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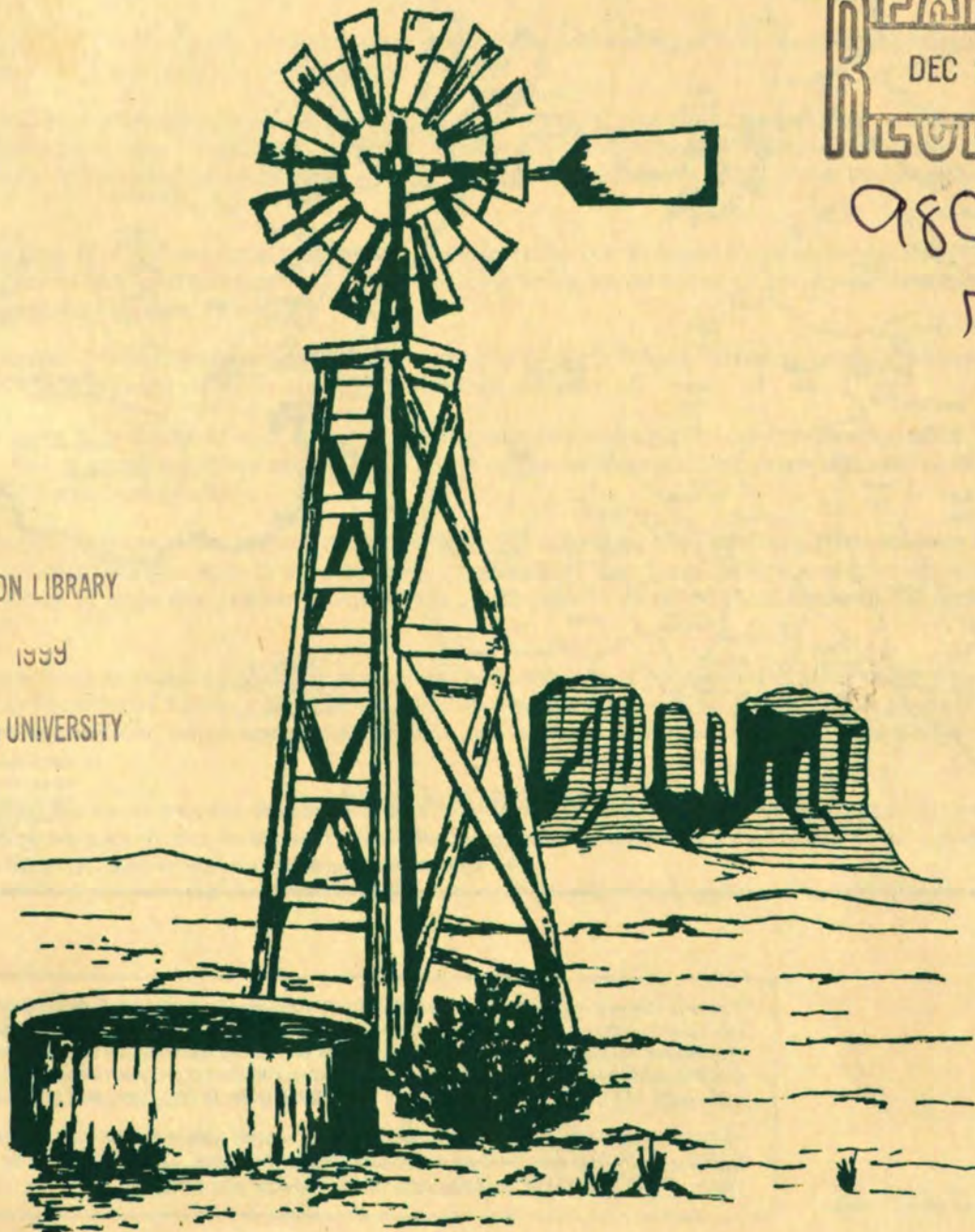


# Final Environmental Impact Statement for the Windmill Allotment

Mormon Lake, Peaks and Sedona Ranger  
Districts, Coconino National Forest

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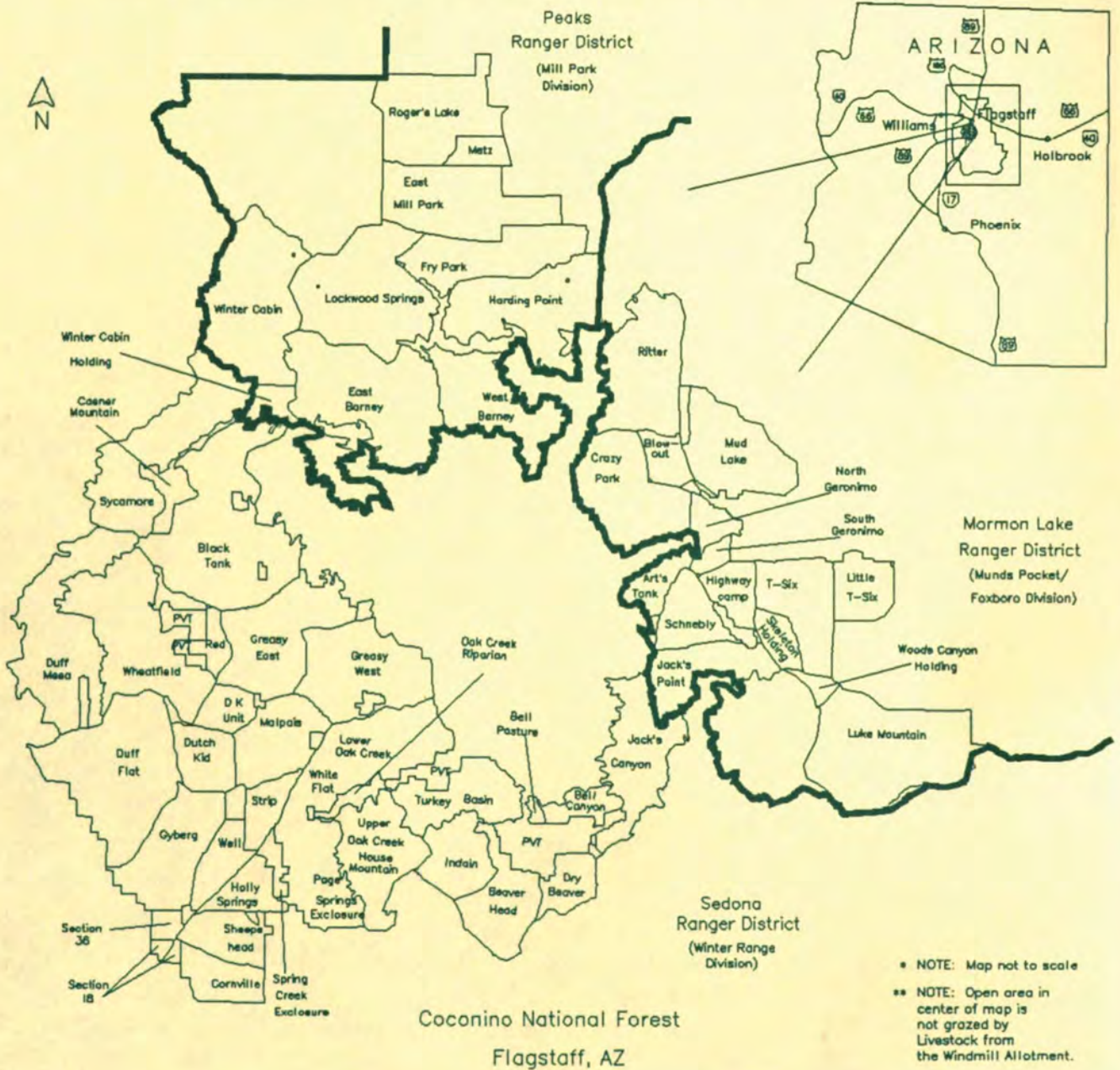


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# CURRENT WINDMILL ALLOTMENT



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# Final Environmental Impact Statement Windmill Range Allotment

## Coconino National Forest Coconino and Yavapai Counties, Arizona

<b>Type of Action:</b>	Administrative
<b>Lead Agency:</b>	USDA Forest Service
<b>Responsible Official:</b>	Fred Trevey, Forest Supervisor
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**Abstract:** A preferred alternative and six other alternatives are described and compared for the 248,792-acre Windmill Allotment planning areas. The alternatives are:

1. Alternative A is designed to meet all the current grazing management issues while maintaining a viable ranching operation. This alternative uses permittee and range conservationist knowledge to determine proper livestock numbers, grazing periods, grazing rotations, and pasture splits. Total livestock numbers are 1,252 to 1,257.
2. Alternative B is the no action alternative as required by the National Environmental Policy Act regulations. Selection of this alternative would mean that no grazing would occur on the Forest Service portion of this allotment for the next 10 years.
3. Alternative C is the management system currently in place. This alternative permits a total of 1,252 to 1,257 cattle to graze year-round on the Windmill Range Allotment.
4. Alternative D is designed to respond to grazing capacity and proper use guidelines issues. This alternative uses timber stand database and TES data to project total yearly forage production for each pasture. Total livestock numbers are 635.
5. Alternative F is the same as Alternative A except for adjusting the Luke Mountain pasture of the Foxboro Herd from a 2-way pasture split to a 3-way pasture split. This third pasture reduced grazing periods in Little T-Six from 20 to 10 days and Highway Camp from 14-20 days to 10 days. Total livestock numbers are 1,252 to 1,257.
6. Alternative G is designed to better meet resource concerns of poor and declining range conditions in parts of Munds Pocket and Foxboro Herd areas. This alternative improves on Alternative A in these areas by reducing livestock numbers, adjusting grazing periods and additional pasture splits. Total livestock numbers are 1,090 to 1,125.

**A Draft Environmental Impact Statement was available for comment between August 21 and October 13, 1997. Changes between the Draft and Final Environmental Impact Statement are the result of public comments to the Draft Environmental Impact Statement.**

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# Summary of Environmental Impact Statement

The Environmental Impact Statement (EIS) for the Windmill Allotment describes six alternatives, including a Preferred Alternative, for management of forest lands within the Windmill Allotment. This EIS incorporates the standards and guidelines of the Coconino National Forest Land and Resource Management Plan (1988), and its subsequent amendments, which direct the overall management of the Coconino National Forest. The goals for the Windmill Allotment as well as the alternatives are summarized below.

## Goals

The general goals or desired conditions for the allotment are described here in relative order of priority.

1. Maintain or improve watershed conditions throughout Windmill Allotment. Improve watershed conditions in meadows.
2. Improve forage species density, diversity and composition and emphasize cool season species improvement. Maintain or develop upward trends in vegetative conditions (speed of improvements may vary based on soil types, over story vegetation, and grazing use).
3. Increase herbaceous and woody species diversity and vigor in riparian areas.
4. Maintain or improve habitats for all threatened, endangered and sensitive species habitat.
5. Develop a new grazing management system that meets resource goals while providing opportunity to continue a viable ranching operation. Improve livestock management to help improve resources.
6. Provide productive grasslands that support grazing wildlife populations similar to existing levels, or as described in the Arizona Comprehensive Plan (USDA Forest Service and Arizona Game and Fish 1990).
7. Upward trends on the existing poor and fair range conditions and maintenance on the existing good range conditions.

## Alternatives

Six alternatives were developed for the Windmill Allotment to meet the goals for the allotment over the next 10 years and to address issues raised from the Proposed Action. The alternatives are described in

terms of the four main herds which are the Mill Park commercial herd, Munds Pocket herd, Foxboro herd and bull herd. Each herd except for the bull herd, uses a combination of winter and summer range areas. The Mill Park commercial herd uses areas west of 89A from Rodgers Lake to the Mogollon Rim in the summer and uses areas below the Rim to the Verde River in winter. The Munds Pocket herd uses an area from the Munds Park area north along I-17 to James Canyon in the summer and an area west of 89A, southwest of Sedona. The Foxboro herd uses an area south of Munds Park to the Woods Canyon area in the summer and an area southeast of Sedona and east of Oak Creek in the winter.

**Priorities for Implementation:** Alternatives A, D, F and G require splitting pastures with fences to add to the total numbers of pastures and therefore, increase flexibility of the grazing system. Highest priority items will be done in the first 5 years. Priorities for fence construction are based on T&E protection, meadow and riparian improvement, and providing the greatest increases in management flexibility.

**Management Items:** Described here are some of the management items common to Alternatives A, C, D, F and G (cattle grazing alternatives). All culls are shipped near the time of culling or placed into existing herds. The Mooney Trail and Jacks Canyon are swept after every drive to pick up stragglers and move them. Grazing rotations are adjusted annually to progress toward resource improvement goals. Urban areas around the city of Sedona and Village of Oak Creek are currently fenced from cattle. Some large and small pieces of private property will have cattle on them unless they are fenced by the private land owner (Arizona Open Range Law). Cattle will not use Oak Creek, Sycamore Creek or the Verde River.

**Annual Operating Plans:** Annual operating plans make adjustments to cattle numbers, and time and duration of pasture use based on current climatic and range conditions. Making these plans each year and adjusting throughout the season as conditions change adds needed flexibility to the action alternatives.

**Non-Use Pastures:** The following areas/pastures will not be used by Windmill Allotment cattle for the next 10 years in all action alternatives: Sycamore Canyon, Casner Mountain, Black Mountain, Secret Mountain, Munds Mountain, Black Springs, Turkey Basin, Oak Creek proper, Verde River proper, Spring Creek, Section 1 pasture, Section 36 pasture, Bell pasture, Sheepshead Spring and Purshia pasture. Wilderness areas will only be used as travel routes to and from summer and winter range.

**Riparian Spring Fencing:** Common to Alternatives A, C, D, F and G are fencing to exclude cattle and in some cases elk from riparian springs. The areas chosen for fencing are easily accessed by cattle, are fairly large and have adjacent wet meadows and are estimated to have high potential for improvement. Not all riparian springs located on the Allotment are fenced. Those not chosen for fencing are less accessible to cattle, are not associated with wet meadows and are very small. Riparian fencing will be the responsibility of the Forest Service. These projects are good candidates for cooperative implementation offers of volunteer labor or partnerships are made to the Forest Service. These riparian projects will be done under the no-grazing alternative.

**Meadow Enhancement:** Common to Alternatives A, C, D, F and G (action alternatives) are meadow enhancement actions such as fencing, removing or relocating tanks within meadows, and relocating or obliterating roads.

**Road Closure:** Common to all alternatives is the desired condition of closing roads in the Fain Mountain area and the road past Last Chance Tank. The Fain Mountain desired condition of no roads is to protect wildlife habitat. The Last Chance Tank road closure would restrict vehicular traffic into the *Purshia* pasture. All road closure or obliteration work is done by the Forest Service.

**Roads and Cattle Guards:** Common to Alternatives A, C, D, F and G (action alternatives) is the need to keep forest users from leaving gates open. Where roads are maintained as open, cattleguards will be put in place. Where roads are identified for closure, no cattle guard is necessary.

**Cattleguard Maintenance:** Common to Alternatives A, C, D, F and G (action alternatives) level 3 and 4 roads (paved or surfaced main forest roads) cattleguard maintenance is the responsibility of the Forest Service and the permittee. Level 2 (secondary smaller roads) are the responsibility of the permittee.

**Implementation of Structural Improvements:** Common to Alternatives A, C, D, F and G (action alternatives) is the need for resource coordination when implementing the grazing system. Structural improvements such as fencing, pipelines, stock tanks and cattleguards will be used to implement the grazing plan. During the life of the permit, there may be additional or fewer improvements needed based on adapting to changes and meeting the goals of the new system. The following parameters need to be followed when implementing structural improvements.

**Cultural Resources Coordination:** A programmatic cultural report has been completed and approved by the State Historic Preservation Office (SHPO). Using the parameters described in the programmatic report, conduct surveys and obtain clearance prior to any ground disturbing activities related to structural and non-structural improvements.

**New Tank Construction:** New tanks will be located within stands of trees and not in grassy openings to limit impacts to ground cover and visual quality. New tanks will be located outside of Mexican spotted owl core or protected activity center (PAC) areas to limit additional congregating of cattle in these sensitive areas. Prior to construction, conduct surveys and avoid any threatened, endangered or sensitive plant species.

**Pipeline Construction:** The final on-the-ground location of pipelines should take wildlife, watershed and cultural resource needs into account as well as serve the desired cattle distribution objectives. Conduct surveys and avoid any threatened, endangered or sensitive plant species prior to construction.

**Threatened, Endangered and Sensitive Species Coordination:** Additional, very site specific biological assessments and evaluations will need to be written for chosen actions. Refer to and follow any mitigation measures or implementation parameters described in the biological assessments and evaluations written for this EIS. Locations of improvements may be altered somewhat in response to species considerations. Involve a wildlife biologist prior to final planning of any new improvement.

**Recreation and Special Use Guidelines:** Timing of the construction of new range structures must be coordinated with the recreation specialists and Special Use permit holders.

**Pipeline Use:** The permittee, at his own discretion, may continue to provide water sources for antelope by leaving some pipelines open even when cattle are not present.

**Fencing:** All new fencing, whether to split a pasture, protect a riparian area or to meet other objectives, will contain a smooth bottom wire and appropriate bottom wire height for wildlife. Conduct cultural resources and threatened, endangered and sensitive species coordination as described above. Where possible, locate fences within treelines to limit impact to visual quality. Elk jumps may be constructed along new fences and along existing fences as appropriate.

**Monitoring:** Common alternatives A, C, D, F and G have monitoring items chosen by the team to answer questions and check progress of improvement. The following is a list of the main items that will be monitored in the action alternatives: *Purshia subintegra* populations, SWWF habitat for occupation, elk-livestock utilization, pine-oak habitat forage, selected riparian areas, and general vegetation response to selected management system.

### **Alternative A (Proposed Action)**

Alternative A is designed to meet all the original grazing management goals while maintaining a viable ranching operation. This alternative uses permittee and range conservationist knowledge to determine proper cattle numbers, graze periods, graze rotations and pasture splits. Maximum total cattle numbers are 1,252 to 1,257.

### **Alternative B**

Alternative B eliminates scheduled livestock grazing on the Forest Service portion of the Windmill Allotment for 10 years. Grazing on Arizona State Trust lands within the boundary of the allotment would still be permitted. This is the No Action Alternative required under the National Environmental Policy Act. This alternative also addresses the issues of grazing cattle on degraded areas and resting rangelands in poor and fair conditions. Management intensity is at Level A, meaning cattle grazing is eliminated (USDA Forest Service 1987, p. 254). This alternative does not preclude cattle grazing on the Allotment in the future if a decision is made through another comprehensive analysis to resume grazing. To meet objectives no money will be spent on structural improvements. No maintenance of existing range improvements will be done.

### **Alternative C**

Alternative C is the management system currently in place. This alternative permits a maximum total of 1,252 to 1,257 cattle (up to 20 horses can be included in this total) to graze year-round on the Windmill Allotment. Cattle graze the Mill Park and Munds Pocket/Foxboro Divisions during summer and the Winter Division during winter.

### **Alternative D**

Alternative D is designed to respond to grazing capacity, resting rangelands in poor and fair condition and proper use guideline issues. This alternative uses timber stand data base and TES data to project total yearly forage production for each pasture. A 35 percent use factor is then subtracted from the forage production total to give an allowable forage value for each pasture that could be used by elk and cattle. Elk utilization estimates were then subtracted from this remaining forage. Finally, cattle numbers and graze periods are taken from the remaining allowable forage. Maximum total cattle numbers are 635.

### **Alternative F (Preferred Alternative)**

Alternative F is designed to address the grazing capacity issues in the Foxboro summer range and watershed issues in Mill Park winter range. Alternative F adjusts Alternative A slightly by: 1) splitting Luke Mountain pasture a third time for the Foxboro Summer herd; and, 2) maximizing watershed improvement by grazing within the 5-mile Southwestern willow flycatcher radius during the breeding season 2 of 6 years. Splitting the Luke Mountain pasture a third time within the Foxboro summer area reduces graze periods in Little T-Six from 20 to 10 days and Highway Camp from 14-20 days to 10 days. Grazing within the 5-mile flycatcher radius during the breeding season maximizes flexibility with the grazing rotations. This is done by allowing for yearlong rest 1 year in 6 in Gyberg, Duff Flat, Duff Mesa and Skelton Bone pastures, and better grazing deferment in Mill Park and Munds Pocket herds winter pastures from year to year.

### **Alternative G**

Alternative G is designed to address resource concerns of grazing capacity and of poor and declining range conditions in parts of the Munds Pocket and Foxboro herd range. This alternative reduces cattle numbers and adjusts grazing periods with additional pasture splits. Maximum total cattle numbers are 1,090 to 1,125.

# Project Scope

## Background

The Windmill Allotment Management Plan was updated in 1982 to address the distribution of livestock. In 1988, the allotment plan for the Winter Division was updated to change the grazing system to improve the growth of cool-season needlegrasses and overall range conditions.

In 1994, the Peaks, Mormon Lake and Sedona Ranger Districts, in partnership with the Arizona Game and Fish Department and the Windmill Ranch, initiated a comprehensive analysis of the Windmill Allotment to update the Allotment Management Plan. The allotment was selected for analysis to address:

- large, open meadows that are in poor range or watershed condition indicating an imbalance between plant growth and use of plants throughout the meadows;
- riparian areas that are in less than preferable desired condition;
- management of threatened, endangered and sensitive species;
- administrative inefficiencies (three allotment plans versus one plan);
- a need for landscape scale planning; and
- livestock/elk conflicts.

In 1995, a 10-year grazing permit was issued for the Windmill Allotment under the term of the Rescission Bill (Burns Amendment). This permit included some interim mitigating measures including fencing riparian and sensitive plant habitats, sweeping cattle from driveways and shipping culled cows. As required by this legislation, the allotment was then rescheduled for comprehensive analysis within the 10-year period.

In 1996, the comprehensive analysis was continued. The core group focused on gaining an understanding of relationships between forage production, soils, tree densities, climate, past grazing, and the dietary needs of cattle and elk. Further, the group focused on evaluating where cattle forage dietary needs and current cattle grazing use were out of balance with forage production. The team then evaluated how to change cattle management to regain the balance between forage production and cattle use. The following describes the analysis in detail.

## Purpose of the Action

Specifically, the purpose of this analysis is to evaluate the grazing use on the Windmill Allotment and to propose options for moving toward resource improvement goals and objectives. Cattle grazing alternatives (including no cattle grazing) are being considered. If a cattle grazing alternative is selected, a new permit will be issued along with a new allotment management plan (AMP).

## Need for Action

Need for action is best depicted by comparing existing conditions with desired conditions. The following provide a summary.

**Existing Conditions.** The current AMP for the Windmill Allotment was developed in 1984. Since then, we have learned much about how to maintain or improve watershed conditions. Historical logging and grazing practices, fire exclusion, and climatic factors have created the relatively dense stands of ponderosa pine which cover much of the upland summer range of this allotment. Substantial grass production under pine stands requires tree densities of 60 square feet basal area or less. Many of these areas contain tree stands of 80+ square feet basal area. As a result, some of the Windmill Allotment landscape supports less grass, forbs and shrubs than historical times when fire was a more frequent agent in the forest. For this reason, range conditions on portions of this allotment have declined.

Above the Mogollon Rim, the ponderosa pine vegetation type is in poor to good range condition. The potential for improvement, in most cases, is limited by dense canopy cover of trees which out competes ground cover vegetation for light, water and nutrients. Transitional vegetation type is in poor to fair range condition, with potential for improvement. Pinyon pine-juniper vegetation type is also in poor range condition because of dense tree canopies and dry rocky soils, thereby limiting potential for improvement. All riparian areas which are on accessible terrain are in poor condition with downward trends. All large mountain meadows within the Munds Pocket and Mill Park areas uplands are in poor range condition with the potential for improvement. Current cattle and elk use is keeping these areas in static trends. Meadows in the Foxboro area are in fair range condition with static trends.

Below the Mogollon Rim the pinyon pine-juniper vegetation is in very poor to fair range condition depending on canopy cover. The pinyon-juniper trees are limiting and degrading watershed conditions. In other areas, rocky, shallow soils limit improvement potential. Desert grassland vegetation type is in poor to good range conditions with upward trends. Woody plant invasion limits potential for improvement in a few places, but overall there is potential for continued improvement. Desert shrub vegetation type is in poor to fair range condition with static trends. Chaparral vegetation type is in very poor to good range condition with static to downward trends because of the overall lack of fire and heavy elk use near the Mogollon Rim. Most riparian areas below the Mogollon Rim are in good condition with upward trends and are excluded from cattle grazing. Other factors impacting these riparian conditions include actions on private lands and recreation.

**Desired Future Conditions (including Goals).**

Although upland tree thinning could be undertaken to enhance forage production, it was not carried forward in this analysis because of the complexity of analyzing just the livestock grazing portion of this area. Therefore, we worked with forage estimates and cattle management techniques under the assumption of continued dense tree canopies.

The general goals or desired conditions for the allotment are described here in relative order of priority.

1. Maintain or improve watershed conditions throughout Windmill Allotment. Improve watershed conditions in meadows.
2. Improve forage species density, diversity and composition and emphasize cool season species improvement. Maintain or develop upward trends in vegetative conditions (speed of improvements may vary based on soil types, over story vegetation and grazing use).
3. Increase herbaceous and woody species diversity and vigor in riparian areas.
4. Maintain or improve habitats for all threatened, endangered and sensitive species habitat.
5. Develop a new grazing management system that meets resource goals while providing opportunity to continue a viable ranching operation. Improve livestock management to help improve resources.
6. Provide productive grasslands that support grazing wildlife populations similar to existing

levels, or as described in the Arizona Comprehensive Plan (USDA Forest Service and Arizona Game and Fish, 1990).

7. Upward trends on the existing poor and fair range conditions and maintenance on the existing good range conditions.

**Decision to be Made**

The decision to be made by the Forest Supervisor is what lands on the Windmill Grazing Allotment that are currently grazed, are going to continue to be grazed, and in what manner. The decision will be based on a consideration of the area's existing resource conditions, desired conditions, public concerns and the environmental effects of implementing the various alternatives. The selected strategy will comply with the Coconino National Forest Plan. Following the selection of the management strategy, any and all grazing practices adopted will be further detailed in the terms and conditions of an allotment management plan and grazing permit.

**Project Location and Analysis Area**

**General Project Area Description**

The Windmill Allotment consists of 248,792 acres. These acres lie within three Ranger Districts of the Coconino National Forest and include some Arizona State Trust lands (see the map on the inside front cover). This Allotment has the following plant community types: ponderosa pine (103,256 acres), pinyon pine-juniper (27,941 acres), mountain meadows (3,745 acres), transitional type between ponderosa pine and pinyon-juniper (7,281 acres), chaparral (6,498 acres), desert grassland (87,526 acres), desert shrub (11,635 acres) and riparian (910 acres).

**Mormon Lake Ranger District - Munds Pocket/Foxboro Division of the Summer Range**

The Mormon Lake Ranger District portion of the Windmill Allotment consists of 52,302 acres. This area is called the Munds Pocket/Foxboro Division and is grazed in summer. The division extends north to south from James Canyon to the Coconino County line. The northern portion is referred to as Munds Pocket and the southern portion as Foxboro. The division extends east to west from the rim of Oak

Creek Canyon to Fain Mountain, Casner Park and Pinewood and has two distinct cattle management areas. The Foxboro cattle herds consist of purebred hereford cows, calves and bulls. The Munds Pocket cattle herds consist of replacement heifers and bulls.

### **Peaks Ranger District - Mill Park Division of the Summer Range**

The Peaks Ranger District portion of the Windmill Allotment consists of 66,648 acres. This area is called the Mill Park Division and is also grazed in summer. The division extends north to south from the southern portions of Rogers Lake into the Sycamore Canyon and Red Rock-Secret Mountain Wilderness areas. The western boundary is near Mooney Mountain and the eastern boundary follows Highway 89 south to the rim of Oak Creek Canyon. The northern portions of this division contain 9,467 acres of Arizona State Trust lands. These lands are interspersed with Coconino National Forest lands in a checkerboard configuration. The Mill Park cattle consist of crossbred cows, calves and bulls. This group of cattle is also known as the commercial herd.

### **Sedona Ranger District - Winter Division**

The Sedona Ranger District portion of the Windmill Allotment consists of 129,842 acres. This area is called the Winter Division and is grazed during the winter season. The division extends north to south from the Peaks Ranger District boundary to the Beaver Creek Ranger District boundary. The area's

eastern boundary meets Secret Mountain, Lost Mountain, Bear Mountain, the Boynton Canyon Range Allotment, the Sedona Range Allotment, the western portion of Munds Mountain, the western rim of Horse Mesa and Jacks Point. The western boundary meets Sycamore Canyon and the Verde River. The southwestern portions of the Winter Division contain 8,023 acres of Arizona State Trust lands. These lands lie approximately 4 miles northeast of Cottonwood, Arizona and are bisected by Highway 89A. The Foxboro herd grazes the southern portion of this division from Jacks Canyon to House Mountain. The Munds Pocket herd grazes the central portion of this division in the D.K-Malapais-Strip pasture area. The Mill Park herd grazes the southwestern portion of this division in Cornville-Sheepshead pasture area.

### **Future NEPA Actions**

This EIS will guide any subsequent project implementation related to cattle management in the Windmill Allotment. Future site specific project proposals will be tiered to this EIS (40 CFR 1508.28). Tiering means that, if needed, future environmental documents for projects based on this EIS will summarize or incorporate by reference the issues discussed in this EIS. Environmental documents for those projects will focus on site specific issues unique to the proposed project. This EIS will also serve as a guide along with additional analysis for projects not related to cattle management such as prescribed fire, timber sales, browse enhancement projects, and road closures in the Windmill Allotment.

# Alternatives

## Alternative Development

The following section describes the alternative generation process that was undertaken for this analysis. The thought process and conclusions described here are in the order in which they occurred.

The goal statements were used to create the proposed action. The alternatives were created from issues raised by the proposed action with the goals in mind.

## Problem Statements and Assumptions Used to Develop Proposed Action

Current conditions of the Windmill Allotment were compared to the goals listed above. Where the Allotment does not currently meet these goals, specific objectives were identified. For readability, the problem statement that explains the goal is highlighted and the resulting objective or assumption is not highlighted.

**Goal 1: Large dry meadows above the Mogollon Rim have been experiencing long-term downward trends with soil compaction and scarce ground cover because of years of long duration concentrated use by cattle and elk. The poor ground cover vegetation conditions in the surrounding heavily tree covered landscape causes animals to seek out meadow vegetation which is more desirable and of higher quantity than the minimal vegetation beneath forested areas.**

In all the dry meadows, progress toward improved soil conditions by one or more of the following: reducing graze periods, relocating or removing stock tanks, building waterlot fences around tanks, splitting pastures, and obliterating or re-routing roads out of meadows. Meadows identified for improvement are: Crazy Park, Casner Draw, Mill Park, Fry Park, Rogers Lake, Yellow Flat, Frog Park, Bobs Park, Potato Patch and Lee Butte Meadow.

**Goal 2: Because some existing pastures are large, cattle tend to graze selectively in both area and type of vegetation. Long grazing periods for pastures compounds the problem of too much use in some locations and little use in others. Combined use by cattle and elk is too high in several meadows, around water sources, and in or near transition vegetation types causing downward trends in vegetative condition in these areas. To improve forage density and composition, emphasize cool season species improvement and maintain or develop upward trends.**

Reduce grazing periods to less than or equal to 20 days during fast plant growth as much as possible. Fast forage growth is usually mid-July through August and mid-March to mid-May with flexibility for when rains arrive. This will reduce regrowth of forage regrowth which is better for plant health and vigor.

Incorporate yearlong rest from cattle into every pasture wherever possible in the summer range rotations. This yearlong rest from cattle improves overall forage health by allowing more plants to reach maturity and reproduce.

Increase variability of pasture deferment, i.e. different season of use each year of the rotation.

Assume elk will use a rested pasture somewhat less, because of lack of regrowth from grazing cattle. Elk will continue to use riparian and meadows regardless of cattle use.

The summer cattle range is not used before the cool season species have finished their fast forage growth (June 1st or later) to allow these plants to reach maturity.

**Goal 3: Below the Mogollon Rim in the Winter Division many riparian areas are excluded from cattle grazing. In the Summer Divisions (Mill Park and Munds/Foxboro), riparian areas are grazed heavily by both cattle and elk. The following objective will be incorporated into the proposed action.**

In riparian areas below the Mogollon Rim, reduce time of cattle grazing or exclude from cattle grazing. Riparian areas identified are portion of Oak Creek, Dry Creek, Sheepshead Creek and Jacks Canyon.

Riparian grazed by cattle above the Rim will receive reduced grazing periods by cattle and varied season of use. Several of these areas will be fenced and excluded from cattle grazing. Riparian areas identified are T-6 Spring, Willard Spring, Fain Spring and a portion of Rogers Lake.

**Goal 4: Species of highest concern on the Windmill Allotment are Southwestern willow flycatchers (SWWF), Mexican spotted owls (MSO), and Arizona cliffrose *Purshia subintegra*. The following objectives were identified for incorporation into the proposed action. Additional site specific measures were developed later in the alternative development process.**

Windmill cattle currently do not graze and will not graze proposed critical habitat for the Southwestern willow flycatcher.

Exclude large portions of the *Purshia subintegra* population, an endangered plant, from cattle grazing by fencing within the Gyberg Pasture.

Enhancing overall forage conditions in the summer range through actions described above should maintain and enhance small meadows and, therefore, prey species habitat for raptors.

Limit gathering and holding activities within or adjacent to sensitive Mexican spotted owl areas.

**Goal 5: In keeping with National Forest policy, it is desirable to maintain opportunities for cattle grazing where the grazing use is creating upward not downward trends in vegetative conditions.**

The permittee participated in development of the proposed action and ensured us that proposed improvements and number of cattle moves were possible to implement.

This permittee runs a breeding program as opposed to buying crossbred heifers. The breeding program currently in place requires four separate herds (crossbred, Hereford, heifer, and bull) which increases the complexity of the operation and reduces flexibility in rotations. For the proposed action and all additional action alternatives, this 4-herd breeding program was continued.

### **Other Assumptions Carried Forward to the Proposed Action**

1. Areas/pastures within the allotment that are not currently used by cattle are: Sycamore Canyon, Casner Mountain, Black Mountain, Secret Mountain, Munds Mountain, Lee Mountain, Black Springs, Turkey Basin, Oak Creek proper, Spring Creek, Section 1 pasture, Section 36 pasture, Purshia pasture, Bell pasture and Sheepshead Spring. Wilderness pastures that are not used are Winter Cabin and Sycamore. These pastures will not be used in the future either.
2. Traditional Forest Service funds are limited for administration, monitoring and improvements.
3. Four wire barbed wire fences proposed across large meadows may impact summer or winter antelope herds and that a better option for

antelope is to use electric or 3-wire barbed wire fence that antelope can easily cross.

### **How the Proposed Action Met Our Goals and Objectives**

The new grazing system proposal was named Alternative A, the proposed action. This alternative met the 20-day grazing objectives listed above. Cattle impacts to large dry meadows were reduced by reducing cattle graze days. The number of days cattle graze large meadows was reduced from as high as 50 days to an average of 10 days. Yearlong rest was incorporated throughout the summer range and a large portion of the winter range. The frequency of yearlong rest varies from once every 4 years to once every 6 years. Riparian enclosures were planned to eliminate cattle use from riparian sites. Pasture splits increased the total number of pastures and lessened the number of days per pasture. The 20-day graze during fast forage growth, fewer total days grazing per pasture, and increased variability in the dates when pastures are grazed would move the allotment toward goals of enhancing watershed conditions by increasing forage species density, composition and cool season species mix.

### **Issues That Were Resolved by Incorporation into Alternative A**

The following issues were raised during review of the proposed action (Alternative A) and then incorporated into Alternative A.

Some pastures adjacent to each other were scheduled similarly, i.e., both rested or both grazed in the same year. If these pastures were adjacent to wildlife winter habitat or turkey habitat, then a change to alternate the rest year between pastures to allow for more seedheads for wildlife was incorporated into Alternative A.

Double use on Jacks Point and Schnebly every other year seemed too high considering the heavy elk use this pasture also receives. Cattle graze periods were shortened to 11-15 days per pasture on Jacks Point and yearlong pasture rest was incorporated 1 year in every 4 years.

The number of cattle and number of days of use was thought to be too high on Foxboro winter and Munds Pocket summer



areas. There was disagreement between group members on the amount of forage available. A more intense forage production study was incorporated into Alternative A. Cattle numbers may be adjusted based on the results of this forage production study.

### **Remaining Issues Not Addressed by the Proposed Action**

Even with the adjustments described above, there was concern that the forage base could not support the combined use of elk and cattle on Jacks Point, Ritter, Highway Camp and Little T-Six pastures (addressed later on in Alternatives D and G).

On the summer range, pastures with a high percentage of dense timber, combined with rocky soils and/or steep slopes may not be producing enough forage to support both the elk and cattle combined needs. There are differences of opinion on the extent of this situation. Some believe there is enough forage to support this alternative based on field observations, cattle behavior, calf weights and conditions of the land. Others believe there may be some pastures that are not producing enough forage based on timber data base information, Terrestrial Ecosystem Survey (TES) soil information, and field observations and conditions of the land (incorporated later on into Alternatives D and G).

### **Issues**

During the scoping for the short-term permit issuance in 1995, the following issues were raised. These issues, along with the management goals, have driven the development of alternatives.

**Resource Degradation:** Some people felt that if resource degradation is occurring in any areas, then cattle use in those areas should be drastically reduced or eliminated (Alternative B).

**Resting Rangelands in Poor or Fair Condition:** Some felt that instead of issuing a grazing permit for rangelands in poor or fair condition, these lands should be rested from cattle grazing until restoration occurs (Alternatives B and D).

