



United States  
Department of  
Agriculture

Forest  
Service

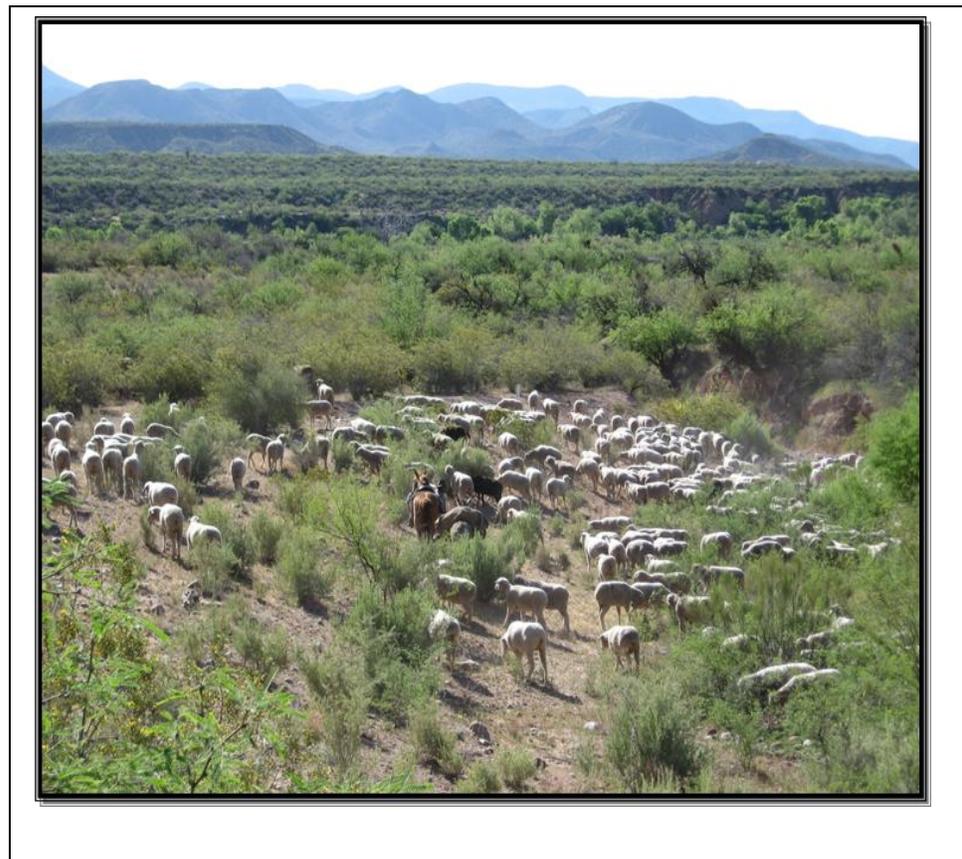
Southwestern  
Region



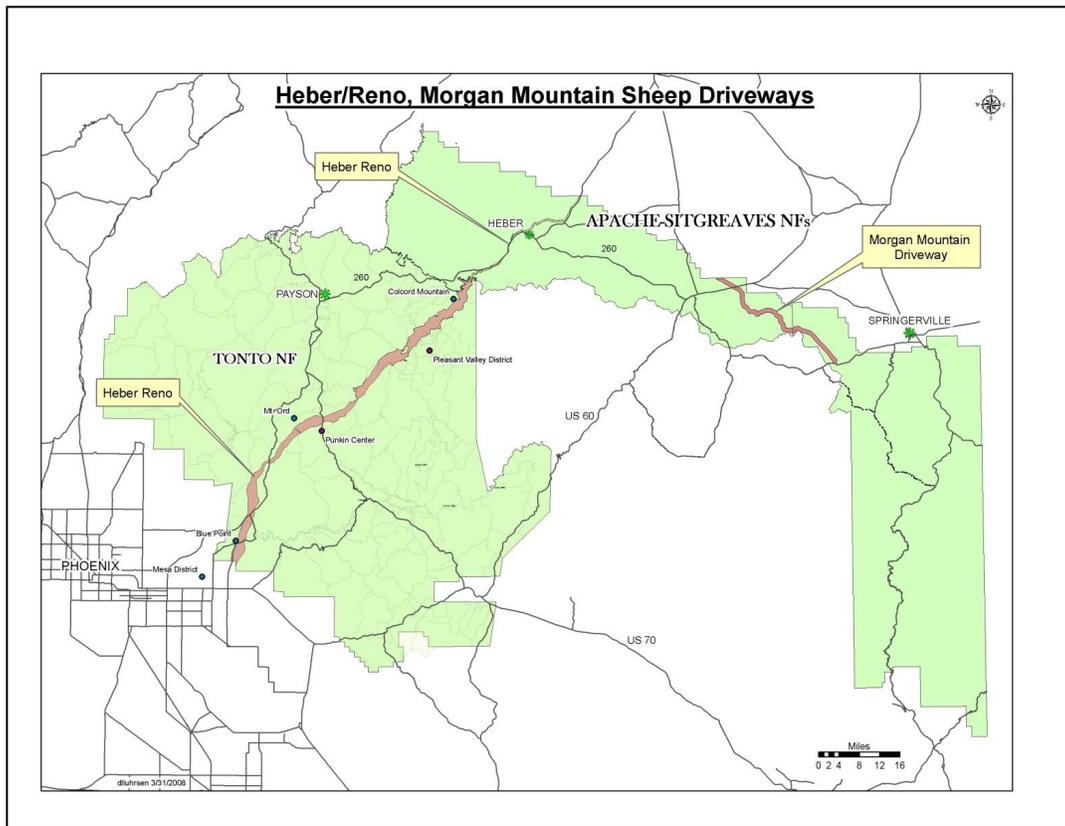
# Environmental Assessment for

## Heber-Reno/Morgan Mountain Sheep Driveways

### Tonto and Apache-Sitgreaves National Forests



**Figure 1. Original Sheep Driveways Vicinity Map**



The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means of communication of program information (Braille, large print, audiotope, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TTY). To file a complaint of discrimination, write to USDA, Director of Civil Rights, 1400 Independence Avenue SW, Washington, DC 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TTY). USDA is an equal opportunity provider and employer.

Printed on recycled paper – April, 2010

# Content

<b>Summary .....</b>	<b>iii</b>
<b>Chapter 1 – Purpose and Need.....</b>	<b>1</b>
Background.....	1
Purpose and Need for Action .....	2
Proposed Action.....	2
Forest Plan Consistency.....	3
Decision Framework.....	4
Public Involvement .....	4
Issues.....	4
<b>Chapter 2 - Alternatives.....</b>	<b>7</b>
Alternatives.....	7
Alternative 1- No Action .....	7
Alternative 2.....	7
Alternative 3.....	9
Monitoring .....	10
Mitigation Measures Common to Both Action Alternatives.....	11
Mitigation by Ranger District per Annual Operating Instructions .....	13
Other Related Mitigation Measures Proposed Through the Risk Assessment by Arizona Game and Fish Department.....	14
Comparison of Alternatives .....	14
<b>Chapter 3 – Environmental Consequences .....</b>	<b>19</b>
Rangeland .....	19
Rangeland Existing Conditions .....	19
Rangeland Effects.....	22
Rangeland Potential Cumulative Effects.....	23
Riparian, Watersheds, and Water Quality .....	23
Riparian, Watersheds, and Water Quality Existing Conditions .....	23
Riparian and Watersheds Effects .....	25
Wildlife .....	28
Wildlife Existing Condition.....	28
Wildlife Effects.....	29
Wildlife Cumulative Effects.....	31

Social and Economic.....	32
Social and Economics Existing Condition .....	32
Social and Economic Effects.....	33
Heritage.....	34
Heritage Existing Condition .....	34
Heritage Effects.....	35
Contemporary American Indian Uses .....	36
<b>Chapter 4 - Consultation and Coordination .....</b>	<b>37</b>
Local Government .....	37
State and Other Federal Agencies .....	37
Tribes .....	38
Others.....	38
<b>Chapter 5 – References .....</b>	<b>41</b>
<b>Chapter 6 – List of Preparers .....</b>	<b>45</b>
USDA Forest Service, Tonto National Forest .....	45
ID Team Members:.....	45
USDA Forest Service, Apache-Sitgreaves National Forests .....	45
ID Team Members:.....	45
Other Federal and State Officials and Agencies .....	45
<b>Appendix A.....</b>	<b>47</b>

# Summary

The Heber-Reno and 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 and Morgan Mountain Sheep driveways are not grazing allotments. They are used for the movement of sheep between private land in the Chandler, 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 Protection 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 Tonto and Apache-Sitgreaves 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 Tonto and Apache-Sitgreaves National Forests 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. An interdisciplinary analysis of the alternatives is documented in the project record. 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 the Tonto NF and 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. The original 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 a couple hundred feet or less when passing through saddles. Today's limited number of bands 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 could resume use 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 within the Beehive/Sheep Springs Sheep Allotment.

Each spring in April, four bands (2,000 sheep per band), two bands per permittee, have been 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 trail is heavily impacted by recreational activity including extensive Off-Highway Vehicle (OHV) use. While on the driveways, 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 these 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).

Use of the driveways is authorized for two permitted livestock operators as part of their ten-year grazing permits. The herding of permitted sheep is currently managed 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. 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 shepherders/camp tender, on the Morgan Mountain Sheep Driveway.

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 NF 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 spring trip is the reverse of the late summer trip.

## **Purpose and Need for Action**

Use of the sheep driveways is connected to the use of the Long Tom and Beehive/Sheep Springs allotments. Use of the driveways has been considered historic and has been authorized for over 100 years. There is a need to supplement the environmental analyses that were completed for the Long Tom (in 2007) and Beehive/Sheep Springs (in 2002) allotments and consider appropriate use of the driveways in connection with these allotments. This is needed in order to be consistent with Forest Service Manual direction. Manual direction requires that this use must be accomplished at an appropriate level and timing such that it perpetuates satisfactory resource conditions and improves unsatisfactory resource conditions, in order to maintain long-term sustainability. The use must be consistent with applicable laws and regulations (*FSM 2234.13*).

## **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 will 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 driveway. 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.

- 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.<sup>1</sup>
- 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.

## Forest Plan Consistency

Specific direction for sheep driveways is not found in either forest plan. Authorization for sheep driveways is provided in Forest Service Manual direction. Standards and guidelines for 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 Tonto NF is located within several forest plan 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 analysis area is within several forest plan 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. [X] 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.

---

<sup>1</sup> 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.

## Decision Framework

Given the purpose and need, the Forest Supervisors of the Tonto and Apache-Sitgreaves NFs will decide: (1) whether or not to authorize continued use of the driveways, and if so, to what level and management intensity.

## Public Involvement

The Proposed Action has been listed in the quarterly Tonto and Apache-Sitgreaves NFs NEPA *Schedules of Proposed Actions* (SOPA) since December 19, 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 (via mail and electronic mail) 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 (both mail and electronic mail) were received. Most responders indicated they wanted their 2008 responses to be carried forward into the analysis. Please refer to the content analysis summary in the project record, which provides additional detail on how each comment was addressed. 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 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. Seven of the contacts for the Tonto NF list were repeated in the Apache-Sitgreaves NFs list. 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 pre-decisional environmental assessment.

