGFD). (2009). Game Management Unit 22 and Game Management Unit 26M. Retrieved on April 15, 2010 from http://www.azgfd.gov/h_f/hunting_units_22.shtml and http://www.azgfd.gov/h_f/hunting_units_26m.shtml, updated April 2009.

Arizona Game and Fish Department (AZGFD). (2009b). 2009-10 Arizona hunting and trapping regulations. Retrieved on March 15, 2010, from http://www.azgfd.gov/pdfs/h_f/regulations/HuntingRegulations.pdf. p. 14.

Arizona Game and Fish Department (AZGFD). (2010a). Comments on the draft environmental assessment of the Heber-Reno/Morgan Mountain Sheep Driveway. May 26, 2010.

Arizona Game and Fish Department (AZGFD). (2010b). Additional comments on the draft environmental assessment of the Heber-Reno/Morgan Mountain Sheep Driveway. August 22, 2010.

Arizona Department of Water Resources (ADWR). (2010). Arizona drought monitor report January 2010. Retrieved from http://www.azwater.gov/AzDWR/StatewidePlanning/Drought/documents/January2010DroughtMonitorReport_000.pdf.

Associated Press. (2010a). Pneumonia outbreak kills more than 400 bighorn sheep in several Western states. Retrieved on April 23, 2010, from http://www.washingtonexaminer.com/nation/85475612.html.

Barstad, J. (1988). *The Verde River Sheep Bridge and the Sheep Industry in Arizona*. (pp. 2-3, 12 and 14-15). Phoenix, AZ: Gerald A. Doyle & Associates.

Burriel, A. R., (1997). Isolation of Pasteurella haemolytica from grass, drinking water, and straw bedding used by sheep. *Current Microbiology* 35, 316-318.

Burton, T. A., Smith, S. J., and Cowley, E. R. (2008). Monitoring stream channels and riparian vegetation-multiple indicators, *BLM Interagency Technical Bulletin Version 5.0*. April 2008. 57 pp.

Callan, R. J.; Bunch, T. D.; Workman, G. W.; and Mock, R. E. (1991). Development of pneumonia in desert bighorn sheep after exposure to a flock of exotic domestic sheep. *Journal of American Veterinary Medical Association. 198(6): 1052-1056*.

Chaney, E.; Elmore, E.; and Platts, W. S. (1990). Livestock grazing on western riparian areas. *U.S. Government Printing Office*, Region No, 8. 45 pp.

Clifford, D. L; Schumaker, B. A.; Stephenson, T. R.; Bleich, V. C.; Cahn, M. L.; Gonzales, B. J.; Boyce, W. M.; and Mazet, J. A. K. (2009). Assessing disease risk at the wildlife-livestock interface: a study of Sierra Nevada bighorn sheep. *Biological Conservation* 142: 2559-2568

Cosgrove, C. R. (1998). Economic impacts of Apache-Sitgreaves National Forest public land ranching. Unpublished report for Apache, Greenlee and Navajo Counties. January 1998.

Curtois et al. (2004). Vegetation Change After 65 Years of Grazing and Grazing Exclusion. Journal of Range Management 57:574-582. November 2004.

Desert Bighorn Council. (1990). Guidelines for management of domestic sheep in the vicinity of desert bighorn habitat. *Desert Bighorn Council Transactions 34:33-35*.

Dobson, D. (2007). *Heber-Reno and Morgan Mountain Sheep Driveway Operational Management Needs – Earl Dobson Estate – Sheep Springs Sheep Co.* Unpublished, mailed to the USDA Forest Service, about June 5, 2007.

Dorum, D. (2010). Arizona Game and Fish Department, Region 1 Habitat Program Manager. Personal communication with Charles M. Denton in March 2010.

Federal Register. 1998. Endangered and Threatened Wildlife and Plants: Establishment of a nonessential experimental population of Mexican gray wolf in Arizona and New Mexico. Vol. 63(7):1752-1772.

Foreyt, W., and Jessup, D. (1982). Fatal pneumonia of bighorn sheep following association with domestic sheep. *Journal of Wildlife Diseases. 18: 163-168*.

Foreyt, W. J. (1989). Fatal Pasteurella haemolytica pneumonia in bighorn sheep after direct contact with clinically normal domestic sheep. *American Journal of Veterinary Research. 50(3): 341-344*.

Fraser, J.D., L.D. Frenzel and J.E. Mathisen. 1985. The impact of human activities on breeding bald eagles in north-central Minnesota. J. Wildl. Manage. 49:585-592.

Garde, E.; Kutz, S.; Schwantje, H.; Veitch, A.; Jenkins, E.; and Elkin, B. (2005). Examining the risk of disease transmission between wild Dall‟s sheep and mountain goats and introduced domestic sheep, goats, and llamas in the Northwest Territories. Canadian Cooperative Wildlife Health Centre. (14.06.08). Retrieved from

http://www.ccwhc.ca/Publications/NWT_Dall_Mtngoats_Domestic_sheep_goats_RiskAssessment.pdf>

Gori, D. and Backer, D. (2005). Watershed improvement using prescribed burns as a way to restore aquatic habitat for native fish. U.S. Forest Service Proceedings RMRS-P-36. pp 403-406.

Goodson, N. J. 1982. Effects of domestic sheep grazing on bighorn sheep populations: a review. Proceedings of the Biennial Symposium of the Northern Wild Sheep and Goat Council 3:287-313.

Grubb, T.J., S.J. Nagiller, W.L. Eakle, AND G.A. Goodwin. 1989. Winter roosting patterns of Bald Eagles (Haliaeetus leucocephalus) in north-central Arizona. Southwest.Nat. 34453-459.Hawksbury River City Council. (Undated). What is a Weed? Website in 2010. Http://www.hrcc.nsw.gov.au/what_is_a_weed_.html#whatisaweed

Hawksbury River City Council. (Undated). What is a Weed? Website in 2010. Http://www.hrcc.nsw.gov.au/what_is_a_weed_.html#whatisaweed

Holechek, J.Let al. (2006). Grazing and Grazing Exclusion Effects on New Mexico Shortgrass Prairie. Rangeland Ecology & Management 59(6) November 2006. Pp. 655-659.

Holt, T. (2008, Mar. 8). Summary of the Heber-Reno/Morgan Mountain Domestic Sheep Driveway collaborative risk assessment. Field Supervisor, Region 6, Arizona Game and Fish Department.

Kauffman, J. B. and Krueger, W. C. (1984). Livestock impacts on riparian ecosystems and streamside management implications... a review. *Journal of Range Management* 37(5). p. 430-437.

Kessler, K. (2009). Heber-Reno Sheep Driveway – Mesa Ranger District. Unpublished. Available in the project record.

Latta, M. J., Beardmore, C. J., and Corman, T. E. (1999) Arizona Partners in Flight Bird Conservation Plan. Version 1.0. *Technical Report 142*. Nongame and Endangered Wildlife Program. Arizona Game and Fish Department. 2221 W. Greenway Rd., Phoenix, AZ 85023. 331 pp.

Lenart, M. (2005). Monsoon could strengthen as climate warms. *Southwest Climate Outlook*. June 2005.

Loeser, M. R. R.; Sisk, T. D.; and Crews, T. E. (2007). Impact of grazing intensity during drought in an Arizona grassland. *Conservation Biology*. 21(1). pp. 87-97.

McBride, K. and Grove, J. (2002). Riparian area management utilization guidelines. On file at the Tonto National Forest Supervisor"s Office. 25 pp plus Appendix.

Mosley, J. C.; Cook, P. S.; Griffis, A. J.; and O'Laughlin, J. (1999). Guidelines for managing cattle grazing in riparian areas to protect water quality: Review of research and best management practices policy. Moscow, Idaho. *University of Idaho*: *1997: v. 67p*. (Report) (Idaho Forest, Wildlife and Range Policy Analysis Group); no. 15.

National Park Service (NPS). (2009). http://www.nps.gov/ncrc/programs/rtca/nri/states/az.html

Nelson, E. W. (1911). Correspondence to the U.S. National Museum and U.S. Biological Survey.

NOAA (2009). National Weather Service Forecast Office, Phoenix, AZ, http://www.wrh.noaa.gov/psr/DroughtPage.php?data=ALLDATA

Olson et al. (1997). Recovery of Leafy Spurge Seed from Sheep. Journal of Range Management, Vol. 50, No. 1 (Jan., 1997), pp. 10-15

Shein, K. A., ed., (2006). State of the climate in 2005. *Bulletin of the American Meteorological Society*, *87*, S1-S102.

Shroufe, D. (1996). Letter to A-S NFs Forest Supervisor from the Director of AZGF, indicating concern over possible disease transmission from HRSD sheep to bighorns, and future options. Unpublished. January 3, 1996.

Silberman, J. (2003). The economic importance of fishing and hunting. Report prepared for the Arizona Game and Fish Department. Retrieved from http://www.azgfd.gov/pdfs/w_c/FISHING_HUNTING%20Report.pdf. p. 10.