**Efficiently Operating and Complying with the Allotment Management Plan:** Some people were concerned whether the Forest Service and the permittee will efficiently operate and comply with the Allotment Management Plan. Others commented that

permits should not be reissued to permittees whose compliance with the Allotment Management Plan is mediocre. This is not part of this decision. If compliance is a problem in the future, it will be handled through permit administration (common to all alternatives).

**Capacity/No Capacity Grazing Land:** Some felt that portions of the allotment that do not have grazing capacity should be identified and should be closed to cattle use (common to all alternatives but varies by alternative).

**Past and Present Cumulative Impacts:** Some people commented that past and present cumulative impacts on soils and watersheds in the allotment should be considered when setting the terms and conditions of a grazing permit for the area (common to all alternatives but varies by alternative).

**Future Watershed Conditions in Portions of the Mill Park Winter Range:** Some felt that not grazing within the SWWF 5-mile nest radius limited management options and reduced watershed health. There is no yearlong rest incorporated in Alternative A in Duff Mesa, Duff Flat, Skeleton Bone and Gyberg pastures (Alternative F).

**Economic Impacts:** Some commentors asked that economics be considered in the analysis of the allotment (common to all alternatives).

### **More Foxboro Options**

Other topics of discussion were the issues raised about the lack of flexibility in rotation, the impact to cool season species, and the combined elk and cattle use in some pastures on the Foxboro summer range, named the FOXSUMM Option. Parts of these options were incorporated in Alternative A and parts were incorporated into Alternatives F and G.

**FOXSUMM Option:** This option for the Foxboro summer range dealt with the Foxboro summer herd within a 6-month (180-day) use period. Pastures are the same as Alternative A except one additional fence will create Jacks Point and HA pastures. The fence would be constructed near the elevation gradient between transition pinyon-juniper/brush type from ponderosa pine type because the vegetation has different growing seasons (incorporated into Alternative A).

This option focused on deferred rest and lessened the number of days per pasture in pastures of concern (Jacks Point, Highway Camp, T-Six and Little T-Six).

These pastures of concern were based on elk use and current poor conditions as identified by the range specialist and biologist. This alternative provides yearlong rest in Highway camp, Goofy (a new pasture), T-Six and Little T-Six 1 year in every 4 years, to respond to the concern over poor conditions. This option assumes herd size of 200-250 animals (incorporated into Alternatives F and G).

### **Capacity Concerns on the Munds and Foxboro Summer Areas**

Another issue is the need to respond to concerns about capacity in the Munds Pocket and Foxboro Summer Divisions.

The group developed a method for understanding the relationship between the grazing needs of cattle and elk and estimated forage production levels. This effort was a coarse sieve analysis which gave an indication of where levels of use and resources available were out of balance.

High density forested areas, very rocky soils and steep slopes were mapped for each pasture. The 1994 group went through a process of looking at the maps, pasture by pasture, and making conclusions about what they saw. The 1994 group also developed a way of displaying the information in the form of a large spreadsheet of columns and numbers. Below is a brief description of this spreadsheet.

The spreadsheet contains estimates of forage production based on tree densities, rocky (>30% surface rock) soils identified through Terrestrial Ecosystem Survey (TES), and steep slopes from TES data. In 1994, the group mapped out these land features and reviewed every pasture comparing the information with what they knew on-the-ground and estimating forage produced in each pasture. The group then estimated that cows eat approximately 30 pounds of forage per day. In addition, Game and Fish wildlife managers gave their best estimate of elk numbers in the various pastures over the summer months assuming elk eat grass in summer and browse in winter. The group estimated that elk eat approximately 12 pounds of perennial grass per day, with additional pounds consumed in forbs and non-grass species. By comparing the combined eating needs of the elk and cattle by pasture with the estimated amount of feed produced in each pasture, the group identified pastures of concern. Pastures of concern are those pastures where estimated total elk and cattle consumption of forage is far greater than 50 percent of the estimated forage production. Fifty percent use is a rough rule of thumb for forage

utilization, where the remaining 50 percent is left for long-term plant health and watershed conditions.

This spreadsheet was used as a tool in further forage production and capacity discussions about the Windmill Allotment.

The estimates were next compared with Alternative A. The 30 pounds estimate for cattle dietary needs was lowered to 25 pounds. This was done because 25 pounds more closely represents the amount of perennial grass consumed by cattle with additional pounds in non-grass species. The number of cattle per pasture from the new alternative was used. We assumed that our estimated elk use would likely remain similar over time given the Arizona State Comprehensive Plan target populations for these herds.

Once the new Alternative A system is in place, the total estimated forage produced and the total forage needs of elk and cattle are in overall balance over the entire Mill Park summer and winter pasture. Barney West and Harding Point are the only pastures where over 50 percent estimated use occurred.

The total estimated forage needs of cattle in the Foxboro winter range was also in balance with the estimated forage production. House Mountain pasture showed over 50 percent estimated use.

The total estimated forage produced and the total forage needs of elk and cattle in the Foxboro summer range are in balance over the entire area, however, there is an imbalance between pastures. One pasture, Luke Mountain pasture, had more estimated forage produced than would be consumed and two other pastures had more use occurring than 50 percent of what was produced. Other pastures had close to 50 percent estimated use. The two pastures of concern identified through the spreadsheet (Highway Camp and Little T-Six) were two of the four pastures identified earlier by specialists through on-the-ground knowledge. Two options to respond to the pastures of concern were proposed.

**Option 1** - Use the FOXSUMM option but split the Luke Mountain pasture three ways to increase the total number of days in the Luke Mountain area and reduce the number of days in the pastures of concern to 10. This system will require more cattle moves and one difficult move in and out of the Luke Mountain pasture. However, the difficult move will occur after the calves are shipped which makes it easier (incorporated into Alternatives F and G).

**Option 2** - Split Luke Mountain pasture three ways and design a system and numbers where no use occurs in the two pastures of concern (Incorporated into Alternative D).

The total estimated forage produced and the total forage needs of elk and cattle in Munds Pocket are out of balance over the entire area, with all pastures over 50 percent estimated use except one. Those that had spent time on-the-ground in Munds Pocket agreed that there are high tree densities and rocky soils that limit forage production. There is heavy elk use because of the adjacent elk winter range. The question was asked if heifers eat less forage than the 25 pound estimate. The answer was no as this is a large breed heifer. The following options were suggested.

**Munds Option 1** - Having a much shorter grazing season in Munds Pocket. This option was considered but dropped because there is no other pasture in the allotment to take these animals.

**Munds Option 2** - Put the Bull herd (100 head) on Munds Pocket area and keep the heifers in the Winter Division yearlong. Considered but dropped because Sedona could not support a full heifer herd and also the difficulties associated with gathering and moving bulls.

**Munds Option 3** - Change number of heifers in Munds Pocket from 250 to approximately 125 and keep same grazing season (Incorporated into Alternative G).

**Munds Option 4** - Combine heifers with Foxboro herd. Considered but dropped because the permittee can't use Munds Pocket and Foxboro areas together, because there is no way to cross Munds Canyon or the Freeway. Also, Foxboro summer range does not have ability to support more cattle or longer grazing periods according to spreadsheet estimates and on-the-ground estimates.

**Munds Option 5** - Combine Munds Pocket herd with Mill Park herd. Considered but dropped because other areas on the Allotment are in balance now, but cannot handle additional numbers or grazing time.

## Discussion of the Options

There was support from the group to add a 20-day cattle grazing period in Southwest willow flycatcher habitat to add flexibility to the summer range. We recognized the need for more discussions with the U.S. Fish and Wildlife Service (USFWS) in this process. Also, the group identified the need to consider grazing options which result in a minimum impact determination for flycatcher from the USFWS based on requirements of the Threatened and Endangered Species Act (added to Alternative F).

The group supported doing more intense production surveys in Foxboro winter and Munds Pocket summer ranges.

Next we discussed the Foxboro summer and Munds Pocket ranges. Those with concern for pastures in these areas explained their concerns. There was disagreement among the group about the extent of problems in these areas. Some members did not agree that there was a major imbalance between use and forage availability under Alternative A.

The group explained the estimates displayed on the spreadsheet and how this information was used to do a preliminary identification of areas of concern which mostly occurred in Foxboro summer and Munds Pocket. There was disagreement on the estimates in the spreadsheet. The point was brought up that more intensive production surveys would be better data to support or deny concerns about levels of production. The permittee and ranch manager supported the concept of doing these surveys in Munds Pocket area and adjusting cattle numbers according to the interpretation of the results as opposed to any alternatives which adjusted permit numbers based on the spreadsheet estimates.

The group recognized that no matter what data we have, there will be disagreement to some extent on what it means. The spreadsheet information, even though it is rough and only estimates, is the best information we have on hand to answer questions of production and utilization when a current production utilization study is unavailable.

The question was raised about whether or not an overall estimated utilization level of 50 percent is too high and asked that an alternative designed for less estimated utilization be developed. This would allow us to compare lower use scenarios with the current levels and 50 percent levels. Less utilization overall may be better for those areas in static or downward trends to allow for faster recovery.

One point was made that most of our discussions to date have revolved around managing time as opposed to managing utilization. We have addressed concerns for areas by lessening the size of pastures and decreasing the numbers of days each pasture is grazed, as opposed to determining the proper level of utilization and adjusting numbers of cattle or days to that desired use level. Some felt that utilization levels, not grazing time management, should be emphasized.

## Developing Alternatives From the Options

### Developing Alternatives A, B, C, D, E and F

The group discussed the need to create an alternative that had minimum impact to SWWF. They decided to create this alternative and named it Alternative E (later dropped, see discussion in following section).

The Foxboro options were discussed to see if they really did warrant an alternative, or if the adjusted Alternative A addressed the areas of concern. They decided that options which split Luke and reduced the numbers of days cattle graze the rest of the Foxboro summer area addressed pastures of concern better than Alternative A. The 3-way split in Luke was named Alternative F. It is similar to A except for the Foxboro 3-way split.

To respond to concerns that 50 percent use levels are too high for areas with static to downward range health and to provide a comparison between different use levels, the spreadsheet was used as a tool to create an alternative where 35 percent of the estimated forage produced is used. This caused some pastures to drop out because estimated elk use was at 35 percent already and it caused the number of cattle to be reduced about in half. All pasture splits remained the same because the group kept the goals of 20-day graze periods in fast forage growth and yearlong pasture rest where possible.

Another option to recommend changes in elk management to help decrease total use in the Munds Pocket and Foxboro summer range was discussed. We recognized that elk numbers are likely to continue at existing levels. The result was to drop from consideration an alternative which reduces elk numbers, partly because it is not within Forest Service authority to reduce elk numbers and partly because elk will continue to heavily use meadow and riparian areas even with lower elk herd numbers.

However, the group did recommend encouraging hunters use in areas where heavy elk use is contributing to capacity concerns in the Munds Pocket and Foxboro summer range. The Munds area is easily defined by I-17 and surrounding canyons. A late hunt in the Jacks Point of Foxboro may also be a possibility.

### Developing Alternative G

Some of the group members felt that the issue of grazing capacity in the Munds Pocket and Foxboro ranges was not fully addressed in other alternatives. Alternative G was developed to address this issue. Alternative G used the spreadsheet as a tool to see what the cattle numbers and rotations would look like under 50 percent estimated total use. Next, specialists took the spreadsheet numbers and used their professional judgement to adjust these estimates to the following numbers.

In the Munds Pocket summer range, there would be a range of 125 to 150 animals adjusted according to that year's moisture and plant response to moisture. Since this is a heifer herd, adjusting the numbers within this range is feasible for the operation. The number estimate is based on poor vegetative conditions, existing elk numbers and high timber basal areas.

In the Foxboro range, there would be 200 head of cattle with the 3-way split and subsequent increased use in the Luke Mountain pasture. Keep all pastures within the rotation and reduce days per pasture across the area as much as possible except for Luke Mountain pasture.

### Dropping Alternative E and Re-Analyzing Alternative F Related to Flycatcher

Over a few weeks time, discussions were undertaken with USF&WS regarding the Southwestern willow flycatcher that resulted in dropping Alternative E, adding items to each of the action alternatives, and incorporating a winter watershed improvement option into Alternative F.

Some assumption/conclusions relative to the Southwestern willow flycatcher are:

1. Protection and/or improvement of site specific areas, such as existing suitable and potential habitat. Suitable and potential sites lie in

riparian vegetation of creeks, streams and rivers. Actions should not preclude the progress of potential habitat to suitable habitat classification either directly (grazing riparian) or indirectly (watershed).

2. Cowbirds parasitize flycatchers by laying their own eggs in the flycatcher nests. The most important step that can be taken to ensure reproductive success of existing SWWF is trapping the cowbirds. Trapping of cowbirds is cheaper than reintroduction of flycatchers. Protection of habitat and development of long-term strategies will be ineffective if there are no flycatchers to populate those sites. Cowbird trapping is recognized as triage but because of the declining nature of this SWWF population, it is critical that the effect of facilitated parasitism is mitigated. Habitat and population centers for SWWF in Arizona are scattered and highly fragmented making population dispersal and colonization of new sites difficult.
3. Overall watershed maintenance and improvement is most important for long-term SWWF viability. Grazing should take place in a way to protect and enhance watershed values (soils and vegetation) and riparian condition. If watershed conditions are poor and/or declining, then the long-term prognosis for flycatcher habitat, riparian and proposed critical habitat is poor.
4. Another way to affect potential flycatcher parasitism is by varying the timing, the number of days, and the number of cattle within the foraging radius. However, the overall effect will probably be incremental compared to the previous three items. Female cowbirds can lay 40 eggs per season. It does not take many cowbirds to have a significant effect on 1-2 flycatcher nests. Cattle concentrations attract cowbirds and it may not take too many cows around salt, a tank or a corral to attract cowbirds. Therefore, there is basically no difference, from a parasitism standpoint, between 100 cows or 600 cows. The difference between these numbers lies in their effect on the watershed.

Alternatives A, D, F and G all improve suitable habitat by excluding cattle from all suitable or potential habitat. Removing cattle impacts is the most allotment management can be expected to do. Planting or structural improvements to further enhance these areas was discussed, but no locations were identified for such actions.

Alternative A uses a 5-mile radius and Alternatives C, D and G all avoid a 5-mile radius around occupied flycatcher nest areas during the cowbird/flycatcher breeding season. Alternative F will allow grazing within this radius 2 years out of 6 years to incorporate yearlong rest into all the desert pastures.

Watershed conditions in the winter range have been on an upward trend with a combination of poor, fair and good range conditions present. The Foxboro winter range is on the low end of reaching potential and the rest of the winter range is about 1/2 to 2/3 of the way to potential. Avoiding the 5-mile radius has caused less flexibility than could be obtained if the 5-mile radius did not have timing restrictions placed on it. Alternative F grazes cattle within the 5-mile radius during the breeding season to incorporate rest into all pastures.

Cowbird trapping is critical to short-term recovery of the species and will likely occur regardless of which alternative is chosen.

Monitoring suitable habitat to see if it becomes occupied is also necessary to be proactive for flycatcher recovery. This monitoring will also likely occur regardless of which alternative is chosen.

## Summary of Options Considered But Dropped

The following options were dropped from further consideration in the EIS. Alternative E was dropped because the SWWF issues could be incorporated effectively in Alternative F. Munds Options 1, 2, 4 and 5 were dropped because the options were not feasible or incorporated into other alternatives. Reducing elk numbers below the target populations set in the Arizona Comprehensive Plan was dropped because this is not the device to set new elk population numbers. Incorporating the adjacent vacant Horse Mesa Allotment into the Windmill Allotment was dropped because this area is currently closed to livestock grazing.

## Alternative Descriptions

### Items Common to All Alternatives

The alternatives described here are the six final alternatives considered for implementation for the Windmill Allotment over the next 10 years. They are

described in terms of the four main herds which are the Mill Park commercial herd, Munds Pocket herd, Foxboro herd and bull herd. Each herd except for the bull herd, uses a combination of winter and summer range areas. The Mill Park commercial herd uses areas west of 89A from Rodgers Lake to the Mogollon Rim in the summer and uses areas below the Rim to the Verde River in winter. The Munds Pocket herd uses an area from the Munds Park area north along I-17 to James Canyon in the summer and an area west of 89A, southwest of Sedona. The Foxboro herd uses an area south of Munds Park to the Woods Canyon area in the summer and an area southeast of Sedona and east of Oak Creek in the winter.

**Priorities for Implementation:** Alternatives A, D, F and G require splitting pastures with fences to add to the total number of pastures and, therefore, increase flexibility of the grazing system. These alternatives are described as they would look after the fences are in place. The priorities and time-frames for building these fences is described in the Improvement List found later in this chapter. Under Alternatives A, D, F and G there will be an interim time period to change from the existing system to the new system. Highest priority items will be done in the first 5 years. Priorities for fence construction are based on T&E protection, meadow and riparian improvement, and providing the greatest increases in management flexibility.

**Management Items:** Described here are some of the management items common to Alternatives A, C, D, F and G (cattle grazing alternatives). All culls are shipped near the time of culling or placed into existing herds. The Mooney Trail and Jacks Canyon are swept after every drive to pick up stragglers and move them. Grazing rotations are adjusted annually to progress toward resource improvement goals. Urban areas around the City of Sedona and Village of Oak Creek are currently fenced from cattle. Some large and small pieces of private property will have cattle in them unless they are fenced by the private land owner (Arizona Open Range Law). Cattle will not use Sycamore Creek or the Verde River.

**Annual Operating Plans:** Annual operating plans make adjustments to cattle numbers, and time and duration of pasture use based on current climatic and range conditions. Making these plans each year and adjusting throughout the season as conditions change adds needed flexibility to the action alternatives.

**Non-Use Pastures:** The following areas/pastures will not be used by Windmill Allotment cattle for the next 10 years in all action alternatives: Sycamore Canyon, Casner Mountain, Black Mountain, Secret Mountain,

Munds Mountain, Black Springs, Turkey Basin, Oak Creek proper, Verde River proper, Spring Creek, Section 1 pasture, Section 36 pasture, Bell pasture, Sheepshead Spring and Purshia pasture. Wilderness areas will only be used as travel routes to and from summer and winter range.

**Riparian Spring Fencing:** Common to Alternatives A, D, F and G are fencing to exclude cattle and in some cases elk from riparian springs. These locations are described in alternative descriptions. The areas chosen for fencing are easily accessed by cattle, are fairly large and have adjacent wet meadows, and are estimated to have high potential for improvement. Not all riparian springs located on the allotment are fenced. Those not chosen for fencing are less accessible to cattle, are not associated with wet meadows, and are very small. Riparian fencing will be the responsibility of the Forest Service. These projects are good candidates for cooperative implementation offers of volunteer labor or partnerships made to the Forest Service. These riparian projects will be done under the no-grazing alternative.

**Meadow Enhancement:** Common to Alternatives A, D, F and G (action alternatives) are meadow enhancement actions such as fencing, removing or re-locating tanks within meadows and re-locating or obliterating roads. These are described in each alternative.

**Road Closure:** Common to all alternatives is the desired condition of closing roads in the Fain Mountain area and the road past Last Chance Tank. The Fain Mountain desired condition of no roads is to protect wildlife habitat. The Last Chance Tank road closure would restrict vehicular traffic into the Purshia pasture. All road closure or obliteration work is done by the Forest Service.

**Roads and Cattle Guards:** Common to Alternatives A, D, F and G (action alternatives) is the need to keep forest users from leaving gates open. Where roads are maintained as open, cattle guards will be put in place. Where roads are identified for closure, no cattle guard is necessary.

**Cattle Guard Maintenance:** Common to Alternatives A, C, D, F and G (action alternatives), level 3 and 4 roads (paved or surfaced main forest roads) cattle guard maintenance is the responsibility of the Forest Service and the permittee. Level 2 (secondary smaller roads) is the responsibility of the permittee.

**Implementation of Structural Improvements:** Common to Alternatives A, D, F and G (action alternatives) is the need for resource coordination when implementing the grazing system. Structural im-

provements such as fencing, pipelines, stock tanks and cattleguards will be used to implement the grazing plan. During the life of the permit, there may be additional or fewer improvements needed based on adapting to changes and meeting the goals of the new system. The following parameters need to be followed when implementing structural improvements.

**Cultural Resources Coordination:** A programmatic cultural report has been completed and approved by the State Historic Preservation Office (SHPO). Using the parameters described in the programmatic report, conduct survey and obtain clearance prior to any ground disturbing activities related to structural and non-structural improvements.

**New Tank Construction:** New tanks will be located within stands of trees and not in grassy openings to limit impacts to ground cover and visual quality. New tanks will be located outside of Mexican spotted owl core or protected activity center (PAC) areas to limit additional congregating of cattle in these sensitive areas. Prior to construction, conduct surveys and avoid any threatened, endangered or sensitive plant species.

**Pipeline Construction:** The final on-the-ground location of pipelines should take wildlife, watershed and cultural resource needs into account as well as serve the desired cattle distribution objectives. Conduct surveys and avoid any threatened, endangered or sensitive plant species prior to construction.

**Threatened, Endangered and Sensitive Species Coordination:** Additional very site specific biological assessments and evaluations will need to be written for chosen actions. Refer to and follow any mitigation measures or implementation parameters described in the biological assessments and evaluations written for this EIS. Location of improvements may be altered somewhat in response to species considerations. Involve a wildlife biologist prior to final planning of any new improvement.

**Recreation and Special Use Guidelines:** Timing of the construction of new range structures must be coordinated with the

recreation specialists and special use permit holders.

**Pipeline Use:** At his own discretion, the permittee may continue to provide water sources for antelope by leaving some pipelines open even when cattle are not present.

**Fencing:** All new fencing, whether to split a pasture, protect a riparian area or to meet other objectives, will contain a smooth bottom wire and appropriate bottom wire height for wildlife. Conduct cultural resources and threatened, endangered and sensitive species coordination as described above. Where possible, locate fences within treelines to limit impact to visual quality. Elk jumps may be constructed along new fences and along existing fences as appropriate.

**Monitoring:** Common to Alternatives A, C, D, F and G are monitoring items chosen by the group to answer questions and check progress of improvement. Monitoring projects are listed with each alternative. The following is a list of the main items that will be monitored in the action alternatives: *Purshia subintegra* populations, SWWF habitat for occupation, elk-livestock utilization, pine-oak habitat forage, selected riparian areas and general vegetation response to selected management system.

## Alternative A (Proposed Action)

Alternative A is designed to meet all the original grazing management goals while maintaining a viable ranching operation. This alternative uses permittee and range conservationist knowledge to determine proper cattle numbers, grazing periods, graze rotations, and pasture splits. Maximum total cattle numbers are 1,252 to 1,257. To meet objectives, approximately \$216,150 will be spent on structural improvements, roughly half for materials and half for labor. Structural improvements are listed by cost and priority in Table 1.

Graze the Mill Park Herd of 675 animals in a 27-pasture rest deferred-rest rotation system that uses each pasture for 2 to 40 days, less than or equal to 20 days during fast forage growth. Mill and Fry Park grazing periods are less than or equal to 10 days. Yearlong rest is incorporated in each pasture in a 2-

Table 1. Structural Improvements of Alternative A with Costs and Who Pays for the Project (FS=Forest Service, P=permittee). Overall allotment priorities are also listed.

Item	Cost And Who Pays	Overall Priority
<b>Peaks District</b>		
West Barney/Rattlesnake		
2.25 Miles Fence	E-4,275, B-11,250 FS/P	2
1 Cattle Guard (CG)	1,200 FS/P	2
8 Waterlots	16,000 FS/P	2
East Barney		
3 Waterlots	6,000 FS/P	2
Fry Park		
1.5 Miles Fence	E-2,400, B-6,700 FS/P	2
2 Cattle Guards	2,700 FS/P	2
Mill Park		
3 Miles Fence	E-4,800, B-13,500 FS/P	5
3 Cattle Guards	4,200 FS/P	5
Rodgers Lake		
.25 Mile Fence	2,250 FS/P	9
Harding (tank)	1,500 FS/P	17
<b>Mormon Lake District</b>		
Luke Mountain		
4.75 Miles Fence	E-8,800, B-26,000 FS/P	3
1 Cattle Guard	1,200 FS/P	3
10 CG'S/ 2 Road Closures	14,400 FS/P	3
Jacks Point/HA		
1.25 Miles Fence	B-6,800 FS/P	6
4 Cattle Guards	4,800 FS/P	6
1 Tank	1,500 FS/P	17
Mud Lake		
3.5 Miles Fence	E-6,500, B-19,250 FS/P	8
4 Cattle Guards	4,800 FS/P	8
2 Tanks	3,000 FS/P	8
T-Six, Goofy, Little T-Six		
1.75 Miles Fence	E-3,200, B-9,600 FS/P	10
9 Cattle Guards	10,800	14
Crazy Park		
3 Miles Fence	E-5,600, B-16,500 FS/P	13
2 Cattle Guards	2,400 FS/P	13

to 5-year rotation, except for Duff Flat, Duff Mesa, Gyberg and Skeleton Bone pastures. No livestock grazing is scheduled within the flycatcher 5-mile nest radius from April 1 to July 31.

Graze the Munds Pocket Herd of 250 in a 18-pasture rest deferred-rest rotation system in the winter and a deferred-rest rotation system in the summer. Grazing periods range from 3 to 85 days, less than or equal to 20 days during fast forage growth. Ritter pasture is used for 20 days and Crazy Park pasture is used for 15 days. The 85-day grazing period in reality is 40-45 days because the pastures will be split using water instead of a fence. This can occur because cattle in this pasture are watered by a pipeline that can be turned on and off. Yearlong rest is incorporated in each winter pasture in a 4-year rotation. Yearlong rest is not scheduled for these summer pastures. However, in high forage production years pasture rest will occur because grazing periods will increase and eliminate the need to graze all pastures.

Graze the Foxboro herd of 250 animals in a 20-pasture rest deferred-rest rotation system that uses each pasture for 2 to 60 days, less than or equal to 20 days during fast forage growth. Jacks Point is used for 15 days, Highway Camp and Little T-Six are used for 20 days. Yearlong rest is incorporated in summer pastures of concern including Jack's Point, T-Six, Highway Camp, Goofy and Little T-Six in a 4-year rotation. Deferred-rest grazing is used in the remainder of this herd.

Graze the bull herd of 100 animals in a 6-pasture rest deferred-rest rotation system that uses each pasture for 30 to 75 days, less than or equal to 30



days during fast forage growth. The bull herd is with the cows from March 15 to June 1, the remainder of the time the bulls will be in this 6-pasture system. Yearlong rest is incorporated in each pasture in a 6-year rotation.

Riparian areas grazed by cattle in Alternative A below the Mogollon Rim are treated as follows:

- a. Oak Creek - Five miles of fence listed in the improvement section above along with maintenance of existing fences will result in no Windmill Allotment cattle grazing in Oak Creek, except for three small watering points.
- b. Dry Creek - Grazing periods during the forage growing season are reduced.
- c. Jacks Canyon - Grazing periods during the forage growing season are reduced.

Riparian grazed by cattle above the Mogollon Rim will receive reduced grazing periods by cattle and varied season of use until they are fenced and excluded from cattle grazing. All of the springs listed below will be excluded.

- a. T-Six Spring - Elk enclosure.
- b. Willard Spring - Elk enclosure.
- c. Fain Spring - enclosure.
- d. Portion of Rogers Lake - Cattle enclosure only.

In all the dry meadows listed below, progress toward improved soil conditions by reducing grazing periods, splitting pastures to reduce grazing time, obliterating or re-routing roads, and/or building waterlots around tanks. Specifically:

Table 1. Structural Improvements of Alternative A with Costs and Who Pays for the Project (FS=Forest Service, P=permittee). Overall allotment priorities are also listed (continued).

Item	Cost And Who Pays	Overall Priority
<b>Bedona District</b>		
<b>Gyberg</b>		
2.25 Miles Fence	B-11,250	FS 1
1 Road Closure, 3 Gates	2,000	FS 1
Pipeline 0.5 Mile	1,850	FS/P 18
<b>White Flat</b>		
2 Miles Fence	B-10,000	FS/P 4
1 Cattle Guard	5,000	FS/P 4
1 Mile Pipeline	3,700	FS/P 4
3 Drinkers	1,500	FS/P 4
<b>Black Tank</b>		
2 Waterlots/or Fence	5,000	FS/P 4
<b>Cornville</b>		
1.25 Miles Fence	E-2,000, B-5,600	FS/P 7
2 Cattle Guards	2,400	FS/P 7
<b>Holly Springs Fence</b>		
1.25 Miles Fence	B-5,625	P 7
<b>Page Springs</b>		
3 Miles Fence	B-15,000	FS/P 11
2 Cattle Guards	7,000	FS/P 11
<b>Duff Flat</b>		
2 Miles Pipeline	7,400	FS/P 12
3 Drinkers	1,500	FS/P 12
<b>Greasy East</b>		
2 Miles Pipeline	7,400	FS/P 19
2 Drinkers	1,000	FS/P 19
<b>Malapais</b>		
2 Miles Pipeline	7,400	FS/P 20
2 Drinkers	1,000	FS/P 20

NOTE: E=electric fence, or B=barbed wire fence.

FS/P = Approximate 50/50 split.

Underlined electric fence = electric fence is preferred because of antelope concerns.

- a. Mill Park - Ask permittee/State Land Department to fence water.
- b. Fry Park - Ask permittee/State Land Department to fence water and wetland.
- c. Casner Draw - Waterlot the tank or fence meadow.
- d. Yellow Flat - No tank fencing.
- e. Rogers Lake - Exclude small tip of lake basin.
- f. Crazy Park - Fill in/obliterate tank.
- g. Frog Park - No tank fencing needed.
- h. Bobs Park - No tank fencing needed.
- i. Potato Patch - No tank fencing needed.
- j. Lee Butte Meadow - No tank fencing needed.

Riparian and meadow improvements listed by cost and priority for this alternative are shown in Table 2.

Monitoring items including costs, who will monitor, and when it will be monitored in this alternative are shown in Table 3.

Surveys for cultural, threatened, endangered and sensitive species will be done prior to any ground disturbing activity related to any of the improvements on the allotment. We estimate approximately 10 days for cultural work and 10 days of biological work per year at a cost of \$2,000 to \$4,000 per year.

### Alternative B

Alternative B eliminates scheduled livestock grazing on the Forest Service portion of the Windmill Allotment for 10 years. Grazing on Arizona State Trust lands within the boundary of the allotment would still be permitted. This is the No Action Alternative required under the National Environmental Policy Act. This alternative also addresses the issues of grazing cattle on degraded areas and resting rangelands in poor and fair conditions. Management intensity is at Level A, meaning cattle grazing is eliminated (USDA Forest Service 1987, p. 254). This alternative does not preclude cattle grazing on the Allotment in the future if a decision is made through another comprehensive analysis to resume grazing. To meet objectives no money will be spent on structural improvements. No maintenance of existing range improvements will be done.

**Table 2. Riparian and Meadow Improvements Listed by Cost and Priority for Alternative A. (FS=Forest Service, P=Permittee)**

Item	Cost	Who Pays	Allotment Priority
Coffee Creek Enclosure Fence	3,000	FS	1
Willard Spring Enclosure Pipe Fence	10,000	FS	2
Road Closure/Oblit.	800	FS	2
Pipeline/Drinker	2,000	FS	2
T-6 Spring Enclosure Pipe Fence	10,000	FS	3
Fain Spring Enclosure Pipe Fence	10,000	FS	4
Crazy Park Tank Tank Removal	2,500	FS	5
Casner Draw Meadow Fence Meadow	6,000	FS	6
Waterlot (State)	6,000	P	6
Mill Park Tank (State Land) Waterlot	6,000	P	7
Fry Lake Waterlot	12,000	FS	8

### Alternative B Riparian Improvements above the Rim:

- a. T-Six Spring - Elk enclosure.
- b. Willard Spring - Elk enclosure.
- c. Fain Spring - Elk enclosure.

**Alternative B Meadow Improvements:** In all the dry meadows listed below, progress toward improved soil conditions by obliterating or re-routing roads and/or building waterlots around tanks which limit elk use.

- a. Mill Park - Ask State Land Department to fence water.
- b. Fry Park - Ask State Land Department to fence water and wetland.
- c. Casner Draw - Waterlot the tank or fence meadow.
- d. Yellow Flat - No tank fencing.

**Table 3. Alternative A Monitoring Items Including Costs, Who Will Monitor and When it Will be Monitored (FS=Forest Service, AG&FD=Arizona Game and Fish Department).**

Monitoring Item	Cost	Who	When
Monitoring <i>Purshia subintegra</i> .	\$125/Yr.	FS	Ongoing Thru Yr. 10
Monitor suitable Southwestern willow flycatcher habitat to see if it becomes occupied.	\$2,160/Yr.	FS	Yrs. 1-10
Trap cowbirds in sites known to be occupied by Southwestern willow flycatcher.	\$7,000/Yr.	FS*	Yrs. 1-10
Continue on-going elk cattle monitoring effort.	\$500/Yr.	FS,AG&FD	Yrs. 1-10
Monitor pine/oak habitat, cages with photo points; four cages.	\$160/Yr.	FS	Yrs. 1-10
Monitor riparian sites for elk cattle utilization: Rogers Lake - cattle & elk; T-Six Spring - cattle & elk; Willard Spring - cattle & elk; Fain Spring - cattle & elk.	\$160/Yr.	FS	Yrs. 1-10
Continue visual inspections by range staff for vegetative response information.	ADMIN \$	FS	Yrs. 1-10

\* Note the cowbird trapping and flycatcher monitoring is part of a collaborative effort with other agencies and organizations.

- e. Rogers Lake - Exclude small tip of lake basin.
- f. Crazy Park - Fill in/obliterate tank.
- g. Frog Park - No tank fencing needed.
- h. Bobs Park - No tank fencing needed.
- i. Potato Patch - No tank fencing needed.
- j. Lee Butte Meadow - No tank fencing needed.

Riparian and meadow improvements listed by cost and priority for this alternative are shown in Table 4.

Monitoring items likely to occur under Alternative B are shown in Table 5. The monitoring may be less intensive than under the action alternatives and the costs are somewhat less than the grazing alternatives.

### Alternative C

Alternative C is the management system currently in

place. This alternative permits a maximum total of 1,252 to 1,257 cattle (up to 20 horses can be included in this total) to graze year-round on the Windmill Allotment. Cattle graze the Mill Park and Munds Pocket/Foxboro Divisions during summer and the Winter Division during winter. Structural improvements still to be completed under the current Allotment Management Plans (AMPs) include fencing Gyberg pasture before this area can be used by cattle.

Maintain existing barbed wire and electric fences, Cattle guards, stock tanks, pipelines and holding areas. Repair the fence in the Oak Creek riparian pasture.

During summer, cattle graze in the Munds Pocket/Foxboro Division of the Mormon Lake Ranger District and the Mill Park Division of the Peaks Ranger District as described below. The dates below are approximate and may be adjusted somewhat each season depending on range conditions.

Graze the Mill Park commercial herd of 675 animals on the Mill Park Division in a 7-pasture deferred-rest rotation system that uses each pasture for 20 to 40 days between June 1 and October 31.

Graze the Foxboro herd of 250 animals on the Munds Pocket/Foxboro Division in a 7-pasture deferred rotation system that uses each pasture for 30 to 45 days between May 1 and November 30.

Graze the Munds Pocket herd of 250 animals on the Munds Pocket/Foxboro Division in a 5-pasture deferred-rest rotation system that uses each pasture for 30 to 60 days between June 1 and October 31.

During winter, graze cattle on the Winter Division of the Sedona District as described below:

Graze the Mill Park commercial herd of 675 animals in a 14-pasture deferred-rest rotation system that uses each pasture for 20 to 60 days between November 1 and May 31.

**Table 4. Riparian and Meadow Improvements Listed by Cost and Priority for Alternative B (FS=Forest Service, P=Permittee).**

Item	Cost	Who Pays	Allotment Priority
Coffee Creek Exclosure Fence	3,000	FS	1
Willard Spring Exclosure Pipe Fence	10,000	FS	2
Road Closure/Oblit.	800	FS	2
Pipeline/Drinker	2,000	FS	2
T-6 Spring Exclosure Pipe Fence	10,000	FS	3
Fain Spring Exclosure Pipe Fence	10,000	FS	4
Crazy Park Tank Tank Removal	2,500	FS	5
Casner Draw Meadow Fence Meadow	6,000	FS	6
Waterlot (State)	6,000		6
Mill Park Tank (State Land) Waterlot	6,000	P	7
Fry Lake Waterlot	12,000	FS	8

Graze the Foxboro herd of 250 animals in the Foxboro range in a 7-pasture deferred-rest rotation system that uses each pasture for 20 to 60 days between December 1 and April 30.

Graze the Munds Pocket herd of 250 animals on the DK and Malapais Units and on state lands in a 5-pasture deferred-rest rotation system that uses each pasture for 20 to 60 days between November 1 and May 31.

Graze a bull herd of 100 animals for about 75 days on each of the two Cornville Pastures between October 15 and March 15.

Adjust rotations to ensure that spring deferment occurs as much as possible on this winter range.

Fence *Purshla subintegra* from the Gyberg pasture.

During both summer and winter, follow the management practices described below:

Do not graze the Gyberg and Duff Flat Pastures from April 1 to July 31 to avoid indirectly affecting the Southwestern willow flycatcher (*Empidonax traillii extimus*) during its breeding season.