## Issues

Comments received during 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 already decided by law, regulation, forest plan, or other higher level decision were addressed in the analysis. Scoping comments and the response to the comments (including their categorization) are located in the project record. Among the topics raised during scoping, the Forest Service identified the following key issues:

**Issue #1: Disease transmission risk to bighorn sheep populations.** Use of the driveways by domestic sheep may negatively affect bighorn sheep populations. **Response:** Alternative 1, No Action, addresses this issue by eliminating sheep use of the driveways. Alternative 2, the Proposed Action, includes mitigation to address the potential for interaction. Alternative 3, partial use, was developed to eliminate the potential for domestic and wild sheep interaction within occupied bighorn sheep habitat. 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 driveway would negatively affect the traditional, cultural, and

aesthetic values associated with its use. **Response:** Both the No-Action and Proposed Action alternatives respond to this issue. 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:** A qualitative assessment of how each alternative affects the potential for disease transmission (potential risk to bighorn sheep population) will be used to evaluate environmental consequences.

**Issue #3a: Economics.** Removing the driveways from use would have adverse economic effects on grazing permittees. The costs associated with finding alternative ways (trucking) of moving sheep to and from the Forests and the need to find additional pasture to replace the time frame when sheep are normally on the driveways would be a minimum of an additional \$98,000 expense for the permittees. This does not include costs of lost production from stress and mortality. Sheep must be off the winter pastures in Chandler, Arizona, by mid-April because alfalfa fields are coming out of dormancy; however, are not allowed on the Apache-Sitgreaves NFs' allotments until May 25. **Response:** Alternative 1 (No Action) and Alternative 3 (Partial Use) respond to this issue. The indicator used to evaluate economic environmental consequences is the additional cost to permittees from alternative methods needed to avoid contact with wild bighorn sheep.

**Issue #3b: 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. **Response:** Alternative 1 (No Action) and Alternative 3 (Partial Use) respond to this issue. The indicator used to evaluate economic environmental consequences is the additional cost to permittees from alternative methods needed to avoid contact with wild bighorn sheep.



# Chapter 2 - Alternatives

This chapter describes and compares the alternatives considered for the Heber-Reno/Morgan Mountain sheep driveways 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 maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative 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. 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

#### Minor Information Corrections and Modifications to Proposed Action since 2008 Scoping

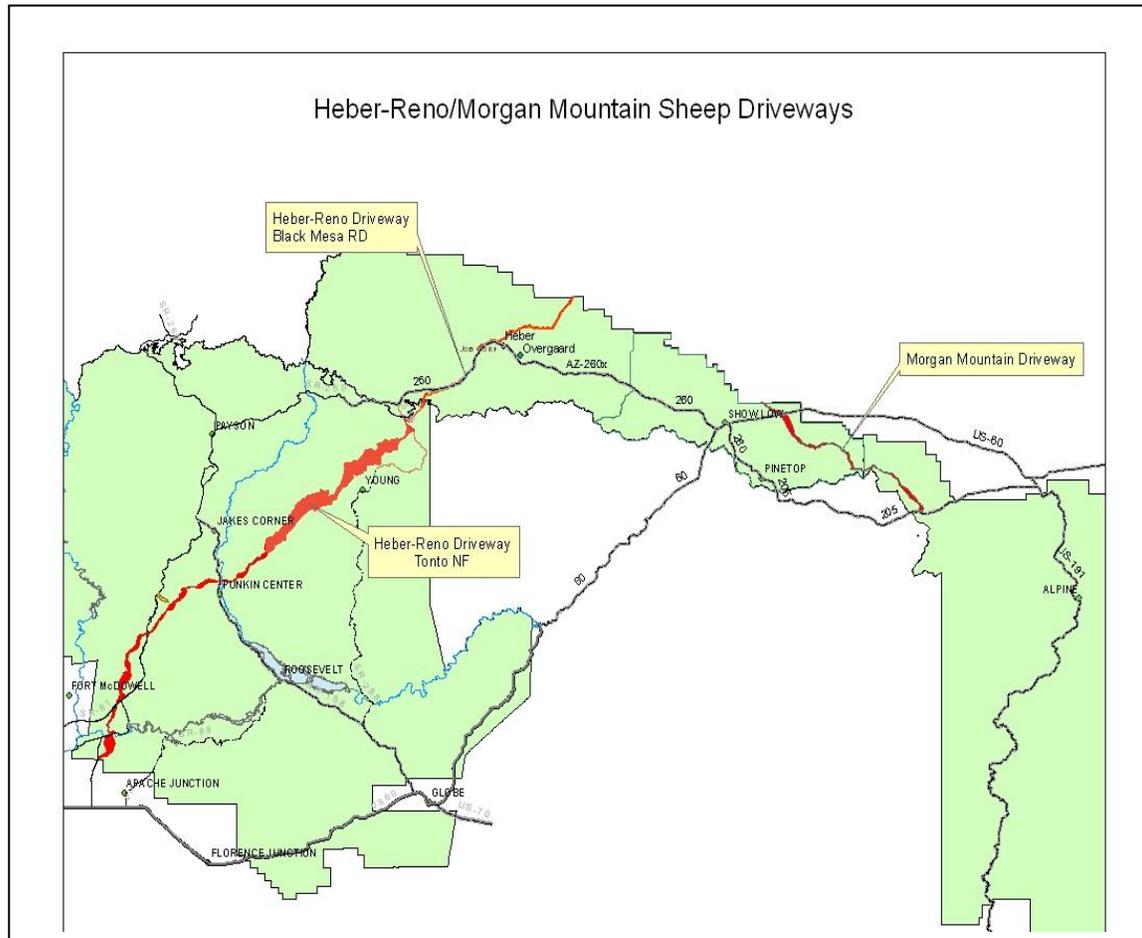
The Proposed Action that was sent out for public comment in 2008 included applying burned area restocking guidelines to determine when soil and vegetation conditions have improved to a level that the trailing, grazing, and bedding of sheep use could resume in those areas of the Heber-Reno Sheep Driveway that were burned in the 2001 Rodeo-Chediski Fire. Due to the amount of time 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 in these locations), this action was removed.

### The Proposed Action

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

- Authorize 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 (figure 2). Use would occur two times per year, spring and late summer, not to exceed 57 days total travel time annually. Annual trips would include the necessary pack stock for the sheep herders.
- 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 add use of the driveways to the term grazing permits for Long Tom and Beehive/Sheep Springs allotments.
- Manage use of the driveways through AOIs prepared in coordination with the permittees and the ranger districts from the Apache-Sitgreaves and Tonto NFs. The AOIs would provide driveways' entry and exit dates for each permittee and various instructions for the permittees to follow, while herding sheep along the driveways including designating: 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.
- Bedding grounds will be located outside of all riparian areas, southwestern willow flycatcher critical habitat, Mexican spotted owl protected activity centers, and developed and dispersed recreation camping areas.
- 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 modifications are needed in the current year's AOI to mitigate adverse drought effects upon vegetative health, water availability, and soil conditions. On the Apache-Sitgreaves NFs, applicable guidelines would be utilized to determine if modifications to the AOIs are also necessary to mitigate these same adverse drought concerns.
- Meet forage utilization guides by annually adjusting 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.

**Figure 2. Alternative 2 – Proposed Action**

### Alternative 3

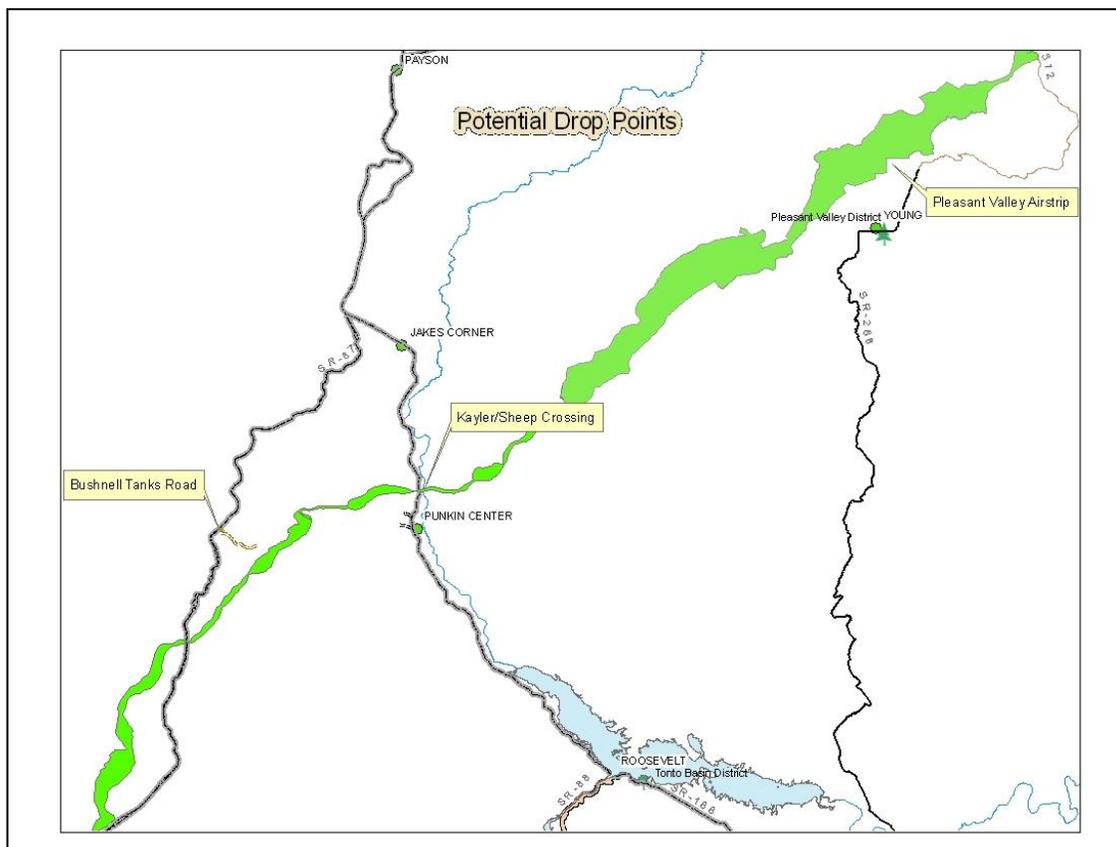
Alternative 3 was developed to respond to the key issue #1, disease transmission. This alternative removes use by domestic sheep on the portion of the Heber-Reno Sheep Driveway that lies within bighorn sheep habitat (figure 3). This alternative would:

- 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, Punkin Center (Kayler/Sheep Crossing), or Pleasant Valley Airstrip. Loading facilities would be necessary before these

sites would be suitable. 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.

**Figure 3. Alternative 3 - Partial Use**



## Monitoring

Adaptive management for use of the driveways will be incorporated into the AOI and monitored through the AOI. 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.

## Mitigation Measures Common to Both Action Alternatives

The mitigation measures will 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 will constitute a violation of the Term Grazing Permit and will be dealt with through the administrative process.

- The permittees will 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 will be identified. This information should be accurately recorded on allotment maps in coordination with ranger district personnel.
- Permittees and their herders will 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) will be included (as needed) in AOI.
- The AOI will include instructions addressing the management, retrieval, and disposition of stray domestic sheep left on the forests prior to and/or after grazing/trailing/permited on and off dates.
- Sheep bands will maintain progress on a direct travel route through each ranger district. Herding techniques that promote the movement of sheep steadily in one direction will be used. The permittees will not add stops or camps for the purpose of securing additional forage or period of use on the driveways.
- Herders will 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 will be required to provide for public safety, while trailing the sheep on/across established roads.
- Sheep will be kept out of all riparian areas (Naegelin Canyon is an exception) except when crossing and watering. Herders will avoid allowing sheep to parallel streams to keep them off the banks. Crossings will be made perpendicular to the stream channel.
- Herders will not bathe themselves or wash their clothes directly in streams.
- Herder camps will be maintained free of trash and trash will be packed out, when camp is moved. All fires, if permitted, will 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 will be repaired immediately and restored to the previous wire spacing within five days. All gates opened to allow passage will be closed once the sheep are through. If a fence is lifted for the sheep bands to pass under, the herders need to put the fence back after each passing.
- Range improvements will 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 are not permitted to graze within reforestation exclosures, riparian and spring protection exclosures, or campgrounds. Bedding grounds and salting locations will avoid areas susceptible to adverse soil and vegetative impacts associated with concentrated sheep use. Locations of concern will be identified through the AOI.
- Any sheep that are left behind will be reported, gathered, and removed from the ranger district within five days. The permittee will notify the ranger district when removal is complete. Counts will be made at identified road crossings.
- Exclude all riparian areas in 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 NF portion of the Heber-Reno Sheep Driveway, many of which are armored (rock and cobble or dry washes) or cross on road surfaces.<sup>2</sup>
- Identify water hauling locations annually through 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 modifications are needed in the current year's AOI to mitigate adverse drought effects upon the vegetative health, water availability, and soil conditions. On the Apache-Sitgreaves NFs, applicable guidelines would be used to determine if modifications to the AOIs are necessary to mitigate these same adverse drought concerns.
- 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.