Skovlin, J. M. (1984). Impacts of grazing on wetlands and riparian habitat: A review of our knowledge. *Developing strategies for range management*. *Western Press*, Boulder CO. pp. 1001-1103.

Smith, L., Ruyle, G., et al. (2005). Principles of obtaining and interpreting utilization data on Southwest rangelands. The University of Arizona College of Agriculture and Life Sciences, Tucson, AZ. Retrieved on April 1, 2010, from cals.arizona.edu/pubs/natresources/az1375.pdf.

Southwick Associates, Inc. 2002. The 2001 Economic Benefits of Watchable Wildlife Recreation in Arizona. Produced for the Arizona Game and Fish Department. October 2002. Pp. v, 7-13. Available at http://www.southwickassociates.com/sites/default/files/reports/AZ_WW.pdf

Steenhof, K. 1978. Management of wintering bald eagles. USDI Fish and Wildlife Service, Biological Service Program, FWS/OBS-78/79. Columbia, Mo. 59 pp.

Thiel, C. (2009). Affected Environment Report-Rangeland Resources-Heber-Reno Sheep Driveway, Pleasant Valley Ranger District. Unpublished. Available in the project record.

Trimble, S. W. and Mendel, A. C. (1995). The cow as a geomorphic - A critical review. *Geomorphology. (13).* pp. 235-253

USDI et al. (1996). Sampling Vegetation Attributes. *Interagency Technical Reference.* USDI Bureau of Land Management , USDA Cooperative Extension Service, U.S. Forest Service and Natural Resources Conservation Service.

USDI et al. (1999). Utilization Studies and Residual Measurements. *Interagency Technical Reference.* USDI Bureau of Land Management , USDA Cooperative Extension Service, U.S. Forest Service and Natural Resources Conservation Service.

U.S. Fish and Wildlife Service. (2008). Birds of conservation concern. U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. Retrieved from http://www.fws.gov/migratorybirds/

U.S. Forest Service, Southwestern Region. (1985, amended 1996). Tonto National Forest plan.

U.S. Forest Service, Southwestern Region. (1987). Apache-Sitgreaves National Forest plan.

U.S. Forest Service, Southwestern Region. (1997). Rangeland analysis and management training guide.

U.S. Forest Service. (1993). Resource information report, potential wild – scenic – recreational river designation, national forests of Arizona. Southwestern Region, 375 pg.

U.S. Forest Service, Tonto National Forest. (2005). Management indicator species status report. *Tonto National Forest Land and Resource Management Plan.* (Version 2.0)

U.S. Forest Service, Southwestern Region. 2007. USDA Forest Service Southwestern Region Sensitive Animals and Plants species List dated September 21, 2007.

U.S. Forest Service, Washington Office. 2005. Forest Service Manual 2670 Threatened, Endangered and Sensitive Plants and Animals. 22 pp.

Western Regional Climate Center (WRCC). (2008). Retrieved from http://www.wrcc.dri.edu/summary/climsmaz.html

Wood, S. (2004 and 2010). Tonto NF Archaeology Specialist. Personal communication.

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Appendix A

Riparian and Water Section

Table 1a. Developed waters on the Heber-Reno Sheep Driveway.

State File Number	Name	District	Comments
	Bushnell Tanks	Mesa	Storage tank in working condition, troughs in poor condition, 2006
	Bob Trough	Mesa	
38-12782	Reno Tank	Mesa	
36-24283	Chinaberry Spring	TB	No riparian vegetation, functioning, 5-18-2006
36-103005	Weak Spring Horz Well	TB	
36-103090	Jump-off Spring	TB	
38-25096	unnamed tank	TB	Functioning, needs repair, 5-18-2006
38-25103	Daniels Spring Trap Tank	TB	Heavily silted, 4-9-2009
4A-1971	Daniels Spring	TB	Not functioning, 4-9-2009
	Cooks Trick Tank	PV	Functioning, 8-13-2008
	McInturf Trick Tank	PV	
36-75236	Clay (Naegelin #2) Spring	PV	Functioning needs repair, 6-21-2008
38-75121	Granite Tank	PV	
38-75211	Steve Tank	PV	Recently cleaned, 8-20-2009
38-75212	Ruth Tank	PV	Recently cleaned, 8-20-2009
38-87902	Trail Bike Tank	PV	Recently cleaned, 8-20-2009
4A-1983	Naegelin (McInturf) Spring	PV	Functioning, 8-22-2008
55-601011	Pine Creek Well	PV	
55-601013	Walnut Well	PV	Functioning, 6-19-2008
55-632791	McInturf Windmill	PV	Not functioning, 8-19-2008

Table 2a. Streams assessed by ADEQ on the Heber-Reno Sheep Driveway

Stream Monitored	Designated Use	Overall Assessment
Canyon Creek – headwaters to White Mountain Apache Reservation	A&Wc, FBC, FC, DWS, AgI, AgL	Attaining all uses
Spring Creek – from headwaters to Tonto Creek	A&Ww, FBC, FC, AgL	Attaining some uses
Salt River – Saguaro Lake to Verde River	A&Wc, FBC, FC, DWS, AgI, AgL	Impaired

A&Wc - Aquatic and Wildlife Coldwater Fishery
A&Ww - Aquatic and Wildlife Warmwater Fishery
DWS - Domestic Water Source
FC - Fish Consumption
FBC - Full Body Contact recreation activities
AgI - Agricultural Irrigation
AgL - Agricultural Livestock Watering

Table 3a. Potentially eligible streams for inclusion into the National Wild and Scenic Rivers System (USFS, 1993).

Stream Name	Classification	ORVs
Canyon Creek	Recreational	Wildlife and Ecological
Spring Creek	Recreational	Fisheries, Riparian, Ecological
Lower Salt River	Recreational	Recreational, Wildlife, Cultural, Ecological, Riparian

Table 4a. Criteria for the Outstandingly Remarkable Values (ORVs) for Canyon Creek, Spring Creek, and Salt River (NPS, 2009).

Cultural (C)	The river or area within the river corridor contains archaeological sites or areas significant to traditional cultures. Examples might be American Indian burial grounds, petroglyphs, the oldest known human use site in a region, or streams that support traditional agriculture, subsistence fishing, or religious ceremonies.
Fish (F)	Fish values may be judged on the relative merits of either fish populations or habitat, or a combination of these river-related conditions.
Recreation (R)	Recreational opportunities are, or have the potential to be, popular enough to attract visitors from throughout or beyond the region of comparison or are unique or rare within the region. Visitors are willing to travel long distances to use the river resources for recreational purposes. River-related opportunities could include, but are not limited to, sightseeing, wildlife observation, camping, photography, hiking, fishing, and boating.
Wildlife (W)	Wildlife values may be judged on the relative merits of either terrestrial or aquatic wildlife populations or habitat or a combination of these conditions.
Other Values (O)	While no specific national evaluation guidelines have been developed for the "other similar values" category, assessments of additional river-related values consistent with the foregoing guidance may be developed - including, but not limited to, hydrology, paleontology and botany resources.

Appendix B

Heber-Reno/Morgan Mountain Domestic Sheep Driveway Collaborative Risk Assessment

March 12, 2008

Arizona Game and Fish Department – Region VI
7200 E. University Drive Mesa, AZ 85207

Introduction

In a letter dated October 2, 2007, the Tonto National Forest (TNF) and Apache-Sitgreaves National Forest (ASNF) asked Arizona Game and Fish Department (AGFD) to lead a collaborative risk assessment for the Heber-Reno/Morgan Mountain Domestic Sheep Driveway (Driveway) as part of the analysis and disclosure under the National Environmental Policy Act (NEPA). This letter requested that the AGFD form a workgroup to include both agencies and the affected permittees to help participants agree on basic principles, best management practices, and guidelines to follow when managing domestic sheep and wild sheep on United State Forest Service (USFS) lands near the Driveway. A response letter dated October 5, 2007 indicated that AGFD agreed to lead this collaborative process to assist TNF/ASNF develop options that are fair and reasonable and meet the needs of the permittees, TNF/ASNF, wild bighorn sheep, and other wildlife.

AGFD and TNF personnel met shortly after exchange of these letters to discuss the collaborative risk assessment process. It was agreed that neither agency had the resources to conduct a full quantitative risk assessment, but that a brief qualitative risk assessment in the form of a workgroup involving affected parties over a two to three month time period would be sufficient to assist TNF/ASNF with the NEPA analysis. AGFD contacted the affected parties and formed the Heber-Reno/Morgan Mountain Sheep Driveway Workgroup (Workgroup) and three meetings were held from December 2007 through February 2008. A list of participants is included in Appendix A.