**Table 5. Alternative B Monitoring Items Including Costs, Who Will Monitor and When it Will be Monitored (FS=Forest Service, AG&FD=Arizona Game and Fish Department) .**

Monitoring Item	Cost	Who	When
Monitoring <i>Purshla subintegra</i> .	\$125/Yr.	FS	Ongoing Thru Yr. 10
Monitor suitable Southwestern willow flycatcher habitat to see if it becomes occupied.	\$2,160/Yr.	FS	Yrs. 1-10
Continue on-going elk monitoring effort.	\$400/Yr.	FS, AG&FD	Yrs. 1-10
Monitor pine/oak habitat, cages with photo points; four cages.	\$160/Yr.	FS	Yrs. 1-10
Monitor riparian sites for elk utilization: Rogers Lake - Elk; T-Six Spring - Elk; Willard Spring - Elk; Fain Spring - Elk.	\$160/Yr.	FS	Yrs. 1-10
Continue visual inspections by Forest Service for vegetative response information.	ADMIN \$	FS	Yrs. 1-10

\* Note the cowbird trapping and flycatcher monitoring is part of a collaborative effort with other agencies and organizations.

Structural improvements listed by cost and priority are shown in Table 6.

Table 6. Structural Improvements Listed by Cost and Priority for Alternative C. This list only includes the structural improvements that are in addition to Alternative A's list (Table 1) (FS=Forest Service, P=Permittee).

Item	Cost and Who Pays	Overall Priority
<b>Alternative C</b>		
Cyberg		
2.25 Miles of Fence	B-12,400 FS	1
1 Road Closure, 3 Gates	2,000 FS	1

B = Barbed wire FS/P = Approximate 50/50 split.

### Alternative D

Alternative D is designed to respond to grazing capacity, resting rangelands in poor and fair condition, and proper use guideline issues. This alternative uses timber stand data base and TES data to project total yearly forage production for each pasture. A 35 percent use factor is then subtracted from the forage production total to give an allowable forage value for each pasture that could be used by elk and cattle. Elk utilization estimates were then subtracted from this remaining forage. Finally, cattle numbers and grazing periods are taken from the remaining allowable forage. Maximum total cattle numbers are 635. To meet objectives, approximately \$248,425 will be spent on structural improvements, roughly half for materials and half for labor.

Graze the Mill Park herd of 375 animals in a 29-pasture rest deferred-rest rotation system that uses each pasture for 2 to 35 days, less than or equal to 20 days during fast forage growth. Mill and Fry Park grazing periods are less than or equal to 10 days. Yearlong rest is incorporated in each pasture in a 2- to 5-year rotation, except for Duff Flat, Duff Mesa, Gyberg and Skeleton Bone pastures. No grazing is scheduled within the flycatcher 5-mile nest radius from April 1 to July 31. However, to increase flexibility in this grazing system, Duff Mesa and Gyberg pastures (which are within the 5-mile radius) may be used up to 20 days in April.

Graze the Munds Pocket herd of 50 animals in a 17-pasture rest deferred-rest rotation system throughout the year. Grazing periods range from 2 to 85 days,

less than or equal to 20 days during fast forage growth. Ritter pasture is removed from the grazing rotation and Crazy Park pasture is used up to 15 days. The 85-day grazing period in reality is 40-45 days because the pastures will be split using water instead of a fence. Yearlong rest is incorporated in each pasture in a 4- to 6-year rotation.

Graze the Foxboro herd of 150 animals in a 21-pasture rest deferred-rest rotation system that uses each pasture for two to 60 days, less than or equal to 20 days during fast forage growth. Jacks Point is used for 20 days, Highway Camp and Little T-Six are taken out of the rotation. Yearlong rest is incorporated in summer pastures of concern including Jack's Point, T-Six and Goofy in a three year rotation. Deferred rest is used in the remainder of this division.

Graze the bull herd of 60 animals in a 6-pasture rest deferred-rest rotation system that uses each pasture for 30 to 75 days, less than or equal to 30 days during fast forage growth. The bull herd is with the cows from March 15 to June 1. The remainder of the time the bulls will be in this 6-pasture system. Yearlong rest is incorporated in each pasture in a 6-year rotation.

Structural improvements listed by cost and priority are shown in Table 7.

All the riparian, meadow and other improvements are the same as Alternative A. All monitoring items are the same as Alternative A.

Table 7. Structural Improvements Listed by Cost and Priority for Alternative D. This list only includes the structural improvements that are in addition to Alternative A's list (Table 1)(FS=Forest Service, P=Permittee).

Item	Cost and Who Pays	Overall Priority
<b>Alternative D</b>		
Wheatfield		
2.5 Miles Fence	E=4,750, B=11,250 FS/P	11
3 Cattle Guards	3,600	11
White Flat		
3.25 Miles Fence	B=16,250 FS/P	11
2 Gates	1,000	11
Luke Mountain		
2.25 Miles Fence	E=4,275 B=10,125 FS/P	3
2 Cattle Guards	2,400 FS/P	3

E = Electric, B = Barbed, FS/P = Approximate 50/50 split.

## Alternative F

Alternative F is designed to address the grazing capacity issues in the Foxboro summer range and watershed issues in Mill Park winter range. Alternative F adjusts Alternative A slightly by: 1) splitting Luke Mountain pasture a third time for the Foxboro Summer herd, and 2) maximizing watershed improvement by grazing within the 5-mile Southwestern willow flycatcher radius during the breeding season 2 of 6 years. Splitting the Luke Mountain pasture a third time within the Foxboro summer area reduces grazing periods in Little T-Six from 20 to 10 days and Highway Camp from 14-20 days to 10 days. Grazing within the 5-mile flycatcher radius during the breeding season maximizes flexibility with the grazing rotations. This is done by allowing for yearlong rest 1 year in 6 in Gyberg, Duff Flat, Duff Mesa and Skeleton Bone pastures and better grazing deferment in Mill Park and Munds Pocket herds winter pastures from year to year.

Maximum total cattle numbers in this alternative are 1,252 to 1,257. To meet objectives, approximately \$222,825 will be spent on structural improvements, roughly half for materials and half for labor.

Graze the Mill Park herd of 675 animals in a 27-pasture rest deferred-rest rotation system that uses each pasture for 2 to 40 days, less than or equal to 20 days during fast forage growth. Mill and Fry Park grazing periods are less than or equal to 10 days. Yearlong rest is incorporated in each pasture in a 2- to 6-year rotation. To maximize flexibility during the winter, grazing is scheduled within the flycatcher 4.2-mile nest radius from April 1 to July 31. However, cowbird trapping will occur at the occupied site to mitigate possible effects (trapping would occur regardless of grazing within the flycatcher radius). This flexibility allows for yearlong rest in Gyberg, Duff Flat, Skeleton Bone, and Duff Mesa pastures 1 in 6 years and increased variation in times that the pastures are grazed from year to year.

Graze the Munds Pocket herd of 250 in a 18-pasture rest deferred-rest rotation system in the winter and a deferred rest rotation system in the summer. Grazing periods range from 3 to 85 days, less than or equal to 20 days during fast forage growth. Ritter pasture is used for 20 days and Crazy Park pasture is used for 15 days. The 85-day grazing period in reality is 40-45 days because the pastures will be split using water (turning pipeline water on and off) instead of a fence. Yearlong rest is incorporated in each winter pasture in a 6-year rotation and has an improved deferred rotation schedule over Alternative A. Yearlong rest is not scheduled for the summer pastures but is ex-

pected in one pasture every other year. This additional rest is possible because of the additional flexibility in grazing within the 4.2 mile flycatcher radius during the breeding season.

Graze the Foxboro herd of 250 animals in a 21-pasture rest deferred-rest rotation system that uses each pasture for 2 to 60 days, less than or equal to 20 days during fast forage growth. Jacks Point is used for 15 days, Highway Camp and Little T-Six are used for 10 days. Yearlong rest is incorporated in summer pastures of concern including Jack's Point, T-Six, Highway Camp, Goofy and Little T-Six in a 4-year rotation. Deferred rest is used in the remainder of this herd area.

Graze the Bull herd of 100 animals in a 6-pasture rest deferred-rest rotation system that uses each pasture for 30 to 75 days, less than or equal to 30 days during fast forage growth. The bull herd is with the cows from March 15 to June 1, the remainder of the time the bulls will be in this 6-pasture system. Yearlong rest is incorporated in each pasture in a 6-year rotation.

Structural improvements listed by cost and priority are shown in Table 8.

Table 8. Structural Improvements Listed by Cost and Priority for Alternative F. This list only includes the structural improvements that are in addition to Alternative A's list (Table 1).

Item	Cost and Who Pays	Overall Priority
<b>Alternative F</b>		
Luke Mountain		
2.25 Miles Fence	E-4,275 B-10,125 FS/P	3
2 Cattle Guards	2,400 FS/P	3

E = Electric, B = Barbed wire, FS/P = Approximate 50/50 split.

All the riparian, meadow and other improvements are the same as Alternative A. All monitoring items are the same as Alternative A.

## Alternative G

Alternative G is designed to address resource concerns of grazing capacity and of poor and declining range conditions in parts of the Munds Pocket and Foxboro herd range. This alternative reduces cattle

numbers and adjusts grazing periods with additional pasture splits. Maximum total cattle numbers are 1,090 to 1,125. To meet objectives, \$256,300 will be spent on structural improvements, roughly half for materials and half for labor.

Graze the Mill Park herd of 675 animals in a 29-pasture rest deferred-rest rotation system that uses each pasture for 2 to 40 days, less than or equal to 20 days during fast forage growth. Mill and Fry Park grazing periods are less than or equal to 10 days. Yearlong rest is incorporated in each pasture in a 2- to 5-year rotation, except for Duff Flat, Duff Mesa, Gyberg and Skeleton Bone pastures. No grazing is scheduled within the flycatcher 5-mile nest radius from April 1 to July 31. However, to increase flexibility in this grazing system, Duff Mesa and Gyberg pastures (which are within the 5-mile radius) may be used up to 20 days in April.

Graze the Munds Pocket herd of 125-150 in a 18-pasture rest deferred-rest rotation system in the winter and a deferred rest rotation system in the summer. Grazing periods range from 3 to 85 days, less than or equal to 20 days during fast forage growth. Ritter pasture is used for 20 days and Crazy Park pasture is used for 15 days. The 85-day grazing period in reality is 40-45 days because the pastures will be split using water instead of a fence. Yearlong rest is incorporated in each winter pasture in a 4-year rotation. Yearlong rest in the summer pastures is scheduled only for Ritter pasture every other year. Yearlong rest is not scheduled for the remaining summer pastures, but is expected in 1 pasture in 4 years.

Graze the Foxboro herd of 200 animals in a 21-pasture rest deferred-rest rotation system that uses each pasture for 2 to 60 days, less than or equal to 20 days during fast forage growth. Jacks Point is used for 15 days, Highway Camp and Little T-Six are used for 10 days. Yearlong rest is incorporated in summer pastures of concern including Jack's Point, T-Six, Highway Camp, Goofy and Little T-Six in a 4-year rotation. Deferred rest is used in the remainder of this herd area.

Graze the Bull herd of 100 animals in a 7-pasture rest deferred-rest rotation system that uses each pasture for 30 to 75 days, less than or equal to 30 days during fast forage growth. The bull herd is with the cows from March 15 to June 1, the remainder of the time the bulls will be in this 7-pasture system. Yearlong rest is incorporated in each pasture in a 6-year rotation.

Structural improvements listed by cost and priority are shown in Table 9.

All the riparian, meadow and other improvements are the same as Alternative A. All monitoring items are the same as Alternative A.

Table 9. Structural Improvements Listed by Cost and Priority for Alternative G. This list only includes the structural improvements that are in addition to Alternative A's list (Table 1).

Item	Cost and Who Pays	Overall Priority
<b>Alternative G</b>		
<b>Wheatfield</b>		
2.5 Miles Fence	E=4,750, B=11,250	FS/P 11
3 Cattle Guards	3,600	11
<b>White Flat</b>		
3.25 Miles Fence	B=16,250	FS/P 11
2 Gates	1,000	11
<b>Sheepshead</b>		
1.75 Miles Fence	7,875	FS/P 11
<b>Luke Mountain</b>		
2.25 Miles Fence	E=4,275, B=10,125	FS/P 3
2 Cattle Guards	2,400	FS/P 3

E = Electric, B = Barbed wire, FS/P Approximate 50/50 split.

### Desirable Watershed Improvement Projects

In addition to cattle grazing management, other watershed improvements are desirable for this allotment area. Upward trends in overall watershed improvement is not dependent on these projects, however, these additional actions can supplement improvement. These projects can be attached to any of the alternatives. Further NEPA documentation and resource coordination will be necessary prior to their implementation. In addition, the Sedona/Oak Creek Ecosystem Management Project will identify a prescribed fire program for portions of the Windmill Allotment. The Sedona/Oak Creek Ecosystem Management Project will serve as a reference for prescribed fire projects related to watershed improvement. Below is the list of desirable watershed improvement projects identified during this analysis:

Burn Projects	Fuel Type	Acres
Wheatfield	P/J, mesquite, grassland	1,000
Black Tank	Catclaw, turbinella oak, P/J	800
Red Tank	Mesquite, grassland, P/J	700
Dutch Kid	Mesquite, grassland, P/J	700
Duff Flat	Mesquite, grassland	600
Upper Jacks C.	P/J, browse	800
House Mountain	P/J	2,000
D.K.	P/J, mesquite	300

Burn projects would be designed to improve watershed conditions by removing invading woody species and increasing grasses and forbs. We will use the guidance from the on-going Sedona/Oak Creek Ecosystem Management (EM) project. This EM project is scheduled for completion in the Fall of 1997.

Gully treatment would be designed to improve watershed conditions. Priority projects are in watersheds that have direct impacts on riparian vegetation and suitable/potential Southwestern willow flycatcher habitat (Spring Creek and Sheepshead Spring watersheds):

Gully Treatments	Pastures
Spring Creek Watershed	Malpals, Strip, Greasy West and Black Tank
Sheepshead Watershed	Dutch Kid, Gyberg
Gyberg Pasture	Gyberg

#### Creosotebush Treatment: Duff Flat Pasture

Creosotebush treatment would be designed to improve watershed conditions by reducing creosotebush and increasing grasses and forbs. The neighboring permit (Apache Maid Allotment) will be conducting treatments on creosotebush using a variety of methods. After these methods are completed and evaluated, we will determine which method will be used to remove a portion (approximately 1,000 acres) of the creosotebush in Duff Flat pasture.

#### Browse Burning for Wildlife: Munds Mountain, Lee Mountain, Sycamore Canyon and Casner Mountain

Browse burning may be conducted to improve winter wildlife habitat. Exact location and acreage has not

been determined. Maps and existing condition information created during this analysis process can serve as reference material for planning these improvements.

## Alternative Comparison

This section summarizes the differences between the alternatives related to goals, assumptions and critical issues. The first chart (Table 10) gives an alternative comparison for permitted cattle numbers (maximum), cost of structural improvements and other major alternative differences. Table 11 compares alternatives by the number of pastures, maximum grazing period days during non-fast plant growth, maximum graze period days during fast plant growth and the amount of yearlong rest. The next chart (Table 12) displays alternative differences by the effect on cool season grass species, forage conditions and trends in ponderosa pine (<80 basal areas) and in transition pine areas and mountain meadows. Table 13 compares expected vegetative trends, pastures of concern and utilization for all alternatives.

## Preferred Alternative

In this environmental impact statement, the agency's preferred alternative is Alternative F. This alternative will best meet our goals for the Windmill Allotment area.

Because Alternative F was described as including everything in Alternative A plus its unique attributes, the following is the complete alternative:

Alternative F permits cattle and/or horses to graze year-round. There are a maximum of 1,252 cattle permitted on Forest lands (155 of which is permitted on State land) on the winter range division near Cottonwood and Sedona. During the summer, there are a maximum 1,257 cattle permitted on Forest lands (160 of which are permitted on State land) on the summer divisions above the Mogollon Rim. To meet objectives, approximately \$222,825 will be spent on structural improvements, roughly half for materials and half for labor. Appropriate Forest Plan standards and guidelines will be included in part three of the grazing permit.

Alternative F is designed to address the grazing capacity issues in the Foxboro



Table 10. Alternative Comparison Including Permitted Cattle Numbers, Structural Improvement Costs and Other Major Differences.

Alternative	Permitted Cattle Number (Max.)	Structural Improvement Cost (Approximate)	Other Differences
A	1,252 - 1,257	\$216,150	Fifteen additional from current management with 20-day grazing periods during fast plant growth.
B	0	0	No cattle permitted.
C	1,252 - 1,257	\$14,400	Current management.
D	635	\$248,425	Same as Alternative A with additional divisions. See note 1 below.
F	1252 - 1257	\$222,825	Same as Alternative A, but with grazing within willow flycatcher radius 2 of 6 years. See note 2 below.
G	1,090 - 1,125	\$256,300	Same as Alternative D except additional Sheepshead Pasture.

(1) In Wheatfield, Luke Mountain, and White Flat Pastures. No grazing in Ritter Pasture.

(2) Additional pasture division in Luke Mountain Pasture. Gyberg, Duff Flat, Skeleton Bone and Duff Mesa Pastures will receive rest one in every 6 years, and will have better deferred rest from year to year.

Table 11. Alternative Comparison Including Number of Pastures, Maximum Days in Non-fast Plant Growth, Maximum Days in Fast Growth, and Year-long Rest.

Alternative	Number of Pastures	Maximum Days Non-Fast Growth	Maximum Days Fast Growth	Year-Long Rest
A	71	75 bulls - winter 60 - Foxboro - winter	20 - majority 30 - bulls - Foxboro - winter	See note 1 below.
B	0	0	0	Rest from cattle
C	56	90 - bulls - winter 90 - bulls - winter	90 - Munds winter 60 - Mill and Munds winter	2-3 pastures rested in winter division each year
D	73	Same as Alternative A	Same as Alternative A	Same as Alternative A but see note 2 below.
F	72	Same as Alternative A	Same as Alternative A	Same as Alternative A
G	75	Same as Alternative A	Same as Alternative A	Same as Alternative A but see note 3 below.

(1) Rest varies from year-long rest in foxboro winter to year-long rest every 4 years in Munds Pocket winter.

(2) Total rest in Ritter, Little T-Six and Highway Camp.

(3) Little T-Six, Highway Camp, and Jacks Point are rested every other year instead of every 4 years in Alternatives A, D, and F.

Table 12. Alternative Comparison for Cool Season Grasses, Meadows, and Forage Condition Trends.

Alternative	Cool Seasons	Expected Forage Conditions and Trends in Pine Type <80 Basal Area and In Transition Type	Meadows
A	Slightly lower response in cool seasons than in D, and much faster response than C.	Combination of very poor, poor and fair conditions with upward trends. Measurable change is expected in 10 years.	Poor conditions with moderate improvements noticeable in 10 years.
B	Fastest response of all the alternatives, cool season improvement is tempered by elk use.	Combination of very poor, poor and fair conditions with fastest upward trends. Measurable change is expected in 5 years.	Poor conditions with noticeable improvement in 10 years. Fastest of all alternatives
C	Slowest to static response.	Combination of very poor, poor and fair conditions with static trends. Measurable change is not expected in 10 years.	Poor conditions with static to downward trend.
D	Fastest response of all the grazing alternatives, slightly faster than A and somewhat slower than B.	Combination of very poor, poor and fair conditions with fastest upward trend of all grazing alternatives, slower than B. Measurable change is expected in 5-10 years.	Similar to A, slightly faster than A, F, and G. Slightly slower than B.
F	Slightly faster than A in the Foxboro division.	Same as A except slightly faster trend in Foxboro summer area.	Same as A.
G	Slightly faster than A in Foxboro and Munds Pocket divisions.	Same as A but slightly faster trend in Foxboro and Munds Pocket summer areas.	Similar to A, slightly faster than A and F. Slightly slower than B and D.

**Note:** Changes do not occur between alternatives for ponderosa pine greater than 80 basal area because of tree cover. These areas remain in poor range condition with static trends.

Effects on riparian areas excluded from cattle grazing will be similar to the effects of Alternative B (no cattle grazing).

summer range and watershed issues in Mill Park winter range. Alternative F adjusts Alternative A slightly by: 1) splitting Luke Mountain pasture a third time for the Foxboro Summer herd, and 2) maximizing watershed improvement by grazing within the 5-mile Southwestern willow flycatcher radius during the breeding season 2 of 6 years. Splitting the Luke Mountain pasture a third time within the Foxboro summer area reduces grazing periods in Little T-Six from 20 to 10 days and Highway Camp from 14-20 days to 10 days. Grazing within the 5-mile flycatcher radius during the breeding season maximizes flexibility with the grazing rotations. This is done by allowing

for yearlong rest 1 year in 6 in Gyberg, Duff Flat, Duff Mesa and Skeleton Bone pastures and better grazing deferment in Mill Park and Munds Pocket herds winter pastures from year to year.

### Grazing Schedule

(Note: The following grazing schedules are given as a guide for future use, however, these schedules may be adjusted to better meet the goals of this alternative because of monitoring, weather, etc. throughout the 10-year planned period. The Annual Operating Plan is the document that may adjust livestock numbers, change the season of use, and pasture rest periods to respond to this new information.)

Table 13. Alternative Comparison for Forage Condition and Trend and Number of Days in Pastures of Concern.

Alternative	Forage Conditions and Trends in Desert Grasslands	Number of Use Days in Pastures of Concern
A	Combination of poor, fair and good conditions with upward trends. Fourth fastest in moving toward improvement (slightly slower than F.)	Ritter 14-20, Highway Camp 14-20, Little T-Six 20-25, Jacks Point 11-15, Mill Park 6-10, Fry Park 6-10.
B	Combination of poor, fair and good conditions with upward trends. First fastest in moving toward improvement. There is a possibility of long-term (10-20 year) downward trends due to plant decadence in the desert community.	Cattle use does not occur. Elk use occurs at varying levels in these pastures.
C	Combination of poor, fair and good conditions with static to downward trends due to long grazing periods.	Ritter 30, Highway Camp 25, Little T-Six 30, Jacks Point 45, Mill Park 30, Fry Park 30.
D	Combination of poor, fair and good conditions. Second fastest in moving toward improvement.	Ritter 0, Highway Camp 1, Little T-Six 0, Jacks Point 20, Mill Park 10.
F	Slightly better than A and G due to better flexibility and rest as a result of occasional grazing of three pastures during the flycatcher breeding season.	Ritter 14-20, Highway Camp 10, Little T-Six 10, Jacks Point 14-15, Mill Park 6-10, Fry Park 6-10.
G	Similar to A.	Ritter 0, Highway Camp 1, Little T-Six 0, Jacks Point 15-15, Mill Park 10, Fry Park 10.

**Mill Park Herd Winter:** maximum numbers 675, 10/16 - 5/31. This herd uses 15 pastures in a 6-year rest/deferred rotation grazing system. Grazing periods range from 2 to 40 days, 20 days during a projected 2-month fast plant growth period normally from mid-March to mid-May. Yearlong rest is incorporated in each pasture in a 2- to 6-year rotation. To maximize flexibility during the winter, grazing is scheduled within the flycatcher 5-mile nest radius from April 1 to July 31, 2 out of 6 years. However, cowbird trapping will occur at the occupied site to mitigate possible effects (trapping would occur regardless of grazing within the flycatcher radius). This flexibility allows for yearlong rest in Gyberg, Duff Flat, Skeleton Bone, and Duff Mesa pastures 1 in 6 years and increased variation in times that the pastures are grazed from year to year.

Pasture	Year A		Year B	
	Date	Graze	Date	Graze
Black Tank W.	rested	-	10/16-11/24	40
Black Tank E.	10/16-11/24	40	rested	-
Sugarloaf	rested	-	11/25-2/1	7
Red Tank	11/25-12/1	7	rested	-
Gyberg	12/2-1/5	35	3/10-4/3	25
Duff Mesa	3/9-4/3	26	12/2-1/5	35
Duff Flat N.	2/19-3/8	20	1/6-25	20
Duff Flat S.	2/11-18	8	1/26-2/3	8
Skeleton Bone	1/6-2/10	35	2/4-3/9	35
Wheatfield	4/4-23	20	rested	-
White Flat	rested	-	4/7-5/6	35
Greasy West	4/24-5/26	33	helpers	-
Greasy East	helpers	-	5/7-23	17
Strip	-	-	4/4-6	3
Corrals/D.K.	5/27-29	3	5/24-26	3
Sugarloaf	-	-	-	-
Red Tank	-	-	-	-
Black Tank W.	-	-	5/30-31	2
Black Tank E.	5/30-31	2	-	-

Pasture	Year C		Year D	
	Date	Graze	Date	Graze
Black Tank W.	rested	-	10/16-11/24	40
Black Tank E.	10/16-11/24	40	rested	-
Sugarloaf	-	-	11/25-12/1	7
Red Tank	-	-	rested	-
Gyberg	rested	-	3/10-29	20
Duff Mesa	rested	20	12/2-1/5	35
Duff Flat N.	4/5-24	20	1/6-25	20
Duff Flat S.	3/28-4/4	8	1/26-2/3	8
Skeleton Bone	3/8-27	20	2/4-3/9	35
Wheatfield	4/25-5/14	20	helpers	-
White Flat	1/14-3/4	50	4/2-5/6	35
Greasy West	11/25-12/24	30	rested	-
Greasy East	12/25-1/13	20	5/7-23	17
Strip	3/5-7	3	3/30-4/1	3
Corrals/D.K.	5/22-24	3	5/24-26	3
Sugarloaf	5/15-21	7	-	-
Red Tank	5/25-29	5	5/27-29	3
Black Tank W.	-	-	5/30-31	2
Black Tank E.	5/30-31	2	-	-

Pasture	Year E		Year F	
	Date	Graze	Date	Graze
Black Tank W.	rested	-	10/16-11/24	40
Black Tank E.	10/16-11/24	40	rested	-
Sugarloaf	rested	-	11/25-12/1	7
Red Tank	11/25-12/1	7	rested	-
Gyberg	12/2-1/5	35	2/18-3/24	35
Duff Mesa	3/9-31	23	12/2-29	28
Duff Flat N.	2/19-3/8	20	rested	-
Duff Flat S.	2/11-18	8	rested	-
Skeleton Bone	1/6-2/10	35	rested	-
Wheatfield	4/1-20	20	12/30-2/17	48
White Flat	helpers	-	3/28-4/26	30
Greasy West	4/21-5/23	33	5/9-26	18
Greasy East	rested	17	4/27-5/8	12
Strip	-	-	3/25-27	3
Corrals/D.K.	5/24-26	3	5/27-29	3
Sugarloaf	5/27-29	3	-	-
Red Tank	-	-	-	-
Black Tank W.	-	-	5/30-31	2
Black Tank E.	5/30-5/31	2	-	-

**Mill Park Herd Summer:** maximum numbers 675, 6/1 - 10/15. This herd uses 12 pastures in a 5-year rest/deferred rotation grazing system. Grazing periods range from 4 to 30 days, 20 days during a projected 1.5 month fast plant growth period normally from mid-July through August. When days become available during a given year, the large meadow pastures will receive less use then the 10 days projected. Two to three pastures receive yearlong rest each year. Each large pasture is rested at least once during this 5-year time frame.

Pasture	Year A		Year B	
	Date	Graze	Date	Graze
Winter Cabin H	6/1-5	5	6/1-6/5	5
West Barney	6/6-25	20	6/6-6/25	20
Rattlesnake	6/26-7/10	15	rested	-
East Barney	7/11-30	20	rested	-
Lockwood	7/31-8/19	20	6/26-7/15	20
Harding Point	8/20-9/8	20	7/26-8/12	18
East Fry Park	9/9-18	10	8/13-8/22	10
West Fry Park	rested	-	7/16-7/25	10
East Mill Park	9/19-28	10	8/23-9/1	10
West Mill Park	9/29-10/9	10	9/2-9/11	10
Rogers Lake	rested	-	9/12-10/9	28
Metz Holding	10/10-15	5	10/10-10/15	5

Pasture	Year C		Year D	
	Date	Graze	Date	Graze
Winter Cabin H	6/1-5	5	6/1-5	5
West Barney	restrf	-	6/6-25	20
Rattlesnake	6/6-20	15	6/26-7/10	15
East Barney	6/21-7/10	20	7/11-30	20
Lockwood	7/13-8/1	20	rested	-
Harding Point	rest	-	8/10-29	20
East Fry Park	8/12-21	10	rested	-
West Fry Park	8/2-11	10	7/31-8/9	10
East Mill Park	8/22-31	10	rested	-
West Mill Park	9/1-10	10	8/30-9/8	10
Rogers Lake	9/11-10/9	29	9/9-10/9	30
Metz Holding	10/10-15	5	10/10-15	5

Pasture	Year E	
	Date	Graze
Winter Cabin H	6/1-5	5
West Barney	6/6-25	20
Rattlesnake	6/26-7/10	15
East Barney	rested	-
Lockwood	7/11-31	20
Harding Point	8/11-30	20
East Fry Park	8/31-9/9	10
West Fry Park	8/1-10	10
East Mill Park	rested	-
West Mill Park	rested	-
Rogers Lake	9/10-10/9	30
Metz Holding	10/10-15	5

**Munds-Pocket Winter:** maximum numbers 250, 10/15 - 6/1. This herd uses 10 pastures in a 6-year rest/deferred rest rotation grazing system. The heifers use a rested pasture from the Mill Park Herd, either Greasy West, Greasy East, Wheatfield or White Flat. This use gives these four pastures rest 1 in 6 years. Grazing periods range from 3 to 85 days, 30 days during a projected 2-month fast plant growth period normally from mid-March to mid-May. The 85-day grazing period in reality is 40-45 days because the pastures will be split using water instead of a fence.

Pasture	Year A		Year B	
	Date	Graze	Date	Graze
Malapais	1/9-3/1	50	1/9-3/1	50
Dutch Kid	rested	-	3/1-4/1	30
Well	4/28-5/28	30	4/1-5/1	30
Strip	3/1-28	27	5/1-28	27
Page Springs	3/28-4/28	30	rested	-
Corrals	5/28-6/1	3	5/28-6/1	3
Greasy West	-	-	10/15-1/9	85
Greasy East	10/15-1/9	85	-	-
Wheatfield	-	-	-	-
White Flat	-	-	-	-

Pasture	Year C		Year D	
	Date	Graze	Date	Graze
Malapais	10/15-1/9	85	4/28-5/28	30
Dutch Kid	4/28-5/28	30	1/9-3/1	50
Well	2/19-4/1	40	rested	-
Strip	4/1-28	27	3/1-28	27
Page Springs	1/9 - 2/19	40	3/28-4/28	30
Corrals	5/28-6/1	3	5/28-6/1	3
Greasy West	-	-	-	-
Greasy East	-	-	-	-
Wheatfield	-	-	10/15-1/9	85
White Flat	-	-	-	-

Pasture	Year E		Year F	
	Date	Graze	Date	Graze
Malapais	rested	-	3/28-4/28	30
Dutch Kid	4/28-5/28	30	1/9-3/28	77
Well	2/19-4/1	40	10/15-1/9	85
Strip	4/1-28	27	rested	-
Page Springs	1/9-2/19	40	4/28-5/28	30
Corrals	5/28-6/1	3	5/28-6/1	3
Greasy West	-	-	-	-
Greasy East	-	-	-	-
Wheatfield	-	-	-	-
White Flat	10/15-1/9	85	-	-

**Munds-Pocket Summer:** maximum numbers 250, 6/1 - 10/15. This herd uses eight pastures in a 3-year deferred rotation grazing system. No pasture rest is scheduled. However, pastures will be rested during the year if grazing periods can be extended in early and/or mid-season pastures (projected one pasture rest 2 years in 3). Grazing periods range from 5 to 30 days, 20 days during a projected 1.5 month fast plant growth period normally from mid-July through August.

Pasture	Year A		Year B	
	Date	Graze	Date	Graze
Ritter	6/1-20	20	9/9-28	20
Crazy Park	6/21-7/5	15	8/25-9/8	15
Roundup	7/6-25	20	8/5-24	20
Blowout	7/26-8/10	15	7/21-8/4	15
N.Geronimo	8/11-25	15	7/6-20	15
Mud Lake S.	8/26-9/14	20	6/16-7/5	20
Mud Lake N.	9/15-29	15	6/1-15	15
Willard Hld	9/30-10/4	5	9/29-10/3	5

Pasture	Year C	
	Date	Graze
Ritter	8/5-24	20
Crazy Park	7/21-8/4	15
Roundup	7/1-20	20
Blowout	6/1-15	15
N. Geronimo	6/16-30	15
Mud Lake S.	9/9-28	20
Mud Lake N.	8/25-9/8	15
Willard Hld	9/29-10/3	5

**Foxboro Winter:** maximum numbers 250, 12/1 - 5/31. This herd uses six pastures in a 2-year deferred rotation grazing system. Grazing periods range from 2 to 60 days, 30 days during a projected 2-month fast plant growth period normally from mid-March to mid-May. This 30-day grazing period during fast growth is achieved within pastures by controlling livestock waters (drinkers and waterlots).

Pasture	Year A		Year B	
	Date	Graze	Date	Graze
Jacks Canyon	12/1-15	14	12/1-15	14
Dry Beaver	12/16-26	10	12/16-26	10
Beaverhead	12/27-2/20	25	12/27-31	5
Indian	2/21-3/6	45	-	-
House Mtn.	3/7-5/5	60	1/1-3/1	60
Indian	5/6-13	8	3/2-4/15	45
Beaverhead	5/14-19	6	4/16-5/11	25
Dry Beaver	5/20-24	5	5/12-21	10
Corrals	5/25-26	2	5/22-23	2
Jacks Canyon	5/27-31	5	5/24-31	8

**Foxboro Summer:** maximum numbers 250, 6/1 - 12/1. This herd uses 15 pastures in a 4-year rest/deferred rotation grazing system. Grazing periods range from 2 to 35 days, 20 days during a projected 1.5 month fast plant growth period normally from mid-July through August. T-Six, Goofy, Little T-Six, Highway Camp-South Geronimo, Woods and Jack's Point pastures will be rested 1 year in 4 years.

Pasture	Year A		Year C	
	Date	Graze	Date	Graze
Jack's Point	6/1-15	15	6/1-15	15
HA	6/16-30	15	6/16-30	15
Woods	7/1-20	20	7/1-20	20
Lee Butte	7/21-8/9	20	7/21-8/9	20
Luke Mtn	8/10-30	20	8/10-29	20
Woods Hldg	8/31-9/2	3	8/30-9/1	3
Goofy	9/3-18	15	rested	-
Little T-Six	9/19-29	10	9/2-11	10
T-Six	rested	-	9/12-10/2	20
Goofy	9/30-10/5	5	rested	-
Skeleton Hldg	10/6-13	7	10/3-12	9
Clay Park Cor	10/14-15	2	10/13-15	2
Hwy Camp-S.Ger	10/16-25	10	10/16-26	10
Art's Tank	10/26-11/15	20	10/27-11/11	15
Schnebley	11/16-12/1	17	11/12-12/1	21

Pasture	Year B		Year D	
	Date	Graze	Date	Graze
Schnebley	6/1-20	20	6/1-20	20
Art's Tank	6/21-7/5	15	6/21-7/15	25
Hwy Camp-S Ger	7/6-15	10	rested	-
T-Six	7/16-8/4	20	7/10-30	20
Little T-Six	rested	-	7/31-8/10	10
Goofy	8/5-20	15	8/11-26	15
Luke Mtn	8/21-9/10	20	8/27-9/30	34
Lee Butte	9/11-10/11	30	10/1-31	30
Woods Hldg	10/12-15	3	11/1-4	3
Skeleton Hldg	10/16-23	7	11/5-13	8
Clay Park Cor	10/24-26	2	11/14-15	2
Skeleton Hldg	rested	-	11/16-17	1
Woods	10/27-11/16	35	rested	-
HA	11/17-27	10	11/18-12/1	12
Jack's Point	11/28-12/1	14	rested	-

**Bulls:** maximum numbers 100, 6/1 - 3/15 (with the cows 3/15 - 6/1). This herd uses six pastures in a 6-year rest/deferred rotation grazing system. Each pasture receives rest 1 year in 6. Grazing periods range from 30 to 75 days, 30 days during a projected 1.5 month fast plant growth period normally from mid-July through August.

Pasture	Year A		Year B	
	Date	Graze	Date	Graze
Holly 1	6/1-7/15	45	rested	-
Holly 2	7/15-8/15	30	6/1-7/15	45
Sheepshead	8/15-10/15	60	7/15-8/15	30
Cornville 1	10/15-12/31	75	8/15-10/15	60
Cornville 2	12/31-3/15	75	10/15-12/31	75
State	rested	-	12/31-3/15	75

Pasture	Year C		Year D	
	Date	Graze	Date	Graze
Holly 1	12/31-3/15	75	10/15 -12/31	75
Holly 2	rested	-	12/31-3/15	75
Sheepshead	6/1-7/15	45	rested	-
Cornville 1	7/15-8/15	30	6/1-7/15	45
Cornville 2	8/15-10/15	60	7/15-8/15	30
State	10/15-12/31	75	8/15-10/15	60

Pasture	Year E		Year F	
	Date	Graze	Date	Graze
Holly 1	8/15 -10/15	60	7/15-8/15	30
Holly 2	10/15-12/31	75	8/15-10/15	60
Sheepshead	12/31-3/15	75	10/15-12/31	75
Cornville 1	rested	-	12/31-3/15	75
Cornville 2	6/1-7/15	45	rested	-
State	7/15-8/15	30	6/1-7/15	45

## Improvements

The following list of structural improvements is needed to implement this alternative (see map 2 for locations).

**Gyberg Pasture:** Construct 2.25 miles of barbed wire fence to improve control of cattle movement in this pasture. Close FR 9538A to vehicular traffic at Last Chance Tank. Construct three self-closing horse gates and/or alternative bike gates where trails cross this new fence.

**White Flat Pasture:** Construct 2 miles of barbed wire fence to improve control of cattle movement in this pasture. Install one cattle guard where this new fence crosses FR 216. Construct 1 mile of pipeline and three drinkers to improve control of cattle movement in this pasture.