---

<sup>2</sup> 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.

## 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 will be kept overnight at Bushnell tanks, while on the Diamond Grazing Allotment. The two new water improvements located south of Bushnell Tanks will be avoided.
- To avoid possible contact with bighorn sheep, domesticated sheep using the driveways will not bed down or be held over within known bighorn sheep habitat (South of State Road (SR) 87 and Usery Pass).

### **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) Breached tank on top of mountain.
- Herders will use the same bedding ground for each band. Each herder camp that is used in association with each bedding ground will 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 will 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 should be used for only one night by each band.

### **Black Mesa RD, Apache-Sitgreaves NFs:**

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

### **Lakeside RD, Apache-Sitgreaves NFs:**

- The permittee will 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 will be discussed at that time.
- The period of use on the stock driveway will be limited to the amount of time necessary for trailing across the Black Mesa RD.
- Concentration will be minimized at the gate when crossing Highway 60.
- Use of Porter Springs is as follows: (1) sheep will pass through the area with minimal use, and, (2) Sheep will not bed down anywhere near Porter Springs to allow for recovery.

## Other Related Mitigation Measures Proposed Through the 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 risk assessment provided by a task force that was led by Arizona Game and Fish Department (AGFD) and representatives from U.S.F.S. Tonto and Apache-Sitgreaves NFs, U.S.D.A. Wildlife Services, AZ Department of Agriculture, Navajo Nation Tribal Wildlife DVM, Sheep Springs 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.

Although not part of this decision, additional mitigation by AGFD may be applied, as needed, to reduce the risk to wild bighorn sheep. The primary area of risk, as defined in the 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 AGFD 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 will be developed by AGFD, if needed.
- A Memorandum of Understanding (MOU) between the permittees, AGFD, and the Arizona Department of Agriculture will be developed for the removal of stray domestic, if needed.

## Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table 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	The Purpose and Need, which is to	The purpose and need, which is to complete a supplemental analysis, would be met.	

Attribute	Alternative 1	Alternative 2	Alternative 3
Need	complete a supplemental analysis, would not 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.	
Forest Service Sensitive species	No use of the driveways by domestic sheep would be 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.	
Management Indicator Species (MIS)	No use of driveways by domestic sheep would have no effect on forest-wide trends for MIS habitat and species.	Use of the driveways by domestic sheep would have no effect on forest-wide trends for MIS habitat and species.	
Soils	Removal of sheep not likely to change soil conditions.	In both alternatives, the impact of sheep use to soils would be negligible because of soil composition on the Sonoran Desert on Tonto NF. Primary soils within driveway corridor on Sonoran Desert is disintegrated granite (sand). This extends from Mesa RD across most of the Tonto Basin RD. Wind and rain often obscure signs of the trail here within a few weeks after trailing occurs. Above 5,000 feet elevation, on non-sandy soils of Pleasant Valley RD and above the Mogollon Rim, frost-heaving breaks up compaction that may have been caused by sheep trailing. Soils are normally dry when the sheep trail reducing opportunity for compaction to occur.	

Attribute	Alternative 1	Alternative 2	Alternative 3
Vegetation	Vegetative conditions are likely to remain static or improve depending on climatic conditions.	Vegetative conditions likely to remain static or improve slowly because most vegetative species respond positively to limited utilization.	
Riparian and Hydrology	There would be no use of riparian species by sheep because driveways would be eliminated.	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 achieved.	
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 this species. There are no known bald or golden eagle nests in the area.	No alternative would affect this species. There are no known bald or golden eagle nests in the area.
Heritage Resources	No use of driveways by domestic sheep would have no effect on heritage resources.	In Alternatives 2 and 3, continued use of the driveways by domestic sheep would have no adverse effect to heritage resources. Trailed and bedded sheep would be restricted to the driveways.	
Impacts on traditional, cultural, and aesthetic social values	Elimination of the driveways would negatively affect one of two permittees in terms of social values and Basque traditional cultural use. There would be no effect to American Indian Sacred and	There would be no change in how sheep use the driveways. Therefore, there would be no direct, indirect or cumulative effects to Basque traditional cultural use. There would be no effect to American Indian Sacred and Traditional Cultural Places.	There would be reduced opportunities for use of the driveways by one permittee. However, in terms of social values and Basque traditional cultural use, there would be no change. There would be no effect to American Indian Sacred and Traditional Cultural Places. The potential impact to

Attribute	Alternative 1	Alternative 2	Alternative 3
	<p>Traditional Cultural Places. There would be a negative effect to aesthetic and social values for those recreationists who value experiencing sheep use of the driveways.</p>		<p>recreationists in terms of aesthetic and social values would be the same as Alternative 1.</p>
<p>Economic impacts</p>	<p>Negative effect to one of two permittees due to the costs associated with acquiring non-Federal lands for holding sheep and the costs associated with transporting/trucking sheep. Elimination of sheep use would result in loss of approximately \$11,500 in grazing fees to Treasury, approximately eight jobs and \$75,000 to the local economy.</p>	<p>There would no change in how sheep use the driveways. Therefore, there would be no direct, indirect or cumulative effects.</p>	<p>Negative effect to one of two permittees due to the costs associated with acquiring non-Federal lands for holding sheep and the costs associated with transporting/ trucking sheep. Elimination of sheep use on the lower portion of the Heber-Reno Sheep Driveway would result in loss of approximately \$11,500 in grazing fees to Treasury, approximately eight jobs and \$75,000 to the local economy.</p>



# 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). The project record (see Appendix B for the project record index) contains copies of the full reports for most of the resources analyzed.

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. Chapter 3 analyzes the environmental consequences of the Proposed Action and any alternatives to the Proposed Action. The analysis of effects for Alternative 2 (Proposed Action) under each resource is described with the assumption that adaptive management will be used as needed. Past, present and reasonably foreseeable actions that have been considered are addressed by each resource.

## Rangeland

### Rangeland Existing Conditions

There is a lack of data regarding the proportional use of forage between wildlife, cattle, and sheep across the driveways. Trampling damage may be found; however, most riparian areas show no sign of sheep trailing. As much as possible, sheep are pushed along roads and the pace is fast, so the animals have little time to graze. The affected area is far less than a mile wide in any given year, in some cases only 50 feet.

The driveways are not fenced or posted on the Apache-Sitgreaves NFs, which allows the herders latitude to drive the bands across adjacent though somewhat different routes, depending on site conditions (water and forage availability, and proximity to roads which offer the fastest herding). The majority of land affected is vegetated with upland types, of which dense forest (spruce/fir, ponderosa pine, and piñon/juniper) is a major component. A number of riparian/wetland resources are used as watering facilities; however, they are not used as bedding grounds.

### 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. Sheep are moved north through Tonto Basin RD in April, and return south in October. 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. No portion of the sheep driveway on this RD is fenced.

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, the sheep bedded down north of State Road 87 (SR87) avoiding known bighorn habitat along the north side of the River (Stewart Mountain).

The driveway bisects two active 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. 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, 2008 & 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. 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 vegetation 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 piñon/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.

Improvement in rangeland vegetation has mainly occurred in areas dominated by perennial grasses, and where tree canopy is not closed. 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.

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 (Hwy) 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.

### **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 Highway 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 Highway 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.

Generally speaking, upland watershed conditions on most of Springerville RD are in good condition, in terms of ground cover. All vegetation types with tree canopies have good litter cover.

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 vegetation types piñon/juniper. Below ponderosa pine, the remaining part of the driveway passes through piñon/juniper and small sections of grassland before it leaves National Forest System lands at the northeastern corner of Lakeside RD. Piñon/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 in themselves have slow infiltration rates. Large rainfall events mostly run off, carrying loads of reddish brown silt with it. Compaction is a factor in basaltic soils; however, the clays most often encountered have a high shrink/swell potential (montmorillonite, a type of clay in the smectite mineral family) and wetting/drying cycles help to fluff compacted soils back up.

### **Rangeland Effects**

Alternative 1 would end trailing sheep along the entire Heber-Reno and Morgan Mountain Sheep driveways. Direct and indirect effects of sheep trailing, bedding, and light grazing would be discontinued. Cumulative effects on the driveways could include deer and elk still populating the watersheds, dispersed recreation including camping, OHV, hunting, and sightseeing, and livestock grazing will continue with forage utilization limited to 40 percent per year. Bedding grounds may recover perennial vegetative cover over time. The bedding grounds are located in flat areas that do not contribute to runoff or erosion. There are no timber sales or mining activity planned within the driveways' corridors at this time or in the foreseeable future.

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 varies from a trace to 20 percent depending on how fast they are traveling. Those effects on the driveways are temporary in nature. The direct and indirect effects of this alternative, when combined with other past, present, or reasonably foreseeable actions (deer and elk still populating the watersheds, dispersed recreation including camping, OHV, hunting, and sightseeing, and livestock grazing continuing with forage utilization limited to 40 percent per year.) are likely to result in no change. The impacts from permitted sheep trailing are temporary. Most of the environmental effects resulting from past and current sheep trailing are limited in magnitude with minimal duration. Bedding grounds (one-to-three acres in size) will continue to hair over with annual grasses and forbs between trips. The bedding grounds are located in flat areas that do not contribute to runoff or erosion. Recently published research from the field of rangeland management supports the concept that conservative livestock use yields results in plant vigor and diversity on the landscape that are similar to an absence of livestock grazing (Holechek, et al., 1999, Navarro, et al., 2002, and Loeser, et al., 2007). 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 than 50 percent on most allotments that adjoin the driveway corridor.

Alternative 3 would retain use of the 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. The direct and indirect effects of this alternative, when combined with other past, present, or reasonably foreseeable actions (deer and elk still populating the watersheds, dispersed recreation including camping, OHV traffic, hunting, and sightseeing, and livestock grazing continuing with forage utilization limited to 40 percent per year) are likely to result in no change above the selected drop point. Trailing impacts from permitted sheep are temporary. Bedding grounds (one-to-three acres in

size) 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. Cattle stocking within the Heber-Reno Sheep Driveway corridor was reduced due to drought and restocking is less than 50 percent on most allotments that adjoin the corridor.

### **Rangeland Potential Cumulative Effects**

When combined with the past, present, and reasonably foreseeable future actions, effects to rangeland will likely be temporary in nature because 1) bedding grounds recover between trips and do not contribute to runoff or erosion, 2) utilization of available forage is light, and 3) trailing impacts are short-term. When combined with possible effects from deer and elk forage utilization, dispersed recreation activities such as camping, OHV, hunting, and sightseeing, and continued livestock grazing (limited to 40 percent utilization per year), cumulative effects for all alternatives are expected to be impermanent.