The Workgroup conducted a risk assessment by dividing the Driveway up into six different parts based on Forest Ranger District boundaries. The Workgroup decided that only Pasteurella/Mannheimia-type pneumonic disease would be considered for this risk assessment as these types of diseases have been the focus of most recent scientific literature regarding wild bighorn sheep diseases. **Risk was defined as "the probability of nose-to-nose contact between domestic sheep and wild bighorn sheep".** The conclusions and recommendations of this Workgroup were only designed to assist TNF/ASNF with the NEPA process and include assumptions that have not been quantitatively substantiated. The conclusions and recommendations to reduce risk represent the collaborative effort of the affected parties:

1. The Driveway in its entirety represents very low to low risk of nose-to-nose contact between domestic sheep and wild bighorn sheep.
2. The Mesa Ranger District portion of TNF represents the highest risk of nose-to-nose contact between domestic sheep and wild bighorn sheep of all Forest Ranger Districts on the Driveway.
3. Aerial surveys of wild sheep locations prior to domestic sheep entering the Driveway and the use of volunteers to haze wild sheep and locate domestic sheep strays should reduce risk.
4. An AGFD policy for removal and management of wild sheep that have come in contact with domestic sheep is needed. AGFD should have a protocol for evaluating these wild bighorn sheep once they are taken or captured (e.g. physical exam, necropsy, serology) to see if contact actually resulted in any evidence of infection or disease using a standardized testing panel for pathogens of interest.
5. A Memorandum of Understanding (MOU) with the permittees, AGFD, and the state Department of Agriculture for preventative management and removal of stray domestic sheep is needed.
6. Sustained compensation for permittees for use of other pastures in lieu of the Driveway, or trucking domestic sheep around wild sheep habitat, or truncating the Driveway around wild sheep habitat, or elimination of the Driveway will reduce risk of nose-to-nose contact and Pasteurella/Mannheimia-type pneumonic diseases.

These measures will not reduce risk of insect-borne infections acquired from other wild ungulates in wild bighorn sheep habitat such as bluetongue/EHD viruses from infected deer and elk and other wild bighorn sheep.

History and Current Use of the Driveway

To understand the history and current use of the Driveway, the Workgroup allowed the permittees and TNF/ASNF to elaborate on their knowledge. This information was instrumental in understanding where the affected parties were based.

In 1898 Woodrow Wilson created a proclamation allowing for domestic sheep driveways in specifically designated areas but the proclamation did not give any rights on USFS lands. Establishment of driveways on USFS lands was provided for in the original USFS "Use Book" (1905) which expanded and developed into the Forest Service Manuals and Handbooks (FSM & FSH) the USFS use today. Currently under FSM 2200, 2204.3: Forest Supervisors have responsibility and authority to; 17.) Establish and terminate livestock driveways. The actual record of the Driveway establishment has not been located but the TNF/ASNF have references to the Forester's marking of the boundaries of the Driveway in 1908 when the TNF Supervisor's Office was located in Roosevelt. At about the same time an executive order designated other driveways on State Trust Lands and Bureau of Land Management (BLM) lands. .

Domestic sheep driveways where common throughout Arizona and one example from the Prescott National Forest describes that “In earlier years, ranchers used driveways for herding their livestock - generally sheep and goats - to and from summer and winter ranges. The Government Gap Driveway on the Prescott National Forest's southern end and the Oak Creek Driveway that crossed through the

middle of the Baker's Pass area, north of Jerome, were the most heavily used driveways. In 1911, a half a million sheep and goats traveled over the Prescott National Forest's driveways. They were gradually reduced to 147,241 in 1933 and 5,764 in 1993." (USFS Web Page).

In the late 1800"s and early 1900"s as many as 300,000 - 400,000 sheep were driven along the Driveway. The primary reason for the Driveway was to allow sheep to travel to higher elevations for forage when the desert became too hot. The Driveway also allows the domestic sheep to become acclimated to higher elevations. The Driveway buys time for the permittees because the domestic sheep grazing allotments on ASNF are not open until early summer. In 2008, the Driveway will be used by approximately 10,000 domestic sheep split between two permittees. Sheep Springs Sheep Company has been using the Driveway annually, and Joseph Auza has authority to use the Driveway but has not used it since acquiring the permit, although he plans on using the Driveway in 2008. Joseph Auza has been trucking his sheep to the Long Tom Allotment on ASNF from various places including Needles, California and on State Trust Land leases near Kingman, Arizona. For 2008, the Joseph Auza sheep are on pastures in the East Valley and Casa Grande so use of the Driveway is more cost effective. The permittees do not have domestic rams on the Driveway because the breeding is done while on ASNF in June/July and the rams are trucked to the destination points. The domestic sheep lambing period occurs in winter on property around Queen Creek.

The domestic sheep travel approximately six miles/day and are attended by dogs and herders 24 hrs/day while on the Driveway. The domestic sheep are physically examined before they enter and leave the Driveway and are currently vaccinated for Clostridial diseases, blue tongue virus, and given ivermectin or Dectomax® to control parasite infestations. Fecal samples are also taken and tested for evidence of parasitism by a veterinarian hired by the domestic sheep permittees. The domestic sheep are counted daily and at various control points along the Driveway to ensure that strays are picked up in a timely manner. Injured and crippled domestic sheep are picked up and trucked to the destination point or base property of the permittees.

Current and Proposed Wild Bighorn Sheep Management

AGFD provided the Workgroup with current and proposed wild bighorn sheep management plans in areas near the Driveway and plans to reintroduce wild bighorn sheep in all historic suitable habitats in Arizona. AGFD proposes to introduce wild bighorn sheep (Rocky Mountain bighorn sheep) to Hell"s Gate Wilderness, Matazal Mountains, and Chevlon Canyon. AGFD also proposes to translocate wild bighorn sheep (desert bighorn sheep) to the Goldfield Mountains and Superstition Mountains.

The Workgroup discussed the history of the Game Management Unit 22 (Stewart Mountain) desert bighorn sheep population status and history. Questions were raised as to why this population suffered a decline in the mid to late 1990"s. AGFD conducted a study on this population decline as disease was suspected, but no clinical symptoms of disease (other than contagious ecthyma) were ever observed, and other evidence of exposure to disease agents was not found. The report hypothesizes that nutritional status and mountain lion predation were the biggest factors in the bighorn sheep population during the study period (McKinney et al 2005). The question was asked why AGFD reintroduced sheep in this area in the 1980"s knowing that the Driveway existed. AGFD stated the Department released the sheep in an area that was at that time thought to be far enough east of the Driveway as not to facilitate the mixing of domestic sheep and wild sheep. As the herd expanded to the west they

occupied the habitat that is adjacent to the Driveway. At that time the best available wildlife science theorized that disease transmissions were limited by having an 8.4 Km buffer between domestic sheep and wild sheep (USDI – BLM 1998). Today, the best available wildlife science recognizes the importance of contiguous wild sheep habitat as it relates to a domestic sheep barriers and that nose-to-nose contact is required for bacterial infections affecting the respiratory tract (WAFWA – Western Sheep Working Group 2007).

AGFD has not confirmed large scale wild bighorn sheep die-offs due to Pasteurella/Mannheimia-type pneumonic disease in Arizona as has been documented on the Payette National Forest in Idaho. Increased mortality, some of it due to predation of diseased animals, of wild bighorn sheep in Arizona were documented as a result of severe bilateral ocular disease (keratoconjunctivitis caused by *Mycoplasma conjunctivae infection*) and additionally, in some animals, soremouth (contagious ecthyma), both of which were thought to have been acquired from stray domestic goats in the Silverbell Mountains in 2003-2004 (AGFD 2004). Disease is suspected in recent (2000-2008) population declines of wild bighorn sheep in the Black Mountains of northwest Arizona and Kanab Creek in northern Arizona. In 2006, AGFD captured 11 wild bighorn sheep from the Kanab Creek area from which samples indicated captured sheep had bacteria consistent with that which causes Pasteurella/Mannheimia-type pneumonic disease (AGFD 2006). In addition AGFD received reports of wild bighorn sheep displaying symptoms of respiratory disease in the Kanab Creek area in 2005, 2006, and 2007. AGFD does not have knowledge of nose-to-nose contact between wild bighorn sheep and domestic sheep or goats in either location although both locations are subject to stray domestic sheep and goats. AGFD has not translocated bighorn sheep into the Goldfield Mountains and Chevlon Canyon because of proximity to domestic sheep on the Driveway and the Long Tom Domestic Sheep Allotment and potential disease risks.

The Workgroup reviewed and used the Western Association of Fish and Wildlife Agencies (WAFWA) Wild Sheep Working Group paper entitled "Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat" (2007). AGFD stated that the AGFD position as it applies to the Driveway mirrors the recommendations found within this document. AGFD will determine "acceptable risk" in regards to wild bighorn sheep translocations/reintroductions that are near the Driveway on a case-by-case basis.