**Black Tank Pasture:** Construct two waterlots Black Tank pasture tanks and split pastures, if needed, to control cattle movement in this pasture.

**Cornville Pasture:** Construct 1.25 miles of barbed wire or electric fence to improve control of cattle movement in this pasture. Install two cattle guards where this new fence crosses FR 9806 and 9806A.

**Holly Springs Pasture:** Construct 1.25 miles of barbed wire fence to improve control of cattle movement in this pasture.

**Page Springs Pasture:** Construct 3 miles of barbed wire fence to improve control of cattle movement in this pasture. Install two cattle guards where this new fence crosses FR 9822.

**Duff Flat Pasture:** Construct 2 miles of pipeline and three drinkers to improve control of cattle movement in this pasture. Construct 2.75 miles of barbed wire or electric fence, if necessary, and one cattle guard to improve control of cattle movement in this pasture.

**Greasy East Pasture:** Construct 2 miles of pipeline and two drinkers to improve control of cattle movement in this pasture.

**Malapais Pasture:** Construct 2 miles of pipeline and two drinkers to improve control of cattle movement in this pasture.

**Dutch Kid Pasture:** Install one half mile of barbed wire fence around existing cottonwoods/incipient riparian in Coffee Creek to protect from livestock and off-road vehicles.

**West Barney/Rattlesnake Pasture:** Construct 2.25 miles of barbed wire or electric fence to improve control of cattle movement in this area. Install one cattle guard where this new fence will cross Forest Road (FR) 539. Install eight waterlots throughout these pastures to improve control of cattle movement in this area.

**East Barney Pasture:** Construct three waterlots to improve control of cattle movement in this area.

**Fry Pasture:** Construct 1.5 miles of barbed wire or electric fence to improve control of cattle movement in this area. Install two cattle guards where this new fence will cross Forest Roads (FR) 535 and 536. Construct 1 mile of barbed wire fence to protect five acres of Casner Draw meadow from livestock. Construct a barbed wire fence waterlot around Casner Draw tank so it can be opened and closed to control cattle movement within this pasture. Construct a barbed wire fence waterlot around Fry Park Tank to control cattle movement in this pasture.

**Mill Park Pasture:** Construct 3 miles of barbed wire or electric fence to improve control of cattle movement in this area. Install three cattleguards where this new fence will cross Forest Roads (FR) 535, 536 and 6330. Construct a barbwire fence around Mill Park Tank to create a waterlot that will be used to control cattle movement in this pasture.

**Rogers Lake Pasture:** Construct one quarter mile of barbed wire fence to exclude Windmill cattle from Rogers Lake.

**Harding Pasture:** Build a roadside tank to improve control of cattle movement in this area.

**Luke Mountain Pasture:** Construct 7 miles of fence to split the current Luke Mountain pasture in three separate pastures. This will result in cattle utilizing a higher percentage of a given pasture but at a lower overall utilization level and with less impacts to riparian areas and small meadows. Three cattle guards will be installed where this new fence crosses FR 239 twice and FR 127. Close or obliterate one half mile of road on FR 9470 and 0.2 mile of road on FR 9470A on Fain Mountain to protect wildlife habitat, reduce soil loss and reduce road densities. Install 10 cattle guards on Forest Roads 741B, 9467X, 127E, 9464B, 127B, 127Ba, 127A, 9464T, 9464J and 80. Build an 8-foot fence to protect five acres of Fain Spring from cattle and elk.

**Jacks Point/HA Pasture:** Construct 1.25 miles of barbed wire fence to improve control of cattle movement in this area. Install four cattle guards where this new fence will cross Forest Roads (FR) 9495G, 9499G, and 9494F (twice). Build one roadside tank to improve control of cattle movement in this area.

**Mud Lake Pasture:** Construct 3.5 miles of barbed wire or electric fence to improve control of cattle movement in this area. Install four cattle guards where this new fence will cross Forest Roads (FR)

78A, 9463Y, 9463X and 9495A. Build two roadside tanks to improve control of cattle movement in this area. Build an 8-foot fence to protect five acres of Willard Spring from cattle and elk. Install a pipeline or drinker to pipe water outside of enclosure for use by cattle and wildlife. Close or obliterate 1 mile of road to reduce erosional impacts to spring area.

**T-Six, Goofy and Little T-Six Pastures:** Construct 1.75 miles of barbwire or electric fence to improve control of cattle movement in this area. Install nine cattleguards where this new fence will cross Forest Roads (FR) 226, 228, 226C, 9468G, 9491L, 9467Y, 2471S, 226F and 9468P. Build an 8-foot fence to protect five acres of T6 Spring from elk, cattle and ORV use.

**Crazy Park Pastures:** Construct 3 miles of barbwire or electric fence to improve control of cattle movement in this area. Install two cattle guards where this new fence will cross Forest Roads (FR) 9459S and 9459T. Remove Crazy Park Tank from its present location in the middle of a meadow to reduce cattle and livestock concentrations from this sensitive area to alleviate soil compaction and loss of soil and vegetation.

## Planned Monitoring

Monitoring on the Windmill Allotment over the next 10 years will include: compliance, allotment inspections, range readiness, forage production, rangeland utilization, condition and trend, soil and riparian condition, and threatened and endangered species habitat.

**Compliance:** Throughout each grazing season, compliance monitoring will be done by Forest Service personnel to determine accomplishment of the terms and conditions of this permit, Allotment Management Plan, and annual operating instructions.

**Allotment Inspections:** Allotment inspections are a written summary done each fall by Forest Service personnel to document compliance monitoring and to provide an overall history of that year's grazing. This document may include weather history, the year's success, problems, improvement suggestions for the future, and monitoring summary.

**Range Readiness:** Each spring before cattle move above the Mogollon Rim, range readiness will be assessed by Forest Service personnel to determine if vegetative conditions are ready for cattle grazing. The range is generally ready for grazing when cool season grasses are leafed out, forbs are in bloom, and brush and aspen are leafed out. These characteristics



indicate the growing season has progressed far enough to replenish root reserves so that grazing will not negatively impact these forage plants.

**Forage Production:** Production surveys in the Munds Pocket area will be done within the first 5 years to resolve the area's capacity issues. Cattle numbers will be maintained or lowered as a result of evaluating these figures.

**Rangeland Utilization:** Utilization monitoring is an estimate of the available forage by weight consumed or trampled through grazing and is expressed as a percent of current years biomass removed. Utilization monitoring is designed to assess key forage utilization levels by cattle and elk during the year and from year to year. Key forage species for this allotment include western wheatgrass, blue grama, squirreltail, and Arizona fescue in the summer range and needlegrass, blue grama, black grama, sand dropseed, and sideoats grama in the winter range. Utilization monitoring will be conducted by the permittee and spot checked by Forest Service personnel throughout the year in every grazed pasture. This monitoring will calculate an overall utilization value for a pasture: 1) before cattle go into a pasture, 2) within 5 days after cattle leave a pasture, and 3) at the end of the growing season in the fall. Utilization will be averaged into the following five categories: no-use (0-10 percent), light (11-20 percent), moderate (21-50 percent), high (51-70 percent) and extreme (71 percent +). The goal for utilization will be 50 percent or less by cattle throughout the year with this intensive livestock grazing system. In addition, key site and key species monitoring will be conducted at a minimum of one per herd in each of following habitat types: pine (oak), riparian, mountain meadow, and aspen, if these habitat types are grazed by cattle. Utilization monitoring will also occur in selected pastures rested from cattle grazing by Forest Service and/or Arizona Game and Fish Department personnel.

**Condition and Trend:** Watershed and vegetative condition and trend monitoring will help determine the effectiveness of the new Allotment Management Plan. Two types of transect monitoring techniques will be used for this analysis: Parker 3-step and paced transects, and paired nested rooted frequency and cover transects. Both these transects will include photo points.

Parker 3-step and paced transect monitoring points were established throughout this allotment in the 1950-60's. These transects are one of best historic records of range condition and trend. The photo points and vegetative ground cover data show how the

site has changed over time. Sixty transects above the Mogollon Rim and 60 below the Mogollon Rim currently exist throughout the allotment. From all these transects, we will select at least 15 transects located in key areas that represent various TES soil units currently in unsatisfactory condition or within threatened, endangered or sensitive species habitat, such as mountain meadows, pine-oak, piñon-juniper, and desert grassland. Forest Service and ranch personnel will update the vegetative ground cover data or at least retake the photo points at these sites every 3 years to help determine long-term trend throughout this allotment. In key areas where the Parker 3-step and paced transects don't currently exist, new vegetative ground cover transects, with 300 points, will be established using TES ground cover definitions.

At least three new paired nested rooted frequency and cover monitoring transects will be established within the allotment to record statistically how vegetative frequency and ground cover changes over time. These paired transects will compare similar cattle grazed and ungrazed sites as near to each other as possible. Nested rooted frequency plots record ground cover and plant species composition, frequency, and cover data. At each site a permanent tenth acre transect will be established. Five random lines will be run out from this transect and 10 plots per line will be read using a standard canopy cover frame. These transects will be read every 5 years by Forest Service personnel. Likely sites for these plots include the following enclosures: Wheatfield (Wheatfield pasture), Purshia (Purshia pasture), and Yellow Flat (Rogers Lake pasture). These plots will be used to help determine the effectiveness of the new Allotment Management Plan and long-term range and watershed trend.

**Precipitation:** Precipitation is currently recorded within or near the Windmill Allotment at Sedona Airport, Turkey Butte Fire Lookout, East Pocket Fire Lookout, and Flagstaff National Weather Service Office at Bellemont. Additional rain gauges will be established at the winter and summer (Mill Park and Newman Park) headquarters of the Windmill ranch by the Windmill permittee. This data will be recorded throughout the year and summarized in the annual inspection.

**Soil and Riparian Condition:** The Intergovernmental Agreement between the Forest Service and the State of Arizona that controls water quality and the Clean Water Act requires implementation and effectiveness monitoring. The objectives of monitoring are to: 1) collect data sufficient to assist line officers and

resource managers in evaluating effects of management activities on soil and water resources; and, 2) support changes in management activities to protect soil and water quality. Monitoring will help determine how successfully managers are implementing guidance practices and how effectively those practices are protecting soil and water quality. Arizona Department of Water Quality (ADEQ) will continue to monitor water quality in the area.

Evaluating watershed condition will be assessed using information from the monitoring schemes above. Monitoring of plant abundance, ground cover, species diversity and estimates of overall soil condition (using the methods throughout this monitoring section) will indicate whether or not management practices are effectively meeting management goals. Trends toward improvements in key species abundance and diversity should indicate that management practices are effectively improving soil condition and by inference, maintaining or improving downstream water quality and complying with water quality standards. Conversely, decreases in plant abundance and species diversity may indicate that management practices are not effective and need to be changed. Environmental factors, especially precipitation, will be considered when evaluating monitoring results.

At the end of 10 years, all planned improvements will be in place. Overall effectiveness will be evaluated on a yearly basis and intensively again at the end of the 10-year permit period. The annual operating plans will make adjustments to pasture graze periods, pasture rest periods and cattle numbers to respond to results of the previous year's annual monitoring, weather conditions, and as improvements are implemented.

An improving trend for riparian vegetation and stream channel conditions should indicate that management practices are effectively benefiting water quality. Conversely, decreases in riparian vegetation or channel condition indicate that management practices are not effective and need to be changed. Environmental factors, especially flooding, will be considered when interpreting monitoring results. Several Fixed Station, Biocriteria Program, and other water quality monitoring sites are located within or near the allotment. These sites have and are being used to track long-term conditions and trends at critical points in a watershed and to develop biological criteria for stream segments. Information from these sites will be considered in evaluating the effectiveness of management practices, but may be of limited value considering the multitude of potential influences affecting each monitoring site.

The management practices detailed in the Affected Environment of Water Quality section of this document will become part of the terms and conditions of the grazing permit. Implementation of management practices will be monitored through enforcement of permit terms and conditions throughout the 10-year period.

**Threatened, Endangered and Sensitive Species:** Threatened, endangered and sensitive species monitoring is covered by the preceding monitoring schemes, with some additional monitoring to fully cover specific plant and animal species.

Four 25 x 25 foot exclosures will be placed in pine-oak Mexican spotted owl restricted habitat with permanent photo points. This will give a relative gauge of utilization and species use in areas of moderate forage production. These areas will be used as the key area monitoring points for the Mexican spotted owl and northern goshawk guidelines in the Coconino Forest Plan. The exact locations and key species will be determined in the future and may be moved if necessary to better meet monitoring objectives.

Riparian habitat will be monitored with permanent photo points within all riparian exclosures. A list of the present and future riparian exclosures include: T-6 Spring, Fain Spring, Willard Springs, Oak Creek, Verde River, Spring Creek, Sheepshead Spring, Coffee Creek, and National Forest portion of Roger's Lake. Dry Beaver, Jacks Canyon and Dry Creek are the only riparian areas easily accessible to cattle and these areas will also be monitored by permanent photo points. If cattle grazing is determined to be detrimental to the long-term health of these grazed riparian sites, grazing management will be further adjusted to reduce grazing effects or these areas will be excluded from cattle grazing.

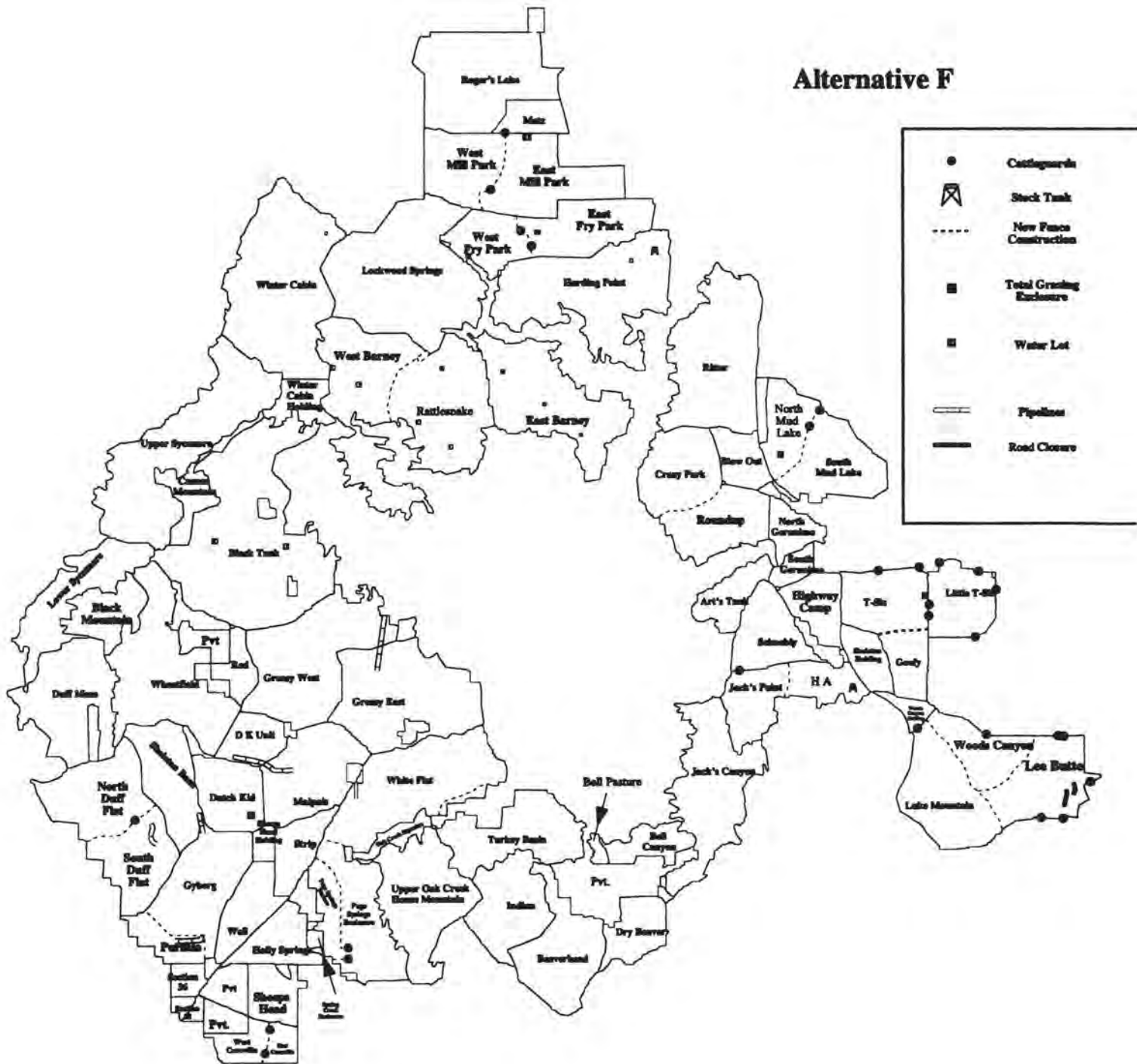
*Purshia subintegra* monitoring will adhere to the following plan. There will be a minimum of five visits to the grazeable *Purshia* populations with the objective of detecting early use, mid-use and utilization after cows have left one pasture and before they have entered another. If greater than 20 percent use by cattle on individual plants is detected (using the twig length measurement method, Interagency Technical Reference 1996), cows will be removed from the pasture or temporary fencing will be installed to prevent further use. U.S. Fish and Wildlife Service will be notified. More than five visits may be appropriate depending on local climatic conditions or local vegetation growth rates.

Coconino National Forest will survey the following suitable habitat for southwestern willow flycatcher occupancy ever year for the life of the permit: Sheephead, Stagesop, Red Rock Crossing, Winter Cabin, Tapco, and any potential habitat that becomes suitable during the life of the permit. Should any suitable sites become occupied, Coconino National Forest will assist and cooperate with Arizona Game and Fish Department (lead agency for monitoring) in order to monitor for nesting success and cowbird parasitism. Coconino National Forest will coordinate with personnel conducting ongoing research regarding monitoring as well. For non-Forest occupied habitat at Tuzigoot and Tavasci, Coconino National Forest will cooperate and assist as possible with survey efforts. If these sites are determined to have breeding flycatchers, Coconino National Forest will either: 1) initiate cowbird trapping as outlined in the U.S. Fish and Wildlife Service's September 27, 1995, Windmill

Biological Opinion immediately upon occupancy regardless of whether assistance can be gained from Arizona Game and Fish Department, or 2) immediately remove cattle from the Windmill pasture(s) located within a 5-mile radius of southwestern flycatcher location(s) and reinitiate consultation with the U.S. Fish and Wildlife Service to determine an adequate site-specific solution. Flexibility with the 5-mile radius will be used if current research or subsequent management direction indicates that a different radius would be more appropriate.

**Rationale:** This monitoring program gives the best data possible to monitor the effectiveness of this new management strategy while staying within the projected Forest Service budget. This is insured mainly because of the cooperation by the Forest Service, Windmill Ranch, and the Arizona Game and Fish Department in collecting this information.

# Windmill Allotment



Map 2. Windmill Allotment Alternative F.

# Affected Environment and Environmental Consequences

This chapter shows the present condition (i.e. affected environment) within the project area and the changes that can be expected from implementing the action alternatives or taking no action at this time. The no action alternative sets the environmental base line for comparing effects of the action alternatives.

The major issues define the scope of environmental concern for this analysis. The environmental effects (changes from present base line condition) that are described in this chapter reflect the identified major issues. Some of the environmental effects are confined to this action and the project area. Others are cumulative with environmental effects from other actions and cover an issue area beyond the project area. Cumulative effects are discussed for each major issue when they occur.

## Affected Environment of Vegetation, Watershed, Riparian and Soils

The following section describes historical factors which shaped current vegetative conditions on the allotment, current range conditions for the major vegetative types on the allotment, existing conditions of riparian areas, existing conditions of meadows, major soil factors, and how grazing effects soils and finally the existing watershed conditions on the Windmill Allotment.

## History of Logging, Grazing and Fire and How These Shaped the Affected Environment

**Pre-European settlement and the turn of the century:** Prior to Euro-American settlement, periodic wildfires occurred fairly often on the allotment creating some park-like landscapes dominated by large ponderosa pines or pine stands with a variety of tree sizes and ages. Historically, wildfires, combined with climatic changes, created conditions necessary for good seedbeds and tree regeneration. Episodes of tree regeneration created new patches of trees and occurred approximately every 20 years.

Native Americans traditionally used the areas above the Mogollon Rim for hunting. Large settlements occurred below the Rim in the Sedona and Verde Valley areas. The earliest Euro-Americans in the Windmill Allotment arrived in the mid to late 1800s and included Basque sheepherders, itinerant trappers and mountaineers. The first homesteaders arrived in the 1880s and began harvesting the region's timber resources as firewood and building materials. These

early logging operations were extensive. Railroad ties were in great demand at that time and trees in the allotment were cut and milled to produce ties for the Atlantic & Pacific Railroad.

Although not well documented, Basque sheepherders took sheep through areas of the Windmill Allotment during the late 1880's, moving north to the San Francisco Peaks in the summer, and south below the Mogollon Rim in the winter.

Cattle grazing started on the Windmill Allotment in the Verde Valley in the mid-1860's when cattle were grazed to supply beef to Fort Lincoln. Above the Mogollon Rim, cattle grazing started in the late 1870's with small cattle operations. In 1881, John Young started the first large scale cattle ranch (A-1 Ranch) in the Flagstaff area. The Atlantic and Pacific Railroad completion to Flagstaff in 1882 brought the next major influx of cattle into this region. Cattle numbers increased from this time and peaked in the late 1890's. The industry was brought down at the turn of the century by a drought, low cattle prices and poor range conditions. During this time, continual grazing and overstocking caused some gully erosion and soil loss. These actions also reduced grass and litter on the forest floor that served as fuel for forest fires.

Prior to Euro-American settlement some ungulates ranged throughout the area. Mule deer, antelope, bighorn sheep and Merriam's elk were common. A few springs, ephemeral drainages and marshy bogs provided water. Wildlife moved according to climatic changes and water availability, ranging long distances between water sources during dry periods.

Climatic conditions ideal for pine regeneration in 1919, combined with logging, grazing and the reduction of wildfires, created a good seedbed and pine regeneration conditions. These conditions resulted in large areas of similar-aged trees throughout the Windmill Allotment above the Mogollon Rim. Many of these areas have become the relatively thick stands of closely spaced pole-sized pines seen in many places today on the Coconino National Forest.

These new dense stands of trees did not allow much sunlight to reach the forest floor and increased pH levels in the soil. As a result, trees covered large areas and the forest floor had few grasses, forbs and shrubs.

Management approaches to commercial logging in the Windmill Allotment have fluctuated from the "pick and pluck" technique of the 1950's and 1960's to the precommercial thinning of the 1970's and the even-

aged thinning of the 1980's. Although different, most of these approaches retained stands of trees at densities that kept undergrowth production at low levels. During the 1970's and 1980's, the Forest Service also seeded areas in which timber had been harvested, obliterated roads and caused other types of soil disturbance. Where seeding occurred in some parts of the Windmill Allotment, non-native species were used to increase the amounts of palatable forage. Today, however, management emphasizes creating ecological diversity and a balance of forest age classes within stands. This approach also includes creating small or large grassy openings and small or large patches of widely-spaced trees where possible.

Grazing has continued on portions of the Windmill Allotment since the mid-1860s. However, over time the Forest Service reduced cattle numbers and controlled cattle grazing periods more strictly. Live-stock grazing management has been improved over time by the construction of fences and waters by the Forest Service and permittees.

Merriam's elk were extirpated in the early 1900s and Rocky Mountain elk were introduced to repopulate the area. Since then, Rocky Mountain elk numbers have steadily increased. This increase can be attributed to an increase in availability and distribution of water, an increase in non-native forage species and elk management.

Currently, elk herds winter along and below the Mogollon Rim, browsing on shrubs and eating acorns. They move north above the Rim in April and early May and summer in ponderosa pine areas above the Rim. In fall, elk congregate in large herds and migrate south to the Rim. They leave pine areas when the first heavy snow falls. The Arizona Game and Fish Department manages the health and well-being of the elk herds and controls their numbers through hunting. Viewing and hunting elk are popular activities for Arizonans and some people come from other states to hunt elk.

Antelope and other species adapted to open grasslands have not increased and have probably decreased since the early 1900s on the allotment.

#### **Estimated fire activity and how vegetation**

**evolved:** Because the Windmill Allotment is located above, below and along the Mogollon Rim, historic fire regimes were probably influenced by the Rim. In pastures along the Rim fires were frequent, caused by lightning and accompanied by rain. The combination

of fast-growing, vigorous ponderosa pine and good plant regeneration on limestone soils created a good range of vertical structure within tree stands and a fairly dense forest overall along the Rim. Browse species are now in the same general distribution as they were 100 years ago. Grass quantities are not high under dense tree canopies, but small openings contain high volumes of grasses. Duff layers were reduced in the past by ground fires, but much organic material remained in soils because dense populations of trees, grasses and forbs produced litter.

Along the Mogollon Rim and on the Mill Park and Munds Pocket/Foxboro Divisions, fire suppression and grazing of fine fire fuels reduced the influence of fire on the landscape. Silvicultural practices aimed at even-age management removed overstory trees and thinned the understory in many parts of these divisions and these practices have created more open areas. Browse species populations are mature in these areas. Plant populations accessible to grazers have low vigor and little regeneration. This lack of regeneration was probably caused by grazing by deer and elk and the reduction of fires.

Further north of the Mogollon Rim on the Mill Park and Munds Pocket/Foxboro Divisions, rocky basalt soils exist. This area is drier than the Rim country but still supports pine, oak, forbs and grasses. Fires probably occurred every 2 to 12 years here and probably burned large areas. Most were ground fires, but some probably torched clumps of trees. Sustainable levels of oak probably grew in groves or smaller pockets. Mature trees existed and younger trees grew around them, but pine regeneration was less than in the Rim country because fires in wet years were necessary to create seedbeds favorable for regeneration. Fires reduced duff layers, but organic material was abundant beneath large trees and clumps of trees.

Some drainage slopes on the Windmill Allotment contain dense, multi-storied stands of pine, Douglas-fir, white fir, oak and other browse and shrub species. Fires probably occurred infrequently and were most likely crown fires that traveled up slopes until they reached the tops of drainages. Duff layers are thick on these slopes except on rocky outcrops.

Forests of Arizona cypress grow on the allotment from 4,500 to 5,500 feet on southwest-facing slopes. Their current range is probably the same as it was historically. Little forage is available beneath the closed canopies of these forests.

The allotment also contains many areas of pinyon pine, juniper, oak and ponderosa pine "transition" vegetation. Aggressive fire control coupled with less ground fuel (grasses, forbs and brush) than higher elevations allowed ground fires to occur less frequently.

Pinyon-juniper stands on rocky soils tend to be older and these areas probably consisted of pinyon-juniper stands in the past. In deep soils, pinyon-juniper stands are younger, so they spread to these areas over time. Little forage grows beneath dense pinyon juniper forests.

Pinyon-juniper stands are expanding into grasslands. More grasslands probably existed on the allotment in the past because fires would have killed encroaching pinyon-juniper trees and maintained grasses. Fires in grassland areas were not as frequent as on the Mogollon Rim but still occurred. Occasionally, heavy winter and spring moisture produced more growth in annual grasses, weeds and other fuels to sustain short-lived increases in fire frequency and intensity during dry summer months before monsoon rains began. Prehistoric human-caused fires may have also helped to maintain grassland communities.

Grasslands with mesquite and creosotebush populations that now exist on the allotment were probably true grasslands in the past that changed over time. Most mesquite populations moved into the grasslands over the last 30 years and the average age of most mesquite trees on the grasslands is 50 years or less. Mesquite is hardy and fire resistant. Cattle and wildlife help to distribute mesquite seeds. Creosotebush has been moving northward throughout Arizona since the turn of this century.

The Verde Valley is basically an Upper Sonoran desert shrub habitat. A wide variety of species exist here and many live on the upper end of the Sonoran range or the lower edge of the transitional range between the desert and pinyon pine-juniper habitats. Fire in the past probably burned unimpeded over the Valley's large, grassy areas. Lightning occurs less frequently here than along or above the Mogollon Rim, but prehistoric and historic peoples may have frequently started large fires. The banks of the Verde River were marshier in the past than they are now and cattle have grazed this area since the mid-1860s when Fort Lincoln was established.

### **Condition and Trend by Vegetation Type**

The narrative below describes the overall range condition and trend in each main vegetation type

within each division of the Windmill Allotment and is based on professional judgement. Condition and trend are long-term measures of the health of vegetation. The estimates below give an overview of conditions and trends for large areas and do not necessarily apply uniformly to all areas. In fact, within each vegetation type on the allotment every condition class exists.

For the following discussion, the ponderosa pine type is forested lands containing primarily ponderosa pine with some oak in understories. The transitional vegetation type is a mix of pinyon pine, juniper, Arizona cypress, oak and ponderosa pine. The mountain meadow type is naturally occurring meadows greater than 10 acres in size. The pinyon pine-juniper type is forested areas with a mix of pinyon pine and juniper trees. The desert grasslands type may have scattered pinyon pine and juniper trees but are primarily open grasslands containing grass species adapted to limited water availability. The desert shrub type contains desert grassland species and an overstory shrub component of creosote, mesquite, canotia, or other desert shrubs. The chaparral type contains dense overstories of turbinella oak, manzanita and other brush species.

### **Munds Pocket/Foxboro Division - Mormon Lake Ranger District (52,302 acres)**

The Munds/Foxboro Division's ponderosa pine vegetation type covers about 85 percent. Most of this range is in poor to fair condition and some in good condition. Currently many areas have the potential to improve to a higher condition class, but dense canopy cover is preventing them from attaining this potential. That is, many of these areas are forested at basal areas over 60 square feet. Trends are generally static in these areas.

The Munds/Foxboro Division's transitional vegetation type covers about 9 percent. This area is in poor to fair condition with static trends, but many have the potential to improve to a higher condition class. Soils are rocky and dry and canopy cover from pinyon pine-juniper forests is dense in some places. Currently, cattle use these areas at various times between May 1 and November 30. Elk use is in late fall, winter and spring.

The Munds/Foxboro Division's mountain meadow vegetation type covers about 1 percent. In the Munds Pocket portion of the division, meadows within the pine type are in poor condition but have the potential to improve to a higher condition class. A long history of heavy domestic cattle use and increasing elk use over the past 20 years caused the poor conditions.

Cattle and elk prefer to graze these meadows because grasses in the meadows are more plentiful, palatable and have higher nutrient contents compared to forage growing in the surrounding dense pine stands. Current cattle and elk use are keeping these areas in static trends.

On the Foxboro portion of this division, meadows within the pine type are in fair condition. They have improved to fair condition over the last 10 to 15 years because orchard grass and other palatable species were seeded over large areas during timber sales. The resulting increase in forage has somewhat lessened the pressures on meadows from elk and cattle grazing. Trends in these meadows are now static.

The Munds/Foxboro Division's pinyon-juniper vegetation type covers about 5 percent. Most of this area is in poor condition. In some areas, canopy closure is high and soils tend to be rocky. Like the transitional vegetation type, pinyon pine-juniper areas provide elk winter habitat and these areas are used by cattle in summer. Mainly because of high tree densities, trends are downward in these areas.

#### **Mill Park Division - Peaks Ranger District (66,648 acres)**

The Mill Park Division's ponderosa pine vegetation type covers about 95%. Most of this area is in poor to fair condition and a few are in good condition. Currently, many areas in this division have the potential to improve to a higher condition class, but dense canopy cover is preventing them from attaining this potential. That is, many of these areas are forested at basal areas over 60 square feet. Trends are generally static in these areas.

The Mill Park Division's mountain meadow vegetation type covers about 5 percent. In the Munds Pocket portion of the division, meadows within the pine type are in poor condition but have the potential to improve to a higher condition class. A long history of heavy domestic cattle use and increasing elk use over the past 20 years caused the poor conditions in these areas. Cattle and elk prefer to graze these meadows because grasses in the meadows are more plentiful, palatable and have higher nutrient contents and compared to forage growing in the surrounding pine areas. Current cattle and elk use are keeping these areas in static trends.

#### **Winter Division - Sedona Ranger District (129,842 acres)**

The Winter Division's pinyon-juniper vegetation type covers about 15 percent. Conditions in these areas

are very poor where canopy cover is high and fair where lands are more open. Soils in these areas are generally rocky, shallow and hilly and derived from basalt, limestone and sandstone. These soils usually produce more shrubs and woody overstory than understory vegetation. A long-term (50- to 100-year) downward trend is probably occurring in these areas as canopy cover increases and woody species invade or increase in population. These changes are probably due to past overgrazing and lack of fire.

The Winter Division's desert grassland vegetation type covers about 45 percent. These areas are in poor to fair condition with static to upward trends depending on soil characteristics and densities of woody plants. Desert grasslands usually have deep soils that produce more ground cover than shallow or rocky soils do. Woody plant invasion in these areas also affects herbaceous plant abundance and composition, and reduces grass cover.

The Winter Division's desert shrub vegetation type covers about 25 percent. Where desert shrubs exist in high quantities, conditions are poor to fair and trends are static.

The Winter Division's chaparral vegetation type covers about 15 percent and exists on steeper rocky slopes and escarpments. These areas are in very poor to good condition and have static to downward trends because of the lack of fire and heavy elk use near the Mogollon Rim.

### **Description of Riparian Vegetation**

Riparian areas are dynamic and highly productive. Disturbances such as floods, livestock and wildlife grazing, and human activities can seriously affect vegetation, soils and streambank functioning. Such disturbances can also affect vegetative successional stages. For example, a flood can alter a riparian area's vegetative structure from a high successional stage to a lower one. Stages, from low to high, can range from no vegetation at all to mature and decadent stands of vegetation.

Riparian stream systems represented on the Windmill Allotment include perennial streams with native riparian vegetative communities and seasonal, intermittent and ephemeral flows that range from semi-perennial to surface runoff only. Semi-perennial flows generally occur during winter and early spring but do not maintain surface flows when plants are actively growing and have high evapotranspiration rates.



Riparian habitats associated with the Windmill Allotment are limited to streamside or riverside communities and associated seeps and springs. These communities occur on the allotment from forested areas above the Mogollon Rim to the desert of the Verde Valley. One stream reach on the allotment contains only effluent discharge, but it will probably exist only for short periods because the discharge is expected to be used on a local golf course.

#### **Riparian Areas on the Winter Range - Sedona**

**Ranger District:** Impacts to riparian areas in the Winter Division stem mainly from flooding, recreation and cattle grazing. The majority of riparian areas in the Winter Division are excluded from cattle grazing. In these fenced areas, vegetative conditions are satisfactory with a diverse mix of woody and non-woody vegetation and successful plant regeneration. Cattle might use Spring Creek in the Black Tank Pasture for 1 to 2 days when they travel the Mooney Trail between winter and summer ranges. Sections of Dry Creek and Dry Beaver Creek impacted by cattle are primarily cottonwood stands with dry, sandy soils, but these areas are in stable condition.

#### **Riparian Areas on the Summer Range - Peaks and**

**Mormon Lake Ranger Districts:** Several riparian areas on the allotment's summer range are used and impacted by both cattle and elk. Elk are primary grazers in fenced areas and areas with topography that limits cattle use. Many springs, seeps and associated wet meadows show signs of heavy utilization such as a decrease in seedheads, large interspacing between plants, and soil compaction. Recreational use also causes soil compaction and physical damage to plants in some places, such as Lockwood and Willard Springs.

Drainages and canyons listed in the riparian table for the summer range are mostly in fair to good condition. They contain woody vegetation with varying degrees of successful regeneration. Topography limits both cattle and elk use in some parts of these canyons.

Table 14 (on the following 3 pages) summarizes the conditions and uses of riparian habitats on the Windmill Allotment. The table includes only areas considered true riparian habitats that are sensitive to cattle and elk grazing.

### **Explanation of Soil Condition Factors**

Soil condition is an evaluation of soil quality based on an interpretation of factors which effect soil function. Primary soil functions are the ability of the soil to: 1)

accept, hold and release water; 2) accept, hold and release nutrients (recycle nutrients); and 3) resist erosion.

Watershed condition is a description of the health of a watershed or portions thereof in terms of the factors which affect hydrologic function and soil productivity.

Domestic cattle grazing has the potential to affect soil and hydrologic functions that are important in the maintenance of long-term productivity and favorable conditions of water flow. Specifically, changes in the soil's surface structure and it's ability to accept, hold and release water may be affected by compaction caused by trampling. The nutrient recycling function of the soil may be interrupted by removal of vegetation that impacts above-ground nutrient inputs into the system. Finally, the soil's resistance to erosion is affected by changes in plant density, composition and protective vegetative ground cover that are part of the organic components in the soil.

Several soil characteristics have been selected to evaluate the differences between alternatives on hydrologic function and soil productivity. These characteristics include:

**Soil Surface Structure:** The structural characteristic of the soil is determined by the degree to which soil particles are held together in individual clusters or aggregates. Aggregation occurs when soil particles are bound by roots, fungal hyphae and/or by-products of organic matter decay. Trampling moist soils destroys existing soil aggregates by compacting them into a comparatively impermeable surface layer composed of dense, unstable clods.

**Bulk Density:** This is a measure of soil density; changes in density can be effected by changes in soil aggregates and soil porosity. A 15 percent increase in bulk density over <10 percent of an area is considered satisfactory, >10 percent of an area is considered unsatisfactory.

**Organic Matter (litter):** Fallen foliage accumulates as litter which eventually becomes part of the soil in the form of soil organic matter. Litter plays a major role in nutrient recycling and creates a more consistent temperature and moisture microenvironment that favors microorganism activity. Soil organic matter helps to form stable soil aggregates and aids in infiltration and reduces erosion. Satisfac-

Table 14. Riparian Areas on the Windmill Allotment Listed by Ranger District, Location, Soil Unit, Stream Order, Vegetation Type, Acres, Miles, Condition, Trend and Impacts.