## **Riparian, Watersheds, and Water Quality**

### **Riparian, Watersheds, and Water Quality Existing Conditions**

#### **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 within the sheep driveway boundaries. Several have been inventoried or have information provided by the ranger districts, as indicated under comments (table 1, 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 (table 2, Appendix A). 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 do further monitoring. The overall assessment is “impaired”, which means our 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.

Designated uses for non-ephemeral, unlisted tributaries above 5000 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 5000 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).

### **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 aerial extent.

There are three climate gages 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 22.55 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 (39.82 inches). Punkin Center gage is near the middle of the driveway. The period of record is 1973-present and the average annual precipitation is 19.07 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 13.7 inches (WRCC, 2008 and NOAA, 2009). The data indicate seven of the last ten years (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 3. There are criteria established to describe these ORVs (table 4).

### **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 driveway were evaluated. Some were determined to be low risk because of lack of riparian vegetation. The stream crossings determined to be moderate-to-high risk due to their ability to support riparian vegetation are listed in table 5. Visual observations indicate that the sheep use riparian areas primarily to water. They do not

loiter or bed in riparian areas. Naegelin Creek is the only stream channel on the sheep driveways shown as a travel corridor. Based on existing utilization monitoring, most impacts to riparian vegetation appear to be limited and of short duration (Grove, 2009).

Drainages that were found to be ephemeral and vegetated with normal upland vegetation were documented as non-riparian (also in GIS).

### **Black Mesa RD**

#### Black Canyon

The first creek area that is crossed on the Black Mesa RD is at Black Canyon. This area has some riparian species such as cottonwoods and willows, but is a mainly a rocky/hardened crossing area that receives minimal impacts. The floodplains before and after are areas that show more of an effect where the sheep enter and exit.

#### Pearce Wash

The second area that is crossed on the Black Mesa RD is Pearce Wash. This area has very little riparian species within the wash area. This is a very wide wash area that is currently in nonfunctioning condition, but is closer to a non-riparian area. Mainly made up of rocky/gravel areas. There are minimal to no impacts from the sheep in this wash area.

### **Lakeside RD**

#### Brown Creek

The only creek or riparian area that is crossed on the Lakeside RD is Brown Creek. The sheep follow Forest Road 3 and cross the creek on a cement hard crossing inverted bridge area in the road. Riparian species are present in the creek area such as cottonwood, willow and sedges. Effects from the sheep are minimal to this area.

Springerville RD - Unaware of riparian or stream crossings on the Springerville RD.

### **Direct, Indirect, and Cumulative Effects**

Low-risk stream reaches identified within the footprint of the Heber-Reno Sheep Driveway on the Tonto NF do not have riparian vegetation within the corridor. Trailing effects by sheep are considered to be short term and minimal. Within moderate to high-risk stream reaches, channels are mostly naturally well-armored and appear to have low potential for impacts. Sheep cross in bedrock or cobble-dominated sections. Sheep trails usually do not exceed 100 feet in width at crossings. Sheep are not allowed to trail parallel to stream channels. Furthermore, impacts from historic and on-going grazing, on-going recreation pressure, and off-road vehicles could obscure the impacts of sheep browsing riparian vegetation and trailing.

The effects of livestock grazing on western riparian ecosystems have been widely discussed (Kaufman and Krueger, 1984; Skovlin, 1984; Chaney, Elmore and Platts, 1990; Pieper, 1994; Ohmart, 1996; Belsky, Matske and Uselman, 1999; Borman, Massingill, and Elmore, 1999). These effects pertaining to livestock grazing, summarized below, have also occurred on the sheep driveways.

### **Riparian Area Regulatory Framework**

Direction for managing riparian areas on the Tonto NF is found in the Tonto Forest Plan (U.S. Forest Service, 1985, amended 1996). The intention of the plan is to manage riparian areas for protection of soil, water, vegetation, wildlife, and fish populations. Key standards and guidelines/desired conditions are from the Tonto Forest Plan.

*Direct Effects:* 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, Clary and Kruse, 2003). These changes may lead to loss of stream stability and function (Rosgen, 1996). 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 (Clary and Kruse, 2003). One of the most important factors influencing riparian conditions is utilization (Mosley, et.al., 1999, Clary and Kruse, 2003).

*Indirect effects:* Stream channels and riparian areas can also be affected indirectly by watershed condition and/or stream channel conditions above and below the stream reach of interest. 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).

*Cumulative effects:* 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 (Croxen, 1978). There have been many accounts of the overgrazing and subsequent drought and flood events that occurred throughout central and southeastern Arizona (Wagoner, 1952). Direct and indirect effects from roads, OHV use and wildland fires may also contribute to adverse cumulative effects. The 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. Wildfires may cause accelerated erosion which also contributes sediment to stream channels.

### **Criteria used to Evaluate Alternatives and Determine Consistency with Management Direction**

The criteria used to evaluate alternatives will be the number of stream channels, determined to be moderate to high risk stream reaches, which could be potentially impacted by livestock. The risk to these streams is not in their entire reaches, but in the short segments within the driveways' corridors where the sheep actually cross, with the exception of Naegelin Creek.

**Alternative 1** –Under this alternative, there would be no domestic sheep use of the driveways.

*Direct Effects of Alternative 1:* 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 will also affect recovery.

*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 will facilitate the most rapid recovery of riparian areas.

*Cumulative Effects of Alternative 1:* This alternative will eliminate the direct and indirect effects of domestic sheep trailing to the moderate to high risk stream reaches. 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 whether eliminating the direct effects of sheep trailing at the crossings will 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 (cumulative effects) as listed above, should contribute to reaching desired conditions at the fastest rate.

Under Alternative 1 there will be no impacts to water quality from sheep trailing.

**Alternative 2 - Proposed Action** This alternative would authorize use of the Heber-Reno Sheep Driveway 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 trailing 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. It is expected that the sheep would be in the riparian area for such a limited time that they would not reach use guidelines. These mitigation measures should be effective for the entire moderate-to-high risk stream reaches, with the exception of Naegelin Creek. Naegelin Creek is used by the sheep as a travel way; however, the creek is dominated by coarse sediments, which should afford some protection. If the mitigation measures are followed, sheep are moved when use guidelines are met and 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.

*Cumulative Effects of Alternative 2:* In this alternative, the sheep have the potential to impact all moderate to high risk stream reaches. If the mitigation measures are followed, the direct and indirect effects of this alternative, when combined with other past, present or reasonably foreseeable actions (cumulative effects discussed above), are likely to result in moving toward or attaining desired conditions for all of the moderate to high risk stream reaches, but at a slower rate than Alternative 1.

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.

**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 the same mitigation measures as Alternative 2 with additional mitigation to protect bighorn sheep. To avoid bighorn sheep habitat, the domestic sheep would enter the driveway at either 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 risk stream reaches. If entering and exiting at Punkin Center, the sheep have the potential to impact all the moderate-to-high risk stream reaches except Sycamore Creek. If the sheep enter and exit at the Pleasant Valley airstrip, the sheep have the potential to impact Naegelin Creek and Canyon Creek only. If the mitigation measures are followed, sheep are moved when use guidelines are met and riparian area and stream channel condition should be maintained or improved.

*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.

*Cumulative Effects of Alternative 3:* If the sheep enter and exit at Bushnell Tanks, the direct effects will be the same as Alternative 2. If the sheep enter and exit at Punkin Center, the direct effects will be the same as Alternative 2 for all moderate to high risk 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 will be the same as Alternative 2 for Naegelin Creek and Canyon Creek and the same as Alternative 1 for the remainder of the moderate to high risk stream reaches.

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.

## Wildlife

### Wildlife Existing Condition

The project action area contains diverse habitats for a variety of animals and some special plants. These species may be classified in a number of ways. The Forest Plans lists Management Indicator Species (MIS) on the Forests. In addition, The Regional Forester (USFS), Southwest Region, has designated some species as Sensitive (S). Through the *Endangered Species Act* (ESA) some species are listed or proposed for listing as Threatened or Endangered (TE) by the U.S. Fish & Wildlife Service.

*Federally Listed and Forest Sensitive Species.* Tonto NF has 16 federally listed species, designated critical habitat for four species, and 58 forest sensitive species. The Apache-Sitgreaves NF has 6 federally listed species, designated critical habitat for 1 species, and 33 forest sensitive species (table 6, Appendix A).

*Multiple Indicator Species (MIS).* Tonto NF has 39 (MIS) species representing 30 types of habitat features (USFS, 2005). However, only two MIS are analyzed because either the MIS does not occur within the project area or habitat features will not be affected by sheep moving, grazing, or

bedding in the habitat. Tables 8 and 9 in Appendix A list the MIS habitats on the Heber-Reno Sheep Driveway and forest-wide trends. Apache-Sitgreaves NF has nine MIS for the Heber-Reno/Morgan Mountain sheep driveways.

*Migratory Birds.* Tonto NF provides habitat for 39 breeding bird species (table 13 in Appendix A) that occur on lists from either the *Birds of Conservation Concern 2008* (USFWS, 2008) or the *Arizona Partner in Flight Conservation Plan* (Latta, et al., 1999). Three Important Bird Areas and one overwintering area occur within the outer boundaries of Tonto NF.

*Bighorn sheep.* Throughout the driveways' project area, bighorn sheep habitat is absent except for about 35 acres of low-quality, overlapping bighorn sheep habitat west of Saguaro Lake within Mesa Ranger RD of Tonto NF (figure 1, Appendix A). In addition, many people have observed bighorn sheep in that same general area (Holt, 2009).

There is some historic habitat about seven miles from the driveway in Chevelon Canyon at the Apache-Sitgreaves NF. Bighorn sheep have been noted to be present in Chevelon Canyon in the 1870s (Nelson 1911). Arizona Game and Fish Department (AGFD) have shown interest in the re-introduction of Rocky Mountain Bighorn Sheep into Chevelon Canyon as it ranks high as a re-introduction site. The AGFD has indicated that they would not proceed with bighorn sheep introduction plans if domestic sheep continued to be trailed on the sheep driveway or graze the adjacent Long Tom Allotment.

## Wildlife Effects

Alternative 1—No Action would not cause any expected direct, indirect, or additional cumulative adverse effects to wildlife and plant populations because sheep are not permitted on the driveways.

Alternative 2 and Alternative 3 will have similar effects on the Tonto NF except for those areas potentially exempted from trailing on the Mesa, Tonto Basin, and Pleasant Valley RDs. Alternative 2 and Alternative 3 will have the same effects on the Apache-Sitgreaves NF. Therefore, this analysis addresses the effects of both alternatives as described below.

*General impacts to wildlife and wildlife habitat during trailing and bedding.* Trailing sheep will 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.

*Federally Listed and Forest Sensitive Species.* For Tonto NF, we have summarized the determinations and rationales by alternative in table 6 located in Appendix A. Determinations for federally-listed species range from “no effect” to “may affect, not likely to adversely affect” due to discountable or insignificant effects. Determinations for Forest Sensitive Species range from “no effect” to “may affect.” “May affect” actions will not lead to federal listing or the loss of population viability to forest sensitive species. We have used data from Arizona Game and Fish (Heritage Data Management System, plant abstracts and distribution maps), SEINet, and expertise and data collected by Tonto NF biologists to make these determinations. More detailed information for federally listed species and forest sensitive species are documented in the biological assessment and biological evaluation, respectively.

*Management Indicator Species (MIS).* The effects to Tonto NF MIS habitat quantity by alternative is located in table 8 in Appendix A. The summary of habitat effects as a percentage of Forest-wide habitat quantity are listed in table 9 in Appendix A, and the determinations of effect on forest-wide MIS and their habitats are listed in table 10 in Appendix A. More details on the project-level analysis can be found on Heber-Reno Sheep Driveway MIS Report. Apaches-Sitgreaves NF summary data can be found in tables 11 and 12 in Appendix A.