Wild Bighorn Sheep Disease Literature Review and Discussion

The Workgroup reviewed the Payette National Forest wild bighorn sheep disease experiences through the two documents: (1) "A process for Finding Management Solutions to the Incompatibility between Domestic and Bighorn Sheep" (2001, 2007), and (2) "Risk Analysis of Disease Transmission between Domestic Sheep and Bighorn Sheep on the Payette National Forest" (2006). After reviewing these documents, hearing opinions from participants, and reviewing information from recent wild bighorn sheep disease workshops, the Workgroup concluded that Pasteurella/Mannheimia pneumonia-type diseases are only transmitted through nose-to-nose contact between domestic sheep and wild bighorn sheep. Veterinarians in the Workgroup agreed that nose-to-nose contact was required to transmit harmful bacteria resulting in pneumonia-type diseases in wild bighorn sheep. The Workgroup made the decision to focus discussions on respiratory diseases in wild bighorn sheep based on the most recent wildlife science literature concerning wild bighorn sheep population declines. For the purposes of this disease risk assessment, the Workgroup defined risk as: **The probability of nose-to-nose contact between domestic sheep and wild bighorn sheep.**

The Workgroup noted three main differences between the Driveway and the Payette National Forest experiences:

1. Goats are not used on the Driveway and never have been according to the domestic sheep permittees.
2. This is a domestic sheep driveway and not an allotment. The number of days that domestic sheep reside in occupied wild bighorn sheep habitat on the Driveway is minimal compared to the domestic sheep allotments on the Payette National Forest, where occupancy within wild bighorn sheep habitat by domestic sheep is over several months.
3. There are no **documented** cases of domestic sheep contact with wild bighorn sheep that have resulted in die-offs in the history of or in areas near the Driveway.

The Workgroup also discussed management guidelines for domestic sheep and wild sheep on Bureau of Land Management (BLM) lands. When the BLM issued a set of guidelines for the management of domestic sheep in bighorn sheep habitats, it was noted that "native wild sheep and domestic sheep or goats should be spatially separated to reduce the potential of interspecies contact" (BLM Instruction Memorandum No. 98-140). In relation to situations such as the Driveway, the BLM states specifically that trailing sheep near or through bighorn sheep habitat may be permitted but only when physical contact between domestic and wild sheep is adequately prevented, such as through the use of a topographical barrier and/or stringent herding practices. A buffer of at least 8.4 Km is suggested between wild bighorn sheep and domestic sheep, but because wild bighorn sheep habitat is contiguous in the area near Stewart Mountain, this buffer zone cannot be assured. AGFD supports these guidelines but also reminded the group that these guidelines do not apply to management of the Driveway because USFS does not have similar guidelines at this time. The Workgroup used the 8.4 Km in several discussions and also in scoring the different sections of the Driveway for risk as defined earlier. The 8.4 Km (9 miles) was used by the Workgroup as a benchmark for a few questions in the scoring matrix as well (see Appendix B).

Dr. Scott Bender provided the Workgroup with information regarding wild bighorn sheep populations on the Navajo Reservation as it relates to disease transmission from domestic sheep. Domestic sheep ranching began on the Reservation in 1868. In 1972 a single bighorn sheep was observed near Mexican Hat. In subsequent years this ewe was observed with lambs and the herd is currently estimated at 222 animals. Dr. Bender indicated that there are two different domestic sheep herds that are within two to three miles of the wild bighorn sheep population and it is thought that nose-to-nose contact has occurred without any negative consequences to the Navajo wild desert bighorn sheep to date.

Methodology

The Workgroup relied heavily upon subject matter experts within the group to help educate other affected parties. Workgroup meetings were focus-driven and discussions led to brainstorming exercises to daylight ideas to reduce the risk of contact between domestic sheep and wild bighorn sheep on the Driveway. After the brainstorming exercise the Workgroup used a scoring matrix (Appendix B) to develop a "risk score" for each of the Forest Ranger Districts in which the Driveway passes through. Although the scoring matrix used was not quantitatively substantiated, the Workgroup collaboratively agreed that it served as a model to evaluate risk on the different parts of the Driveway. At the end of the risk assessment, the Workgroup assigned value to ideas generated to reduce risk, by using a multi-voting technique. Those ideas receiving the most value (votes) are documented as the recommendations and conclusions of the Workgroup.

Step One: Identification of Driveway Sections

The Workgroup divided the Driveway into six different sections and applied risk factors using a scoring matrix to each section. Those sections were defined as:

1. Mesa 1 (approximately 8 miles) – that portion of the Driveway from where it enters the Mesa Ranger District near Usery Pass north to its southernmost intersection with Highway 87.
2. Mesa 2 (approximately 15 miles) - that portion of the Driveway on the Mesa Ranger District from its southernmost intersection with Highway 87 to the Tonto Basin Ranger District boundary near Reno Pass.
3. Tonto Basin (approximately 20 miles) – that portion of the Driveway on the Tonto Basin Ranger Distinct.
4. Pleasant Valley (approximately 20 miles) – that portion of the Driveway on the Pleasant Valley Ranger District.
5. Black Mesa (approximately 20 miles) – that portion of the Driveway on the Black Mesa Ranger District.
6. Lakeside (approximately 20 miles) – that portion of the Driveway on the Lakeside Ranger District.

Step Two: Identification of Risk Factors

The group then brainstormed "risk factors" associated with domestic sheep respiratory disease transmission to wild sheep as it relates to management of the Driveway. **Again, the Workgroup defined RISK as "the probability of nose-to-nose contact between domestic and wild bighorn sheep".**

Risk Factors Used

1. Domestic sheep strays
   - four bands of approximately 2500 sheep travel one day apart
   - travel 3-8 miles/day depending on terrain
   - there are 1-2 dogs and approximately 40 bells/1000 sheep
   - sheep are counted various places on the Driveway (box culverts at Highways, Blue Point, fence gates, and when they get to allotments)
   - there can be up to 1-2 cripples per day but the foreman picks these up on a daily basis and they are hauled to destination point
   - if short on count then herders search for strays and USFS notified
   - the permittees were asked if domestic sheep that have never been on the Driveway pose a greater risk for strays and they indicated no because of herding nature of domestic sheep - Dr. Bender seconded that opinion based on his experience
2. Frequency of domestic sheep counts on Driveway
   - theoretically reduces risk by reducing number of strays
3. Number of days domestic sheep are on the Driveway
   - more days equals higher risk
4. Terrain
   - the rougher the terrain the higher probability of strays, injuries, and lagging domestic sheep, and therefore higher risk
5. Bighorn sheep population/distribution
   - the larger the population the greater the risk
6. Wild bighorn sheep ram:ewe ratio
   - the narrower the ratio the greater the risk of "pioneering" rams
7. Timing of wild bighorn sheep translocations/reintroductions
   - Higher risk if during Driveway use due to "pioneering" nature of recently reintroduced/translocated herds
8. Domestic sheep herding activity
   - the more human herding activity associated with the domestics results in lower risk
9. Location/distance of wild sheep from domestic sheep during Driveway use
   - risk increases if wild bighorn sheep are in proximity to the Driveway during use by domestic sheep
   - Dwayne Dobson said that herders have not observed wild sheep on the Driveway since the 1980"s when he remembered reports of some near Blue Point
   - Department has survey data and study (McKinney et al. 2005) indicate year-round use of habitat adjacent to and within the Driveway near Stewart Mountain

Risk Factors Not Used and Reason

1. Breeding season of domestic sheep (June 1 – August)
   - determined not to be an issue as domestic sheep are not on the Driveway during this time and therefore not an "attractant" to wild bighorn sheep although probably reduces cumulative risk
2. Vaccination and health management of domestic sheep
   - currently vaccinated for bluetongue, Clostridial diseases, physical health inspection both at "on" and "off" Driveway locations

- not vaccinated against any Pasteurella/Mannheimia (no effective vaccine labeled for use in domestic sheep known to be available at this time, but some vaccines are used under NAID- New Animal Investigation Drug or shorthand "off label") or contagious ecthyma
- Dr. Bender gave some background on contagious ecthyma virus and vaccination – it is generally effective for 7 years, there is no carrier state, and probably less risk of transmission than respiratory diseases
- determined that this does not meet the definition for "risk" because vaccination does not increase or decrease risk as defined

3. Disease background of wild bighorn sheep
   - serologic naivety and lack of previous exposures to diseases in wild bighorn sheep herds increases risk of disease outbreaks
   - workgroup determined that this does not increase or decrease risk as defined in this document
4. Predation
   - higher risk of disease outbreaks if higher predation rate because of more stress on wild bighorn sheep if an exposure were to occur
   - workgroup determined that not enough information is available to evaluate very well and there are several other factors including cover, terrain, etc.
5. Translocations of naive wild sheep increases risk of disease acquisition by wild bighorn sheep, as does mixing source herd animals of wild bighorn sheep to make new introductions
   - determined does not determine risk as defined
6. Domestic sheep band width/size
   - dependent on terrain and therefore already covered
7. Sharing of water sources
   - workgroup determined this does not increase risk because wild bighorn sheep would most likely not venture near water with herding activity present

Step Three: Risk Assessment Scoring

From the risk factors the Workgroup formulated a list of 16 questions in three risk categories for the Driveway. The three risk categories were:

1. Driveway Physical Characteristics (Total of 25 points)
2. Domestic Sheep Herding Characteristics (Total of 25 points)
3. Wild Bighorn Sheep Characteristics (Total of 30 points)

Each question was rated on a scale of 1-5 with the following definitions:

Outcome 1: Very low risk of disease transmission from domestic sheep on this portion of the Driveway within the next 10 years because of very low likelihood of nose-to-nose contact between domestic sheep and wild bighorn sheep.
Outcome 2: Low risk of disease transmission from domestic sheep on this portion of the Driveway within the next 10 years because of low likelihood of nose-to-nose contact between domestic sheep and wild bighorn sheep.
Outcome 3: Moderate risk of disease transmission from domestic sheep on this portion of the Driveway within the next 10 years because of moderate likelihood of nose-to-nose contact between domestic sheep and wild bighorn sheep.
Outcome 4: High risk of disease transmission from domestic sheep on this portion of the Driveway within the next 10 years because of high likelihood of nose-to-nose contact between domestic sheep and wild bighorn sheep.
Outcome 5: Very high risk of disease transmission from domestic sheep on this portion of the Driveway within the next 10 years because of very high likelihood of nose-to-nose contact between domestic sheep and wild bighorn sheep.