Area/Stream Reach (Pasture)	Location	Soil Unit	Stream Order	Vegetative Type	Acres Miles	Condition/ Trend	Impacts
<b>Winter Range - Sedona Ranger District</b>							
Spring Creek (Black Tank)	T18N, R4E, Sec 8,9,16	45	2nd Intermittent	Canyon Bottom Quga,Rone	23 ac. 1 ml.	Fair/ Downward	Cattle, Elk
Spring Creek/ Upper Exclosure (No pasture)	T16N, R4E, Sec 22	46	3rd Perennial	Stream Pofr,Fran SALI	10 ac. 1/4 ml.	Good/ Static	Recreat.
Spring Creek/ Lower Exclosure (No pasture)	T16N, R4E, Sec 27	46	3rd Perennial	Stream Pofr,Fran SALI	14 ac. 2/5 ml.	Good/ Static	Recreat.
Sycamore Creek (Prescott cattle)	T17N, R3E, Sec 5,8,32	34	4th Perennial	Stream Pofr, Fran SALI, Alob	60 ac. 3 ml.	Fair/ Static	Floods, Cattle, Recreat.
Verde River/From Sycamore to Private Lands (Prescott cattle)	T17N, R3E, Sec 7,8,17, 20,21,28, 29,32,33	33	5th Perennial	River, Can Sparse Veg Pofr,SALI PLAT	64 ac. 5-1/2 ml.	Fair/ Downward	Floods, Cattle
Jacks Canyon (Jacks Canyon)	T16N, R5E, Sec 24,25; R6E, Sec 30	46	3rd Effluent	Canyon drainage Fran,Pofr	32 ac. 1-1/2 ml.	Fair/ Static Upward	Cattle
Oak Creek/Deer Pass to Eagle Mountain (Oak Creek Riparian)	T17N, R5E, Sec 31,32, T16N, R5E, Sec 7; R4E, Sec 12	46	4th Perennial	Canyon drainage Pofr,Fran SALI,Alob	147 ac. 2 ml.	Fair/ Static Upward	Floods, Cattle, Recreat.
Oak Creek/Deer Pass to Hidden Valley (Lower Oak Creek/White Flat)	T16N, R4E, Sec 11,12	46	4th Perennial	Canyon drainage Pofr,Fran SALI	55 ac. 1-1/2 ml.	Fair/ Static Upward	Floods, Cattle, Recreat.
Oak Creek/Hidden Valley to Lower Oak Creek Unit (Lower Oak Creek/White Flat)	T16N, R4E, Sec 11,14	46	4th Perennial	Canyon drainage Pofr,Fran SALI	36 ac. 1 ml.	Fair/ Static Upward	Floods, Cattle, Recreat.
Oak Creek/Mormon Crossing Area (Lower Oak Creek/ White Flat)	T16N, R4E, Sec 26,27	46	4th Perennial	Canyon drainage Pofr, Fran SALI	12 ac. 3/4 ml.	Fair/ Static Upward	Floods, Recreat.
Dry Creek (Greasy East and Greasy West)	T17N, R5E, Sec 9,16, 17,19,20	45	3rd	Ephemeral Pofr,Fran SALI,Plwr	84 ac. 3-1/5 ml.	Fair/ Static	Floods, Cattle, Recreat.

Area/Stream Reach (Pasture)	Location	Soil Unit	Stream Order	Vegetative Type	Acres Miles	Condition/ Trend	Impacts
Dry Beaver Creek (Dry Beaver)	T16N, R6E, Sec 29	45	4th Intermit. Perennial	Fran, Pofr Qutr Canyon Drainage	10 ac. 3/4 mi.	Fair/ Static	Floods, Cattle, Elk
Dry Creek (Oak Creek/White Flat)	T17N, R5E, Sec 19,30, 31	45	3rd	Ephemeral Pofr,Fran SALI,Plwr	115 ac. 3 mi.	Fair/ Static	Floods, Cattle, Recreat.
Sheepshead Spring (Sheepshead)	T16N,R4E, Sec33	350	2nd	Perennial Pofr,SALI Fran	15 ac. 3/4 mi.	Good/ Upward	Cattle, Irrigation diversion
<b>Summer Range - Peaks Ranger District</b>							
Fry Canyon (Harding Point and Fry Park)	T19N, R6E, Sec 3,4	555	2nd	Intermittent Potr,ALNU ACER,SALI	50 ac. 1-3/4 mi.	Fair/ Static	Floods, Elk
West Fork Oak Creek (East Barney and Lockwood)	T19N, R5E, Sec 14,15, 23	555	2nd	Intermittent Pipu,Potr ALNU	50 ac. 1-1/2 mi.	Fair/ Static	Cattle, Elk
West Buzzard Spring (East Barney)	T19N, R5E, Sec 23	555	1st	Perennial Potr,ALNU Pofr, MC	10 ac. 1/4 mi.	Fair/ Static	Cattle, Elk
Maple Springs (East Barney)	T19N, R5E, Sec 30	555	1st	Intermittent Potr,ALNU Pofr,MC	10 ac. 1/4 mi.	Fair/ Static	Cattle, Elk
Casner Cabin Draw (Lockwood and Fry Park)	T19N, R5E, Sec 2,11, 12	555	2nd	Intermittent Potr,ANLU Pofr,MC	40 ac. 1 mi.	Fair/ Static	Cattle, Elk
Small portion of Rogers Lake (Rogers Lake)	T20, R6E, Sec 6			Intermittent wet meadow	5 ac.	Fair/ Static	Cattle, Elk, Recreat.
<b>Summer Range - Mormon Lake Ranger District</b>							
Fain Spring (Luke Mountain)	T17, R8E, Sec 26	555	3rd	Perennial wet meadow	1/2 ac.	Fair/ Static	Elk
Lee Spring (Luke Mountain)	T17, R8E, Sec 21	555	3rd	Perennial	1/8 ac.	Fair/ Static	Elk, Recreat
Mortgage Spring (Ritter)	T19, R6E, Sec 13	555	3rd	Ephemeral Interrupt. Poan-3	1 ac. 1/2 mi.	Fair/ Static	Cattle, Elk, Logging
Scott Spring (Ritter)	T19, R6E, Sec 14	555	3rd	Perennial spring meadow	1/2 ac.	Fair/ Static	Cattle, Elk, Recreat.

Table 14. Riparian Areas on the Windmill Allotment Listed by Ranger District, Location, Soil Unit, Stream Order, Vegetation Type, Acres, Miles, Condition, Trend and Impacts (continued).

Area/Stream Reach (Pasture)	Location	Soil Unit	Stream Order	Vegetative Type	Acres Miles	Condition/Trend	Impacts
Ritter Spring (Ritter)	T19, R6E, Sec 26	555	3rd	Perennial spring	1/8 ac.	Fair/Static	Rocky, not much impact
Upper James Canyon (Southern edge forms border of Ritter)		555	3rd	Ephemeral Interrupt Poan-3	1.5 ac. .6 mi.	Fair/Static	Cattle, Elk, Logging
Upper Munds Canyon (No pasture)	T18, R6-7E	555 575	3rd	Intermitt Interrupt Poan-3	13 ac. 2.1 mi.	Fair/Static	Floods, Urban Dev.
Upper Woods Canyon (Luke Mountain)	T18, R7E	575	3rd	Ephemeral Poan-3	24 ac. 2.6 mi.	Poor/Downward	Cattle, Elk, Rds.
Woods Ranch (Woods Holding)	T17, R7E, Sec 11,12	584	3rd	Ephemeral Poan-3	2.6 ac. 1/2 mi.	Fair/Static	Cattle Dewatered
Lower T-6 Canyon (T-6)	T17, R7E	584	2nd	Ephemeral Poan-3	14 ac. 2.9 mi.	Fair/Static	Cattle, Elk, Rds.
Upper T-6 Canyon (Little T-6)	T17, R7E	584	2nd	Ephemeral Poan-3	.8 ac. .6 mi.	Fair/Static	Cattle, Elk, Rds.
Willard Spring (Woods Canyon Holding)	T18, R7E, Sec 1	555	3rd	Perennial spring & meadow	2 ac.	Fair/Static	Cattle, Elk, Logging, Rec.
Foxboro Lake (Schnebly)	T18, R7E, Sec 32			Lake Runoff fed	5-10 ac. (rest is private)	Fair/Static	Cattle, Elk, Recreat.

tory conditions include a relatively even distribution across the soil surface; absence or poor distribution is considered unsatisfactory.

**Plant Diversity and Ground Cover:**

Species rich plant communities are reflective of satisfactory soil conditions and are potentially more resilient or better able to regain functional characteristics after disturbance. The extent to which grazing causes a change in species composition, abundance and litter component is important in determining the hydrologic condition of the soil. Density of herbaceous vegetation is a factor influencing runoff with a

decline in plant density generally leading to increased runoff. Satisfactory conditions include distribution of desirable perennial plants and presence of trees, forbs, shrubs and graminoids as identified in the potential plant community; unsatisfactory conditions occur when forb and/or graminoid vegetation are absent or sparse.

**Soil Condition Ratings for Watersheds on the Allotment:**

Table 15 displays current soil condition ratings by watershed within the Windmill Allotment. The table reflects estimates of soil condition on portions of larger watersheds affected by the allotment. TES estimates have not necessarily been

verified in the field. Explanations of unsatisfactory soil conditions follow this table.

#### **Explanation of Unsatisfactory Soil**

**Condition:** Unsatisfactory soil condition is modeled by the Universal Soil Loss Equation where the current rate of soil erosion exceeds tolerable or the rate at which soil formation occurs. Based on TES predictions, some soils in the Windmill Allotment are considered to be in unsatisfactory condition as a result of heavy grazing practices around the turn of the century.

Soils associated with "Vertic" Integrades are the result of impairment due primarily to compaction and mixing (trampling) of thin surface horizons with underlying horizons of high clay content. This change in a soil property seriously reduces infiltration rates and aeration. Reduced infiltration rates have an adverse effect on forage production and vegetation ground cover. Since water is entering the soil at a restricted rate, plant available soil moisture is lower. This in turn results in reduced rooting depth (lack of plant available moisture in lower horizons) of many perennial grasses. If this process is left unchecked, these soils will degrade with a consequent further lowering of soil productivity. Soils containing "Vertic" Integrades are found in TES map units 55, 402 and 414 and are considered to be in unsatisfactory soil condition.

Degradation of soils on slopes over 15 percent is initially one of sheet and rill erosion and began as a result of historic overgrazing. There is excessive removal of the protective vegetative ground cover, exposing the surface soil to raindrop impact, detachment and transport of soil material. A portion of the eroded soil is lost from the site and the remainder will be trapped behind clumps of grasses and other obstacles. The soil surface in bare areas will appear to be lower than surfaces associated with vegetated patches. This produces a pedestaled effect on the soil surface. In other cases, sheet and rill erosion appear to stabilize due to the armoring effect provided by rock cover that is left remaining on the eroded surface. The cobble and gravel mulch is effective in protecting the soil from further erosion. However, runoff rates are abnormally higher under this situation and may result in an

active gully system in the adjacent valley plains. Increased runoff usually means that there is a reduction in on-site soil moisture and an increase in surface soil temperatures resulting in increased soil aridity. This is especially true on shallow, rocky soils. The increased aridity in combination with shallow, rocky soils favors opportunistic shrubs and pinyon-juniper trees resulting in a lowering of on-site productivity. This typically is the case within TES map units 404, 418, 420, 463 and 530. These map units contain soils that are in unsatisfactory soil condition.

Erosion hazard (sheet and rill erosion) is rated as slight for TES map unit 55. Potential as well as current soil loss rates as predicted by the Universal Soil Loss Equation (USLE), do not exceed tolerable soil loss rates. This soil loss is primarily due to slope (average slope gradient for this map unit is 1 percent).

Portions of map unit 530 occur on very steep slopes and may have inadequate ground cover to prevent erosion. Erosion hazard is severe. This soil type is generally not preferred by cattle because of very limited forage and steep slopes.

Soil productivity in the Pinyon/Juniper, Desert Grassland and Desert Shrub can be quite variable depending on lithology, depth of soil, surface rock and precipitation received. Historical and current land uses can also effect soil productivity. Several map units in the winter portion of the allotment are estimated to be in watershed unsatisfactory condition either because of steep slopes, increase in juniper canopy, or historic yearlong grazing.

TES map units on the allotment that have unsatisfactory soil conditions are described below:

**Map Unit 402** is a relatively deep basalt soil on gentle slope elevated plains or mesa tops. Soil condition is probably a result of historic yearlong grazing. Abundant surface rock controls runoff characteristics.

**Map Unit 414** occurs as a lowland plain. The physical properties of this soil produce seasonal surface cracking which causes accelerated drying of subsoil. Revegetation potential is limited by cracking and by high pH.

**Map Units 404 and 418** are similar in terms of landform and vegetation. These areas are probably historic grasslands that, as a result of historic yearlong grazing, have become dominated by shrubs. There is limited opportunity for improvement of soil condition. Prescribed burning and seeding may be beneficial in restoring these areas now that grazing management has been improved. A shorter grazing season with every other year rested will not adversely impact current soil condition. In fact, much improvement in vegetative ground cover associated with map unit 418 has been monitored on the Windmill Allotment due to shorter cattle grazing periods.

**Map Units 420 and 463** occur on slopes greater than 15 percent. These soils are stabilizing due to an increase in armoring by surface rock exposed by past erosion. Degraded soil condition may also be attributed to an increase in pinyon-juniper overstory and a decrease in perennial grasses.

## Effects of the Alternatives on Vegetation, Soils and Watershed Conditions

An explanation of soil watershed effects of the alternatives on the various major vegetation types follows.

### Watershed Effects of Ponderosa Pine Areas

Soil condition is generally satisfactory within those Terrestrial Ecosystem Survey (TES) map units dominated by ponderosa pine. Current sheet and rill erosion from forested areas is minimal as a result of acceptable vegetative ground cover provided by needle casts, oak leaves, woody debris and other perennial vegetation such as grasses, forbs and shrubs. Satisfactory soil condition indicates that the inherent productivity capacity of the soil resource is being maintained with respect to all soil functions and minimal erosion. However, there is a lack of perennial grasses and forbs in the dense canopy closures (greater than 80 BA).

**Dense Pine More than 80 BA:** Condition in this community type over the majority of the Windmill Allotment is stable. The dense canopy closure coupled with the thick needle cast generated from these conditions provide for satisfactory soil condi-

Table 15. Portions (in %) of Watersheds in the Windmill Allotment with Satisfactory or Unsatisfactory Soil Condition Currently and Under Each Alternative (13 digit number represents the National watershed code).

Watershed	Condition Class	Current
BAR M CANYON 1506020288001 1,407 Acres	Satisfactory Unsatisfactory	100 0
BEAVERHEAD FLAT 1506020288006 899 Acres	Satisfactory Unsatisfactory Map Unit 402 Map Unit 404 Map Unit 463	21 21 50 8
COFFEE CREEK 1506020287008 14,510 Acres	Satisfactory Unsatisfactory Map Unit 402 Map Unit 404 Map Unit 414 Map Unit 418 Map Unit 420	76 <1 1 5 13 5
CRAZY PARK 1506020287004 15,048 Acres	Satisfactory Unsatisfactory Map Unit 55 Map Unit 530	98 <1 2
DUFF FLAT 1506020290001 27,935 Acres	Satisfactory Unsatisfactory Map Unit 404 Map Unit 414 Map Unit 420	60 2 3 1
FRY CANYON 1506020287001 14,913 Acres	Satisfactory Unsatisfactory Map Unit 55	83 17
HOUSE MOUNTAIN 1506020288005 3,387 Acres	Satisfactory Unsatisfactory Map Unit 402 Map Unit 404 Map Unit 414 Map Unit 420 Map Unit 463	60 15 14 6 3 2
JACKS CANYON 1506020288004 8,411 Acres	Satisfactory Unsatisfactory Map Unit 402 Map Unit 404	96 1 3

Table 15. Portions (in %) of Watersheds in the Windmill Allotment with Satisfactory or Unsatisfactory Soil Condition Currently and Under Each Alternative (13 digit number represents the National watershed code).

Watershed	Condition Class	Current	Watershed	Condition Class	Current
LITTLE L O SPRING	Satisfactory	92	SYCAMORE BASIN	Satisfactory	90
1506020286004	Unsatisfactory		1506020286005	Unsatisfactory	
2.394 Acres	Map Unit 55	1	13.832 Acres	Map Unit 404	3
	Map Unit 530	7		Map Unit 414	<1
				Map Unit 420	<1
LOY CANYON	Satisfactory	62		Map Unit 463	6
1506020287006	Unsatisfactory		TURKEY BUTTE	Satisfactory	92
24.236 Acres	Map Unit 402	3	1506020286003	Unsatisfactory	
	Map Unit 404	1	7,187 Acres	Map Unit 55	<1
	Map Unit 414	6		Map Unit 530	8
	Map Unit 418	13	VOLUNTEER CANYON	Satisfactory	100
	Map Unit 420	13	1506020286001	Unsatisfactory	0
	Map Unit 463	2	4,535 Acres		
MUNDS CANYON	Satisfactory	95	WEST FORK OAK CREEK	Satisfactory	>99
1506020287005	Unsatisfactory		1506020287003	Unsatisfactory	
16.997 Acres	Map Unit 55	2	22,970 Acres	Map Unit 55	<1
	Map Unit 530	3			
OAK CREEK CORNVILLE	Satisfactory	66	WOODS CANYON	Satisfactory	98
1506020287011	Unsatisfactory		1506020288002	Unsatisfactory	
11.077 Acres	Map Unit 402	11	15.198 Acres	Map Unit 55	2
	Map Unit 404	5		Map Unit 530	<1
	Map Unit 414	1			
	Map Unit 418	2			
	Map Unit 420	10			
	Map Unit 463	4			
OAK CREEK SEDONA	Satisfactory	87			
1506020287009	Unsatisfactory				
11,572 Acres	Map Unit 402	4			
	Map Unit 404	1			
	Map Unit 420	2			
	Map Unit 463	6			
PUMPHOUSE WASH	Satisfactory	100			
1506020287002	Unsatisfactory	0			
3,880 Acres					
SECRET CANYON	Satisfactory	90			
1506020287007	Unsatisfactory				
20,016 Acres	Map Unit 414	6			
	Map Unit 418	<1			
	Map Unit 420	4			
	Map Unit 463	<1			
SHEEPSHEAD CANYON	Satisfactory	100			
1506020287010	Unsatisfactory	0			
3,896 Acres					

tion. There is little forage production associated with these areas which limits the impacts from grazing animals. There should be no change in watershed conditions for this community type for any of the alternatives.

**Pine Less than 80 BA:** Soil conditions in this community type are similar to those found in the dense pine except that as the canopy becomes more open, more forage is produced. This tends to draw more grazing animals into this type. Generally, the more open the canopy the greater the forage production (with differences due to soil type and moisture availability). This utilization, although greater than in the more dense pine, is still relatively low. The grazing animals will tend to concentrate in the areas with the highest forage production, thus the impacts from grazing in the pine type is less than in the meadows and riparian. Also included in this type is the transition areas (areas where pinyon-juniper transition into pine). These transition areas are used heavily by elk as winter range and this impact will not be changed by any of the action alternatives.

## **Watershed Effects of Mountain Meadows**

Many mountain meadows found in the Windmill Allotment ponderosa pine type are considered to be in unsatisfactory condition due to massive or platy surface structure resulting in poor distribution of organic matter, poor plant diversity and far less than potential ground cover. Soils in mountain meadows commonly exhibit changes in the soil's physical properties (i.e. closed soil pores and platy or massive soil structure) in the surface horizon. Platy and/or massive structure (compaction) is observed in soils that have been subjected to heavy grazing (both cattle and elk), roads and recreational use (e.g. off-road vehicle use or recreational camping). Compaction reduces infiltration which has an adverse affect on vegetative ground cover and organic matter production and species diversity of perennial grasses and forbs. Vegetative ground cover is inadequate within most of the mountain meadows within the Windmill Allotment. Organic matter in the form of litter and humus is lacking. The Forest Land Management Plan (FLMP) requires that mountain grasslands achieve vegetative ground cover at 90 percent of potential. Unsatisfactory soil condition indicates that soil productivity is not being sustained with respect to water infiltration and storage.

The erosion hazard (sheet and rill erosion) is rated as slight for mountain meadows. Potential as well as current soil loss rates as predicted by the Universal Soil Loss Equation (USLE), do not exceed tolerable soil loss rates. This is primarily due to slope (average slope gradient for this map unit is 1 percent).

Much of the condition found in the mountain meadow type is a result of historic heavy cattle grazing practices predominately large numbers of cattle for long periods of time. Heavy historic and current, nearly continuous grazing has reduced plant and litter cover leading to sealing of the soil surface via raindrop impact and hoof compaction. This in turn has most likely resulted in reduced infiltration and increased runoff. The effects of this heavy grazing caused a shift in the plant community from a mix of cool and warm season grasses and forbs, to a plant community dominated by grazing tolerant warm season plants with few cool season plants. The plants that dominate under heavy grazing conditions tend to be more grazing tolerant while the plants that do not tolerate grazing well tend to disappear. Another factor involved in the shift in plant communities is the introduction of several species of grasses (either intentionally or not) into these communities. Some of these plants were introduced because they produced more biomass for grazing animals (both domestic and

wild). These introduced plants may displace the native plants, because they may be better able to take advantage of the available moisture and lack natural enemies.

Another consequence of heavy grazing is the removal of standing crop vegetation and litter resulting in less organic matter being incorporated into the soil. Organic matter is an important factor in aggregate formation and stability and nutrient cycling. A decrease in above ground biomass may eventually be mirrored in a decrease in root biomass.

Grazing periods and number of grazers determine the degree of impact that will be caused by grazing an area. The longer the grazing period, the greater the possibility of grazing regrowth (regrowth is growth of a plant after it has been grazed). When this occurs, the plant has to put more effort into above ground production at the expense of root biomass reserves. Regrowth by a plant is available for grazing by cattle and elk after day 20, depending on available moisture and plant health.

In all the action alternatives, the pastures with large meadows (Fry Park Pasture - 1,232 acres, 35 percent of the meadows on the Windmill Allotment and Mill Pasture - 1,332 acres, 38 percent of the meadows on the Windmill Allotment) will be grazed for no more than 10 days. This means that the grazing period in these pastures is being reduced from a current maximum of 60 days to a maximum of 10 days. This reduction of days will eliminate the likelihood of grazing of the regrowth by cattle; however, cattle are not the only grazers in these meadows. Heavy grazing by elk will also cause a grazing of the regrowth. These 10-day grazing periods, in the absence of elk, would have a very beneficial effect on the meadows, but with the heavy elk influence, we can expect only slight improvement. Most grazers (elk and cattle included) will tend to concentrate in meadows where nutritional and water requirements can generally be met.

## **Watershed Effects of Desert Grasslands**

The desert grassland portion of the Windmill Allotment is below the Mogollon Rim. In this arid environment, plant production is limited by climate and edaphic (soil) factors. It is difficult to assess the extent to which grazing influences ecosystem processes relative to abiotic factors as vegetation dynamics may be strongly influenced by climate. The influence of grazing on species composition and productivity can be minor relative to changes caused by variation in rainfall (Thurow 1991).



Grazing is done predominately during the winter months which has specific implications for the grazed plants. Winter grazing coincides, for the most part, with the plants dormant period (time when plants are not growing and have translocated many of their nutrients back into their roots). When plants are grazed at this time, there is little impacts to the plant physiology; however, consumption of above ground forage diverts above ground biomass from the litter component and modifies microclimate.

Litter helps to create a more consistent temperature and moisture microenvironment that favors microorganism activity. These factors enhance formation of soil aggregates and aid in water infiltration. The amount and intensity of precipitation reaching the soil surface may be influenced by grazing to the extent that grazing alters the type of vegetative cover at the site. Reduced vegetative ground cover often results in increased erosion, runoff and soil crusting. Depending on the amount of biomass removed and over how many years it is removed, there could be some negative impacts to long-term productivity. On the other hand, grazing may have some benefits, in that grazing does help to break up some soil crusting, adds nutrients to the soil (animal waste products), and the physical action of the animals moving around knocks plant material down, and plant seeds in the ground.

The potential for improving vegetation and soil condition is greatest in the deeper soils. Shallow and/or lithic soils have inherently low vegetative productivity and infiltration characteristics. In deep to moderately deep soils, as management improves (shorter grazing periods), a more rapid response is expected as compared to the shallow soils. This response can be generalized to all the desert portion of the Windmill Allotment. This portion will respond more effectively to cattle grazing management because unlike the situation on the summer range where there are two major grazers (cattle and elk), cattle are the main impacts on the winter (desert) portion.

Action alternatives for the winter portion of the Windmill Allotment address four main areas of concern which effect vegetative and soil characteristics. These concerns are rest in pastures, cattle distribution, reasonable grazing periods, and grazing in riparian areas.

To address the concern for providing rest, the action alternatives incorporate rest into most pastures over a 4- to 5-year period. Because cattle are the main grazing impact on the winter portion of the allotment,

rest from cattle grazing should provide an opportunity for the plants to maintain and possibly improve vigor and distribution.

Improved cattle distribution will be achieved through the use of water accessibility and new fence construction. Water will be shut off to different portions of the pastures to force cattle to move from one area and fences will be built to split large pastures into smaller ones to also help achieve better distribution. In conjunction with better distribution, shorter grazing periods are also a key factor in improving vegetation and soil condition. Splitting pastures will help to achieve this.

One of the key areas on Windmill Allotment and throughout the Coconino National Forest are riparian areas. These areas have high value for wildlife, recreation, water quality and flood control. Given these values, riparian areas in the winter portion of the allotment have been excluded from cattle grazing. The only exception is Dry Beaver Creek which is grazed for a maximum of 10 days in the spring.

Review of days per pasture, season of cattle use, cattle distribution, amount of rest and ability of cool season species (*Stipa*) to maintain healthy plant vigor, resulted in the following ranking of alternatives for watershed condition:

**Alternative B** - First best for watershed improvement in the short-term (10 years). Fastest upward trends expected for 10 years, with upward trends tapering off and possibly declining between 10-20 years due to plant decadence.

**Alternative D** - Second best for watershed improvement in the short-term (10 years). Next fastest upward trends expected for 10 years, with upward trends tapering off between 10-20 years due to plant decadence.

**Alternative F** - Second best for watershed improvement in the short- and long-term. Second fastest upward trends expected because of shortened days/pasture and rest incorporated into system.

**Alternatives A and G** - Third best for watershed improvement in the short- and long-term.

**Alternative C** - Fourth best for watershed improvement in the short- and long-term.

Alternatives D and F watershed rankings for the desert grassland cannot be easily separated. Alternative D uses reduced cattle numbers to improve watershed conditions. Reduced cattle numbers increases pasture rest to fringe areas, i.e. edges of pastures and away from water. With Alternative F, cattle would graze most of these fringe areas. Alternative F allows grazing within the SWWF 5.0 radius (Gyberg, Duff Mesa and Duff Flat) during the breeding season 2 out of 6 years. By doing this, more pasture rotation options are available which create yearlong rest in these three pastures and increased seasonal deferment to all Mill Park herd pastures. With Alternative D, cattle would graze these three pastures every year and pasture rotation options are limited.

Alternatives A and G have the same pasture rotations as Alternative D except with higher cattle numbers. The higher cattle numbers will reduce the amount of rest each pasture receives.

It is recognized that cattle grazing management is only one part of managing healthy watersheds. Other projects such as prescribed fire, structural improvements in gullies, and road and trail management also affect watershed conditions. We have created a list of desired projects in the Windmill Winter Division. These projects will not be a part of this decision, but future NEPA may tie to this analysis. Also, the Sedona/Oak Creek Ecosystem Management Project is in the process of creating a fire management program for the Windmill winter area.

### **Effects to Riparian Areas**

Utilization of woody vegetation is the main impact in these small key areas. In the absence of all grazing, these areas would show a marked improvement in 1 to 5 years. These areas are used extensively by both livestock and wildlife. The alternative that reduces or eliminates livestock grazing around these springs will help in terms of livestock utilization, but will not address the elk use that can be just as severe.

### **Effects to Cryptogamic Soils**

Cryptogamic soils occur below the Mogollon Rim in sandstone and limestone soils within the pinyon-juniper woodland, transition, and desert grassland communities on this allotment. Approximately 24 percent of these soil types will not be grazed in any of the alternatives. Of the approximate 76 percent

cryptogamic soil types remaining, grazing will have an effect on these soils through hoof action from cattle. Alternative B will have the least effect because cattle will only graze on State Trust Lands. The rest of the alternatives are ranked from least to most effect as follows: D, G (A, C, F). This ranking was made by the number of cattle permitted in each alternative.

Cryptogamic soils are typically found in low forage production areas. Cattle impacts are lower in these areas because cattle are more attracted to higher forage productive sites. Trailing and gathering cattle through cryptogamic soil areas may have an effect on these soils but even this activity is limited on these low forage production sites.

### **Alternative Comparison Table - Soil and Watershed Condition**

Table 16, on the following pages, compares the alternatives for soil and watershed conditions for all vegetation types. A baseline of no cattle and elk (ungulate) grazing category is given to compare to the alternatives.

### **Effects of Alternatives on Plant Vigor and Reproductive Health Related to Plant Utilization**

#### **Explanation of Forage Utilization**

Forage utilization is a measure of the biomass of plants being removed from an area. For example, if an area shows 50 percent forage utilization, then, on average, 50 percent of the plant biomass in that area is being removed. Some plant species or individual plants may be used more than others, but the average loss of plant biomass in the area is 50 percent.

Methods for determining forage utilization include ocular estimates and the clipping and weighing of plots. Utilization estimates for the Windmill Allotment were made with the ocular method in which an estimate of plant biomass used is made based on a visual inspection of the plants.

Many factors affect forage utilization. Two main factors are species composition and the availability of water. Sensitive areas tend to be utilized more than other upland areas because they contain higher amounts of palatable forage and water.

Table 16. Alternative Comparison for Soil and Watershed Conditions

Mountain Meadows	Baseline	Alternative B	Alternative C	Alternative D	Alternatives A, E, F, G
<p>3,499 acres Total: 3,018 acres Mill Park, and 481 acres Munds/Fox.</p>	<p>Desired Response - "Potential Conduction" Maximum reduction of grazing impacts (no cattle and elk).</p>	<p>Expected Response - Meadow forage use by elk is documented in the range of 60%+.</p>			
	<p>As a result of years of overuse in these areas, current soil condition is far from potential. Overgrazing has reduced plant and litter cover. The soil surface has become sealed through raindrop impact and hoof compaction thereby reducing infiltration. Trampling of moist soil has destroyed soil aggregates by compacting them into a relatively impermeable surface layer. Recovery of surface properties may require decades. Surface structure will improve through incorporation of organic matter and normal freeze/thaw processes. As plant vigor, soil condition, and litter improve, ground cover should also improve. Abundance and diversity of plant species should increase.</p>	<p>Soil structure may improve, but at a very slow rate due to season long presence of elk. Trampling is likely to continue, but at a reduced level. Organic matter is not likely to improve if current utilization (60%+) continues. Measurable change in soil condition is likely to be low in the 10-year period covered in this analysis even though 30-40 days of impact from cattle is eliminated.</p>	<p>Soil structure may not improve primarily because of the length of time cattle are present. Excessive trampling is likely to continue. Soil surface organic matter will not improve due to heavy utilization of plants and consequent lack of litter production.</p> <p>Plant diversity and ground cover will not increase, and may well decrease during drought conditions.</p> <p>Grazing of plant regrowth is likely to occur during the longer grazing times.</p>	<p>Grazing only 10 days in the Mill Park and Fry Park pastures, and 5 days in the Metz pasture will have only slightly more impact than Alternative "B". Cattle numbers are reduced from Alternatives "A, E, F, and G" which should result in less impact than these alternatives.</p> <p>Roughly 30-day grazing periods in the Munds and Foxboro divisions may not allow for improvement over current conditions. Little T-Six and Highway Camp pastures are not grazed, but account for only 61 meadow acres.</p>	<p>Grazing only 10 days in the Mill Park and Fry Park pastures, and 5 days in the Metz pasture will have only slightly more impact than Alternative "B" and "D". These three pastures account for 80 percent of the Windmill mountain meadows. The other 20 percent will have grazing periods of between 15 and 25 days.</p> <p>Shorter grazing lengths in the meadows should have the effect on plant diversity and ground cover similar to Alternative "B" over 80% of the meadows. The other 20% may improve slightly with 15-25 day grazing, but species diversity is likely to remain static.</p>

Table 16. Alternative Comparison for Soil and Watershed Conditions (continued).

<b>Dense Ponderosa Pine (&gt;80 basal area)</b>	<b>Baseline</b>	<b>Alternative B - Expected Response</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternatives A, E, F, G</b>
	<p>Forage utilization studies indicate that very little forage is produced or utilized in this vegetative component. Pine needle litter comprises most of the ground cover. Watershed condition and function are considered to be at potential. Soil structure has not been altered by grazing animals. Condition is expected to remain similar to current.</p>	<p>The effects are the same as Alternative "B" - desired response.</p>	<p>The effects are the same as Alternative "B" - desired response.</p>	<p>The effects are the same as Alternative "B" - desired response.</p>	<p>The effects are the same as Alternative "B" - desired response.</p>
<b>Ponderosa Pine (&lt;80 basal area) Transition Pine</b>	<b>Baseline</b>	<b>Alternative B - Expected Response</b>	<b>Alternative C</b>	<b>Alternative D</b>	<b>Alternatives A, E, F, G</b>
	<p>Soil structure and bulk density will remain unchanged as there is currently little concentrated impact from grazing animals. Organic matter, plant diversity, and ground cover should improve to potential.</p>	<p>Soil structure and bulk density will remain unchanged as there is currently little concentrated impact from grazing animals. Organic matter, plant diversity, and ground cover should improve toward potential, but at a slower rate. Transition areas will continue to be heavily used by wildlife in the spring, fall, and winter. Little if any recovery is expected.</p>	<p>In addition to Alternative "B" Expected Response, 30-60 day use by livestock will inhibit any improvement in plant organic matter and ground cover conditions. The proposed grazing times probably results in grazing of re-growth.</p>	<p>Reduced cattle numbers may produce slightly more improvement than Alternatives "A, E, F, and G" even though the grazing length is slightly longer. Seed heads, organic matter, and ground cover should improve over current conditions. Improvements (fencing) are not as critical as in Alternatives "A, E, and F" to improve soil condition.</p>	<p>Organic matter, plant diversity, and ground cover may increase over current due to shortened (20-30 days) grazing lengths. Since fencing may take some time to complete, measurable change may occur toward the end of the 10-year period. Alternative "G" best reduces numbers in the Munds and Foxboro divisions and is less dependent on structural improvements.</p>

Table 16. Alternative Comparison for Soil and Watershed Conditions (continued).

Riparian Areas Below the Rim	Baseline	Alternative B - Expected Response	Alternative C	Alternative D	Alternatives A, E, F, G
<p>Oak Creek, Spring Creek, Sheepshead Spring</p> <p>Dry Beaver Creek</p>	<p>Any current impact from cattle will be removed.</p> <p>Any current impact from cattle will be removed.</p>	<p>Any current impact from cattle will be removed.</p> <p>Any current impact from cattle will be removed.</p>	<p>No cattle grazing is permitted in Spring Creek and Sheepshead Spring. Oak Creek will be grazed below Red Rock State Park, near Echo Canyon to just below Mormon Crossing.</p> <p>An average grazing length of 18 days may prohibit any improvement in woody vegetation. Channel structure is not likely to be effected adversely.</p>	<p>No cattle grazing is permitted. Any negative effects will be associated with management failure.</p> <p>An average grazing length of 18 days may prohibit any improvement in woody vegetation. Channel structure is not likely to be effected adversely.</p>	<p>No cattle grazing is permitted. Any negative effects will be associated with management failure.</p> <p>An average grazing length of 18 days may prohibit any improvement in woody vegetation. Channel structure is not likely to be effected adversely.</p>
Riparian Areas Above the Rim	Baseline	Alternative B - Expected Response	Alternative C	Alternative D	Alternatives A, E, F, G
	<p>Utilization of woody vegetation and trampling of soft soil are the main impacts from grazing on these small, sensitive areas. In the absence of grazing impacts, the areas will progress rapidly toward potential vegetation and soil condition.</p>	<p>Because these areas provide water and nutritious forage, use by elk will continue to prohibit significant improvement. The woody plant component will continue to decline.</p>	<p>Combined grazing impacts from cattle and elk will perpetuate overuse of riparian vegetation. The woody component will continue to decline.</p>	<p>Combined grazing impacts from cattle and elk will perpetuate overuse of riparian vegetation. The woody component will continue to decline.</p> <p>Protection measures to exclude cattle and elk from some areas are proposed.</p>	<p>Combined grazing impacts from cattle and elk will perpetuate overuse of riparian vegetation. The woody component will continue to decline.</p> <p>Protection measures to exclude cattle and elk from some areas are proposed.</p>

Table 16. Alternative Comparison for Soil and Watershed Conditions (continued).