*Migratory Birds.* In Alternatives 2 and 3, sheep may incidentally kill nestlings or eggs of some of these breeding bird species (tables 13 and 14, Appendix A) that may occur along the driveways; however, it is highly unlikely because a small proportion of those species nest within reach of traveling sheep. In addition, the nesting period for most of those species fall outside the time when sheep would be using the driveways. No significant effects will occur to range-wide populations of migratory bird species because Alternatives 2 and 3 will not affect the suitability of migratory bird habitat and will not result in intentional take. Consequently, we expect a negligible, if any, amount of eggs, nestlings, or nests to be incidentally destroyed during the project for Alternatives 2 or 3, and therefore migratory bird populations would not be affected.

Within Tonto NF, the sheep driveway does not cross any Important Bird Areas or overwintering areas. More details on the migratory-bird analysis can be found on the Tonto NF Heber-Reno Sheep Driveway Migratory Bird Analysis Report.

*Bighorn sheep.* Disease such as Pasteurella/Mannheimia-type pneumonic disease can devastate bighorn sheep populations. About 400 bighorn sheep have recently died from disease outbreaks in Nevada, Montana, Utah, Washington (Associated Press, 2010a).

When bighorn sheep are exposed to diseased domestic sheep, studies found that the bighorn sheep can contract the disease (Foreyt, 1989, Callan, et al., 1991). To analyze the probability of impacts the chances of domestic sheep infecting bighorn sheep in the action area, Arizona Game and Fish Department and Tonto NF conducted a risk assessment (Holt, 2008) for this project. In this risk assessment, the group considered a variety of factors that contributed to the risk of nose-to-nose contact between domestic and bighorn sheep. Those risk factors 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. Figure 1 below lists the risk assessments based on alternatives (Holt, 2008).

**Figure 1. AGFD Risk Assessment**

<b>Alternatives</b>	<b>Alt 1</b>	<b>Alt 2</b>	<b>Alt 3</b>
Risk category	No risk	Low risk	Very low risk

These conclusions are further supported by history. Despite operating regularly as late as the 1900's with 300,000 to 400,000 sheep, there have been no evidence of large-scale, bighorn sheep die-off's due to Pasteurella/Mannheimia-type pneumonic diseases in Arizona. There was a bighorn population decline in the mid- to late- 1990's. However, AZGFD observed no clinical

symptoms of disease (other than contagious ecthyma), and AZGFD did not find any other evidence of exposure to disease agents (Holt, 2008).

Reducing the probability of nose-to-nose contact is further mitigated by mitigation measures stated in this EA. The most important mitigation measures are: 1) the exclusion of bedding grounds in bighorn sheep habitat, and 2) a procedure that will be developed to deal with the detection and removal of stray domestic sheep.

### **Wildlife Cumulative Effects**

Cumulative effects consideration will include any past, present, and future foreseeable projects that have any potential effects that could accumulate with the Proposed Action to impact any species or potential or suitable habitat. For detailed sensitive species cumulative effects analysis see Sheep Driveway BAE. There are impacts associated with sheep trailing included in the Proposed Action. These include a temporary increase in disturbance levels; and disturbance to vegetation and ground cover from trampling, compaction, and grazing. Mitigation measures help reduce these impacts. Cumulative effects consideration will include any past, present, and future foreseeable projects that have any potential effects that could accumulate with the Proposed Action to impact any species or potential or suitable habitat. For detailed sensitive species cumulative effects analysis see Sheep Driveway BAE. There are unavoidable impacts associated with sheep trailing included in the Proposed Action. These include a temporary increase in disturbance levels; and disturbance to vegetation and ground cover from trampling, compaction, and grazing. Mitigation measures help reduce these impacts, but they will occur. They are expected to be short term in duration and minor in consequence at the landscape scale.

### **Wildlife Summary for Alternatives 2 and 3**

In summary, there may be short-term impacts due to the modification of vegetation from grazing, trampling, and compaction, but these impacts will be of short duration and are not likely to adversely affect or jeopardize the continued existence of any threatened, endangered, or proposed species. See Biological Assessment and Evaluation for effects determination and cumulative effects for each species.

Sensitive species associated with grasslands may have individuals of a species impacted but this disturbance is not likely to result in a trend toward Federal listing or loss of species viability.

Implementation of this alternative could have an effect on individual goshawks and bald eagles in or near the driveways, but the effects would not be adverse and this disturbance is not likely to result in a trend toward Federal listing or loss of species viability.

Some of the livestock allotments in the action area have been analyzed within the last 15 years and necessary adjustments were made to meet management objectives as stated in the Apache-Sitgreaves Forest Plan including management concerns for TES species.

Livestock numbers were reduced to allotment capacity, allowable use standards were implemented to meet the physiological needs of range plants and range improvement structures were developed to better distribute livestock across the allotments. Current management of these allotments further reduces impacts to terrestrial and aquatic species and their habitats from previous management practices.

The expected level of disturbance from the Proposed Action may displace or otherwise affect individuals of a species in the short-term during trailing activities but this level of disturbance is relatively minor in both intensity and duration. Cumulatively, known actions are not expected to result in a loss of species viability or result in a trend toward Federal listing or to change wildlife population or habitat trends.

## Social and Economic

### Social and Economics Existing Condition

**Social Affected Environment** – Ranchers have been using the driveways and surrounding public lands since the late 1800s. As many as 400,000 sheep have travelled down the driveways in early decades. As the economy of Arizona and the United States 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 8,000 mother 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 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.

**Economic Affected Environment** – 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. Full permitted use of the driveways would generate the equivalent of about eight jobs per year, and current use generates about four. 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 Arizona Department of Game and Fish (AGF) sells about 90 bighorn sheep hunting tags each year for revenues of about \$27,500, and donates two tags per year to a non-profit group for auction, which bring in about \$250,000 yearly for habitat improvement work. Bighorn sheep tags from Hunt Unit 22, the only unit through which the driveways pass where bighorns are hunted, vary from one to three yearly, plus one of the two donated tags. AGF would likely increase bighorn sheep populations along the lower driveway if sheep use on the lower Tonto NF 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.

## Social and Economic Effects

**Social Environmental Effects** – Alternative 1 would end trailing sheep along the entirety of the driveways. Both permittee families and like-minded people would feel it as a loss. Anti-Driveway interests would be pleased, especially for the opportunity of possible introductions of new bighorn sheep populations on the lower Tonto NF. Cumulatively, no past or present activities appear to measurably affect the social aspects of this alternative beyond those discussed as indirect effects.

Alternative 2 would keep sheep trailing along the driveways very much as before. The permittee families and like-minded people would be pleased at retention of a historic use. Anti-driveway interests 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 NF. There would be no direct, indirect or cumulative effects to any involved interests.

Alternative 3 would retain use of the driveway starting at some point on the Tonto Basin or Pleasant Valley RDs, eliminating domestic sheep use below the chosen point. At least one permittee family and like-minded people would be pleased at retention of a historic use, though the active driveway permittees are unlikely to be as content. Anti-driveway interests would be to varying extents pleased, especially for the opportunity of possible introductions of new bighorn sheep populations on the lower Tonto NF. Cumulatively, no past or present activities appear to measurably affect the social aspects of this alternative beyond those discussed as indirect effects.

**Economic Environmental Effects** – 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 \$68,000 at minimum. They might convert to all cattle ranching. The other sheep permittee family may 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/Sheep Springs Allotment completely converted to cattle, likely fewer employees would be needed.

Cumulatively, the AGFD 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. 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 would keep sheep trailing along the driveways very much as before. There would be no direct, indirect or cumulative effects to the two permittee families, their employees, the AGFD or hunting businesses.

Alternative 3 would retain use of the driveways starting at some point on the Tonto Basin or Pleasant Valley RDs, eliminating domestic sheep use below the chosen point. For the one permittee family that uses the driveways, 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 may 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/Sheep Springs Allotment completely converted to cattle, likely fewer employees would be needed.

Cumulatively, the AGFD 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. 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.

## Heritage

### Heritage Existing Condition

Sheep driveways are a unique type of heritage property. They belong to that class of properties known as "cultural landscapes," but unlike most cultural landscapes, they do not simply represent a single event or time period from the past. In fact, they are created and maintained by the continuation of their original historic use and thus are still evolving in a cumulative manner. Because of this continuing use, the Heber-Reno Sheep Driveway, in addition to being an historic property, is also Traditional Cultural Property (TCP) for the Basque ethnic community in Arizona who see it as a tangible and important part of their history over the last century. The significance of the driveways as historic sites is thus enhanced by their additional status as a TCP, essentially guaranteeing that they are eligible for the National Register of Historic Places.

The Heber-Reno Sheep Driveway encompasses an area which has had very little formal archaeological investigation. The 95,569 acre Heber-Reno Sheep Driveway consists of 74,209 acres located on the Tonto NF and 21,360 acres located on the Apache portion of the Apache-Sitgreaves NF. Approximately 3,267 acres within the Tonto NF have been surveyed. However, only 1,950 acres of the total surveyed acreage on the Tonto NF has been surveyed within the past 15 years. On the Tonto NF, the majority of the large acreage survey projects have been related to commercial fuelwood sales and timber sales on the Pleasant Valley RD. A number of small surveys conducted for low acreage projects are those related to range and wildlife improvements, recreation, road improvements, and closures.

A total of approximately 165 sites have been identified through these various projects on the Tonto NF. The majority of these are prehistoric, limited activity sites such as artifact scatters and field houses, although a few multi-room habitation sites ranging from two-to-five rooms are known. Five sites either are Apache period or have Apache components present. Six sites are historic, consisting of the remnants of three homesteads, two historic irrigation ditches associated with the OW Ranch and the Chamberlain Trail (FSR 200), which was constructed by the Civilian Conservation Corp. Six additional sites (four of which are multi-component) have been identified which are directly related to sheep driveway activities, representing camp areas, including a large rock corral, and one which has rock piles which may be driveway markers or "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.

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. The majority of these resources consist of prehistoric sites in open or exposed locations. Subsequent centuries of exposure to a range of formation processes have resulted in the deterioration of the sites, particularly to the organic components such as wooden construction elements. Although the Heber-Reno Sheep 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 Analysis Area is primarily confined military activities during the Apache wars and the subsequent ranching in the vicinity, which began as the Apache threat dwindled in late 1870s and early 1880s. Several of these inholdings 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 nineteenth century.

Although it has not been formally designated, the Reno-Heber Sheep Driveway is recognized as an historic site, and is informally considered eligible for the National Register of Historic Places by the Arizona State Historic Preservation Officer. Grazing itself is part of the mission and history of the Forest Service and a part of the cultural heritage of the Western States. It is also recognized that this historic use has contributed to the cultural landscape of the Forests and that all aspects of the landscape combine to create the natural and cultural heritage of the Tonto and Apache-Sitgreaves NFs. Sheep were first introduced into Gila County in 1876. The first reference of using driveways comes from the mid 1880's; however, whether this correlates to our current understanding of the term is uncertain. Further, we have no record of where the earliest driveway(s) may have been located (Scott Wood, 2004). However, by the early 1890's the use of driveways to herd sheep from the mountains to desert for seasonal pasturage was occurring on a regular basis; and it is assumed that these routes largely correspond to the current Reno-Heber Driveway, which was formalized by the Forest Service in the 1910s. Archival information indicates that in 1902, the Secretary of the Interior announced that over a million sheep were to be allowed in the reserves. A cooperative plan published in 1902 under the name of Supervisor F.S. Breen of the San Francisco Reserve stipulated that sheepherders would have exclusive rights to five-year permits, that residents were to have preference over owners from other States, that local cases were to be decided on local grounds, and that the government policy was based on regulation rather than prohibition. In 1922, 65,000 head of sheep were utilizing the Reno-Heber Driveway. It is reasonable to assume that comparable numbers were typical at least up till World War II and likely decreased after that time when formal road building became common place and vehicle transportation to seasonal pasturage became more economical.