The higher the score meant a higher risk for that category and a higher cumulative score from all three categories represented an overall higher probability of nose-to-nose contact between wild bighorn sheep and domestic sheep for that portion of the Driveway being analyzed. The range of possible cumulative scores was from a minimum of 16 to a maximum of 80. The cumulative score range was then divided into five outcomes as well to assess cumulative risk:

Very Low Risk = 16 – 28
Low Risk = 29 – 41
Moderate Risk = 42 – 54
High Risk = 55 – 67
Very high Risk = 68 – 80

Cumulative Risk Scores by Driveway Section (Forest Ranger District)

Driveway Section	Cumulative Risk Score (X/80)	Driveway Physical Characteristics Risk Score	Domestic Sheep Herding Characteristics Risk Score	Wild Bighorn Sheep Characteristics Risk Score
Mesa 1	41 (Low Risk)	15/25	8/25	18/30
Mesa 2	27 (Very Low Risk	11/25	10/25	6/30
Tonto Basin	26 (Very Low Risk)	11/25	9/25	6/30
Pleasant Valley	28 (Very Low Risk)	10/25	12/25	6/30
Black Mesa	24 (Very Low Risk)	9/25	9/25	6/30
Lakeside	20 (Very Low Risk)	5/25	9/25	6/30

Step Four: Assignment of Value to Alternatives to Reduce Risk

The Workgroup assigned value to the brainstormed list of alternatives by choosing their top three ideas under the auspices that the goal of the Workgroup was to assist the TNF/ASNF with the NEPA analysis. Furthermore the Workgroup was only to recommend items to help reduce risk (probability of nose-to-nose contact).

This is the list of brainstormed ideas with additional comments in parenthesis:

1. Disease Management
   - Vaccination of wild and domestics (not there yet, tool for the future, no current funding, too many unknowns, vaccinate for contagious ecthyma and/or other diseases only if disease is first observed in domestic sheep)
   - Baseline identification of Pasteurella/Mannheimia biotypes and genotypes-fingerprinting if possible in wild bighorn sheep
   - Standardize the protocols for disease testing and surveillance in wild bighorn sheep (there are templates already out there, if disease is detected in domestic sheep before domestics enter Driveway then they have to be trucked around wild sheep area, for AGFD - develop protocol with Wildlife Manager notification) and domestic sheep
   - Conduct full necropsy and bacteriology testing of all wild bighorn sheep and domestic mortalities (funding for domestic necropsies?)
   - Genetic study of biotypes of Pasteurella/Mannheimia and mycoplasma bacteria and viruses related to the respiratory diseases of wild bighorn sheep and domestic sheep (information gathered here will assist with mitigation and decision making later)
   - Continue or initiate more disease studies specific to Driveway (funding?)

2. Operational Changes for Woolgrowers
   - Compensate permittees for other pastures, trucking, truncating Driveway, elimination of Driveway (permittees can‟t account for lost time, too hot to keep domestic sheep in Valley, economic burden to permittees, more stress on pregnant ewes if trucked, yearly expense – not a one time cost)
   - Alternate driveway route (none identified except Highway 288 alignment)
   - Switch operation to cattle (other management and environmental considerations)
   - Maintain current operation
   - Fencing of parts of Driveway where wild bighorn sheep contact is higher (who?, funding?, difficult to coordinate volunteer effort twice a year, high recreation area will result in destruction/vandalism to fence)
   - Timeline changes for use of Driveway and allotments
   - Increase herding activity

3. Disease Management Risk Assessment
   - Use radio collars to establish contacts between wild and domestics (need this data for better decision making)
   - Aerial surveys of wild bighorn sheep locations prior to domestic sheep entering Driveway including the use of volunteers to haze wild sheep and locate domestic strays (would

take approximately 2-4 hours of helicopter time per year, volunteer coordination, enough notification for logistics?)

Investigate disease acquisition from other wildlife (e.g. deer, elk) with resultant population reduction of wild bighorn sheep

Rural public sheep/goat risk? (not associated with this effort)

Predators as contributor to population reduction (too large an issue with too many other contributing factors to grasp)

Increase number of times domestic sheep are counted

Pursue AGFD policy for wild sheep removal that have come in contact with domestic sheep (should include no lethal removal for respiratory disease studies)

Pursue MOU with permittees/AGFD/Department of Agriculture for removal of straying domestic sheep policies and procedures.

Monitor wild bighorn sheep introductions/translocations for evidence of respiratory disease

Wild bighorn sheep herds that are introduced or self establish in close proximity to the driveway should be monitored but should not preclude the use of the Driveway.

Monitor all wild bighorn sheep herds and introductions done in proximity to Driveway

Recommendations and Conclusions

The conclusions and recommendations of this Workgroup are only designed to assist TNF/ASNF with the NEPA process and include assumptions that have not been quantitatively substantiated. The following are the items that received the most votes and are recommendations by the Workgroup:

1. Aerial surveys of wild sheep locations prior to domestic sheep entering the Driveway and the use of volunteers to haze wild sheep and locate domestic sheep strays should reduce risk.
2. An AGFD policy for removal and management of wild sheep that have come in contact with domestic sheep is needed.
3. A Memorandum of Understanding (MOU) with the permittees, AGFD, and the state Department of Agriculture for preventative management and removal of stray domestic sheep is needed.
4. Sustained compensation for permittees for use of other pastures in lieu of the Driveway, trucking domestic sheep around wild sheep habitat, truncating the Driveway around wild sheep habitat, or elimination of Driveway will reduce risk of Pasteurella/Mannheimia-type pneumonic disease. (but not insect-borne infections acquired from other wild ungulates in wild bighorn sheep habitat such as bluetongue/EHD viruses from infected deer and elk and other wild bighorn sheep)

Furthermore, the Workgroup makes the following conclusions:

1. The Driveway in its entirety represents very low to low risk of nose-to-nose contact between domestic sheep and wild sheep with five of the six Driveway subsections being rated as “very low risk” and one subsection as “low risk”.
2. The Mesa 1 Ranger District subsection of the Forest represents the highest risk of the six Driveway subsections for nose-to-nose contact between domestic sheep and wild sheep of all Forest Ranger Districts on the Driveway and was rated as “low risk”.

Literature Cited

Arizona Game and Fish Department. 2006. Kanab Creek Wilderness Area Bighorn Sheep Health Assessment Disease Results and Discussion. AGFD, unpublished. 6 pp.

Arizona Game and Fish Department. 2004. Performance Report, Project W-53-M-54. Wildlife Disease Investigations: To investigate game animal disease outbreaks; (a) Bighorn sheep disease epizootic in the Silver Bell Mountains, southern Arizona. AGFD, 28 pp.

McKinney, T., T.W. Smith, and J.C. DeVos Jr. 2005. Evaluation of potential factors influencing a desert bighorn sheep population. Wildlife Monographs. 164: 1-36.

Schommer, T. and M. Woolever. 2001. A Process for finding Management Solutions to the Incompatibility Between Domestic and Bighorn Sheep. USDA Forest Service, Washington, DC. 62 pp

Schommer, T. and M. Woolever. 2007. (Update of 2001 report): A Process for finding Management Solutions to the Incompatibility Between Domestic and Bighorn Sheep. USDA Forest Service, Washington, DC. 62 pp.

USDA Forest Service 2006. Risk Analysis of Disease Transmission Between Domestic Sheep and Bighorn Sheep on the Payette National Forest. 41 pp.

USDI Bureau of Land Management. 1998. Instruction Memorandum 98-140. Revised Guidelines for Management of Domestic Sheep and Goats in Native Wild Sheep Habitats. USDI-BLM, Washington, DC. 6 pp.

Western Association of Fish and Wildlife Agencies – Wild Sheep Working Group. 2007. Recommendations for Domestic Sheep and Goat Management in Wild Sheep Habitat. 27 pp.