Soils Below the Rim Cattle Winter Range	Baseline	Alternative B - Expected Response	Alternative C	Alternative D	Alternatives A, E, F, G
	<p>The amount of litter carried over from year to year will increase. Ground cover and organic matter should increase. Plant diversity and plant production should also improve. However, plant production and the resultant effect on soil condition will be primarily controlled by climate and edaphic factors.</p>	<p>The amount of litter carried over from year to year will increase. Ground cover and organic matter should increase. Plant diversity and plant production should also improve. However, plant production and the resultant effect on soil condition will be primarily controlled by climate and edaphic factors.</p>	<p>The action alternatives for the winter range attempt to provide rest from grazing in most pastures every 4-5 years. Grazing is mostly limited to the plant dormant season.</p>	<p>The action alternatives for the winter range attempt to provide rest from grazing in most pastures every 4-5 years. Grazing is mostly limited to the plant dormant season.</p> <p>Perennial waters subject to adverse impacts will be removed from grazing.</p> <p>Fewer cattle (56% Mill Park, 20% Munds, 60% Foxboro) make this the least likely of the grazing alternatives to have any adverse impacts to soil condition.</p>	<p>The action alternatives for the winter range attempt to provide rest from grazing in most pastures every 4-5 years. Grazing is mostly limited to the plant dormant season.</p> <p>Perennial waters subject to adverse impacts will be removed from grazing.</p> <p>Alternative "G" may have some advantage over "A, E, and F" in that cattle numbers in Munds/Foxboro herds are reduced.</p> <p>Alternative "E" is likely to adversely impact pastures outside willow flycatcher habitat because of restrictions within the habitat.</p>

Table 17. Expected Utilization in Sensitive Areas\* (estimates in percent) on the Windmill Allotment.

Sensitive Areas	Utilization Levels		
	Acceptable	Alternative B**	Alternatives A,C,D,F,G***
<b>Dry Meadows</b>			
Peaks District	35-50	25-45	50-75
Mormon Lake District Munds Area	35-50	30-60	60-80
Mormon Lake District Foxboro Area	35-50	20-50	60-80
<b>Springs In Pine Vegetation Type</b>			
Easily Accessible	35-50	0 (exclosures)	0 (exclosures)
Remote	35-50	35-50	35-50
<b>Perennial Creeks</b>			
Oak Creek	35-50	0	0, C=20
Sycamore Creek	35-50	0	0
<b>Emphemeral Creeks</b>			
Below The Rim (Dry Beaver And Dry Creek)	35-50	0	35-50
<b>Other Areas</b>			
Greasy Spoon Tank Area	50	0	50
Robinson Tank Area	50	0	50
Casner Mountain Top	30-40	70+	70+
Jacks Point	35	50-60	60-80

\* A sensitive area is one with high production potential and high levels of use. These areas relate to problem statements made in other sections of this document.

\*\* Does not include State Trust lands.

\*\*\*Projected utilization levels when cattle use these areas. Year-long rest by cattle varies by alternative.

Alternatives A, F and G use 50 percent or less use of forage plants by cattle in all pastures as a goal to maintain or improve watershed conditions. This level of use is appropriate with these intensive grazing management systems regardless of range conditions in this area. The main reasons for this higher use level is the reduction in grazing of regrowth by cattle, increased amount of pasture rest, and the increased amount of seasonal deferment. Grazing to 50 percent use has little to no effect on root growth stoppage of a forage plant (USDA 1975). Dense tree canopies limit forage production and is the main reason for poor range conditions on the Windmill Allotment.

### Utilization in Sensitive Areas

Utilization in sensitive areas on the Windmill Allotment can be divided into two main zones: one above the Mogollon Rim and one below the Mogollon Rim. In sensitive areas above the Mogollon Rim, utilization is high throughout the year because both cattle and elk use these areas. In May, elk have used these areas throughout the spring and forage utilization ranges from 75 to 90 percent. In November, both cattle and elk have used these areas during the summer and forage utilization ranges from 80 to 90 percent. Forested uplands are generally used less than riparian areas. Both cattle and elk use these uplands, but here forage utilization ranges from only 5 to 10 percent in May and 25 to 30 percent in November. Below the Mogollon Rim, elk are beginning to use riparian areas more, but their numbers are still low. This may be an issue that requires monitoring to prevent overuse of riparian areas below the Mogollon Rim in the future.

Utilization in sensitive areas is listed in Table 17. This table gives acceptable levels of utilization and expected utilization by alternative.

### Estimates of Overall Pasture Utilization

For the discussions which follow, differences in estimated utilization outside of sensitive areas (meadows and riparian sites) affect plant vigor but not overall watershed condition. As described in the previous watershed sections, watershed conditions

are stable in most areas. Differences in utilization does not cause differences in watershed conditions because of tree cover, rock component and soil characteristics. Utilization can, however, affect plant vigor, quantity of seed heads and reproductive health.

A general rule of thumb in range management is to leave 50 percent plant biomass to support plant vigor and reproduction. Leaving more plant biomass, with some plant species, adds to plant health. The amount of total elk and cattle utilization also affects the presence or absence of seed heads which serve as an important food source for turkey and many other non-game species.

On a pasture-by-pasture basis, the overall estimated utilization was compared with the estimated forage produced. It is important to note that although the overall pasture may be estimated at 50 percent or less use of plant biomass, sensitive sites will still receive overutilization as described in the preceding section on utilization of sensitive areas.

Below is a description by alternative of the number of pastures where estimated use exceeds 50 percent of estimated production:

- Alternative A** - 13 out of 75 pastures.
- Alternative B** - 1 pasture on FS lands.
- Alternative C** - 23 out of 56 pastures.
- Alternative D** - 1 out of 76 pastures.
- Alternative F** - 13 out of 76 pastures.
- Alternative G** - 1 out of 77 pastures.

In all the Divisions except the Munds Pocket summer area, there were a few (1-5) pastures where estimated use exceeded estimated forage production. Overall use on the Division could be balanced through pasture splits and lessening the number of days cattle grazed pastures. In the Munds Pocket summer range, however, all but one pasture was estimated to be over 50 percent utilization of the estimated forage. This indicates an imbalance in the entire Munds Pocket summer area. This imbalance is caused either by incorrect data in the spreadsheet or incorrect past production utilization studies (which has set the current cattle numbers).

It is important to remember that the utilization estimates were not based on formal production utilization monitoring or other formal studies. Broad based estimates were used to indicate areas that were out of balance, but exact extent of this imbalance is not known.

## Explanation of Grazing Capacity

The 1997 Region 3 USFS Rangeland Handbook describes carrying capacity as the average number of livestock and/or wildlife which may be sustained on a management unit compatible with management objectives for the unit. In addition to site characteristics, it is a function of management goals and management intensity. Holechek, Pieper, and Herbel (1989) describes grazing capacity as the maximum stocking rate possible year after year without inducing damage to vegetation or related resources. Capacity for domestic cattle grazing was determined for the Windmill Allotment with production utilization studies from the 1970s to the early 1990s. These studies removed non-capacity range from total available acres, and formed capacity figures from full and partial capacity lands. No new formal production utilization studies have been done since the early 1990's.

The grazing capacity spreadsheet was an attempt to use TES and tree stand data base information to reach an estimated forage capacity. The spreadsheet, although useful, has its limitations and was used to show areas of concern not to determine exact capacity. Each alternative addresses capacity in a different way, either by professional judgement and old production utilization studies (Alternatives A, C and F) or by the spreadsheet (Alternatives D and G). The attempt to estimate forage produced and the total dietary needs of cattle and elk was an effort to better understand changes that have occurred in the allotment over time. However, the estimates we used to find out-of-balance areas are not detailed enough to fine tune capacity figures.

## Affected Environment of Water Quality

### Assessments of Water Quality in Watersheds on the Allotment

The Department of Environmental Quality water quality assessment report referred to as the 1994 305(b) Report is a description of the status of water quality in Arizona. The report was prepared to fulfill biennial reporting requirements contained in the Clean Water Act. Assessments of surface water quality are primarily based on surface water monitoring results from October 1, 1988 to September 30, 1993. Table 18, on the following page, summarizes the water quality status within those watersheds that occur within the Windmill Allotment.



Any above background sources of sediment within the Windmill Allotment area come from the cumulative effects of a variety of sources. Activities within the watersheds are displayed in the cumulative effects section. All of the action alternatives are designed to improve grazing practices and result in improved soil conditions over current. Riparian areas will be excluded from cattle grazing in all alternatives. This should help to reduce any adverse effects from cattle grazing that may currently effect water quality.

### Explanation of Guidance Practices to Comply With the Clean Water Act

The Nonpoint Source Intergovernmental Agreement signed by the Forest Service (Region 3) and the Arizona Department of Environmental Quality states that the Forest Service will endeavor to minimize and mitigate all potential nonpoint source pollution activities. As agreed upon by the state of Arizona and the Forest Service, the most practical and effective means of controlling potential nonpoint pollution

Table 18. Water Quality Status of Watersheds Affected by the Windmill Allotment.

Waterbody Name Location Reach or Lake Number	Waterbody Size (Miles)	Designated Uses	Assessment Category	Water Quality Limited	Use Support	Assessment Comments
Verde River, Sycamore Creek- Oak Creek 15060202-025	24	A&Ww, FBC, FC, Agl, Agl	Monitored	Yes	Partial	<ul style="list-style-type: none"> <li>• USGS station (Clarkdale) and 4 other ADEQ monitoring sites, 1991-95, 72 samples: uses impaired by arsenic and turbidity.</li> <li>• The Verde Formation, a natural alluvial deposit in the middle Verde River, is the major source of high arsenic. Anthropogenic activities (mining, manufacturing) do not appear to be a source at ambient (lower) flows.</li> </ul>
Volunteer Wash, Headwaters- Sycamore Creek 15060202-020ffv	16	A&Wc, FBC, FC Agl, AgL	Evaluated	No	Threat	Volunteer Wash receives drainage from the U.S. Army Navajo Depot Hazardous Waste Disposal Facility. In 1993, ADEQs Priority Pollutant Program took a set of sediment samples from the wash as it exited the military base: only arsenic was found to be elevated in the wash sediment, but at background levels found in Arizona.
Sycamore Creek Cedar Creek- Verde River 15060202-0250ffb	9.3	A&Wc, FBC, FC Agl, AgL	Monitored	No	Full	<ul style="list-style-type: none"> <li>• ADEQ Biocriteria Development monitoring site (summer/spring) 1992-95, 5 samples: full support.</li> <li>• USFS monitoring 1991, 3 samples: full support.</li> </ul>
Dry Beaver Creek, Rattle- snake-Jack Canyon 15060202-011	3.3	A&Wc, FBC, FC Agl, AgL	Evaluated	No	Full	<ul style="list-style-type: none"> <li>• USFS/ADEQ cooperative monitoring 1991, 3 samples: full support</li> <li>• ADEQ Biocriteria Development monitoring site (physical/chemical samples), 1 sample in 1995: full support</li> </ul>

Table 18. Water Quality Status of Watersheds Affected by the Windmill Allotment (continued).

Waterbody Name Location Reach or Lake Number	Waterbody Size (Miles)	Designated Uses	Assessment Category	Water Quality Limited	Use Support	Assessment Comments
Dry Beaver Creek Rattlesnake-Wet, Beaver 15060202-010	13	A&Wc, FBC, FC Agl, AgL	Monitored	No	Full	<ul style="list-style-type: none"> <li>• ADEQ monitoring 1991-93, 8 samples: full support. ADEQ compliant investigation at a sand and gravel operation: full support.</li> </ul>
Jacks Canyon Creek, headwaters- Dry Beaver Creek 15060202-008	11.1	Varies	Evaluated	No	Partial	<ul style="list-style-type: none"> <li>• There are two sets of designated uses on this waterbody: A&amp;WC, FBC, FS, agl, and AgL above Big Park WWTP discharge, and A&amp;Wedw and PBC below the Discharge.</li> <li>• Evaluation based on report and concern by US Forest Service District Park Improvement District discharge (correspondence dated June 8, 1993). Two facilities discharge to this reach, but only one has had a permit to discharge (as of Jan. 1, 1996).</li> </ul>
Oak Creek, headwaters- West Fork 15060202-019	17.7	A&Wc, DWS, FBC, FC, Agl, AgL, (Unique Water)	Evaluated	No	Partial	<ul style="list-style-type: none"> <li>• ADEQ monitoring (above West Fork) 1988-91, 8 samples: full support.</li> <li>• ADEQ Biocriteria Development Program monitoring sites at Cave Spring Camp and Pine Flat (physical/chemical monitoring) 1992-93, 9 samples: partial support due to low dissolved oxygen and high turbidity.</li> </ul>
Oak Creek, West Fork- Dry Creek 15060202-018	21.7	A&Wc, DWS, FBC, FC, Agl, AgL, (Unique Water)	Monitored	Yes	Non	<ul style="list-style-type: none"> <li>• Monitoring at Slide Rock Park has resulted in occasional closing of the swimming area due to high fecal coliform counts in the water. Sediments also high in fecal coliform.</li> <li>• USGS (Red Rock) station 1991-94, 37 samples: partial support of uses due to arsenic and turbidity.</li> <li>• ADEQ has 2 monitoring sites (Lomacasi Resort, Red Rock Crossing) 1992-95: 18 samples, partial support due to turbidity.</li> <li>• ADEQ Biocriteria Development sites 1992-95, 4 sites with 6 samples 1992-95: partial support due to turbidity.</li> </ul>

Table 18. Water Quality Status of Watersheds Affected by the Windmill Allotment (continued).

Waterbody Name Location Reach or Lake Number	Waterbody Size	Designated Uses	Assessment Category	Water Quality Limited	Use Support	Assessment Comments
Oak Creek, Dry Creek- Spring 15060202-017	9	A&Wc, DWS, FBC, FC, Agl, AgL, (Unique Water)	Monitored	Yes	Partial	<ul style="list-style-type: none"> <li>• ADEQ Biocriteria Development sites and ADEQ Complaint Investigation - 3 samples 1992-95, uses impaired by turbidity, iron and arsenic. Iron and arsenic level may be natural; however, turbidity is due to natural conditions combined with construction activities, grazing, recreational activity, urban runoff, and other activities occurring within the watershed which increase erosion or deteriorate riparian conditions.</li> <li>• The AGFD hatchery has a permit to discharge to this reach.</li> </ul>
Oak Creek, Spring-Verde River 15060202-016	10.4	A&Wc, DWS, FBC, FC, Agl, AgL, (Unique Water)	Monitored	Yes	Non	<ul style="list-style-type: none"> <li>• ADEQ fixed site 6 samples and special investigation of Lower Oak Creek (6 other sites) all in 1992: uses impaired by turbidity, arsenic, iron, and low dissolved oxygen. Arsenic at a natural level. High turbidity and low dissolved oxygen are due to a combination of natural conditions and multiple activities within this watershed (intensive recreation, construction activities, urban runoff, and grazing).</li> </ul>
Spring Creek headwaters-Oak Creek 15060202-022	4.8	A&Ww, FBC, FC Agl, AgL	Evaluated	No	Full	<ul style="list-style-type: none"> <li>• ADEQ Biocriteria Development site (physical/chemical monitoring) 1992-95, 7 samples: full support.</li> </ul>
West Fork Oak Creek, head- waters-Oak Creek 15060202-020	11	A&Wc, FBC, FC AgL (Unique Water)	Evaluated	No	Full	<ul style="list-style-type: none"> <li>• ADEQ Biocriteria Development site (physical/chemical monitoring) 1992-95, 7 samples: full support.</li> </ul>
Pumphouse Wash, head- waters-Oak Creek 15060202- 0190ffp	11	A&Wc, DWS, FBC, FC, Agl, AgL	Monitored	Yes	Non	<ul style="list-style-type: none"> <li>• ADEQ station 1990-93, 9 samples: uses impaired by turbidity, dissolved copper, iron, and low dissolved oxygen. Streambank destabilization has been noted by ADEQ field personnel.</li> </ul>

Table 18. Water Quality Status of Watersheds Affected by the Windmill Allotment (continued).

Waterbody Name Location Reach or Lake Number	Waterbody Size	Designated Uses	Assessment Category	Water Quality Limited	Use Support	Assessment Comments
Munds Creek headwaters-Oak Creek 15060202- 0180ffm	7	A&Wc, DWS, FBC, FC, Agl, AgL	Monitored	Yes	Non	<ul style="list-style-type: none"> <li>• ADEQ 2 fixed stations and 2 special investigations 1990-93, a total of 46 samples: uses impaired by turbidity, fecal coliform, nutrients, iron, manganese, and low dissolved solids.</li> <li>• Special investigation also indicated that the west tributary did not support its uses due to high fecal coliform and nutrients. Reuse wastewater (applied to golf course) has been found to be the primary source of fecal coliform and nutrients.</li> </ul>

**Key:** ADEQ = Arizona Department of Environmental Quality  
 A&Wc = Aquatic and Wildlife (coldwater fish)  
 FBC = Full Body Contact  
 Agl = Agriculture Irrigation  
 DWC = Domestic Water Source

AGFD = Arizona Game and Fish Department  
 A&Ww = Aquatic and Wildlife (warmwater fish)  
 FC = Fish Consumption  
 AgL = Agriculture Livestock Watering

sources from forests and rangelands is through the development of preventative or mitigating land management practices, generally referred to as Best Management Practices (BMPs), or in the case of Arizona's process, Guidance Practices (GPs). The purpose of this agreement is to meet objectives defined by the United States Congress in the Federal Water Pollution Control Act (as amended in 1987). These objectives are to restore and maintain the chemical, physical and biological integrity of the nation's waters in Arizona by complying with water quality standards identified for designated uses in downstream perennial waters.

The following GPs were developed for the Windmill Allotment through the Integrated Resource Management process. These GPs should protect soil and water quality on the allotment under the management alternatives.

Other BMPs or GPs have been adopted from the "Draft Best Management Practices and Rangeland Guidance Practices for Grazing Activities in Arizona." These practices include:

**Planned Grazing System** - Grazing systems are alternately rested and grazed in a planned sequence. See each alternative for specifics on how this practice is now displayed.

**Proper Grazing Use** - Grazing at an intensity that will maintain enough cover to protect the soils and maintain or improve the quantity and quality of desired vegetation. See each alternative for specifics on how this practice is adopted.

**Streambank Protection** - Stabilizing and protecting streambanks against scour and erosion through vegetative and structural rehabilitation means. Livestock grazing will not be allowed in Oak Creek, Sycamore Creek, Verde River, Spring Creek, and Sheepshead Spring. Above the Rim, ungulate grazing will be restricted or eliminated at T-Six Spring, Fain Spring, and Willard Spring.

**Trough or Tank** - To provide watering facilities for animals at selected locations. See Table 1 for new tank construction, pipeline construction, and water lot development. These improvements are intended to increase distribution of livestock and wildlife.

**Fencing** - Fencing is intended to improve livestock and wildlife management, control access, prevent soil loss, and improve water quality. See Table 1 for a list of fencing improvements.

Site specific Guidance Practices for the Windmill Allotment include the following:

In all the dry meadows, progress toward improved soil conditions by one or more of the following: reducing graze periods, relocating or removing stock tanks, building waterlot fences around tanks, splitting pastures, and obliterating or rerouting roads in meadows.

Reduce graze periods to less than or equal to 20 days during fast plant growth as much as possible. Fast forage growth is usually mid-July through August and mid-March to mid-May with flexibility for when rains arrive. This will reduce regrazing of forage regrowth by cattle which is better for plant health and vigor.

Incorporate yearlong rest from cattle into every pasture wherever possible in the summer range rotations. This yearlong rest from cattle improves overall forage health by allowing more plants to reach maturity and reproduce.

Increase variability of pasture deferment, i.e., different season of use each year of the rotation.

The summer cattle range is not used before the cool season species have finished their fast forage growth (June 1st or later) to allow these plants to reach maturity.

In riparian communities below the Mogollon Rim, reduce time of cattle grazing or exclude from cattle grazing. Riparian areas identified are portions of Oak Creek, Dry Creek, Sheepshead Creek and Jacks Canyon.

Riparian grazed by cattle above the Rim will receive reduced grazing periods by cattle and varied season of use. Several of these areas will be fenced and excluded from cattle grazing. Riparian areas identified are: T-6 Spring, Willard Spring, Fain Spring, and National Forest portions of Rogers Lake.

Sweep cattle out of riparian areas above and below the Mooney Trail after moving them along the trail between summer and winter ranges.

Move cattle between pastures and summer and winter ranges according to each area's readiness for grazing.

Ensure that the permittee complies with the terms and conditions of the allotment permit.

## Effects to Water Quality

Soil conditions on the Windmill Allotment are not expected to decline under any of the alternatives. Therefore, none of the alternatives will improve or impair water quality on or downstream from the allotment. Sediment above background levels within the allotment results from the cumulative effects of a variety of sources. Activities that could contribute to these cumulative effects within the allotment's watersheds are displayed in the Cumulative Effects section below.

## Cumulative Effects of Past, Present, Future and Adjacent Actions on Watersheds of the Windmill Allotment

Various activities occurring in a watershed have cumulative effects on water quality or water yield. A cumulative effects analysis considers all these activities in addition to the proposed action. The analysis and description of earth- or vegetation-disturbing activities on the entire watershed include both Forest Service and non-Forest Service lands. Another reference for these potential future activities is the Sedona/Oak Creek Ecosystem Management report.

The following is the analysis conducted to assess cumulative effects for the Windmill Allotment located on the Mormon Lake, Peaks and Sedona Ranger Districts of the Coconino National Forest. Guidance Practices will be recommended that, if implemented in a proper and timely manner, will minimize cumulative effects that may adversely affect the soils and water within the allotment's watershed areas. This analysis considers direct and indirect cumulative effects on watersheds. Direct effects assessed include impacts from roads and loss of ground cover vegetation. Indirect effects are related to impacts on soil and watershed conditions, water quality and runoff.

## Total Area of Analysis

The Windmill Allotment occurs in four 5th code watersheds: Sycamore Canyon, Oak Creek (a state-design unique water), Dry Beaver Creek and Camp Verde. Table 19 displays the number of acres of land managed by the Coconino National Forest and the number of acres owned or managed by landowners other than the Coconino National Forest relative to the total acres within each watershed. Also shown are the number of acres and percent of the allotment within each watershed. Acres were estimated from Forest Service maps.

Although the allotment affects four watersheds, only the Oak Creek Watershed was analyzed in depth for the 10-year permit period. This 5th code watershed is the area most influenced by management on the allotment and is of the greatest interest to the public. Cumulative effects on the Sycamore Canyon, Dry Beaver Creek and Camp Verde watersheds are similar to those discussed below that occur below the Mogollon Rim. Effects to water quality within these watersheds are discussed in the Water Quality section.

The Arizona Department of Environmental Quality's Arizona Water Quality Assessment Report (1994) was consulted for water quality statuses of all watersheds within the allotment. The report lists conditions of 6th code watersheds impacted by the Windmill Allotment that feed the Oak Creek Watershed. The West Fork of Oak Creek is threatened but in full support of standards. Pumphouse Wash was determined to be in non-support of the designated use of coldwater fishery because of turbidity and low dissolved oxygen. Pumphouse Wash was also found to be in partial support of the designated use of full body contact because of turbidity. Turbidity, a measure of particulate matter in a water sample, is the water quality standard that is most likely affected by land management activities. In most cases in wildland waters, turbidity is caused by very fine and fine soil particles.

### Oak Creek Watershed Analysis Area

This cumulative effects analysis is intended to assess the impacts on resources from past, present and future management actions that have or may impact the Oak Creek Watershed. Actions considered are those within the Windmill Allotment and adjacent areas.

Approximately 86.4 percent of the Oak Creek Watershed is managed by the Coconino National Forest. How the Forest Service manages these lands, therefore, has a great impact on water quality and quantity in Oak Creek. Consequently, this analysis covers four main areas of forest management: timber, livestock, fire and recreation.

The remaining area, about 13.6 percent, of the Oak Creek Watershed consists of Arizona State trust lands (6%); urban areas including Forest Highlands, Kachina Village, Mountainaire, Munds Park-Pinewood, Page Springs, Cornville and the City of Sedona (5 percent); privately-owned lands in Oak Creek Canyon and above and below the Mogollon Rim (2.1 percent); and Highway 89A and Interstate 17 administered by the Arizona Department of Transportation (about 0.5 percent). These areas are discussed below.

Forest Service management and other uses and management that together affect peak storm flows, riparian habitat, sedimentation and turbidity, and biological pollution within the Oak Creek Watershed are also discussed below.

Table 19. Land Ownership and Portions of the Windmill Allotment within Four 5th Code Watersheds.

5th Code Watershed	Land Ownership		Portions of the Allotment Lying Within the 5th Code Watershed	
	Coconino	Other	Acres	Percent
	National Forest	Acres		
Sycamore Canyon (106,397 acres)	82,382	24,015	27,948	26
Oak Creek (298,522 acres)	255,468	43,054	158,360	53
Dry Beaver Creek (128,398 acres)	123,979	4,419	34,606	27
Camp Verde (54,560 acres)	45,965	8,595	27,935	51

### Past Actions - Mill Park and Munds Pocket/Foxboro Divisions

The following Forest Service management actions on the Mill Park and Munds Pocket/Foxboro Divisions within the Oak Creek Watershed may have caused short- or long-term impacts on water quality.

Timber has been harvested over a large portion of these Divisions in the past 10 years. Tree removal has occurred on Coconino

National Forest and state lands since the early 1900s.

Prescribed fire was used to reduce slash created by timber harvesting projects on both State and Forest Service lands over about half of these divisions. Prescribed fires have been used as a forest management tool since the 1970s.

Wildfires have been and continue to be suppressed on Coconino National Forest and State lands.

A road network was built for timber harvesting and other forest management activities. Unpaved forest roads are fairly evenly distributed across these divisions with densities at or above 2 miles per square mile on Coconino National Forest and State lands.

Some roads have been closed or obliterated in the past 10 years on Coconino National Forest lands.

Forest Service trailheads, with small dirt parking areas and wooden interpretive signs, were established as access to the adjacent Munds Mountain, Red Rock-Secret Mountain, Sycamore Canyon and Wet Beaver Creek Wilderness areas. Recreationists use unpaved forest roads to access the trailheads.

### **Future Actions - Mill Park and Munds Pocket/Foxboro Divisions**

The following Forest Service management actions on the Mill Park and Munds Pocket/Foxboro Divisions within the Oak Creek Watershed may cause short- or long-term impacts on water quality.

Timber harvesting will continue, but probably to a lesser degree than in the past. Most trees harvested in the future will be 5 to 15 inches in diameter. The harvesting objective is to manage forests toward the desired conditions of having a mix of structural stages (trees sizes and ages) in clumps or with multiple layers over a larger area. These future harvest activities are not likely to substantially change the amount of forage available for grazing animals or affect the litter or ground cover that protects soil and water quality over the long-term.

However, the overall amount of forage in small open areas next to clumps of trees may slightly increase.

Prescribed underburns throughout these divisions may increase in order to reduce forest fuels, stimulate fire-adapted understory vegetation and return fire to its historic role as a frequent regulator of the forests in these divisions. Prescribed fires will not substantially change the overall amount of forage available for grazing animals. Short-term, site-specific reductions in forage will occur immediately after a fire, but forage quality and diversity in these areas will improve over the long-term, eventually benefiting all grazers, domestic and wild.

Future timber harvests and prescribed fires have been or will be planned so that large dead logs will be left on the forest floor to contribute to the nutrient cycling process and benefit wildlife species dependent on the logs for food or shelter.

The goal for managing the road system on the Coconino National Forest within the allotment is to limit overall road densities to 2 miles per square mile. Several roads in these divisions have been closed or obliterated recently and additional closures and obliterations are expected in the future. Existing open forest system roads will be maintained at levels suited to their uses and locations. Future road closures, obliterations and maintenance activities will not substantially change the amount of forage available for livestock or wildlife in these divisions.

New trailheads or other developed recreational sites may be proposed for these divisions

### **Past Actions - Winter Division**

The following Forest Service management actions on the Winter Division within the Oak Creek Watershed may have caused short- or long-term impacts on water quality.

Some roads have been closed or obliterated in the past 10 years on Coconino National Forest lands.

Forest Service trailheads, with small dirt parking areas and wooden interpretive signs, were established as accesses to the adjacent Munds Mountain, Red Rock-Secret Mountain, Sycamore Canyon and Wet Beaver Creek Wilderness areas. Recreationists use unpaved forest roads to access the trailheads.

Firewood harvesting and prescribed burning were used in some pinyon pine-juniper areas to reduce the overstory and increase the ground cover vegetation (grasses and forbs) that protects soil and increases water infiltration.

### **Future Actions - Winter Division**

The following Forest Service management actions on the Winter Division within the Oak Creek Watershed may cause short- or long-term impacts on water quality.

The City of Sedona needs to expand or upgrade its sewer system and may wish to use Coconino National Forest lands within the Windmill Allotment for these actions.

Several land exchanges are proposed or may be proposed soon within the Windmill Allotment and the greater Oak Creek Watershed.

An urban trail system is proposed for lands, including Forest Service lands, within and adjacent to the City of Sedona.

Several horse pack trails are proposed for areas near Sedona and the Verde Valley. Building corrals and stables may be part of this proposed action.

### **Timber Management**

Timber management activities, including commercial harvesting, precommercial thinning and tree planting or seeding, have occurred within the Oak Creek Watershed since before the turn of this century. Most areas of the watershed that support ponderosa pine were commercially harvested by the early part of the century. Timber volumes removed during the late 1800s and early 1900s were generally low, but harvests concentrated on high-value timber. Because horses were used in harvest activities during this era instead of machinery, only a few arterial roads were constructed for access.

Timber harvest activities intensified when railroad logging began. Although the number of trees and intensity of harvest activities increased, the primary product was still high-value timber. Adjacent to rail spurs, harvesting was very intense and strongly impacted the Oak Creek Watershed. Some notable impacts included damage to many stream courses and some meadows. Road construction and rail development also increased impacts on the watershed because many roads and rails were placed in filter strips, stream courses and meadows.

Timber harvesting then focused on older saw timber. As harvesting increased and intensified, impacts on the watershed increased. Major road systems were developed throughout the watershed, increasing the per-section road density. Many roads, skid trails and landings were poorly located and designed, and adversely impacted watershed and riparian conditions. Impacts from the disposal of logging slash intensified with the use of tractor piling and burning. Specifically, organic surface material and understory vegetation were removed when tractor blades scraped the ground during piling and intense heat from burning slash piles destroyed any organic matter and vegetation under the piles.

New timber management strategies are more sensitive to the environment (i.e. less road building and piling) and areas of harvest are smaller and will likely stay that way. New timber harvest activities are mostly thinning cuts designed to increase tree growth and vigor and improve wildlife habitat, forage productivity and watershed conditions where needed. Within the project area, roads impacting water quality are rehabilitated, obliterated, or relocated whenever possible. Part of the revenues generated from commercial timber harvests are used to rehabilitate and restore degraded watershed conditions. Overall, current timber harvesting activities impact soil conditions and water quality less than past harvesting related activities.

### **Livestock Management**

Livestock management within the analysis area has improved over the past several decades. Livestock numbers and pasture sizes have decreased and the number of pastures has increased. These changes have shortened grazing periods within each pasture which, in turn, has reduced the overall impact of cattle grazing on the allotment. However, cattle tend to congregate in meadows and in riparian areas and this can contribute to unsatisfactory soil conditions and loss of vegetative ground cover if the cattle remain too long. The impacts of season-long use by



elk, whose populations have increased during the last 10 years, are contributing to unsatisfactory soil conditions in some areas.

The location and management of range improvement structures also affect soil and water resources. Stock tanks located within meadows and riparian areas attract livestock and wildlife grazers and increase the length of time grazing occurs in the vicinity of the tanks. The results are compacted soils, high grazing use on palatable grasses and forbs and eventual loss of vegetative ground cover and species diversity in meadow and riparian plant communities. Stock tanks located in uplands away from meadow and riparian areas tend to draw grazing animals away from these sensitive areas. This results in a better distribution of livestock and fewer negative impacts from all grazers.

Livestock and big game grazing within the Oak Creek Watershed occur on portions of the Windmill, Kelly Seep, Casner Park, Woody Mountain, Mooney Mountain and Mud Springs Range Allotments. Livestock grazing on these allotments contributes to cumulative impacts on the watershed. However, grazing on these allotments in conjunction with grazing on the Windmill Allotment during the 10-year period will probably not cause any long-term negative impacts on resources in the watershed given current cattle and elk numbers.

### **Fire Management**

Wildfires and prescribed fires have impacted the Oak Creek Watershed in the past and may impact it more strongly in the future. A moderate to high risk of catastrophic wildfire exists in the watershed because of wildfire suppression activities over the last 100 years. Throughout the Oak Creek Watershed and most of the western United States, past forest management practices have produced unnatural accumulations of fuels and large numbers of tree stems per acre in forests. Under severe burning conditions in these areas, suppression of large wildfires will be difficult if not impossible and such wildfires could greatly affect water quality and soil productivity in the Oak Creek Watershed.

### **Recreation Management**

Recreational use of the Oak Creek Watershed is high and will probably increase over the 10-year permit period. Individuals and groups, often lead by outfitter guides, use the area and activities include hiking, horseback riding, bicycling, jeep driving, off-highway vehicle driving, dispersed camping, and camping in

developed campgrounds. In some places throughout the watershed, these uses cause one or more of the following effects: loss of vegetative ground cover, soil compaction, localized erosion, increased runoff and biological pollution (see the Biological Pollution subsection later in this Cumulative Effects section).

### **Arizona State Trust Lands**

The State of Arizona administers about 6 percent of the land base in the Oak Creek Watershed. These areas are located both above and below the Mogollon Rim. Above the Mogollon Rim, major human uses are cattle grazing, timber harvesting, dispersed recreation and firewood gathering. Below the Mogollon Rim, the same activities occur except timber harvesting. Wildlife use and associated impacts occur both above and below the Mogollon Rim.

The Arizona State Land Department manages timber harvesting, cattle grazing, dispersed recreation and firewood gathering on State Trust lands in a manner similar to that used by the Forest Service to manage these activities on forest lands. In addition, a Best Management Practices agreement, similar to the one between the Forest Service Southwestern Region and the Arizona Department of Environmental Quality (described in the Water Quality section of this chapter), is currently being negotiated for Arizona State agencies. Cattle grazing on state lands included in the Windmill Allotment is administered by the Arizona State Land Department. However, all the State and Forest Service lands within the Windmill Allotment boundary are managed together to best facilitate management.

Range improvements located on State Trust lands are owned by the lessee and it is their sole responsibility to perform maintenance, construction, and reconstruction of these improvements with approval from the Arizona State Land Department.

### **Urban Areas**

Urban areas comprise approximately 1.5 percent of the land base within the Oak Creek Watershed. A major source of impacts to water quality from these areas is runoff associated with urban uses. This runoff contributes sediment and turbidity to the watershed and possibly organic, inorganic and hydrocarbon compounds from septic systems; road oil and salt; and vehicle emissions.

Kachina Village discharged effluent directly into Pumphouse Wash for several years. Though this

practice has ceased, impacts from it will probably remain in this water system for several years. The Munds Park-Pinewood water treatment system currently impacts water quality in the Oak Creek Watershed with occasional releases of effluent into Munds Canyon. These discharges enter Oak Creek at Indian Gardens in Oak Creek Canyon.

**Sedona, Page Springs and Cornville Urban Areas:** Sedona, Page Springs and Cornville comprise about 3.5 percent of the Oak Creek Watershed and have large populations that depend on an extensive tourist trade. Overland water flow from these areas generally runs directly into Oak Creek. Substantial amounts of nonpoint source pollution could enter the creek in the form of sediment, turbidity, hydrocarbons and organic and inorganic compounds. Sewer and septic systems associated with these urban areas might also contaminate Oak Creek.

**Oak Creek Canyon Private Residences:** Private residences not associated with urban communities comprise approximately 0.2 percent of the Oak Creek Watershed. This portion, although small, can substantially impact water quality in Oak Creek. Nonpoint source pollution from these areas is primarily in the form of sediment, hydrocarbons and organic and inorganic compounds associated with urban development.

Business and private developments in these areas are generally located directly adjacent to Oak Creek and any form of overland water flow from private property and parking lots runs directly into the creek. Sewer and septic system effluents from the high number of business and private uses in these areas could also contaminate Oak Creek.

**Other Privately-owned Lands Above the Mogollon Rim:** Other privately-owned lands comprise about 0.5 percent of the land base of the Oak Creek Watershed. Land use practices in these areas and their effects on water quality are similar to those on lands administered by the Forest Service and the Arizona State Land Department. One exception is the Flagstaff Airport which is possibly a source of organic and inorganic compounds and hydrocarbons associated with airport operations in Pumphouse Wash, a 6th code watershed.

**Other Privately-owned Lands Below the Mogollon Rim:** Other private lands in the Verde Valley, used mostly for agriculture and cattle grazing, comprise about 1.4 percent of the Oak Creek Watershed. From these lands, nonpoint source pollution in the form of sediment and turbidity lowers Oak Creek's water

quality. Nutrient and chemical pollution could also be generated from agricultural lands adjacent to Oak Creek.

**Highway 89A and Interstate 17:** Highway 89A and Interstate 17 are nonpoint sources of sediment, turbidity and salts entering the Oak Creek Watershed and often Oak Creek itself or its major tributaries. This pollution is generated from churning and salting highways, and from erosion of highway cuts and fills, shoulders and drainage ditches. These highways might also be sources of pollution in the forms of hydrocarbons, organic compounds and heavy metals from vehicle emissions and road surfaces.

### Peak Storm Flows

All vegetation- and soil-disturbing land uses that reduce water infiltration rates or remove excessive amounts of vegetative cover from sites can increase runoff during peak storm flows. Land uses such as building sites, paved parking lots and roads most directly impact peak flows. Specifically, these uses eliminate infiltration and cause all precipitation to become runoff. In areas where animals tend to congregate, excessive trampling and overutilization of vegetation can substantially reduce infiltration rates and increase runoff. Proper cattle grazing management minimizes these impacts from cattle. Wildlife, however, usually cannot be controlled, so their impacts on soil conditions and vegetation are not easily mitigated.