### **Heritage Effects**

As a landscape, sheep driveways, including the Heber-Reno and Morgan Mountain, often include various other unrelated heritage properties that may have been affected by the activities associated with the use of the driveways. Physically, they are recognized on the ground by a variety of things and to greater or lesser degrees as a result of those effects. The Heber-Reno and

Morgan Mountain sheep driveways have several different boundary delineating features – in some places it is fenced and signed, in others just signed, in others there is no physical delineation at all or just occasional cairns along the principal trails. Within it, there are features associated with its use, primarily at the camp sites where there may be fire rings or even massive masonry fireplaces, trash deposits, privies, but also at specialized activity areas where there may be traps, pens, watering troughs and other features. Finally, the driveways can be recognized in some places only by fairly ephemeral changes to the landscape – narrow parallel trails, wool caught in the catchclaw, or deposits of sheep byproduct surrounding the camp areas.

The effects from the use of the driveways on other heritage resources vary by any number of factors, not the least of which is the nature of the other properties. 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 heritage resources along the driveways are prehistoric artifact scatters with minimal masonry features and architecture. 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; however, 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 and future impacts from use will be negligible. No recorded sites within the Heber-Reno and Morgan Mountain sheep driveways are known to have been damaged sufficiently by grazing to be ineligible for the National Register.

Direct and indirect impacts caused from the alternatives that propose continued use of the driveways will occur to heritage resources. These potential impacts from the proposed alternatives including the No-Action Alternative are not expected to adversely affect heritage resources including the significant characteristics of the driveways that contribute to their eligibility for listing on the National Register. Cumulative effects from foreseeable range improvement, fuelwood and timber sales, and hazard fuels reduction projects in addition to the Proposed Action will not cause adverse effects to heritage resources.

Authorizing the continued use of the driveways at current or reduced levels will have no adverse effect to heritage resources. 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. SHPO's concurrence with the Forests' determination of no adverse effect on heritage resources is pending and will be available prior to signing a Finding of No Significant Impact and Decision Memo for this project.

### **Contemporary American Indian Uses**

Tribes culturally affiliated with the lands within the Tonto NF and Apache Sitgreaves NFs were consulted regarding the Proposed Action. At present, the Tribes have not expressed concerns or identified sacred or traditional cultural places that would be affected by the Proposed Action.

# 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

## State and Other Federal Agencies

- Arizona Department of Agriculture
- AZ Game & Fish Department (AGFD)
- AGFD, Lisa Shender, DVM, Wildlife Specialist – Veterinarian
- AZ State Congressman Grijalva
- Arizona State Department of Transportation
- Arizona State Land Department
- Arizona State Office of Attorney General
- Arizona State Parks Department
- Arizona State University
- Environmental Protection Agency, Region 9
- 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  
Ft. McDowell Indian Community  
Gila River Indian Community  
Pueblo of Zuni  
Ramah Navajo Chapter  
Salt River Pima-Maricopa Indian Community  
San Carlos Apache Tribe  
Tonto Apache Tribe  
Yavapai-Apache Nation  
Yavapai-Prescott Tribe  
The Hopi Tribe  
The Hopi Tribe Preservation Office  
The Navajo Nation  
White Mountain Apache Tribe

## **Others**

American Fisheries Society  
Animal Welfare Institute, D. J. Schubert  
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  
Gila County Cattle Growers, David Cook  
Maricopa Audubon Society  
Mogollon Sportsman's Association, Richard Henry  
National Wildlife Federation  
Recreation Management of America, Wade Heuett, Lakeside, AZ  
Resource Advisory Committee  
Rocky Mountain Elk Foundation  
Salt River Project  
Sierra Club – Grand Canyon Chapter, Sandy Bahr  
The Nature Conservancy  
The Wildlife Society – AZ Chapter  
Trout Unlimited  
Western Watershed Projects, Eric Ryberg  
White Mountain Conservation League

Joseph Auza, Auza Sheep Company  
Gary Barcom, ADBSS  
Scott Bender, DVM, Navajo Nation, Tribal Veterinarian

Robert and Bonnie Benne, Young, AZ  
Phil Blair, DVM, Arizona Department of Agriculture  
Christopher D. Carrillo, U.S.D.A. Wildlife Services  
Woody Cline, Young, AZ  
Cary Dobson, Dobson Sheep Company  
Dwayne Dobson, Sheep Springs Sheep Company  
Dave Dorum, AGFD – Habitat Program Manager – Region 1  
David Dryer, Tonto Basin, AZ  
Monti Hancock, Heber, AZ  
Jon Hanna, Mesa, AZ  
Russ Haughey, Habitat Program Manager – Region 6, AGFD  
Michael Hemovich, Young, AZ  
Tim Holt, AGFD, Field Supervisor – Region 6  
Kate Klein, Black Mesa District Ranger  
Dave McCasland, ADBSS  
Stephanie Nichols-Young, Attorney-at-Law  
Ted Noon, DVM  
Mark Pederson, Sheep Springs Sheep Company  
James W. Porter, Heber, AZ  
Brad Powell, Arizona Wildlife Federation  
Mr. & Mrs. W. A. Randal, Pine, AZ  
Alix Rogstad, Tucson  
Seibert Cattle Company  
Lisa Shender, DVM, Wildlife Specialist, AGFD  
Paul Stewart, Cave Creek, AZ  
Tom Taylor, Mesa, AZ

Entities who responded to scoping:  
Eric Ryberg, Western Watersheds Project  
Arizona Department of Game and Fish  
Department of the Army, Corps of Engineers  
John Hanna  
Animal Welfare Institute

**Please refer to the project record for a complete list of the 1,017 individuals and organizations included in the scoping mailing list.**



# Chapter 5 – References

- Arizona Department of Environmental Quality (ADEQ). (2008). Draft 2006 Integrated 305(b) Assessment and 303(d) Listing Report.  
<http://www.azdeq.gov/environ/water/assessment/assess.html>
- Associated Press. (2010a). *Pneumonia outbreak kills more than 400 bighorn sheep in several Western states*. Retrieved from <http://www.washingtonexaminer.com/nation/85475612.html> on April 23, 2010.
- Belsky, A. J., Matzke, A., and Uselman, S. (1999). Survey of livestock influences on stream and riparian ecosystems in the western United States. *Journal of Soil and Water Conservation*. 54 (1). pp. 419-431.
- Borman, M. M., Massingill, C. R., and Elmore, E. W. (1999). Riparian Area Responses to Changes in Management. *Rangelands* 21(3). pp. 3-7.
- Callan, R.J.; Bunch, T.D.; Workman, G.W.; 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.
- Clary, W. P. and Kruse, W. H. (2003). Livestock grazing in riparian areas: environmental impacts, management practices and management implications. [In]: *Riparian areas of the southwestern United States*. Eds: M.B. Baker, Jr., P.F. Ffolliott, L.F. DeBano, and D.G. Neary. Lewis Publishers, CRC Press Co. pp. 237 – 258.
- Croxen, F. W. (as told to James E. Serven). (1978). Dark Days in Central Arizona. *The Smoke Signal* (No. 34). Published by the Tucson Corral of the Westerners.
- 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.
- Gori, D. and Backer, D. (2005). *Watershed Improvement Using Prescribed Burns as a Way to Restore Aquatic Habitat for Native Fish*. U.S.D.A. Forest Service Proceedings RMRS-P-36. pp 403-406.
- Grove, J. (2009). Tonto NF Riparian Specialist, personal observation and data gathered as part of the project record.
- Holechek, J.L., H. Gomez, F. Molinar, and D. Galt. 1999. Grazing Studies: What We've Learned. *Rangelands* 21(2):12-16.
- Holechek, J. L., Galt, D., Joseph, J., Navarro, J., Kumalo, G., Molinar, F., and Thomas, M. (2003). Moderate and Light Cattle Grazing Effects on Chihuahuan Desert Rangelands. *Journal of Range Management*. 26(2):133-139.
- Holt, T. (2008, Mar. 8). Summary of the Heber-Reno/Morgan Mountain Domestic Sheep Driveway Collaborative Risk Assessment.

- Holt, T. (2009). Personal communication with Fred Wong.
- Hughes, K. (2010). Communication on monitoring.
- 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. (2008 and 2009). Monitoring Reports. Mesa RD Range/Wildlife Staff.
- 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.
- 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.
- 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. (2009). <http://www.nps.gov/ncrc/programs/rtca/nri/states/az.html>
- Navarro, J. M., Galt, D., Holechek, J., McCormick, J., and Molinar, F. (2002). Long-term impacts of livestock grazing on Chihuahuan Desert rangelands. *Journal of Range Management*. 55(4). pp. 400-405.
- 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>
- Ohmart, R. D. (1996). Historical and present impacts of livestock grazing on fish and wildlife resources in western riparian habitats. In: P.R. Krausman (ed.), *Rangeland Wildlife. Society for Rangeland Management*, Denver, CO. pp. 245-279.
- Pieper, R. D. (1994). Ecological implications of livestock grazing. In: M. Vavra, W. A. Laycock, and R. D. Pieper (eds.), *Ecological implications of livestock herbivory in the west*. Society for Range Management, Denver CO. pp. 176-211.
- Rosgen, D. (1996). Applied River Morphology. *Wildland Hydrology*. Pagosa Springs, CO.
- 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.
- Trimble, S. W. and Mendel, A. C. (1995). The cow as a geomorphic - A critical review. *Geomorphology*. (13). pp. 235-253

- 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, (2004). *Forest Service Manual (FSM)*.
- U.S. Forest Service, Southwestern Region. (1987). *Apache-Sitgreaves National Forest Plan*.
- U.S. Forest Service, Southwestern Region. (1985, amended 1996). *Tonto National Forest Plan*.
- 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)
- Wagoner, J.J. (1952). History of the Cattle Industry in Southern Arizona, 1540-1940. *University of Arizona Bulletin, Social Science Bulletin No. 20*. 23(2). University of Arizona Press, Tucson, Arizona. 132 p.
- Western Regional Climate Center (WRCC). (2008). Retrieved from <http://www.wrcc.dri.edu/summary/climsmaz.html>
- Wood, S. (2004). Tonto NF Archaeology Specialist. Personal communication.



# Chapter 6 – List of Preparers

## USDA Forest Service, Tonto National Forest

### ID Team Members:

Don Luhrsen, Tonto Basin Acting District Ranger, IDT Leader  
Janet Grove, Forest Riparian Specialist, Supervisor's Office  
Norm Ambos, Forest Soil Scientist, Supervisor's Office  
Fred Wong, Forest Wildlife Biologist, Supervisor's Office  
Scott Wood, Forest Archeologist, Supervisor's Office  
Sean Brown, Range Program Manager, Pleasant Valley Ranger District

## USDA Forest Service, Apache-Sitgreaves National Forests

### ID Team Members:

Kendall Hughes, Rangeland Management Specialist Black Mesa Ranger District  
Randall Chavez, Rangeland Management Specialist, Lakeside Ranger District  
Charlie M. Denton, Wildlife Biologist, Lakeside Ranger District  
Elizabeth Humphrey, Forest Wildlife Biologist, Supervisor's Office  
Denise VanKeuren, Forest Range Program Manager, Supervisor's Office  
Melissa Schroeder, Forest Archeologist, Supervisor's Office

## Other Federal and State Officials and Agencies

Arizona Agriculture Department  
Arizona Game & Fish Department  
Animal Plant Health Inspection Service  
United States Fish and Wildlife Service  
United States Army Corps of Engineers  
Debbie Cress, Supervisory Rangeland Management Specialist, Tonto Basin RD  
Kelly Kessler, Supervisory Rangeland Management Specialist, Mesa RD  
Candy Luhrsen, Writer-editor, Tonto NF, SO  
Shannon Torrence, Wildlife Biologist, Tonto Basin RD  
Jared Whitmer, Supervisory Rangeland Management Specialist, Pleasant Valley RD  
Virginia Yazzie-Ashley, Rangeland Management Specialist, Springerville RD



# Appendix A

## Riparian and Water Section

**Table 1. 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

The risk to these streams is not in their entire reaches, but in the short segments within the Driveway corridor where the sheep actually cross, with the exception of Naegelin Creek.