Appendix A. – List of Heber-Reno/Morgan Mountain Domestic Sheep Driveway Workgroup Participants

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Appendix B. – Heber-Reno/Morgan Mountain Driveway Scoring Matrix

Heber-Reno Sheep Driveway Scoring Matrix

This scoring matrix was used to assign a "risk score" for individual segments of the Heber – Reno/Morgan Mountain Sheep Driveways. Risk (as defined by the Heber-Reno/Morgan Mountain Sheep Driveway Workgroup) is "the probability of nose-to-nose contact between domestic and wild sheep". As of February 2008, four bands of approximately 2500 domestic sheep/band are trailed twice a year along the Driveway. For this analysis, the Workgroup assumed that each trailing of domestic sheep along the Driveway is considered an independent event in regards to risk. The length of each segment of the Driveway and the number of days that domestic sheep are on each segment of the Driveway were obtained from Mark Pedersen and Dwayne Dobson – Sheep Springs Sheep Company.

Segment of Driveway:

Length of above segment (in miles):

……..…

DRIVEWAY PHYSICAL CHARACTERISTICS

1. Distance between Driveway and nearest bighorn sheep population

≥20 miles 1
≥ 9 but <20 miles 2
≥3 but < 9 miles 3
< 3 miles 4
Directly adjacent/overlapping 5

2. Amount of occupied bighorn sheep habitat adjacent to the Driveway

None 1
< 3 square miles 2
≥3 but < 9 square miles 3
≥ 9 but <20 square miles 4
≥20 square miles 5

3. Distance from the Driveway to unoccupied suitable bighorn sheep habitat proposed for translocation in the next 10 years (Goldfield Mountains considered occupied)

None 5
< 3 miles 4
≥3 but < 9 miles 3
≥ 9 but <20 miles 2
≥20 miles 1

4. Distance from the Driveway to unoccupied suitable bighorn sheep habitat likely to see colonization by bighorn sheep in the next 10 years (Goldfield Mountains considered occupied)

None 5
< 3 miles 4
≥3 but < 9 miles 3
≥ 9 but <20 miles 2
≥20 miles 1

5. Topographic barriers (terrain) along Driveway (% linear coverage) that would limit straying domestic sheep and bighorn sheep (to include: rivers, major roads, deep canyons, cliffs, fences, subdivisions)

90-100% 1
75-89% 2
50-75% 3
25 –49% 4
0- 24% 5

Total Driveway Physical Characteristics Score __/25___

SHEEP HERDING CHARACTERISTICS

1. Number of days domestic sheep are on Driveway in occupied bighorn sheep habitat = X days (Dobson/Auza – four bands of approximately 2,000 sheep/band, trailed one day apart. Driveway length = X miles. The estimated number of days for this section was taken from Mark Pedersen and Dwayne Dobson – Sheep Springs Sheep Company)

≤ 2 1
≤4 2
≤10 3
≤12 4
>12 5

2. Number of days domestic sheep are on Driveway in unoccupied bighorn sheep habitat = X days (Dobson/Auza – four bands of approximately 2,000 sheep/band, trailed one day apart. Driveway length = X miles. The estimated number of days for this section was taken from Mark Pedersen and Dwayne Dobson – Sheep Springs Sheep Company)

≤ 2 1
≤4 2
≤10 3
≤12 4
>12 5

3. Relative occurrence of strays documented or anecdotal (four bands of approximately 2000 sheep each (Dobson/Auza, 3-8 miles/day, 1-2 cripples/day, picked up daily)

None 1
Infrequent 2
Frequent 3
Very frequent 4
Common 5

4. Frequency of domestic sheep counts (assuming daily estimation)
   1-3 1
   None 5

5. Hazing activity (dogs, bells, presence of herders)
   None 5
   Intermittent 3
   Continuous 2
   Heavy 1

Total Sheep Herding Characteristics __/25___

BIGHORN SHEEP CHARACTERISTICS

1. Estimated population of bighorn sheep adjacent/overlapping habitat with Driveway

   150-200 5
   100-150 4
   50-100 3
   1-50 2
   None 1

2. Presence of bighorn sheep within or adjacent to the Driveway (assumption that bighorn sheep observed on Department surveys are year-round residents)

   Yes 5
   No 1

3. Ram:ewe ratio (assumption that narrower ratio results in greater ram dispersal and higher risk)

   < 30:100 1
   30-50:100 2
   50-60:100 3
   60-80:100 4
   >80:100 5

4. Percent age class of estimated Class III and IV ram population (assumption that older age class results in greater ram dispersal and higher risk)

   <20% 1
   20-40% 2

40-60% 3
60-80% 4

>80% 5

5. Distribution (density) of herd (assumption that higher density results in increased risk)

Sparse 1

Low 2
Medium 4
High 5

6. Timing and location of bighorn sheep translocations, reintroductions

During sheep driveway use and adjacent to Driveway 5
Not during sheep driveway use and not adjacent to Driveway 1

Total Bighorn Sheep Characteristics Score ____/30__

Combined Total Score ___/80__

Appendix C. Summary of Scoping Concerns

On April 30, 2010, a Notice of Availability of the Environmental Assessment for Heber-Ren/Morgan Mountain Sheep Driveways was published in the newspapers of record, and a letter providing access information and seeking public comment was mailed to those agencies and individuals who commented during the scoping period. Below are the consideration of substantive comments received during the 30 day comment period. Also included is a comment made by the Arizona Department of Game and Fish in August 2010, and the consideration given to it.

The commentors are: 1) Tom Taylor; 2) Ray Kohls; 3) Wild Sheep Foundation; 4) Arizona Game and Fish Department; 5) Gary Barcom; 6) Arizona Desert Bighorn Sheep Society; 7) Sierra Club, Grand Canyon Chapter; 8) Scottsdale Community College; 9) Kirk Brus; 10) David McCasland; 11) John Clemons; 12) Jim Unmacht; 13) Navajo Nation Veterinary Program; 14) Cindy Shanks; 15) Joe Del Re; 16) Animal Welfare Institute; 17) Erik Ryberg/Western Watersheds Project. After the comment period, the Arizona Game and Fish Department sent another letter on August 22, 2010, which led the interdisciplinary team to make clarifying changes to the proposal and analysis.

Action	Response	LTR #s
Continue authorized use of sheep driveway	Thank you for your comment	1,13,14
Discontinue authorized use of sheep driveway	Thank you for your comment	2,8
Truck sheep to avoid BHS areas as described in Alternative #3	Thank you for your comment	3,5,6, 11,12,15
The driveway passes through two (not one) game management units where bighorn sheep are hunted. Add Unit 24B to document.	EA revised to include Unit 24B	4,10
Correct bullet point #3 on page 13. "sheep using driveways will not bed down or be held over within known BHS habitat South of State Road (SR) 87 and Usery Pass."	Reference to SR 87 and Usery Pass has been corrected.	4
Consider various studies regarding BHS	As stated in the draft EA, we acknowledge and are aware of the studies and reports that: 1) show a strong correlation between the presence of domestic sheep and the spread of disease to bighorn sheep, and 2) describe the lethal and devastating effects disease could have on a bighorn sheep population. We do not dispute these studies or reports. Less is known about the risk/probability of trailing sheep having nose-to-nose contact with bighorn sheep.	4,8,7

Action	Response	LTR #s
Alternative 3 reference to other drop-off points for domestic sheep. Alternative severely limits the opportunity for AZGFD to introduce RM BHS populations to two previously identified and evaluated sites. This needs to be addressed. EA-9	We have discussed this in the wildlife cumulative effects section.	4,7,10,16,17
Alternative 3 has three potential drop off locations all at different distances along HRSD – making it difficult to evaluate impacts of alternative	The impacts resulting from the potential use of three different drop-off points (Alternative 3) are discussed in the EA for wildlife, rangeland and riparian resources.	16
Mitigation does not preclude or prevent nose-to-nose contact for interaction between wild and domestic sheep. EA-11	Permittees are required to notify the Forest Service within 24 hours of bighorn sheep and domestic sheep interaction.	4,7
Active Bald and Golden Eagles nests near the driveway were not addressed. EA-16	We used the qualitative term "near" in respect to potential impacts to nesting eagles. We do not feel the driveway would impact nesting bald eagles nest 1.5 miles away, nor did we feel the driveway would impact a known golden eagle nest 1.9 miles away. We consider a nest to be "near" if it was within 0.6 miles of the driveway. Studies have shown that eagles may flush at these close distances. We have changed the wording of the table to reflect this explanation.	4
Need to clarify that the risk assessment was a qualitative instrument and that risk was defined as "nose-to-nose" contact between DS and wild BHS. EA-29	We added the word "qualitative" in describing the assessment. We restructured the sentence to emphasize the definition of risk. ***Continued on next page.***	4