Timber harvest activities also affect infiltration rates and runoff amounts. These effects vary with the intensities of activities. For example, a clear-cut harvest treatment followed by a complete pile-and-burn slash treatment and site preparation will generally reduce infiltration rates and increase runoff more than a sanitation harvest treatment followed by a partial pile-and-burn or lop-and-scatter slash treatment. The latter treatments in this example more mildly affect overland water flows because they require less heavy equipment and leave more vegetative debris on a site.

In most of the Oak Creek Watershed, forest management activities such as timber harvesting, cattle grazing and wildlife, and recreational uses should not adversely influence peak storm flows because current and future projects emphasize watershed management more than past projects did. This increased emphasis is due, in part, to the Nonpoint Source/Best Management Practices agreement (described in the Water Quality section of this chapter) between the

Forest Service, Arizona State Land Department and Arizona Department of Environmental Quality and the use of new Forest Service soil quality standards currently in draft form. The agreement requires the Forest Service and State to document and implement Best Management Practices, or Guidance Practices and to monitor how effectively these practices protect water quality. The newly drafted soil quality standards establish acceptable limits for soil compaction and require that vegetative material be left on site after timber harvesting.

In the planning phase is the Clean Water Act, Section 319, Watershed Demonstration Project that includes the entire Oak Creek Watershed. This project, funded by the Environmental Protection Agency, is designed to examine all human activities that might impact peak storm flows and other cumulative parameters in the watershed as discussed below. Through this project, the cooperating agencies hope to develop revised guidelines for watershed Best Management Practices. These practices would then be adopted by the participating agencies and municipalities and members of the private sector in a cooperative effort to manage the Oak Creek Watershed. This coordinated effort to address watershed issues and develop and implement watershed Best Management Practices should reduce peak flows in the Oak Creek Watershed.

### **Riparian Habitats**

The Windmill Allotment contains about 1,500 acres of riparian habitat. Riparian areas range from perennial stream systems like Oak Creek, Sycamore Creek and Verde River to ephemeral drainages that flow briefly in response to precipitation.

The Verde River and many of its tributaries experienced three unusually large floods in the last 3 years. Damage to vegetation and redistribution of bedload materials from these floods changed the character of Oak Creek. Also, urban development, road development, fire suppression, grazing and other land uses have probably changed the watershed's response to heavy precipitation over the years by influencing the timing and intensity of storm-generated runoff. This change in watershed response is difficult, if not impossible, to correlate with land uses because limited historical flow data is available. Because the recent floods in the Verde River system resulted from extended periods of heavy precipitation on saturated soils, land uses probably only slightly influenced runoff intensity and timing during these events.

Riparian habitat improvement projects in the Oak Creek Watershed are implemented by the Forest Service through timber sale area improvement plans; allotment management planning; road obliterations, closures, or relocations; and watershed improvement projects. Riparian area maintenance and improvement are also now receiving more attention on lands not administered by the Forest Service. Alternative B (No Grazing) eliminates cattle grazing in riparian areas. Alternative C grazes a stretch of Oak Creek from Red Rock State Park to just below Mormon Crossing. Of this area, approximately 8 miles is grazed, 5 miles of which is on private land. At the most, this area is grazed every other year. Use on the riparian vegetation varies from light to moderate. Alternatives A, C (except for Oak Creek), D, F and G allow cattle grazing only in a few small riparian areas on the summer range, none of the alternatives, considered individually or cumulatively with other activities, will significantly decrease riparian conditions within the Windmill Allotment. Increases in riparian conditions are likely to occur with reduced grazing periods and exclusion from grazing as proposed under all the Alternatives.

### **Sedimentation and Turbidity**

The primary causes of sedimentation and turbidity above background levels from Forest Service-administered lands in the Oak Creek Watershed are timber sale activities, roads, off-road vehicle traffic, overgrazing by cattle and elk, and wildfires. About 8 percent of the Oak Creek Watershed lies within designated wildernesses or in Oak Creek Canyon or are lands that have no capacity for cattle grazing or commercial timber production. Consequently, timber harvesting and cattle grazing do not occur in these areas. About 125,000 acres of the watershed are capable of commercial timber production and most of these acres are available for harvest.

The anticipated sizes of timber sales within the Oak Creek Watershed from 1985 to 1999, as shown in the Coconino National Forest Plan (USDA Forest Service 1987), range from less than 1,000 to nearly 11,000 acres. The average size of timber sales from 1989 through 1995 was approximately 5,230 acres or 1.75 percent of the 298,522 acre Oak Creek Watershed. The total acres of timber harvesting activities on lands managed by the Forest Service within the Oak Creek Watershed peaked in 1991. Timber sale activities on state lands within the Oak Creek Watershed peaked in 1993.

Forest Service and State administered lands in the Oak Creek Watershed are managed in a similar manner and many of the same laws and regulations apply to both agencies. The Arizona State Land Department is developing a nonpoint source/Best Management Practices agreement with the Arizona Department of Environmental Quality that will further emphasize protection for and help reduce sedimentation and turbidity in the Oak Creek Watershed.

The Arizona Department of Transportation (ADOT) is required by the National Environmental Policy Act and the Forest Service to develop a road management plan for highways on Forest Service administered lands and the plan must address watershed and water quality concerns. ADOT is currently assessing impacts of snow and ice removal on state highways. Because Oak Creek is a state-designated Unique Water, ADOT and other agencies may apply additional protective measures in the Oak Creek Watershed to reduce the potential for cinders, salts, or other applied materials from entering Oak Creek. Issues being addressed include sedimentation, turbidity and chemical changes in Oak Creek's water.

Substantial amounts of sediment and turbidity in Oak Creek can probably be traced to activities associated with urban areas. The Oak Creek Watershed Demonstration Project (described in the Peak Flows section above) will help develop water quality Best Management Practices for urban development and construction activities. These practices will reduce the amounts of sediment and turbidity entering the Oak Creek Watershed. The increase in awareness and actions to protect or enhance watershed conditions by ADOT, the Arizona State Land Department and the Forest Service will also reduce the amount of sediment and turbidity entering the Oak Creek Watershed over the long-term.

## Biological Pollution

Biological pollution in water is measured by the amount of bacteria and nutrients in a water supply, both naturally occurring and human caused. Increases in biological pollution can result from livestock and wildlife grazing, full body contact activities, pets and other animals near or in the water, subsurface seepage from campground toilet and shower facilities, urban development and septic tanks, runoff from campgrounds and populated areas where people and animals congregate, and materials naturally present in watersheds.

The Forest Service, Slide Rock State Park and the Arizona Department of Environmental Quality have

monitored fecal coliform levels for several years in Oak Creek between Slide Rock State Park and Grass-hopper Point. Preliminary water quality nutrient information is now available for the Oak Creek Watershed because of the Oak Creek Watershed Demonstration Project (described in the Peak Flows section above). Though the actual sources and causes of nutrient level fluctuations in the watershed are still unknown, nutrient levels of nitrates, nitrites, phosphorous and sulfate generally correlate with fecal coliform counts.

Meadows and riparian areas in the Oak Creek Watershed are potential sources of biological pollution because runoff from these areas moves directly into streams. Also, cattle and elk tend to congregate in and around meadows and riparian areas and, consequently, deposit large amounts of fecal material.

Outdated or insufficient sewage treatment facilities in several urban areas also contribute biological pollution to the Oak Creek Watershed. However, the City of Sedona recently concluded a study on its sewage treatment needs and is developing a central sewage treatment system. Kachina Village recently expanded its sewage treatment plant and no longer discharges treated effluent directly into Pumphouse Wash. The community of Munds Park-Pinewood recognizes the need to improve its wastewater treatment facility and is planning a study to improve the existing system. Other urban areas are also starting to address their sewage treatment problems.

## Summary

Most cumulative effects to the Oak Creek Watershed can be traced to increases in and the timing of runoff that affects peak flows. The accelerated soil erosion caused by these flows can harm the physical and biological integrity of stream systems. For example, flooding has strongly influenced stream channel morphology, water quality and the numbers and locations of human developments in the watershed. Recent flooding, however, locally and across the western states, was caused by extended periods of heavy precipitation on saturated soils. Vegetative and soil conditions, urban developments and transportation systems are other factors that affect the levels and timing of stream flows.

As timber sales continue to decline, so will the periodic road maintenance associated with sales. Funding appropriated for maintenance of forest system roads is also declining. Some funds will be invested in road closures and obliterations, but funding will be poor for the maintenance of many

existing forest roads. Consequently, these roads will continue to be a source of sediment in the Oak Creek Watershed.

Fire suppression over the last 75 years is probably the most important factor that has increased the risk of intense wildfire in Arizona's ponderosa pine forests. Soil and watershed conditions are currently satisfactory in dense pine stands in the Oak Creek Watershed, but an intense wildfire could easily impair the watershed's hydrologic functions by burning soils and vegetation.

Past and, in some areas, current cattle and wildlife grazing have and do degrade soil conditions in uplands and reduce the ability of riparian areas to function properly. Turbidity, the measure of particulate matter in a water sample, is the water quality standard most affected by cattle grazing. Turbidity also increases because of runoff events or disturbances to sediments in a stream.

The cumulative effects of activities on non-Forest Service lands in the Oak Creek Watershed area have not been quantified to the extent that those on Forest Service lands have been and are, therefore, less evident. Nevertheless, private, city and county lands will continue to develop urban uses and the amount of development that will occur over the next 10 years is unknown. The Forest Service and other cooperating land and resource management agencies will continue to work together to limit impacts from urban development on the Oak Creek Watershed.

In conclusion, all alternatives will not contribute to any adverse cumulative impacts on the Oak Creek Watershed during the 10-year permit period because of any proposed changes in cattle management or measures to mitigate adverse effects from grazing. Because Alternative B (No Grazing) will not permit cattle grazing on the allotment, it also will not contribute to any adverse cumulative effects on the Oak Creek Watershed.

## **Affected Environment and Effects of Alternatives on Wildlife**

### **Elk**

Three big game species, deer, elk and antelope, consume some of the same type of vegetation as cattle, may change their distribution relative to cattle, and their movements may be impeded by cattle fences. Deer tend to have a diet of browse and forbs,

with green grass utilized mainly in the spring. Cattle tend to have a diet of grass with browse (when available) consumed during the winter. The diets of deer and cattle are most similar during the spring and in the late winter. Elk diets have the greatest amount of similarity with cattle. Elk will travel large distances to meet their nutritional needs, shifting their foraging patterns to move into areas of fresh feed. Elk will return to areas they have previously grazed if there is plant regrowth to consume. Elk will also move into areas that cattle have grazed after the plant regrowth is available for consumption.

The AGFD is responsible for managing wildlife populations in the State and the Forest Service is responsible for managing habitat on Forest Service lands. The Forest Service coordinates with and is responsive to the AGFD. The Windmill Allotment is a part of two Game Management Units (GMU), 6A and 6B, of the Arizona Game and Fish Department (AGFD). The AGFD elk population objectives for GMU 6A call for a 25 percent reduction by the end of the 1997 fall hunt from the 1991 pre-hunt level. A stable population has been the GMU 6B objective during this same timeframe. Future population objectives are currently being evaluated. The population objectives may have greater or lesser effects on Windmill because GMU and allotment boundaries are different.

The Windmill Allotment provides summer and winter range for four major herds of elk. The majority of the summer and transitional range of the allotment has traditionally had high elk use especially near mountain meadows, riparian areas, chaparral areas and stock tanks. The first herd summers on the Rogers Lake Pasture of the Mill Park Division but winters off the allotment. The second elk herd also uses the Mill Park Division, summering in the eastern pastures and wintering usually in Harding Point, Howard Pocket and western canyon rims. The third herd winters and summers on the Munds Pocket Division, with small groups migrating to the east off the allotment for the summer. These animals winter along the Mogollon Rims of Munds Canyon and Oak Creek Canyon. The fourth herd winters on Jack's Point, Munds Mountain and Jack's Canyon and migrates during summer as far north as Coulter Ridge and Lake Mary, and east to the Lee Butte and Luke Mountain areas. This fourth elk herd is joined in summer by some elk from the Rattlesnake and Verde Valley wintering areas.

Unit managers from the Arizona Game and Fish Department provided an estimate of the number of elk using a given pasture by month. This number was used as a guide to estimate the amount of forage consumed by elk during the growing season for

purposes of comparison with cattle numbers. This analysis is described in the utilization section. Because elk behavior and herd size can be variable by year, these numbers were only used as a general guide.

Browse is heavily used in some areas. However, during dry years more use will occur on these steeper slopes because less forage will be available in the flatter areas. Limited forage at any time will cause more competition between cattle and wildlife in the chaparral and transitional communities.

Where heavy use in dry meadows, riparian areas above the Mogollon Rim and pockets of chaparral communities is expected, continued use at such intensity will probably not be sustainable and will most likely cause negative long-term effects on the composition and vigor of plant species. These high forage use rates are a concern to the Forest Service and the AGFD. Meadows and riparian areas above the Mogollon Rim on the allotment are experiencing heavy elk utilization.

Given that the elk have shown us where they are likely to be, we can now better understand the possible effects of the alternatives on elk. Elk are free to move around and much of the cattle management described in the alternatives will not drastically effect the sustainability of the elk populations as described in the Arizona Comprehensive Plan. We made the assumption that 50 percent was an appropriate utilization by elk and cattle for forage in this allotment. This would allow the residual 50 percent of the plant to be available to reproduce, produce seedheads, produce litter important for nutrient recycling, and provide for the needs of wildlife. There are pastures that have average overall utilization rates by elk and cattle estimated to be greater than 50 percent. In addition, there are pastures having high elk use with estimated use of nearly 50 percent on the average, prior to cattle use. Cattle numbers or the length of use could be reduced in these pastures to improve vegetative condition. Alternative A adds more pastures to the present grazing system which decreases pasture graze periods and increases pasture rest periods in all the problem areas. Alternatives F and G add to Alternative A to possibly better solve these issues. Alternative F responds to the high use pastures in the Foxboro area and Alternative G responds to the high use pastures in both the Foxboro and Munds Pocket areas.

It must also be noted that 35 percent utilization as described in Alternative D may provide better vegetative recovery and better overall vegetative health than

the 50 percent use. This alternative is virtually the same as the no action alternative for these permittees as the lower cattle numbers are not economically viable. Below is a list of the alternatives showing which is best for elk and overall forage condition:

**Alternatives B and D** - Best.

**Alternative G** - Next best.

**Alternative F** - Somewhat less than G.

**Alternative A** - Somewhat less than F.

**Alternative C** - Worst.

The current grazing system has the greatest impact on elk habitat due to having the longest grazing periods. Alternatives A and E have slightly less impact due to reduced grazing periods. Alternative F further reduces the conflict by changing the pasture rotation in the Foxboro Summer area to reduce cattle use in pastures of high elk use. Alternative G makes a further reduction in conflicts by reduced cattle numbers on Foxboro Summer and by reduced cattle numbers on Munds Pocket Summer combined with alternate year rest for a pasture of concern. Alternative D has a slightly lower conflict due to further reductions in cattle numbers which when combined with elk numbers are expected to result in 35 percent forage utilization. Alternative B has the least conflict due to the absence of cattle.

Elk habitat will continue to be modified by timber sales, such as Pumphouse, Mud and Ritter, all proposed or on-going in the Foxboro and Munds Pocket portions of the summer range. Habitat effectiveness is reduced in places by recreational pressure such as high-density dispersed camping, low elevation scenic overflights, and large group events with recreation pressure expected to increase in the Windmill Allotment commensurate with similar increases on Coconino National Forest. Prescribed fire in the Mill Park and Munds Pocket portions of the allotment will modify summer range for these species by improving the nutritive quality of the forage over the short-term, and changing the distribution of hiding and thermal cover.

## Antelope

At least three antelope (pronghorn) herds occur in localized areas within the allotment. The largest herd, approximately 80 animals, occupies meadows within the ponderosa pine type in the Rogers Lake-Mill Park-Fry Lake area of GMU 6B. Small numbers of antelope are scattered in other meadows in the ponderosa pine type in GMU 6A. The large herd in GMU 6B is

isolated from antelope in GMU 6A by fenced paved highways, habitat configuration and topography. Antelope above the Mogollon Rim primarily winter off the allotment. Another herd of about 50 animals lives in the Wheatfield-Duff Mesa area in GMU 6B in the Verde Valley. This herd has remained static in size for more than 25 years. Little potential exists for expanding this herd because both existing and potential habitat is limited due to topography and vegetation type.

Competition for food and disturbance between antelope and cattle are minimal due to lack of diet overlap. Antelope are adapted to open landscapes and commonly observed within grasslands, however their diet is primarily forbs rather than grasses. Genetic viability of these antelope herds is a current concern. Actions related to cattle management which can lead to increased habitat fragmentation and isolation of further herds involves the construction of fences along paved highways.

Alternatives which lead to improved meadow conditions and vegetative diversity will improve antelope habitat quality. Only slight improvement in habitat quality is anticipated in Alternatives A, D, F and G. Only slightly more improvement would occur in Alternative B. No change is expected in Alternative C. Any slight change in meadow conditions is not expected to be reflected in antelope population levels.

Alternatives which include construction of fences within antelope habitat present negative impacts to antelope movements. Alternative B would require fencing only around State Trust Lands, if the permittees would choose to graze these lands. Impacts can be lessened by modifying the fence specifications, with electric fencing being the preferred and a 3-wire with a smooth bottom wire at 20" from the ground being second choice. Some important antelope areas of concern regarding fence construction are Mill and Fry Park, Rogers Lake, Duff Flat, Duff Mesa, Wheatfield, and Gyberg Pastures. Alternatives D and G construct the most miles of fence within antelope habitat or areas where antelope may travel between primary habitat areas. Alternatives A and F construct fewer miles of fence. Alternatives B and C add no additional fences to antelope habitat. New fence impacts will be mitigated by using either electric or the 3 wire raised construction on the following fences: Mill Park, Fry Park, Rodgers Lake and Duff Flat.

Proposed fences in all alternatives were evaluated relative to location. There are no proposed fences parallel to existing paved or dirt roads to be paved. Proposed fences will not result in further herd isola-

tion or fragmentation, but may result in increased predation.

Past cattle grazing combined with fire suppression has resulted in shrub invasion of antelope habitat in the Wheatfield-Duff Mesa area. Prescribed fire treatments are being planned for this area. Some annual changes in the grazing rotation will be necessary to allow vegetative recovery from the prescribed fire, however in the long-term all alternatives are compatible with grassland restoration objectives for this antelope herd.

Current and future impacts from cattle management includes existing fences. An inventory of fences within antelope habitat should be undertaken to evaluate if current impacts could be mitigated by fence modification. Pasture division fences should be inspected regarding design and a list for recommended modification developed. Modification of fences will further mitigate impacts of fences to antelope. Other impacts to antelope include loss of habitat from urbanization, encroachment by woody vegetation, and predation. Fencing creates various types of barriers to antelope ability to use habitat.

## Other Wildlife Species

White-tailed and mule deer, mice, voles, pocket gophers, prairie dogs, rabbits, other small mammals and a variety of birds (including neotropical migrants) rely on herbaceous and woody understory for food and cover. Most are year-round residents although some migrate seasonally to areas both on and off the allotment. They affect or rely on species composition, vigor, seedhead production, relative density and regeneration at various scales and at different times and likewise interact with each other.

The interaction between these species and cattle likewise varies and is a likely series of tradeoffs. Positive effects of Alternatives A, C, D, F and G would include: some succulent vegetative regrowth following grazing; preparation of suitable seedbeds for disturbance species in meadows and other areas of concentration; maintenance or increase of existing populations of some mice or prairie dog populations; selection pressure will favor unpalatable species which may provide cover and food for some small mammals and protection of riparian habitat. The overstory tree species should not be affected in any action alternative. Where cattle utilization is <50 percent and use is well distributed, there is likely to be no measurable effect to deer, small mammals, or birds. Negative effects to deer would be expected in cattle accessible browse areas and in riparian areas

where overgrazing may occur or the remaining browse may be too coarse for use by deer. Negative effects to small animals and birds could include reduction of food and cover or changes in species composition. Any species that relies on vegetative height in meadows or riparian areas, such as voles, will be negatively affected due to cumulative effect of livestock and wildlife grazing in any alternative. No cattle grazing effects to any of these species will occur in Alternative B on Forest Service lands.

Management indicator species include pygmy nuthatches, abert and red squirrels, hairy woodpeckers, yellow-bellied sapsuckers, plain titmouse, cinnamon teal, Lincoln's sparrow, yellow-breasted chat, Lucy's warblers and aquatic macroinvertebrates. The effects to these species are intended to represent the effects to the habitats (and other dependent species) for which they are indicators of ecosystem health.

Population viability of forest associates such as pygmy nuthatches, abert and red squirrels, hairy woodpeckers and yellow-bellied sapsuckers should not be affected by any of the alternatives. Snags and medium to large trees which are key substrates for food or shelter would not be directly affected by any alternative. Some fungi could be negatively affected by trampling in localized and scattered areas which might have a negative effect on abert squirrel food sources. Grazing can influence fire regimes by reducing the fine fuels that can carry fire and by favoring conifer regeneration which increases laddering potential during a stand-replacing wildfire. Historic ungulate grazing combined with fire suppression has had a largely negative effect on ponderosa pine associates due to influence on fire regimes. Yellow-bellied sapsuckers are negatively affected due to reduction of conditions that favor early succession trees like aspen and because aspen regeneration can be heavily browsed by cattle and wildlife. Late succession species such as red squirrels may indirectly benefit from grazing.

Plain titmice, now called juniper titmice, are associated with junipers, pinyon and oak trees and would not be directly affected by grazing or the no action alternative. They are indirectly and negatively affected by areas of heavy utilization and high historical grazing because of the cumulative effect on fire regimes, combined with fire suppression, harsh climate and generally poor soils. This has resulted in some areas in soil loss and loss of vegetative diversity and generally poor ecosystem health. Nesting substrates and insects used for food are not expected to be affected by any alternative. The diversity of food

insects associated with understory vegetation could change in response to vigor and species composition present.

The population viability of riparian associates below the rim should not be affected and some habitat conditions will improve with implementation of all the alternatives except C. Conditions should remain unchanged or improve for Lincoln's sparrows, yellow-breasted chat, aquatic macroinvertebrates and Lucy's warblers because of the fencing of riparian areas and increased exclusion of cattle from mesic areas. Vegetation cover and biodiversity should increase with reduced impacts by cattle. These species may still be affected by recreation, flooding, activities on private land, or other human or naturally caused events unrelated to grazing.

Population viability of cinnamon teal, a small duck that breeds on lakes, ponds and tanks above the rim, should not be affected by implementation of any alternative. The impacts of cattle grazing to their habitat would vary by year, herd size, length of time in pasture, and timing of use in pasture relative to the duck's breeding season.

### Non-grazing Wildlife Species

The Windmill Allotment contains mostly summer and some winter range for turkeys. They feed (on foliage, seed heads and invertebrates) and water in dry meadows; small, grassy openings; riparian areas; and stock tanks on the allotment. When available, acorns and pine and juniper seeds are additional food sources. High vegetative and insect productivity and diversity in these meadows speed the growth of poults. Tall vegetation provides hiding cover from mammalian and aerial predators. Utilization in meadows, small openings and riparian areas that reduces vegetation height or the amount or types of vegetation available as food could affect predation on turkeys and the growth of turkeys.

Upland game birds, such as doves, gambel quail and bandtail pigeons, are also found throughout the allotment from desert to ponderosa pine vegetation communities. These species depend on natural waters, waters developed for cattle, and on adequate grass and other understory vegetation for food and cover. Quail reproduction can be heavily influenced by rainfall. Bandtails rely on acorns when available.

The major effect on turkeys, from the alternatives, will be impacts to understory vegetation height and diversity due to reduced grazed periods, increased rest, seasonal deferment, or reduced cattle numbers.



Mast crops will remain largely unaffected and new pasture division fences will have largely no effect on movements or habitat quality. Road closures in the Fain Mountain area and exclosures in the T6, Fain and Willard Spring area will be largely beneficial for turkeys due to the reduction in human disturbance and positive vegetative effect expected provided the exclosures do not limit their access. Turkeys will also benefit when the conditions in Crazy Park meadow improve as an indirect effect of the removal of Crazy Park Tank.

Seed head availability along the Mogollon Rim in fall and winter is very important to turkey. Seed head availability results from a combination of the amount of grazing use a pasture receives and the variation in the season of use. Varying the season ensures that in some years pastures are not grazed in the fall season. The following ranking of the alternatives is related to seedhead production and turkey habitat:

**Alternative B** - Best.

**Alternative D** - Next best, variability of season and low forage utilization.

**Alternative G** - Next best, variability of season and lower utilization in pastures of the Foxboro and Munds Pocket areas. These areas contain pastures along the Mogollon Rim which provide turkey fall/winter habitat.

**Alternative F** - Somewhat less than Alternative G, good variability but higher utilization in Munds Pocket.

**Alternative A** - Good variability and more utilization than Alternatives G and F in the Munds and Foxboro.

**Alternative C** - Worst, little variability and same roughly the same utilization as Alternative A.

Cumulative effects on non-grazing wildlife species could occur from several actions. Decreasing elk numbers in Game Management Unit 6A may reduce grazing pressure in key areas, but habitat response will be gradual (not detectable within 5 years and possibly detectable within 10 years). Recreational pressure is expected to increase on the allotment and may decrease wildlife use in some areas of good habitat that are disturbed by the recreational use. However, in areas where wildlife and recreational use are in balance, no negative impacts on turkey should occur.

Other activities that could affect non-grazing wildlife on the allotment include timber sales, prescribed burns, activities under special use permits, and activities associated with private lands on the allotment. Large Forest Service projects in any area are analyzed individually and currently no effects on the viability of nongrazing wildlife populations are expected because of any project or because of cumulative effects from multiple projects. Other federally permitted actions are also reviewed individually and no negative effects from any such actions are expected in the foreseeable future.

### Summary of Special Status Species

There are a total of 57 species which have special status designation as displayed in Table 20, Coconino National Forest, threatened, endangered and sensitive species list, Windmill Grazing Allotment. Thirteen species with known or potential habitat on the Windmill Allotment are federally listed as either threatened or endangered.

### Threatened and Endangered Species

Environmental consequences for threatened, endangered and sensitive species under each alternative are displayed in Table 21. There will be no effect under any alternative for 5 of the 13 threatened and endangered species. Information on these species, which includes bald eagle, black-footed ferret, peregrine falcon, brown pelican and Colorado squawfish, is located in the Appendix. There may be some level of effect on the remaining eight species: Arizona cliffrose, Mexican spotted owl, southwestern willow flycatcher, Yuma clapper rail, razorback sucker, spikedace, loach minnow and Gila trout, as described below.

The goal for utilization in the preferred alternative will be 50 percent or less by cattle throughout the year. This is intended to maintain a condition which assures recovery and continued existence of threatened and endangered species. A Biological Opinion on the preferred alternative was completed in October 1997 (USDI 1997) and amended in May 1998 (USDI 1998). A monitoring plan has been established (see monitoring and preferred alternative sections of the FEIS) to meet the management direction in the Coconino National Forest Plan.

**Arizona Cliffrose:** Arizona cliffrose (*Purshia subintegra*) was listed as endangered in 1984 under the name *Cowanla subintegra* (USDI 1984). In general, Arizona cliffrose grows on gentle to steep

Table 20. Threatened, Endangered and Sensitive Species List for the Windmill Allotment Including Occupied/Potential Habitat Status, Species Status and Existence of Critical Habitat.

Common/Scientific Name	Occupied/ Potential Habitat	Status			Critical Habitat
		Federal	State	Forest Service	
<b>Mammals</b>					
Black-footed ferret, <i>Mustela nigripes</i>	XX	ENDANGERED	Endangered	Sensitive	
<b>Bats:</b>					
Greater western mastiff-bat, <i>Eumops perotis californicus</i>	XX	—	—	Sensitive	
Red bat, <i>Lasiurus borealis</i>	XX	—	Candidate	Sensitive	
Occult little brown bat, <i>Myotis lucifugus occultus</i>	XX	—	—	Sensitive	
Mexican free-tailed bat, <i>Tadarida brasiliensis</i>	XX	—	—	Sensitive	
<b>Mice and Voles:</b>					
Navaho Mountain Mexican vole, <i>Microtus mexicanus navaho</i>	XX	—	Threatened	—	
<b>Birds</b>					
<b>Raptors:</b>					
American peregrine falcon, <i>Falco peregrinus anatum</i>	XX	ENDANGERED	Candidate	Sensitive	
Bald eagle, <i>Haliaeetus leucocephalus</i>	XX	THREATENED	Endangered	Sensitive	
Common black-hawk, <i>Buteogallus anthracinus</i>	XX	—	Candidate	Sensitive	
Ferruginous hawk, <i>Buteo regalis</i>	XX	—	Threatened	Sensitive	
Northern goshawk, <i>Accipiter gentilis</i>	XX	—	Candidate	Sensitive	
Swainson's hawk, <i>Buteo swainsoni</i>	XX	—	—	Sensitive	
Zone-tailed hawk, <i>Buteo albonotatus</i>	XX	—	—	Sensitive	
Osprey, <i>Pandion halliaetus</i>	XX	—	Threatened	Sensitive	
Flammulated owl, <i>Otus flammeolus</i>	XX	—	—	Sensitive	
Mexican spotted owl, <i>Strix occidentalis lucida</i>	XX	THREATENED	Threatened	Sensitive	
<b>Wading Birds, Ibises, Pelicans, Stilts &amp; Avocets:</b>					
American avocet, <i>Recurvirostra americana</i>	XX	—	—	Sensitive	
American bittern, <i>Botaurus lentiginosus</i>	XX	—	Candidate	Sensitive	
Black-crowned night heron, <i>Nycticorax nycticorax</i>	XX	—	—	Sensitive	
Black-necked stilt, <i>Himantopus mexicanus</i>	XX	—	—	Sensitive	
Brown pelican, <i>Pelecanus occidentalis</i>	XX	ENDANGERED	—	Sensitive	
Great egret, <i>Casmerodius albus</i>	XX	—	Endangered	Sensitive	
Long-billed curlew, <i>Numenius americanus</i>	XX	—	—	Sensitive	
Snowy egret, <i>Egretta thula</i>	XX	—	Threatened	Sensitive	
Sora, <i>Porzana carolina</i>	XX	—	—	Sensitive	
White-faced ibis, <i>Plegadis chihli</i>	XX	—	—	Sensitive	
<b>Flycatchers:</b>					
Southwestern willow flycatcher, <i>Empidonax traillii extimus</i>	XX	ENDANGERED	Endangered	Sensitive	DESIGNATED
<b>Other Birds:</b>					
American redstart, <i>Setophaga ruticilla</i>	XX	—	Threatened	Sensitive	
Belted kingfisher, <i>Ceryle alcyon</i>	XX	—	Candidate	Sensitive	

Table 20. Threatened, Endangered and Sensitive Species List for the Windmill Allotment Including Occupied/Potential Habitat Status, Species Status and Existence of Critical Habitat (continued).

Common/Scientific Name	Occupied/ Potential Habitat	Status			Critical Habitat
		Federal	State	Forest Service	
Common ground dove, <i>Columbina passerina</i>	XX	—	—	Sensitive	
Gila woodpecker, <i>Melanerpes uropygialis</i>	XX	—	—	Sensitive	
Pine grosbeak, <i>Pinicola enucleator</i>	XX	—	Candidate	Sensitive	
Gray catbird, <i>Lucar carolinensis</i>	XX	—	Threatened	Sensitive	
Yellow-billed cuckoo, <i>Coccyzus americanus</i>	XX	—	Threatened	Sensitive	
Yuma clapper rail, <i>Rallus longirostris yumanensis</i>	XX	ENDANGERED	Threatened	Sensitive	
<b>Amphibians and Reptiles:</b>					
Lowland leopard frog, <i>Rana yavapaiensis</i>	XX	—	Candidate	Sensitive	
Mexican gartersnake, <i>Thamnophis eques</i>	XX	—	Candidate	Sensitive	
Narrow-headed gartersnake, <i>Thamnophis ruftpunctatus</i>	XX	—	Candidate	Sensitive	
Northern leopard frog, <i>Rana pipiens</i>	XX	—	Candidate	Sensitive	
Chiricahua leopard frog, <i>Rana chiricahuensis</i>	XX	CANDIDATE	Threatened	Sensitive	
<b>Fish</b>					
Colorado squawfish, <i>Ptychocheilus lucius</i>	XX	ENDANGERED	Endangered	Sensitive	
Gila chub, <i>Gila intermedia</i>	XX	—	Threatened	Sensitive	
Gila trout, <i>Oncorhynchus gileae</i>	XX	ENDANGERED	Endangered	Sensitive	
Loach minnow, <i>Tiaroga cobitis</i>	XX	THREATENED	Threatened	Sensitive	
Razorback sucker, <i>Xyrauchen texanus</i>	XX	ENDANGERED	Endangered	Sensitive	YES
Roundtail chub, <i>Gila robusta</i>	XX	—	Threatened	Sensitive	
Speckled dace, <i>Rhinichthys osculus</i>	XX	—	—	Sensitive	
Spikedace, <i>Meda fulgida</i>	XX	THREATENED	Threatened	Sensitive	YES
<b>Plants</b>					
Arizona bugbane, <i>Cimicifuga arizonica</i>	XX	CANDIDATE	—	Sensitive	
Arizona leatherflower, <i>Clematis hirsutissima</i> var. <i>arizonica</i>	XX	CANDIDATE	—	—	
Cliff fleabane, <i>Eriogonum saxatilis</i>	XX	—	—	Sensitive	
Ripley wild buckwheat, <i>Eriogonum ripleyi</i>	XX	—	—	Sensitive	
Flagstaff pennyroyal, <i>Hedeoma diffusum</i>	XX	—	—	Sensitive	
Arizona cinquefoil, <i>Potentilla multiflorolata</i>	XX	—	—	Sensitive	
Arizona cliffrose, <i>Purshia subintegra</i>	XX	ENDANGERED	—	Sensitive	
Verde Valley sage, <i>Salvia dorrii</i> ssp. <i>mearnsii</i>	XX	—	—	Sensitive	
Tusayan flame flower, <i>Talium valdulum</i>	XX	—	—	Sensitive	

**Key**

**Occupied/Potential Habitat:** XX denotes the species is either known to occur on the Windmill Allotment or may possibly occur on the Windmill.

slopes, open basins, and limestone ledges and outcrops with a high calcium carbonate component. The landscape is dissected by ephemeral drainages and is sparsely vegetated. There are hybrid swarms of *P. subintegra* and *P. stansburiana* found where these two species occur together. The United States Fish and Wildlife Service (USFWS) considers that species of the genus *Purshia* can respond to long-term and seasonal changes in climate by producing leaves and shoots that have adapted to local or seasonal climatic conditions. This "plasticity" does not mean that the plants are of hybrid origin.

There are only four known populations in the world with the largest and healthiest population occurring near Cottonwood, Arizona. Most of this population occurs on Forest Service and State lands within the boundary of the Windmill Allotment. The majority of this population exists within the 1,140-acre Verde Valley Botanical Area, currently within the boundary of the Gyberg pasture. The Botanical Area was established by the Coconino National Forest Plan (U.S. Forest Service, 1987) for protection of the unique plant community, which includes Arizona cliffrose. The management emphasis of the botanical area is to: "maintain, as nearly as possible, existing conditions and natural processes for public enjoyment, demonstration, and study. Interpretive and educational demonstration opportunities are emphasized and enhanced through selective facility development. Natural events are not rehabilitated. Off-road driving is prohibited."

Section 36, Section 1 and Duff Flat South pastures of the Windmill Allotment also contain this species. Section 1 has been fenced to exclude cattle for the protection of Arizona cliffrose. Section 36 is State land and no longer grazed by Windmill cattle. Duff Flat South pasture is grazed by Windmill cattle, but because of the location and little forage in this area of Arizona cliffrose, little use is expected under any grazing alternative.

By 1992, the Gyberg pasture, which contained the largest known population of Arizona cliffrose, was grazed 20-30 days every other year in the fall, winter or spring. Use levels were set at 20 percent on grass species in areas occupied by this species and once this use was reached, livestock were removed from the unit. Monitoring indicated that Arizona cliffrose was not grazed at this level (Ward 1992). Heavy use occurred on hybrid plants.

In the winter and spring of 1995, this plant received up to 40 percent use by cattle in the Gyberg Pasture. Based on concerns regarding cattle utilization of the

plant, the current conditions of the Windmill permit do not allow grazing in the Gyberg pasture until a fence is constructed to exclude cattle from the Verde Valley Botanical Area.

The populations in the Section 1 and Section 36 pastures have been excluded from grazing since 1989 but livestock grazing did occur due to ORV (off-road vehicle) vandalism to fences. The Windmill AMP underwent consultation in 1992 (Ward 1992). The resultant Biological Opinion required annual monitoring. The monitoring report for the 1993 grazing season indicated that grazing on *Purshia* in the Geyberg and Duff Flat pastures was generally minimal and not measurable. Only several individual plants showed signs of browsing but were less than 10 percent (Munoz 1994).

Seasonal livestock grazing occurred within the VVBA in 1994 and 1995 which was a violation of the Recovery Plan. Subsequent mitigation included exclusion of livestock from Gyberg pasture in 1996 and 1997 (Anderson 1995).

Alternative B (No Grazing) will eliminate cattle grazing on this species on Forest Service lands. Under Alternative C (current grazing system), the Gyberg Pasture is not scheduled for grazing but could be utilized following construction of a fence to exclude the Botanical Area. Alternative C results in exclusion of grazing for approximately 80 percent of the acreage occupied by *Purshia subintegra* on National Forest System lands within the Allotment.