**Table 2. 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 3. Potentially eligible streams for inclusion into the National Wild and Scenic Rivers System (USDA 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 4. Criteria for the Outstandingly Remarkable Values (ORVs) for Canyon Creek, Spring Creek, and Salt River (NPS, 2009).**

<b>Cultural (C)</b>	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.
<b>Fish (F)</b>	Fish values may be judged on the relative merits of either fish populations or habitat, or a combination of these river-related conditions.
<b>Recreation (R)</b>	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.
<b>Wildlife (W)</b>	Wildlife values may be judged on the relative merits of either terrestrial or aquatic wildlife populations or habitat or a combination of these conditions.
<b>Other Values (O)</b>	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.

**Table 5. Moderate to High Risk Stream Reaches.**

District	Reach
Mesa	Sycamore Creek
Tonto Basin	Lambing Creek
	Gun Creek
Pleasant Valley	Spring Creek
	Naegelin Creek
	Canyon Creek
	Walnut Creek

### Wildlife Section – Determinations and rationales for alternatives for federally listed and sensitive species.

**Table 6. Tonto NF Federally Listed and Forest Sensitive Species.**

	Determinations (Det.) & Rationales (Rat.) for each alternative (A#)					
	Det.	Rat.	Det.	Rat.	Det.	Rat.
	A1	A1	A2	A2	A3(PV Airport only)	A3 (PV Airport only)
<b>Federally-listed Species/Critical Habitat</b>						
Arizona cliffrose	NE	NA	NE	ABS	NE	ABS
Arizona hedgehog	NE	NA	NE	ABS	NE	ABS
Chiricahua leopard frog	NE	NA	NLAA	DIS	NLAA	DIS
Colorado pikeminnow (non-essential experimental)	NE	NA	NE	ABS	NE	ABS
Desert pupfish	NE	NA	NE	ABS	NE	ABS
Gila chub	NE	NA	NE	ABS	NE	ABS
Gila chub Critical Habitat	NE	NA	NE	NA	NE	NA

	Determinations (Det.) & Rationales (Rat.) for each alternative (A#)					
	Det.	Rat.	Det.	Rat.	Det.	Rat.
	A1	A1	A2	A2	A3(PV Airport only)	A3 (PV Airport only)
Gila topminnow	NE	NA	NE	ABS	NE	ABS
Lesser long-nosed bat	NE	NA	NE	ABS	NE	ABS
Loach minnow	NE	NA	NE	ABS	NE	ABS
Mexican gray wolf	NE	NA	NE	ABS	NE	ABS
Mexican spotted owl	NE	NA	NLAA	INS, DIS	NLAA	INS, DIS
Mexican spotted owl Critical Habitat	NE	NA	NLAA	INS	NLAA	INS
Razorback sucker	NE	NA	NE	ABS	NE	ABS
Razorback sucker Critical Habitat	NE	NA	NE	ABS	NE	ABS
Southwestern willow flycatcher	NE	NA	NLAA	INS	NE	ABS
Southwestern willow flycatcher Critical Habitat	NE	NA	NLAA	INS	NE	ABS
Spikedace	NE	NA	NE	ABS	NE	ABS
Woundfin	NE	NA	NE	ABS	NE	ABS
Yuma clapper rail	NE	NA	NE	ABS	NE	ABS
<b>Forest Sensitive Species</b>						
<b>Amphibians (4)</b>						
Arizona toad	NE	NA	MAY, 0	SSCA	MAY, 0	SSCA
Western barking frog	NE	NA	NE	NOHAB	NE	NOHAB
Lowland leopard frog	NE	NA	MAY, 0	SSCA	NE	NOHAB

	Determinations (Det.) & Rationales (Rat.) for each alternative (A#)					
	Det.	Rat.	Det.	Rat.	Det.	Rat.
	A1	A1	A2	A2	A3(PV Airport only)	A3 (PV Airport only)
Northern leopard frog	NE	NA	MAY, 0	SSCA	MAY, 0	NOHAB
<b>Birds (9)</b>						
Clark’s grebe	NE	NA	NE	NOHAB	NE	NOHAB
Bald eagle	NE	NA	MAY, 0	SSCA	MAY, 0	SSCA
Zone-tailed hawk	NE	NA	MAY, 0	SSCA	MAY, 0	SSCA
Northern goshawk	NE	NA	MAY, 0	SSCA	MAY, 0	SSCA
Northern gray hawk	NE	NA	MAY, 0	SSCA	NE	NOHAB
Common black-hawk	NE	NA	MAY, 0	SSCA	MAY, 0	SSCA
American peregrine falcon	NE	NA	MAY, 0	SSCA	MAY, 0	SSCA
Western yellow-billed cuckoo	NE	NA	MAY, 0	SSCA	NE	NOHAB
Abert’s towhee	NE	NA	MAY, 0	SSCA	NE	NOHAB
<b>Fish (5)</b>						
Desert sucker	NE	NA	MAY,0	SSCA	MAY, 0	SSCA
Headwater chub	NE	NA	MAY, 0	SSCA	NE	NOHAB
Longfin dace	NE	NA	MAY, 0	SSCA	NE	NOHAB
Roundtail Chub	NE	NA	MAY, 0	SSCA	NE	NOHAB

	Determinations (Det.) & Rationales (Rat.) for each alternative (A#)					
	Det. A1	Rat. A1	Det. A2	Rat. A2	Det. A3(PV Airport only)	Rat. A3 (PV Airport only)
Sonora sucker	NE	NA	MAY, 0	SSCA	NE	NOHAB
<b>Insects (2)</b>						
Parker’s cyloopus riffle beetle	NE	NA	NE	NOHAB	NE	NOHAB
Netwing midge	NE	NA	NE	NOHAB	NE	NOHAB
<b>Mammals (10)</b>						
California leaf-nosed bat	NE	NA	NE	NOHAB	NE	NOHAB
Western red bat	NE	NA	MAY, 0	SSCA	NE	NOHAB
Spotted bat	NE	NA	NE	NOHAB	NE	NOHAB
Allen’s lappet-browed bat	NE	NA	MAY, 0	SSCA	MAY, 0	SSCA
Pale Townsend’s big-eared bat	NE	NA	MAY, 0	SSCA	MAY, 0	SSCA
Pocketed free-tailed bat	NE	NA	MAY, 0	SSCA	MAY, 0	SSCA
Greater western mastiff bat	NE	NA	MAY, 0	SSCA	NE	NOHAB
White-nosed coati	NE	NA	NE	NOHAB	NE	NOHAB
Rocky mountain bighorn sheep	NE	NA	MAY, 0	UNL	MAY, 0	UNL
Desert bighorn sheep	NE	NA	MAY, 0	UNL	MAY, 0	UNL
<b>Reptiles (5)</b>						
Reticulate Gila Monster	NE	NA	MAY, 0	SSCA	NE	NOHAB
Sonoran desert tortoise	NE	NA	MAY,	SSCA	NE	NOHAB

	Determinations (Det.) & Rationales (Rat.) for each alternative (A#)					
	Det.	Rat.	Det.	Rat.	Det.	Rat.
	A1	A1	A2	A2	A3(PV Airport only)	A3 (PV Airport only)
			0			
Maricopa leaf-nosed snake	NE	NA	MAY, 0	SSCA	NE	NOHAB
Mexican gartersnake	NE	NA	MAY,0	SSCA	NE	NOHAB
Narrow-headed gartersnake	NE	NA	MAY, 0	SSCA	MAY, 0	SSCA
<b>Snails (1)</b>						
Fossil springsnail	NE	NA	NE	NOHAB	NE	NOHAB
<b>Plants (22)</b>						
Pima indian mallow	NE	NA	NE	NOHAB	NE	NOHAB
Tonto basin agave	NE	NA	MAY,0	SSCA	NE	NA
Hohokam agave	NE	NA	MAY,0	SSCA	NE	NA
Mt. Dellenbaugh sandwort	NE	NA	NE	NOHAB	NE	NOHAB
Chihuahuan sedge	NE	NA	NE	NOHAB	NE	NOHAB
Cochise sedge	NE	NA	NE	NOHAB	NE	NOHAB
Arizona bugbane	NE	NA	NE	NOHAB	NE	NOHAB
Mogollon fleabane	NE	NA	NE	NOHAB	NE	NOHAB
Fish creek fleabane	NE	NA	NE	NOHAB	NE	NOHAB
Ripley wild buckwheat	NE	NA	NE	NOHAB	NE	NOHAB
Eastwood alum root	NE	NA	MAY,0	SSCA	MAY,0	SSCA
Arizona alum root	NE	NA	NE	NOHAB	NE	NOHAB
Horseshoe deer vetch	NE	NA	NE	NOHAB	NE	NOHAB
Mapleleaf false snapdragon	NE	NA	MAY, 0	SSCA	NE	NOHAB

	Determinations (Det.) & Rationales (Rat.) for each alternative (A#)					
	Det. A1	Rat. A1	Det. A2	Rat. A2	Det. A3(PV Airport only)	Rat. A3 (PV Airport only)
Toumey groundsel	NE	NA	NE	NOHAB	NE	NOHAB
Salt river rockdaisy	NE	NA	NE	NOHAB	NE	NOHAB
Fish creek rockdaisy	NE	NA	MAY, 0	SSCA	NE	NOHAB
Arizona phlox	NE	NA	NE	NOHAB	NE	NOHAB
Hualapai milkwort	NE	NA	NE	NOHAB	NE	NOHAB
Blumer's dock	NE	NA	MAY, 0	SSCA	MAY, 0	SSCA
Galiuro sage	NE	NA	NE	NOHAB	NE	NOHAB
Aravaipa woodfern	NE	NA	NE	NOHAB	NE	NOHAB

**Table 7. Apache-Sitgreaves NF Federally Listed and Forest Sensitive Species.**

<b>Forest Sensitive Species</b>	<b>Federally-listed Species/Critical Habitat</b>
<b>Mammals (6)</b>	
Springerville pocket mouse	Apache trout
White Mountains ground squirrel	Chiricahua leopard frog
New Mexican meadow jumping mouse	Little Colorado spinedace
Merriam’s shrew	Mexican gray wolf (non-essential experimental)
Long-tailed vole	
Allen’s lappet-browed bat	Mexican spotted owl
<b>Birds (6)</b>	Mexican spotted owl critical habitat
Bald eagle	
American peregrine falcon	
Northern goshawk	
Common Blackhawk	
Western yellow-billed cuckoo	
Zone-tailed hawk	
<b>Fish (3)</b>	
Roundtail chub	
Little Colorado sucker	
Bluehead sucker	
<b>Reptiles (5)</b>	
Mexican garter snake	
Narrow-headed garter snake	
Northern leopard frog	
Arizona southwestern toad	
<b>Insects (5)</b>	
Arizona copper	
Four spotted skipperling	
Arizona snaketail	
Nokomis fritillary	
Nitocris fritillary	
<b>Plants (9)</b>	
Godding’s onion	Arizona sneezeweed
Mogollon paintbrush	Eastwood alum root
Blumer’s dock	Arizona alum root
Arizona willow	Arizona sunflower
Bebb’s willow	