Action	Response	LTR #s
Add discussion regarding impacts to predators Mexican Gray Wolf, lions/coyotes	As the first EA draft of table 5a states, Tonto NF made a "no effect" determination for Mexican gray wolf only in Tonto NF because there is no habitat within Tonto NF. This determination did not include Apache-Sitgreaves NFs because both forests did their analysis separately. Apache-Sitgreaves NFs made a "may affect, not likely to adversely affect" determination for Mexican gray wolf for their Forest. The analysis is described in the biological assessment. table 5a will include determinations for federal species for both Forests. The permittees have not engaged in active depredation activities nor have they requested Animal and Plant Health Inspection Service Wildlife Services to kill predators along the driveway. Permittees do not engage in depredation activities along the driveway because expending time and energy to hunt and kill predators for a traveling band of sheep would serve no benefit to the permittees. Domestic sheep will be moving out of the depredated area the next day, and permittees would not receive any detectable benefits of a depredated area after leaving it. Herders will not shoot at predators while moving along the driveway. However, herders will occasionally shoot at coyotes or other predators at night to scare coyotes away from bedding sheep. However, rarely do herders kill coyotes because: 1) it is very difficult to shoot accurately at night and, 2) coyotes are typically gone before the herder arrives (Mark Pederson, personal communications).	7
Add discussion regarding impacts to TES Species.	The impacts to federally-listed species are addressed in the biological assessment, and summarized in table 5a.	7
Add discussion regarding impacts to other wildlife.	The impacts to Forest Sensitive Species are addressed in the biological evaluation, and summarized in table 6a.	7,16
Discuss other sources of disease transmission.	A section has been added to describe the potential for disease transmission.	16,17

Action	Response	LTR #s
Is the habitat you repeatedly refer to as "low quality" in fact low quality?	We erroneously used the term "low-quality." We have changed the description to "low-density," which is based on Arizona Game and Fish Department"s data and definition. We added the definition of low-density as 0.5 to 2 bighorn sheep/square mile.	17
Add background data on BHS populations and trend.	We have added a section from the AZGFD report describing the history of disease and bighorn sheep populations in Arizona.	16,17
Need to provide population data on wildlife species on driveway.	Impacts to wildlife are analyzed in the biological assessment and biological evaluation.	16
The Goldfield Mountains need to be included with Stewart Mountain as BHS habitat. This range represents occupied bighorn sheep habitat and the Driveway encompasses or is immediately adjacent to it for approximately 8 miles including 2 bedding areas	We have depicted additional habitat based on: 1) AZGFD comment letter, 2) observations supplied to Luhrsen and Wong from Holt in an e-mail dated 4/14/2009, and 3) the steep topography relative to "low-density" habitat from classified habitat from Arizona Game and Fish Department. We believe this new area has a similar classification to AZGFD"s "low-density" (0.5 to 2 BHS/square mile) habitat.	4,7
The driveway is adjacent to several thousand acres of occupied BHS habitat that is not mentioned or included in figure 1, appendix A.	We included additional maps to clarify bighorn sheep habitat, bedding areas, and potential drop-off points. See Figures 5, 6, and 7.	4,7,10,16
Two bedding grounds in close proximity of BHS habitat were not addressed.	There are 2 bedding grounds that are close to BHS habitat. The first one near Blue Point is 0.34 miles south and across the Salt River from BHS habitat. The second one near Usery Pass is 1.0 mile northwest of BHS habitat (Pass Mountain).	4,7

Action	Response	LTR #s
The Draft EA fails to identify what a "TES write-up" is, fails to disclose where it can be found, and fails to provide any means of accessing the document via the Internet.	TES refers to a group of wildlife specialist reports that includes federally listed (biological assessment) and Forest sensitive species (biological evaluation). This has been clarified in the document. Per *36 CFR part 220.4(h)*, material must be reasonably available to the public and its contents briefly described in the EA or decision document. In addition, the EA may incorporate by reference data, inventories, other information and analysis (*36 CFR 220.7*). Data used to support the EA are included in the administrative record. The forests are not required to provide documentation via the internet. All public documents (except those exempt from FOIA) are available upon request from the Apache-Sitgreaves NFs.	16
Mitigation measures are entirely unenforceable. Many of these mitigation measures are unacceptable, since they either allow the permittee to dictate certain uses of the driveways instead of the U.S. Forest Service, are faith-based and entirely unenforceable.	Mitigation measures will be included within annual operating instructions (AOI). As described in the proposed action, the USFS will manage the use of the driveways per the AOI. A U.S. Forest Service representation will inspect and monitor for compliance. It is the commenter"s opinion that the mitigation measures are "entirely unenforceable."	16
"a procedure that will be developed to deal with the detection and removal of stray domestic sheep." Mitigation measures should not defer to the future and should be clearly defined as per the categories under CEQ regulations *40 § C.F.R. 1508.20*.	The passage cited is located in the Effects to Wildlife section of the EA, which refers to a mitigation measure described as being added to annual operating instructions (AOI). This passage has been removed from the final EA. The mitigation measure has been improved in the EA to include a stipulation for the inventory of domestic sheep. The USFS will further work with the permittees to determine the best method for effectively reducing/eliminating the potential of stray sheep.	4,7,10,16,17

Action	Response	LTR #s
The economic value of wild BHS to the state and local economy far exceeds the value in receipts derived from hunting license/tag sales as stated in the EA. Establishment of any wild BHS offers the public an aesthetic appeal and a wide range of economic opportunities. There is no mention of traditional, cultural and aesthetic social values associated with hunting/non hunting wildlife related recreation.	Potential impacts to tourism and revenue is unquantifiable and too speculative to analyze. There is no known economic impact to the local economy specifically due to bighorn sheep viewing. The statement assumes any decline in bighorn sheep population only as a direct result of domestic sheep use of the driveways. This comment does not take into account other factors of recreation and tourism, which may have significant impacts on these values.	4,7,10,16,17
Climate change not addressed in doc	Watershed/resource condition will be assessed and addressed annually in the permittees AOIs. A discussion about Climate Change has been added.	7:8
Mitigation measures included which are not part of the decision	Remove first part of sentence "although not part of this decision"	4,8,16
The document frequently refers to external documents making it difficult for reviewers to analyze. The project record is not available until after the decision is signed.	Data used to support the EA are included in the administrative record. All public documents (except those exempt from FOIA) are available upon request from the Apache-Sitgreaves NFs.	7
Supporting documents were not available through the project‟s website nor was any information disclosed in the Draft EA about their content or where they could be obtained.	Per *36 CFR part 220.4(h)*, material must be reasonably available to the public and its contents briefly described in the EA or decision document. In addition, the EA may incorporate by reference data, inventories, other information and analysis (*36 CFR 220.7*). Data used to support the EA are included in the administrative record. The forests are not required to provide documentation via the Internet. All public documents (except those exempt from FOIA) are available upon request from the Apache-Sitgreaves NFs.	16
The driveways are not fenced or posted on A/S. . . Sheep have the potential to be driven into sensitive areas.	While the driveway is not fenced or posted in many areas, it is still limited to the designated width of driveway	7
Sierra Club is not listed as responding to initial scoping.	Sierra Club added to list	7

Action	Response	LTR #s
Modify Alternative 3 to include all the mitigation proposals identified in Alternative 2.	Alternative 3 includes all the mitigation proposals identified in Alternative 2 and are listed in "Mitigation Measures Common to Both Action Alternatives."	10
The U.S. Forest Service has failed to provide a legitimate purpose and need for the proposed action.	The need for NEPA analysis on the driveway is to ensure that the travelway established by manual direction (1908) between winter range and summer range is analyzed and is in compliance with current manual direction. The driveways were not included in the current forests" plans because the use is considered temporary in nature and of light impact. This analysis is also being done at the direction of a court order	16
U.S. Forest Service has still not disclosed any evidence (i.e., legal proclamation, executive order) to demonstrate that the HRSD and MMSD are legal. . .	Use and management of driveways is addressed in FSM 2234.13 and the *Apache-Sitgreaves National Forest Plan (1987)* and the *Tonto National Forest Plan* (1985, amended 1996).	16
The EA provides no reasonable range of alternatives. Why is No Action "no trailing" rather than status quo?	The "no action alternative" has been developed in accordance with Forest Service Handbook (FSH) 2209.13 Ch. 90, which describes "No action" is synonymous with "no grazing" and means that livestock grazing would not be authorized within the project area.	16
Include an alternative that would temporarily compensate permittees not to utilize the domestic sheep driveways.	There are no provisions in current policy which allow compensation to permittees for voluntary or mandatory non-use of grazing resources.	16
Why does the permittee tells FS where to bed down, trail etc rather than other way around?	Forest Service Handbook (FSH) 2209.13, Chapter 90 describes the U.S. Forest Service must approve the annual operating instruction (AOI) of all grazing operations before operations can begin. For permits issued on the Heber-Reno/Morgan Mountain sheep driveways, this includes trailing and bed down locations.	16
Establish a driveway observer program whereby a U.S. Forest Service employee or, preferably, a third party contractor, accompanies the herders as they move sheep along the driveway to watch for interactions between BHS and DS.	Forest Service Handbook (FSH) 2209.13, Chapter 90 describes monitoring criteria for permit compliance will be described in the grazing permit, allotment management plan (AMP), and annual operating instructions (AOI). A U.S. Forest Service representation will monitor for permit compliance.	16