**Table 8. Summary of MIS habitats on the Heber-Reno Sheep Driveway with Tonto NF trends.**

<b>Tonto NF MIS Species</b>	<b>Vegetation Type</b>	<b>Tonto NF Habitat Trend</b>	<b>Tonto NF Population Trend</b>	<b>Habitat in Tonto Portion of Project Area (Acres)</b>
Ash-throated Flycatcher	P/J	Static	Increase	30,319
Savannah Sparrow	Desert grassland	Static/Upward	Increase	3096
Horned Lark	Desert grassland	Static/Upward	Increase	3096
Canyon Towhee	desert-scrub	Downward/Static	Increase	24,119

**Table 9. Effects to Tonto NF MIS habitat quantity by alternative (acres (% of total forest))**

<b>Tonto NF MIS Species</b>	<b>Current Forest-wide Habitat</b>	<b>Alternative 1 (No Action)</b>	<b>Alternative 2 (Entire driveway)</b>	<b>Alternative 3a (Bushnell)</b>	<b>Alternative 3b (Punkin)</b>	<b>Alternative 3c (PV Airport)</b>
Ash-throated Flycatcher	1,413,986	0 (0%)	30,319 (2.1%)	28,386 (2.0%)	22,385 (1.6%)	3566 (trace %)
Savannah Sparrow	316,894	0 (0%)	3096 (7.9%)*	2165 (5.5%)*	1733 (4.4%)*	0 (0%)
Horned Lark	316,894	0 (0%)	3096 (7.9%)*	2165 (5.5%)*	1733 (4.4%)*	0 (0%)
Canyon Towhee	896,771	0 (0%)	24,110 (2.7%)	3806 (trace%)	2570 (trace%)	0 (0%)

\*The actual acreage impacted will be far lower than this figure because we only expect only 300 feet of a 1-mile wide sheep driveway will be impacted by domestic sheep.

**Table 10. Summary of habitat effects as a percentage of Forest-wide habitat quantity and trend effect determinations.**

Tonto NF MIS Species	Tonto NF Habitat Trend	Tonto NF Population Trend	Alt 1 Net change (determination)	Alt 2 net change (determination)	Alt 3a net change (determination)	Alt 3b net change (determination)	Alt 3c net change (determination)
Ash-throated Flycatcher	Static	Increase	0% (no effect)	-2.1% (no effect)	-2.0% (no effect)	-1.6 % (no effect)	Trace% (no effect)
Savannah Sparrow	Upward /Static	Increase	0% (no effect)	-7.9%(no effect)*	-5.5% (no effect)*	-4.4% (no effect)*	0% (no effect)
Horned Lark	Upward /Static	Increase	0% (no effect)	-7.9%(no effect)*	-5.5% (no effect)*	-4.4% (no effect)*	0% (no effect)
Canyon Towhee	Downward /Static	Increase	0% (no effect)	-2.7% (no effect)	Trace % (no effect)	Trace% (no effect)	0% (no effect)

**Table 11. Summary of habitat effects and trend effect determinations for MIS species on the Apache-Sitgreaves NF.**

Apache-Sitgreaves NF MIS Species	Apache-Sitgreaves NF Habitat Trend	Apache-Sitgreaves Population Trend	Alt 1 Net Change (Determination)	Alt 2 Net Change (Determination)	Alt 3 Net Change (Determination)
Elk	Increasing	Stable	No effect	No effect	
Mule Deer	Increasing	Decreasing	No effect	No effect	
Pronghorn Antelope	Increasing	Stable	No effect	No effect	
Turkey	Increasing	Stable/upward trend	No effect	No effect	
Mexican Spotted Owl	?	Stable/upward trend	No effect	No effect	
Northern Goshawk	Upward	Stable	No effect	No effect	
Cinnamon Teal	Increasing	Stable	No effect	No effect	
Aquatic Macro invertebrates	Decreasing	Decreasing	No effect	No effect	

**Table 12. Apache-Sitgreaves Management Indicator Species for the Heber-Reno and Morgan Mountain Sheep Driveways.**

<b>Species Common Name</b>	<b>Water</b>	<b>Forested (MA1)</b>	<b>Woodland (MA2)</b>	<b>Riparian (MA3)</b>	<b>Grassland (MA4)</b>	<b>Habitat Present</b>
Mexican Spotted Owl		X				X
Northern Goshawk		X				X
Elk		X	X		X	X
Mule Deer		X	X			X
Antelope			X		X	X
Turkey		X				X
Aquatic Macroinvertebrates				X		X
Cinnamon Teal	X					

**Table 13. Migratory birds and their habitats listed in either Birds of Conservation Concern (2008) or Partners in Flight Conservation Plan (1999) within Tonto NF.**

<b>Ponderosa Pine Forest: primarily pure ponderosa pine forest</b>
<b>Species</b>
Flammulated Owl*
Grace's Warbler*
Lewis's Woodpecker
Northern Goshawk*
Olive-sided Flycatcher*
Olive Warbler*
<b>Ponderosa-Gambel's Oak Forest</b>
<b>Species</b>
Band-tailed Pigeon*
Flammulated Owl*
Grace's Warbler*
Lewis's Woodpecker*
Northern Goshawk*
Olive Warbler*
<b>Mixed Conifer Forest: Douglas fir, white fir, ponderosa pine, often some aspen and Gambel's oak.</b>
<b>Species</b>
Band-tailed Pigeon*
Cordilleran Flycatcher
Flammulated Owl*
Golden-crowned Kinglet
Mexican Spotted Owl
Northern Goshawk*
Olive-sided Flycatcher
Red-faced Warbler
Red-naped Sapsucker
<b>Pinyon Pine – Juniper woodland</b>
<b>Species</b>
Black-throated Gray Warbler*
Golden Eagle*
Gray Flycatcher
Gray Vireo
Juniper Titmouse
Peregrine Falcon*
Pinyon Jay

<b>Madrean Evergreen woodland: Madrean evergreen oaks, juniper, pinyon pine</b>
<b>Species</b>
Black-throated Gray Warbler*
Golden Eagle*
<b>Species</b>
<b>Interior chaparral: shrub live oak, manzanita, mountain-mahogany, cliffrose</b>
Black-chinned Sparrow
<b>Semiarid grassland, often with scattered stool, agaves burrowed, snakeweed, yucca, mesquite</b>
<b>Species</b>
Golden Eagle*
Swainson's Hawk
<b>Sonoran Desertscrub (Arizona Upland Biome): paloverde, ironwood, mesquite, catclaw, acacia, saguro, cholla, barrel cactus, prickly pear, creosote bush, jojoba, crucifixion thorn</b>
<b>Species</b>
Bendire's Thrasher
Canyon Towhee
Costa's Hummingbird*
Elf Owl
Gila Woodpecker
Gilded Flicker
Golden Eagle*
Peregrine Falcon*
Phainopepla*
Prairie Falcon
Purple Martin
<b>Montane riparian wetlands: cottonwood, maple, box elder, alder, willow, some Gambel's oak, ponderosa pine, Douglas fir, white fir, and aspen</b>
<b>Species</b>
Cordilleran Flycatcher*
MacGillivray's Warbler
Red-faced Warbler*
Red-naped Sapsucker*

<b>Interior riparian deciduous forests and woodlands: sycamore, cottonwood, willow, ash, walnut, bigtooth maple, hackberry, cypress, juniper, oak</b>
<b>Species</b>
Common Black-Hawk*
Northern Beardless-Tyrannulet*
Yellow Warbler*
<b>Sonoran riparian deciduous forest and woodlands: primarily cottonwood, willow, mesquite, tamarisk (salt cedar), some ash, walnut, and hackberry</b>
<b>Species</b>
Bald Eagle
Bell's Vireo*
Common Black-Hawk*
Northern Beardless-Tyrannulet
Southwestern Willow Flycatcher
Western Yellow-billed Cuckoo
Yellow Warbler*
<b>Sonoran riparian scrubland (dry wash): mesquite, paloverde, ironwood, burrobush, desert broom, quailbush, desert willow</b>
<b>Species</b>
Bell's Vireo*
Costa's Hummingbird*
Lucy's Warbler
Phainopepla*

**\*Species occur in this and other habitats**

**Species of Concern**

Arizona State Partners in Flight lists priority species of concern by vegetation type. I reviewed all species of concern for vegetation types found in this project area (Aspen, Spruce-Fir, Ponderosa Pine, Grassland, Mixed Conifer, High Elevation Riparian, and Pinyon-Juniper). Table 14 displays the species that may occur in or near the project area.

**Table 14. Migratory Bird Effects Analysis for the Apache-Sitgreaves NF.**

<b>Veg type</b>	<b>Species</b>	<b>Habitat</b>	<b>Habitat Impacts</b>	<b>Disturbance Effects</b>
Mixed conifer, ponderosa pine, ponderosa pine/gambel oak	Northern goshawk	See TES write-up	See TES write-up	See TES write-up
Mixed conifer, ponderosa pine/gambel oak	Mexican spotted owl	See TES write-up	See TES write-up	See TES write-up
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 TES write-up	See TES write-up	See TES write-up
Mixed conifer, ponderosa pine, pinyon-juniper, oak woodlands	Golden Eagle	Open country from barren areas to coniferous forests, needs large trees and	Suitable cliff and isolated large tree habitat present within/adjacent to driveway. Sheep trailing will not	No adverse effects expected.

<b>Veg type</b>	<b>Species</b>	<b>Habitat</b>	<b>Habitat Impacts</b>	<b>Disturbance Effects</b>
		cliffs for roosting and perching	alter these features.	
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, 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	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	No adverse effects expected.

<b>Veg type</b>	<b>Species</b>	<b>Habitat</b>	<b>Habitat Impacts</b>	<b>Disturbance Effects</b>
			species.	
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	Marginal habitat present along the driveway. Impacts are	No adverse effects expected.

<b>Veg type</b>	<b>Species</b>	<b>Habitat</b>	<b>Habitat Impacts</b>	<b>Disturbance Effects</b>
		dependant on insects, and smaller prey than ferruginous.	expected to be minimal and short term and integrity of habitat will be maintained.	
Grassland	Burrowing owl	Limited to areas w/ burrowing mammals	No prairie dog towns or large population of burrowing rodents present.	No adverse affects expected.
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	Large tall trees along perennial stream.	Sheep trailing will not occur in common black-hawk habitat.	No adverse effects expected.
High Elevation Riparian	Southwestern willow flycatcher	See TES write-up	See TES write-up	See TES write-up
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,	Overstory vegetation will not be altered. The trailing of sheep	Short term disturbance associated with sheep trailing

<b>Veg type</b>	<b>Species</b>	<b>Habitat</b>	<b>Habitat Impacts</b>	<b>Disturbance Effects</b>
		Steep, sloping canyons, ground nester	does not occur on steep slopes.	and grazing possible. No adverse effects expected.
Riparian woodlands	Yellow-billed Cuckoo	See TES write-up	See TES write-up	See TES write-up
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.
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	No adverse effects expected.

<b>Veg type</b>	<b>Species</b>	<b>Habitat</b>	<b>Habitat Impacts</b>	<b>Disturbance Effects</b>
			expected to be minimal and short term.	
Pinyon-Juniper	Juniper Titmouse	Late successional tall pinyon-juniper woodlands; uses riparian habitat adjacent to pj.	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.
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	Mature live aspen stands big enough to provide cavities; uses riparian areas of alder and willow to forage.	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.

Figure 1. Bighorn habitat map

### Bighorn sheep low-quality habitat and sheep driveway