Action	Response	LTR #s
Assure compliance with Federal Clean Water Act.	The U.S.F.S. will recognize all laws, regulations, and policy when making decisions concerning public lands	9
Include annual usage numbers by permittees since 2000	The information you request is available by contacting the Apache-Sitgreaves NFs. For the purpose of determining environmental effects, this EA will provide an analysis using the fully authorized domestic sheep use of 8,000 for the Heber-Reno and 4,000 for the Morgan Mountain driveways, as described in the proposed action section.	10
Mitigation measure permits permittees to cut or pull up fences so that sheep can access trailing routes as long as the damage is "repaired immediately and restored to the previous wire spacing within five days." five days to repair altered fences and to restore wire spaces within five days is not consistent with doing so immediately.	While driving sheep, permittes do not carry the necessary supplies to restore a cut fence to the precut spacing, but carry supplies to restore the overall integrity of a cut fence. This mitigation measure insists cut fences are immediately repaired, but not necessarily to precut spacing requirements for up to five days. The final document will provide a more detailed description of this mitigation measure.	16
Standards and Guidelines for rangeland management etc. are not disclosed nor does Chapter 3 discuss consistency . . .	Please, refer to the Forest Plan Consistency section of the EA, which describes standard and guidelines that are found in the forest plan.	16
The U.S. Forest Service must disclose the impact of said grazing on rangeland and riparian resources. Claims that the impact would be minimal or short-term are not sufficient…	The use of minimal and short-term is appropriate when describing intensity and duration of specific impacts. The specific impacts to rangeland resources resulting from each alternative begins in the Rangeland Effects section of the EA.	16
…actual data must be obtained to quantify the impact of the domestic sheep and to compare and contrast it with the impacts of wildlife and cattle. If said data does not exist, the U.S. Forest Service has an obligation to collect it before proceeding with this planning process.	Forest Service Handbook (FSH) 2209.13, Chapter 90 describes monitoring criteria for permit compliance will be described in the grazing permit, allotment management plan (AMP), and annual operating instructions (AOI). A U.S. Forest Service representative will monitor for range condition and permit compliance. The final document will be improved to describe range condition monitoring.	16

Action	Response	LTR #s
U.S. Forest Service claims that there is a lack of data regarding the proportional use of forage between wildlife, cattle, and sheep across the driveways. How has it determined that current grazing impacts by domestic sheep, wildlife, and cattle has not exceeded a 40 percent utilization rate per year? Is the 40 percent utilization rate is limited to cattle only or to the combined grazing effects of all three species groups? If the U.S. Forest Service can prove that use is equal to or less than 40 percent, it must have sampling data available that, as previously indicated, should have been disclosed in the Draft EA.	The EA indeed describes the proportional forage use by wildlife, cattle, and sheep as unknown. In the Rangeland Effects section, the document states livestock grazing will continue with forage utilization limited to 40 percent per year. To clarify, irrelevant the foraging species, utilization will not exceed 40 percent per year.	16
The FS failed to provide any information about the identified cumulative impacts such as population data on deer and elk, recreation use etc.	See above. Numerous activities take place on the forest that hinge on range inspections.	16
How many strays have there been in the past? Average annual loss of sheep on the driveway?	The average number of sheep lost per trip across the driveway is less than five. Currently inventory requirements are not stipulated by the U.S.F.S. The EA will describe stipulations for inventorying sheep during driveway use. Inventory requirements will be described in the annual operating instructions (AOI) in an effort to reduce the potential for lost domestic sheep.	16,17
Who has authority to carry out mitigation measures or describe them in AOI"s?	Forest Service Handbook (FSH) 2209.13, Chapter 90 describes district rangers must document that grazing permits and activities are consistent with NEPA. Additionally, Washington Office Amendment 2209.13-92-1 describes suspension or cancellation of permit can be made a penalty for violating terms and conditions of a grazing permit.	10,17

Action	Response	LTR #s
Circle domestic sheep each night with portable fencing, use more herders	Natural barriers and habitat preferences of bighorn sheep will likely keep bighorn sheep separated from bedding domestic sheep, and therefore fencing will not be necessary. Although bighorn sheep are known to disperse between mountain ranges through flat areas, bighorn sheep generally prefer rugged topography to escape predators. The Usery Pass and the Blue Point bedding grounds are separated from bighorn sheep habitat by 1.0 and 0.34 miles, respectively, of flat ground. In addition, the Blue Point bedding ground is separated from bighorn sheep habitat by the Salt River.	17
Where and how long do sheep bed down?	As described in the proposed action section of the EA, bedding ground locations will be described in the AOIs. Sheep bed down for one night in identified locations, while using the driveway. This provides the U.S.F.S. with flexibility in managing the driveways to incorporate an adaptive management strategy. The final EA will provide improved maps of current proposed bedding grounds.	16,17
How long are domestic sheep on driveway?	Please, refer to the proposed action section of the EA which describes the annual use of the driveways as not to exceed 57 days.	16,17
Why are the bedding areas considered safe from BHS interactions?	To clarify, the U.S.F.S. does not describe the use of the driveways by domestic sheep as safe from contact with big horn sheep, but rather as no to low risk. See wildlife Effects section of the EA. The Final EA will provide improved mapping and description of BHS habitat adjacent to the driveways.	16,17

Action	Response	LTR #s
We are concerned that the proposed alternating riparian crossings on the Apache-Sitgreaves have been removed from the proposed action. According to the EA, it is due to the location of the crossings, the lack of riparian vegetation in these areas, and the short duration of sheep use.	The EA describes little to no riparian vegetation is present along the driveway in the Apache-Sitgreaves NFs. Since the resource is not present, it is prudent to remove the prescription from the proposed action. Alternatively, general protection measures for riparian resources are included in the proposed action to include; bedding grounds will be located outside of all riparian areas and all riparian areas would be excluded from water haul locations. Mitigation measures have also been developed to provide added protection to riparian resources.	7
There is no mention in the cumulative effects (alternative 2) of risk to wild BHS associated with habitat adjacent to DS on the driveway. Decline in BHS population from contracting disease would have negative impact to AZG&F revenue, nature tourism, wildlife recreation, hunting opportunity, recreation revenue	Risks to bighorn sheep are described in the Wildlife section. Potential impacts to tourism and revenue are unquantifiable and too speculative to analyze because 1) there is no known economic impact to the local economy specifically due to bighorn sheep viewing, and 2) the statement assumes a decline in bighorn sheep population only as a direct result of domestic sheep use of the driveways. In other words, this comment does not take into account other factors of recreation and tourism, such as declines in the national economy, which may have a much more significant impact on these industries.	4,7,10,16,17
Provide citation or "based on observation" comment regarding soil condition	citation added	7
The discussion regarding soil erosion is inadequate.	More information included in soil erosion discussion.	7
Provide citation for vegetation condition.	Citation is provided in Rangeland Effects section	7
Why are sheep using Naegelin Creek as a travel way?	Per conversation with ranch manager, sheep do not trail up Naegelin Creek, but use the road that parallels the creek through the canyon. Reference to Naegelin Creek as a travel way removed.	7, 8,9
Provide a more detailed description of each riparian area along the entire length of both driveways and potential impacts.	Table describing stream crossings on the Tonto added.	9, 16

Action	Response	LTR #s
No discussion on invasive plants provided.	Text describing invasive plants has been added to the mitigation measures, Table 1, rangeland existing condition and rangeland effects sections.	7
Improve discussion concerning recovery from Rodeo-Chediski/Edge Complex	Data used to support the EA are included in the administrative record. Recovery of these areas is considered as a cumulative impact in this document. Providing specific details of recovery is outside the scope of this project. The EA may incorporate by reference data, inventories, other information and analysis (*36 CFR 220.7*).	7
FS claims permittees stand to lose money if use of the driveway is terminated yet does not provide permittees financial information or other proof to substantiate this claim.	The Forest Service does not collect detailed financial information on its grazing permittees, nor is such needed for management or analysis. In 2007, the permittees using the driveway provided the interdisciplinary team with a letter giving their input, including economic, to the analysis. We cite that letter, but do not use it as the sole source of costs relating to changes in driveway management. It has been extensively discussed in many publications that federal land permitted grazing provides ranchers with the cheapest available forage costs compared to private leases or feeding hay. In addition, for the active permittees trucking the entire flock would involve costs they don‟t currently pay.	16, 17
Given the nature of these recent reports [of stray sheep], the evidence may suggest a higher risk of contact between domestic sheep and wild bighorn sheep than what was analyzed during development of the draft EA and the collaborative risk assessment. … It is imperative that the Forest consider this risk to wild bighorn sheep in the EA and the Department would like to reemphasize its support of Alternative #3.	The information contained in the letter is added to the EA in Chapter 2, along with a map. The information is analyzed in the wildlife section of Chapter 3. The proposed action was edited to include specific mention of counting sheep while being driven. Measures to prevent stray sheep are found in the collaborative risk assessment mitigations section.	4 supplement