In Alternatives A, D, F and G, the majority of Arizona cliffrose populations will be excluded from grazing due to the placement of 2.25 miles of fence (with associated gates) in the Gyberg pasture. This will create a new *Purshia* pasture which will result in the exclusion of large populations of *P. subintegra* from grazing. The populations in Sections 1 and 36 will continue to be excluded from grazing. There are several small and scattered populations outside of the proposed *Purshia* pasture in Duff Flat South. This pasture will be grazed approximately 8 days each year. There are also a few scattered populations in Gyberg pasture which will be grazed for 20-35 days. In Alternative F, both of these pastures will receive yearlong rest 1 year in 6 years. The Recovery Plan recommends that "livestock should be permitted within pastures containing Arizona cliffrose only during the fall and early winter months (October through January)". The Recovery Plan also states that "livestock should not be permitted to use pastures containing Arizona cliffrose more frequently than once every 2 years." and "combined use by livestock and wildlife (should)

not exceed 20 percent of current year's growth for any individual" if livestock utilization is permitted with all cattle grazing alternatives. Utilization monitoring "should be measured each year livestock are within pastures containing Arizona cliffrose". The intent of these recommendations is to prevent moderate to heavy grazing within Arizona cliffrose habitat.

The timing of grazing is intended to rotate the use on particular species annually. If a pasture is grazed at the same time every year, then negative impacts to particular species can occur resulting in changes in species composition and reduced vigor. All cattle grazing alternatives' schedules are expected to meet the intent of the Recovery Plan because little to no utilization on these plants is anticipated. Annual use is predicted to be very light (<10 percent) on some, but not all, individual plants and probably not detectable on the rest. The plants are widely scattered and are located in remote portions of these pastures. They occur on sparsely vegetated areas and are not located near water, salt or mineral supplements, loading chutes or concentrations of palatable forage that would attract or concentrate cattle. In other words, there is better and more abundant forage located elsewhere in these pastures so it is not expected that cattle would be drawn to these areas. There is a relatively low density of deer in these areas. Annual monitoring will validate this prediction. If annual monitoring indicates that individual plants are being utilized more, or more frequently than predicted above, then consultation with the USFWS will be re-initiated and protective measures will be taken. These measures might include fencing of individual plants or populations.

A comparison of the acres of Arizona cliffrose exposed to grazing, the number of cattle, the number of days of grazing, and the timing of the grazing relative to cliffrose phenology ranks the alternatives from least to most potential impact as B, D, F, G, A and C. Grazing would occur on scattered unfenced plants in the Gyberg pasture for up to 35 days during the winter months under all grazing alternatives. Utilization levels on Arizona cliffrose in the Gyberg and Duff Flat South pastures are expected to be low because the remaining unfenced plants are located in an area of steeper topography where cattle spend little to no time based on field evaluations.

There are no direct negative cumulative effects from Windmill actions that are not mitigated. Fencing and road closures will result in net improvements for this species. Monitoring will continue for any alternative.

Other cumulative effects vary. Past fencing to reduce ORV use has improved habitat. Widening of Highway

89A will have an adverse effect. The effects associated with Mingus Avenue extension, new high school or land exchanges are unknown at this time but would be adverse with direct impacts to plants or beneficial if habitat can be acquired thru land exchange. Impacts from trails associated with Dead Horse State Park and Sedona range from little effect to localized areas of erosion and channelization. Although recreational use is expected to increase, ongoing discussions are expected to result in improved trail drainage, sign placement and gate access which should result in net improvement.

As new locations of Arizona cliffrose are found, grazing impacts will be evaluated and steps taken as needed to mitigate effects within the parameters specified in the Recovery Plan, in coordination with the USFWS. USFWS states that the preferred alternative is not likely to jeopardize the continued existence of *Purshia* (USDI 1997).

**Mexican spotted owl:** There are 36 MSO territories on the allotment. These are associated with the Mormon Lake, Long Valley, Beaver Creek and Peaks Ranger Districts and the rugged north portion of the Sedona District. Protected Area Centers (PACs) have been delineated for all territories and were based on known owl locations such as nests, roosts, visual locations and suitability of habitat.

Surveys have been conducted on Windmill during the planning of numerous timber sales within or adjacent to the allotment. Most surveys were conducted according to USDA Forest Service protocol. Other surveys were done by researchers conducting demographic research out of Humboldt State University, population and habitat research out of Rocky Mountain Forest and Range Experiment Station in Flagstaff, and by Forest Service personnel conducting informal inventory or monitoring in activity areas.

Most of the suitable habitat and approximately 60 percent of the Mormon Lake Ranger District portion of the allotment has been inventoried. More than 90 percent of the suitable habitat on the Peaks District has been surveyed. All of the suitable habitat on Sedona was inventoried in the early 1990's (Bradley, pers. comm) and portions of the Beaver Creek, Long Valley and Mormon Lake Districts have been inventoried since the mid 1990's as a result of demography studies.

There are 912 acres of riparian on the allotment with 677 acres on the winter range; 165 on the Peaks portion of the allotment; and 70 acres on the Mormon Lake side. An estimated 20-30 percent of the Munds Pocket/Foxboro Division on Mormon Lake District is

restricted habitat (other than riparian). There is an estimated 35 percent of the Mill Park Division in restricted habitat. The amounts of restricted habitat on the Beaver Creek and Sedona portions of the allotment are unknown.

The estimated acres of protected habitat are: PAC's - 24,667 acres, some of these are included in the wilderness acres; Wilderness - 40,471 acres; RNA's - 2,341 acres; Steep slopes - extremely small percentage outside of PACs.

Grazing and related activities that could affect Mexican spotted owls or their habitat include grazing protected or restricted habitat; fencing; road closures; and activities that facilitate concentration of cattle such as trailing, gathering, and placement of waters, salt and nutrient supplements.

Grazing will occur in MSO habitat in areas both known and not known to be occupied. The effects of grazing will be variable and dependent on soil conditions, climate, rotation schedule, number and type of livestock (breed, age, sex), timing of grazing, past timber harvest history, prior seeding, proximity to water, stand structure, fire history and species composition, among other factors. Grazing can impact the ability of an area to move toward future owl habitat, influence the quality and quantity of prey habitat, and can influence how and to what degree a fire moves through an area.

In general, PACs are expected to receive the lightest utilization because canopy closure tends to be high (limiting understory production); multistoried conditions and high basal area likewise limit vegetation and some PACs are associated with steep slopes, cliffs, lack of water or distance from large meadows—all which would discourage cattle use in the area. Openings often are small and scattered which likewise do not facilitate concentrated grazing. Pockets of moderate to heavy grazing may occur in PACs due to proximity to good forage, the presence of orchard grass (a preferred forage frequently seeded following timber sales prior to 1990), proximity to water, or presence of openings.

Other protected habitat such as steep slopes and wilderness areas could have light to heavy grazing pressure. Utilization on steep slopes is expected to be light due to the presence of rock and rugged topography, although heavier grazing may occur in more accessible portions. The only cattle grazing that occurs in wilderness is associated with the trailing of cattle up and back the Mooney and Jacks Point trails between summer and winter ranges in all grazing

alternatives. Cattle remain in these areas for approximately 5 days (includes both trailing and gathering activities) in the spring and again in the fall. Neither the West Fork nor Casner Canyon Research Natural Area are grazed by cattle under any alternative.

Forested restricted habitat mostly would produce light to moderate amounts of forage due to stand structure and canopy closure. Depending on physical factors and proximity to water, meadows or orchard grass, cattle utilization could range from light to heavy. Elk/livestock monitoring in other areas of the forest suggests that utilization in moderate canopy closures ranges from 20-40 percent by both wildlife and cattle.

Unfenced riparian or wetland habitat under any alternative will experience 60-80 percent utilization when areas are accessible to cattle and wildlife with negative effects to soils, vigor and vegetative regeneration.

Light grazing by cattle will maintain current species composition, density and vigor; have little to no effect to prey habitat; and should allow sufficient fine material for nutrient cycling and to carry fires (as much as exists now). In areas where grazing intensity increases and length of grazing period exceeds 20 days, plant species density is expected to decrease; shifts in species composition could occur (including favorable conditions for exotics); prey that favor disturbed systems and short understory could thrive; prey that rely on dense or tall understory vegetation may not do well; and the ability of the area to carry a fire with fine fuels (grass and litter) would be less.

Other animals that also feed on herbaceous and woody understory include white-tailed and mule deer, turkey, mice, voles, pocket gophers, prairie dogs and elk. These animals are year-round residents on the allotment, some elevational migrants. These and any other herbivores affect species composition, vigor, seed head production, relative density and regeneration at various scales and likewise interact with each other. The most obvious grazing effects from wildlife on owl habitat come from elk due to their large size, abundance, and because they are an unmanaged species in terms of grazing rotation and timing of use. Elk utilization of habitat on Windmill will occur year-round and in the summer range (MSO habitat), will persist during the deep snow-free season, whenever and wherever there is forage. Total utilization resulting from wildlife and cattle use (in all cattle grazing alternatives) is expected to remain high in meadows and unfenced riparian areas and chances for a speedy recovery are obviously limited. The rate and amount of vegetative and watershed recovery in the upland

portions of the summer range is also expected to be slowed depending on elk movements, abundance, climate, soil, etc.

The majority of fence and cattle guard building and maintenance will occur outside of MSO habitat. On-the-ground layout of fences will be coordinated with range and wildlife so that fence construction will not occur in or near known heavy MSO use areas. The intent is to minimize the short duration disturbance associated with fence building and maintenance, and mitigate or avoid the inevitable trailing that occurs along fence boundaries. Fence construction will not occur in occupied PACs during the breeding season to minimize disturbance.

Road closures in the Fain Mountain area are specifically proposed to reduce the road densities in owl habitat. Effects from these road closures could include erosion reduction, reduction of dispersed camping, soil and vegetation stabilization, and some reduction in firewood gathering. This will be done outside breeding season if occupied.

One PAC is near trailing/gathering activities in all cattle grazing alternatives. Cattle are trailed between summer and winter range on the Mooney Trail which passes along portions of this PAC. No other PACs are affected by trailing of cattle under this permit.

It takes 2-3 days to move cows between winter and summer range. Around June 1, 635 head are driven by cowboys on horseback partway up Mooney Canyon. The following day they are driven to the top of the rim and through Buck Ridge pasture into either Lockwood or West Barney pastures. It may take an additional day to drive remnant cattle out of Buck Ridge pasture into the more traditional summer pastures. The drive to the winter range is essentially the reverse of the spring. Around October 15 and after roundup, cattle are moved to Buck pasture, descend the steeper part of the trail, and then rest in flatter portions of Mooney Canyon. A rider will drive the main herd and remnants through the canyon during the next day or so with the total time spent averaging 2-3 days.

There are several owl management territories that are associated with Secret Mountain Wilderness, but one is grazed by Windmill cattle. Most of its 600-acre PAC is accessible to cattle. The PAC consists primarily of ponderosa pine/gambel oak habitat with some small pockets of mixed conifer. There is a heavy oak component scattered through the high basal area stands. Few meadows exist and most of these are 2 acres or less in size. There are no tanks in the PAC.

Only the spring cattle drive has the potential to affect owls since the fall drive is outside the breeding season. Disturbance impacts (if any) to nesting owls would be minimal. Nests for one management territory have not been located, but potential nest sites are associated with nearby drainages which are 1/4 mile from the trail at their closest point, with the furthest being 1 mile. Potential nests would be topographically and vegetatively buffered from trail activities. Potential layover sites in Mooney Canyon are 1 mile from the PAC.

Trampling and grazing associated with trailing has the potential to affect prey habitat (Block et al. 1995). Soil disturbance and plant mortality is expected along the trail. Continued soil disturbance and use of the existing trail is expected due to repeated use by the permittee and recreationists. Portions of the trail are also a road and the part adjacent to the PAC boundary is a powerline under which vegetation is cleared periodically. Because of the linear nature of the trail and the small portion of the PAC it occupies, negligible effects to prey habitat are expected.

Maintenance of existing range structures in all cattle grazing alternatives may occur in some owl habitat. Cattle guard and fence maintenance generally involves a small field crew with trucks working in a small area for a few hours to a day. Locations cannot be specified but rather are identified annually while doing routine inspections. Hand tools, winches and occasionally backhoes (for the cleaning of cattle guards) are used. The duration of these activities is short, the magnitude is small, and scope is restricted to widely separated areas. No modification to owl habitat is expected and disturbance to known owls is expected to be minimal (if any). No improvements involving the use of heavy equipment/chainsaws or road closures will occur during the breeding season in Mexican spotted owl PACs unless monitoring (USDI 1997) determines that Mexican spotted owls are non-nesting in a given year. Concurrence by USFWS regarding the results of monitoring must be received prior to construction work in a PAC.

Construction of new range structures in all cattle grazing alternatives, including waters and horse gates, will not occur in nest stands. Timing restrictions will be imposed on new fence construction, waterlots, road closures, and cattle guards in occupied PACs.

Mineral supplements are usually placed in flatter areas of good forage production but low utilization. The intent is to encourage animal use away from riparian and other sensitive areas. Livestock concen-

Table 21. Alternative Comparison for the Threatened, Endangered and Sensitive Species Found on the Windmill Allotment Based on 8/20/95 Forest TES List (modified per Federal Register 2/28/96).

Species Name	Alternatives with No Impact	Alternatives with Some Impact
<b>Mammals</b>		
Greater western mastiff-bat, <i>Eumops perotis californicus</i>	All	
Red bat, <i>Lasturis borealis</i>	All	
Occult little brown bat, <i>Myotis lucifugus occultus</i>	All	
Mexican free-tailed bat, <i>Tadarida brasillensis</i>	All	
Navaho Mountain Mexican vole, <i>Microtus mexicanus navajo</i>	B	A, C, D, F, G
Black-footed ferret, <i>Mustela nigripes</i>	All	
<b>Birds</b>		
American peregrine falcon, <i>Falco peregrinus anatum</i>	All	
Bald eagle, <i>Haliaeetus leucocephalus</i>	All	
Common black-hawk, <i>Buteogallus anthracinus</i>	B	A, C, D, F, G
Ferruginous hawk, <i>Buteo regalis</i>	All	
Northern goshawk, <i>Accipiter gentilis</i>	B	A, C, D, F, G
Swainson's hawk, <i>Buteo swainsoni</i>	All	
Zone-tailed hawk, <i>Buteo albonotatus</i>	B	A, C, D, F, G
Osprey, <i>Pandion hallaetus</i>	All	
Flammulated owl, <i>Otus flammeolus</i>	All	
Mexican spotted owl, <i>Strix occidentalis lucida</i>	B	A, C, D, F, G
American avocet, <i>Recurvirostra americana</i>	B	A, C, D, F, G
American Bittern, <i>Botaurus lentiginosus</i>	B	A, C, D, F, G
Black-crowned night heron, <i>Nycticorax nycticorax</i>	B	A, C, D, F, G
Black-necked stilt, <i>Himantopus mexicanus</i>	B	A, C, D, F, G
Brown pelican, <i>Pelecanus occidentalis</i>	All	
Great egret, <i>Casmerodius albus</i>	B	A, C, D, F, G
Long-billed curlew, <i>Numenius americanus</i>	B	A, C, D, F, G
Snowy egret, <i>Egretta thula</i>	B	A, C, D, F, G
Sora, <i>Porzana carolina</i>	B	A, C, D, F, G
White-faced ibis, <i>Plegadis chihi</i>	B	A, C, D, F, G
Southwestern willow flycatcher, <i>Empidonax traillii extimus</i>	B	A, C, D, F, G
American redstart, <i>Setophaga ruticilla</i>	None	All
Belted kingfisher, <i>Ceryle alcyon</i>	All	
Common ground dove, <i>Columbina passerina</i>	All	
Gila woodpecker, <i>Melanerpes uropygialis</i>	All	
Pine grosbeak, <i>Pinicola enucleator</i>	None	All
Gray catbird, <i>Lucar carolinensis</i>	All	
Yellow-billed cuckoo, <i>Coccyzus americanus</i>	B	A, C, D, F, G
Yuma clapper rail, <i>Rallus longirostris yumanensis</i>	B	A, C, D, F, G



Table 21. Alternative Comparison for the Threatened, Endangered and Sensitive Species Found on the Windmill Allotment Based on 8/20/95 Forest TES List (modified per Federal Register 2/28/96) (continued).

Species Name	Alternatives with No Impact	Alternatives with Some Impact
<b>Amphibians and Reptiles</b>		
Lowland leopard frog, <i>Rana yavapalensis</i>	B	A, C, D, F, G
Mexican gartersnake, <i>Thamnophis eques</i>	B	A, C, D, F, G
Narrow-headed gartersnake, <i>Thamnophis rufipunctatus</i>	B	A, C, D, F, G
Northern leopard frog, <i>Rana pipiens</i>	B	A, C, D, F, G
Chiricahua leopard frog, <i>Rana chiricahuensis</i>	B	A, C, D, F, G
<b>Fish</b>		
Colorado squawfish, <i>Ptychocheilus luctus</i>	All	
Gila chub, <i>Gila intermedia</i>	B	A, C, D, F, G
Gila trout, <i>Oncorhynchus gilei</i>	All	
Loach minnow, <i>Tiaroga cobitis</i>	All	
Razorback sucker, <i>Xyrauchen texanus</i>	B	A, C, D, F, G
Roundtail chub, <i>Gila robusta</i>	B	A, C, D, F, G
Speckled dace, <i>Rhinichthys osculus</i>	B	A, C, D, F, G
Spikedace, <i>Meda fulgida</i>	B	A, C, D, F, G
<b>Plants</b>		
Arizona bugbane, <i>Cimicifuga arizonica</i>	B	A, C, D, F, G
Arizona Leatherflower, <i>Clematis hirsutissima</i> var. <i>arizonica</i>	B	A, C, D, F, G
Cliff fleabane, <i>Erigeron saxatilis</i>	All	
Ripley wild buckwheat, <i>Eriogonum ripleyi</i>	B	A, C, D, F, G
Flagstaff pennyroyal, <i>Hedeoma diffusum</i>	All	
Arizona cinquefoil, <i>Potentilla multifoliolata</i>	B	A, C, D, F, G
Arizona cliffrose, <i>Purshia subintegra</i>	B	A, C, D, F, G
Verde Valley sage, <i>Salvia dorrii</i> ssp. <i>mearnsii</i>	B	A, C, D, F, G
Tusayan flame flower, <i>Talinum valldulium</i>	B	A, C, D, F, G

trations associated with gathering or mineral supplement sites will not occur within Mexican spotted owl PACs during the breeding season. Salt placement and the avoidance of PACs will be discussed in the annual meetings with the permittee. Little inherent conflict between spotted owl PACs and salt placement is expected due to the high basal area and tree density, relatively steeper slopes, and generally low forage production of spotted owl habitat.

Alternative B would have no effect on Mexican spotted owls due to the absence of cattle in owl habitat on Forest Service lands. All action alternatives may

affect, but are not likely to have an adverse effect on Mexican spotted owls. Action alternatives arranged in relative order from most to least improvement to meadows, cool season species, riparian habitat and forage conditions are D, G, F, A and C. With the exception of C, the current grazing system, the grazing alternatives to differing degrees incorporate shortened periods of grazing, seasonal deferment and some rest. This should allow plants to have longer recovery periods from cattle grazing which should result in increased vigor, regeneration, seed and fruit development, and density. The effectiveness of new systems will depend on weather, how quickly range

and habitat improvements are implemented so new grazing systems can begin to take place, timing, duration, season and degree of use by wildlife species, and permittee compliance.

Owls and owl habitat have cumulatively been affected by past timber sales, grazing in other allotments, dispersed recreational activities, firewood gathering, special use permit activities, prescribed and wild fire, and other wildlife. Grazing will not occur within any portion of the PACs located in the Red Hill/Hog Prescribed Fire Project until such a time as forage plants are deemed mature based upon a pre-grazing visit. Federally funded activities are analyzed on a site-specific basis and generally result in a determination of "no effect" or "may affect but not likely to adversely affect" which then undergoes Section 7 consultation with the USFWS. Such activities are likely to occur in the foreseeable future and will be analyzed accordingly. USFWS has already concurred with determinations made for the Mud, Pumphouse and Ritter timber sales which are planned on the Windmill Allotment.

**Southwestern Willow Flycatcher:** The Windmill Allotment lies adjacent to 21.2 miles of southwestern willow flycatcher designated critical habitat. Six suitable habitat sites exist adjacent to the allotment from 0.2 to 2.25 miles. One suitable site exists within the allotment, and a 10-linear foot watergap is grazed at this site by Windmill cattle on private land. One potential habitat site exists 1 mile from the allotment. Three potential habitat sites exist within the allotment. None of these potential habitat sites would be grazed by Windmill cattle in any of the cattle grazing alternatives.

Activities on Federal and non-Federal lands which could affect the southwestern willow flycatcher include livestock grazing, cowbird parasitism, heavy recreational use in some areas, water diversions and allotment improvements. Following is a discussion of potential effects to the southwestern willow flycatcher that may occur from Windmill, other federal, and non-federal activities. The effects are discussed for suitable and potential habitat, and designated critical habitat. A 5-mile radius has been drawn around suitable habitat and potential habitat that could become suitable during the life of the permit. The radius areas provide a format in which to evaluate the complex jurisdictions and associated actions in the vicinity of flycatcher habitat, including the potential for cowbird parasitism.

For all the cattle grazing alternatives, Coconino National Forest will survey for flycatcher occupancy

every year for the life of the permit in suitable Coconino National Forest SWWF habitat and any potential habitat that becomes suitable during the life of the permit. Coconino National Forest will contact USFWS if surveys cannot be conducted. Coconino National Forest will assist and cooperate as possible with monitoring and will contact USFWS as to the status of monitoring as quickly as possible. Arizona Game and Fish Department is the lead agency for monitoring. They will be contacted if any of these sites become occupied and will either have available personnel and be able to monitor the sites quickly or not have personnel available and not be able to monitor the site in that given year. Coconino National Forest will attempt to coordinate with personnel conducting ongoing research regarding monitoring as well. If these sites are determined to have breeding flycatchers within 5 miles of the allotment, Coconino National Forest will do one of the following:

**A** - Initiate cowbird trapping for any flycatcher locations as outlined in the Service's September 27, 1995, Windmill Biological Opinion for the current or following breeding season regardless of whether assistance can be gained from Arizona Game and Fish Department; or

**B** - Immediately remove livestock from the Windmill pasture(s) located within a 5-mile radius of Southwestern willow flycatcher location(s) during the critical season (April 1 through July 31) and reinstate consultation with the Service to determine an adequate site-specific solution. This solution will take into account new information regarding cowbird commuting distances and agency direction.

The results of Southwestern willow flycatcher surveys (conducted to the most recent Arizona Game and Fish Department protocol), as well as the trapping program if initiated, will be reported to the Service and to the Arizona Game and Fish Department each year. All fencing that excludes livestock from designated flycatcher critical habitat will be inspected and repaired prior to releasing cattle in those pastures, as well as following any flood events.

The Forest will follow Regional Forester direction on projects required to remove immediate threats to species in the 7 Species Project. For non-Forest suitable habitat, Coconino National Forest will cooperate and assist as possible with survey efforts. If site(s) become occupied, we will work cooperatively with other entities for monitoring and for trapping if needed. If surveys, monitoring or trapping does not occur, Coconino National Forest will consult with the USFWS.

A review of days per pasture, season of cattle use, cattle distribution, amount of rest, and ability of cool season grass species (*Stipa*) to maintain healthy plant vigor, resulted in the following ranking of alternatives for watershed condition:

**Alternative B** - First best for watershed improvement in the short-term (10 years). Fastest upward trends expected for 10 years, with upward trends tapering off and possibly declining between 10-20 years due to plant decadence on Forest Service lands.

**Alternative D** - Second best for watershed improvement in the short-term (10 years). Next fastest upward trends expected for 10 years, with upward trends tapering off between 10-20 years due to plant decadence.

**Alternative F** - Second best for watershed improvement in the short- and long-term. Second fastest upward trends expected because of shortened days/pasture and rest incorporated into system.

**Alternatives A and G** - Third best for watershed improvement in the short- and long-term.

**Alternative C** - Fourth best for watershed improvement in the short- and long-term.

Alternatives D and F watershed rankings for the desert grassland cannot be easily separated. Although pasture size and duration of stay in these pastures remains approximately the same between Alternatives D and F, the reduced number of cattle in Alternative D means that there will be more rest in the edges of pastures throughout the Windmill Allotment. This will allow for faster recovery of watersheds in the short term in a more localized area. In contrast, Alternative F will graze pasture edges more frequently due to higher cattle numbers.

Alternative F allows grazing within the SWWF 5-mile foraging radius (Gyberg, Duff Mesa and Duff Flat) during the breeding season 2 out of 6 years. By doing this, more pasture rotation options are available which create yearlong rest in these three pastures (1 in 6 years) and increased seasonal deferment to all Mill Park herd pastures. With Alternative D, cattle do not graze within the SWWF 5-mile radius during the breeding season. This strategy limits cattle rotation options because these pastures must be grazed each year during the non-breeding season. Alternative D

also reduces flexibility needed for pasture rotations to respond to annual climate and vegetative needs.

Alternative F allows grazing in a 5-mile foraging radius during the flycatcher breeding season in two pastures adjacent to occupied or recently occupied flycatcher nesting sites 2 out of 6 years (Duff Mesa and Duff Flat). Cattle will graze within a mile of the occupied site in Duff Flat South pasture during the first week of April, 1 year in 6. That same year the cattle would move to Duff Flat North pasture (2 miles from the occupied site) through the third week of April. The other year, cattle will graze Duff Mesa pasture (4 miles from the occupied site) during the first week of April. This limited time early in the breeding season within the 5-mile radius will be offset with the improvement in overall long-term watershed conditions. Cowbird trapping at the occupied sites would help mitigate any potential problems.

Alternatives A and G have the same pasture rotations as Alternative D except with higher cattle numbers. The higher cattle numbers will reduce the amount of rest each pasture receives.

Alternatives A, C, D, F and G will not permit Windmill cattle to graze in designated critical habitat for flycatchers. Windmill cattle will not graze in unoccupied suitable or potential habitat. Therefore, grazing will not modify critical habitat, directly or indirectly disturb nests, or alter suitable or potential habitat structure or species composition. Grazing within 5 miles of designated critical habitat could facilitate parasitism, but trapping or livestock removal within a 5-mile radius would apply as indicated previously. Fences are proposed in Alternatives A, D, F and G that will protect a larger area around one area of suitable unoccupied habitat within the allotment. There is currently an enclosure around potential habitat on the allotment and the installation of self closing horse gates in all action alternatives will assure cattle exclusion when the gate is accidentally left open by recreationists.

It is recognized that cattle grazing management is only one part of managing healthy watersheds. Other projects such as prescribed fire, structural improvements in gullies, and road and trail management also affect watershed conditions. We have created a list of desired projects in the Windmill Winter Division. These projects will not be a part of this decision, but future NEPA may tie to this analysis. Also, the Sedona/Oak Creek Ecosystem Management Project is in the process of creating a fire management program for the Windmill winter area.

Cumulatively, flycatchers, their habitat and proposed critical habitat are affected by activities in nearby communities, private land, State, other Federal lands and various recreational and lands uses. This is extremely complex in the Verde Valley. It will take a concerted planning effort from a variety of people, organizations and landowners to find the appropriate balance between meeting the desires and needs of people and the need to have a healthy watershed and riparian areas and site specific protection for flycatcher habitat and reproduction. Coconino National Forest is an active member and supporter in the development of this long-term strategy.

**Yuma clapper rail:** Yuma clapper rails were first detected in Tavascl Marsh, off the allotment in November 1997. Since Tavascl contains sufficient habitat for year-round needs of this subspecies, it is possible they could breed in this area. Although isolated and distant from other known populations of this subspecies on the Colorado and Gila River, a new population is possible given the presence of high quality habitat in this location. Recent visits have concluded that Sheepshead Spring is unsuitable as potential habitat because of its small size, insufficient water impoundment with a consequent depauperate diet base and poor protection from predation. Dry Beaver Creek on the adjacent Apache Maid allotment may also be suitable unoccupied habitat.

These are secretive rails that inhabit rivers, ponds and bogs with emergent riparian vegetation such as bulrushes. They climb on flattened floating materials and feed on crayfish, invertebrates, arthropods and fish. There is no critical habitat. They are not parasitized by cowbirds.

Alternative B (no grazing on Forest Service land) would have no direct or indirect effect to this subspecies or its habitat due to the lack of cattle in its habitat and distance and size of State land parcels from the marsh or unoccupied habitat. Alternatives A, C, D, F and G may affect but are not likely to adversely affect the species or its habitat. There is no grazing of its habitat under any alternative due to fencing so habitat alteration or disturbance will occur. The Duff Flat pasture (closest to the marsh) is grazed under all alternatives which could indirectly increase sediments into the habitat. This pasture has the potential for most influence on the marsh compared to others in the watershed. Improvements are scheduled in Alternatives A, D, F and G that will improve cattle distribution, increase rest and reduce duration of graze. This should reduce grazing related watershed effects. Improvement implementation should have no impact to habitat or species due to

distance. Cumulatively, birdwatching, hiking on trails/viewing platforms, and cowbird trapping occurs at the marsh. Recreation is not expected to impact this subspecies or habitat due to dense vegetation, difficult access and low use. Water levels at Tavascl appear to be primarily influenced by what is happening at Peck's Lake. U.S. Fish and Wildlife Service consultation with the Environmental Protection Agency and the Corps of Engineers regarding potential direct and indirect effects to this marsh have occurred in the past and have recently been reintiated for a housing development proposed around Peck's Lake.

**Fish:** The change in grazing management on the Windmill Allotment is an acknowledgment of the cumulative effects past and present activities have had on the riparian and aquatic communities in the planning area. Given the cumulative actions that have occurred on public and private land that contributed to the decline in aquatic ecosystems and native fish communities, the recovery of these areas will likely be through cumulative improvements as well. Specific to grazing, elk populations above the Mogollon Rim and livestock use of the Verde River corridor due to allotments on the Prescott National Forest will continue to have direct and indirect impacts on native fish and razorback sucker critical habitat in the Verde River.

As lands off-forest continue to develop, improving watershed conditions and implementing Best Management Practices (BMP's) becomes even more important on National Forest System lands. Activities such as timber harvest, roads, recreation, and other ground disturbing management activities will continue to be implemented in the Windmill Allotment planning area and will need to address the cumulative effects of these actions on downstream habitats. The forest will also need to work with the Arizona Game and Fish Department in addressing elk and non-native fish populations within the planning area and to continue to cooperate with the USFWS in recovering rare fish.

**Razorback Sucker:** Razorback sucker historically occupied the larger streams in the Colorado River basin, including the Verde River. They are believed to have ranged in the Verde River mainstem up to Perkinsville, based on bone samples taken from the same archaeological site as the Colorado squawfish. Razorback suckers persisted in the Verde River near Peck's Lake until 1954 (Minckley 1973). There is no evidence of razorback suckers inhabiting any tributaries on the Forest, but it is speculated they may have occasionally used the lower reaches of the larger tributaries.

Information on habitat of razorback sucker is limited. Except for spawning migrations, razorback suckers are fairly sedentary, moving relatively few miles over several months. They tend to occupy strong, uniform currents over sandy bottoms, eddies and backwaters lateral to the river channels, and sometimes concentrating in deep places near cut banks or fallen trees. During spawning season, razorback suckers are found in runs with coarse sand, gravel, and cobble substrate, flooded bottom lands, gravel pits, and large eddies formed by flooded mouths of tributary streams and drainage ditches. Habitat needs of young and juvenile razorback suckers in the wild are largely unknown because they are rarely encountered by researchers. The diet of razorback suckers consists of middle larvae, planktonic crustaceans, diatoms, filamentous algae, and detritus.

Declines in razorback sucker populations are largely attributed to habitat modification due to water development projects similar to those described for the squawfish. Thus, the few remaining unaltered rivers (e.g. the Verde River) and their tributaries are vital to the continued existence of razorback sucker. In 1993, the Verde River from Horseshoe Reservoir to Sullivan Lake was designated as critical habitat for razorback suckers (USFWS 1994). Present threats to this habitat includes stream diversion along the mainstem and tributaries in the Verde Valley, urban development, and impacts to riparian vegetation.

Razorback suckers are also threatened by the presence of non-native species. Some of the species present in the Verde River include red shiner, channel catfish, flathead catfish, carp, smallmouth bass, largemouth bass, green sunfish, and yellow bullhead.

Reintroduction of razorback suckers into the Verde River was initiated in 1981. Early stocking sites on the forest included the Verde River below Camp Verde, Oak Creek, and West Clear Creek. Returns from these early reintroduction efforts were poor. Currently, razorbacks in the Verde River mainstem are primarily found in the upper reaches near Perkinsville. A 1991-92 survey of radio-tagged razorbacks did locate two fish in the Verde River mainstem adjacent to the forest, so they may be periodically encountered in the vicinity of the Windmill Allotment.

The affected reach of razorback sucker habitat on or adjacent to the Windmill Allotment includes the Verde River mainstem from the confluence of Sycamore Creek to the confluence of Oak Creek. They also may have utilized the lower reaches of Oak Creek in this area, but there is no evidence to support this.

The affected reach is approximately 21 miles long and lies primarily within the Verde Valley. The Coconino National Forest and Windmill Allotment are situated along the eastern side of the drainage, and the Prescott National Forest lies to the west. The Verde River mainstem and riparian corridor are primarily in private ownership through this reach. Stream reaches where the forest borders the river are identified in the Forest Land Management Plan (FLMP) as Management Area (MA) 12, Riparian and Open Water. This includes approximately 6 miles from Sycamore Creek downstream, and along scattered parcels in the Verde Valley.

Habitat quality in the affected reach is mixed. In the 6-mile reach below the confluence of Sycamore Creek, the Verde River flows through a steep walled canyon that limits access by cattle and recreationists from the east side. The channel substrate is primarily cobbles and small boulders. Below this point, the floodplain broadens as it enters the Verde Valley. The Verde River is predominantly in private ownership through the Verde Valley and is highly modified by stream diversions, gravel operations, floodplain developments, and other activities (Sullivan and Richardson 1993). On public lands, grazing and recreation were identified as threats. Additional threats to razorback suckers in the affected reach include non-native species that have established themselves throughout the Verde Valley.

The Verde River was designated as critical habitat because it provides the range of habitats needed for spawning and rearing of razorback suckers. Protecting the stream characteristics and channel morphology that provides these habitat conditions is, therefore, important for maintaining the critical habitat. Management activities that reduce bank stability and riparian vegetation can increase bank erosion during flood events and result in altered channel characteristics detrimental to razorback sucker habitat. Grazing and recreation activities on public lands have been identified as threats to maintaining bank and riparian conditions along the Verde River.

Proper implementation of any of the Windmill alternatives and the Forest Plan standards and guidelines should protect razorback sucker habitat. No grazing is planned along the Verde River and livestock from the Windmill Allotment are excluded from utilizing the river by fencing and topographic features. No direct impacts associated with grazing on the Windmill Allotment are expected to occur to razorback suckers or their critical habitat. Grazing impacts are evident around the confluence of Sycamore Creek and are due to allotments on the Prescott National Forest.

Indirect effects of Alternatives A, C, D, F and G on razorback sucker habitat can occur through changes in the condition of the Verde River watershed. The indirect effects of grazing will most likely influence runoff patterns and sediment movement through the watershed. Considering razorback suckers adapted to life in rivers that had extremely variable flows and were highly turbid, it is unclear what these indirect effects might have. Alternative B would have no indirect effects from cattle grazing.

In order to minimize the indirect effects of grazing on the Windmill Allotment, the objectives of Alternatives A, C, D, F and G are to improve watershed conditions through greater control of cattle. These alternatives incorporate rest into most pastures over a 4- to 5-year period, improve cattle distribution through fencing and water developments, reduce grazing periods within pastures, and generally exclude riparian areas in the winter portion of the allotment. The shorter grazing periods and resting of pastures in these alternatives are expected to improve watershed conditions in the short- and long-term. In all alternatives, the Forest will assign highest priority to efforts to improve watershed conditions through improving cattle distribution (fencing and water developments) in the winter portion of the allotment. These will be completed as quickly as reasonably possible. If watershed conditions do not improve under the proposed grazing management, the Forest Service will review the management and develop new management that does result in improvement to watershed conditions. Annual reports on livestock management and monitoring will be provided to the U.S. Fish and Wildlife Service.

While improving watershed conditions is a step in the right direction, the cumulative impacts of activities, both on forest and off, within the watershed will continue to pose a threat to razorback suckers and critical habitat in the Verde River. The range improvements identified in Alternatives A, C, D, F and G will take up to 10 years to implement and then the benefits may take several years to be realized. During this time, additional activities will occur in the watershed and the benefits of changing the grazing strategy may be masked in such a highly modified environment as the Verde River. But in the long term, these improvements will help keep management options open and should not result in aggravating the conditions downstream.

Alternative B (No Grazing) will not affect razorback suckers or their habitat on the allotment. Although cattle will be excluded from Forest Service lands on the allotment under this alternative, improvement of razorback sucker habitat may be insignificant due to

the level of habitat modification that has occurred along this reach of the Verde River.

Alternatives A, C, D, F and G will not directly affect razorback suckers because most of the fish currently inhabit the Verde River several miles upstream from the Windmill Allotment. Grazing alternatives also will not directly affect razorback sucker habitat on the allotment, including designated critical habitat on the Verde River, because cattle are excluded from the Verde River in all alternatives. However, action alternatives may indirectly affect the Verde River because grazing may change watershed conditions by altering levels of vegetative cover, plant species composition, soil quality, and turbidity and peak flows in the river.

Considering that razorback suckers adapted to life in rivers that had extremely variable flows and were highly turbid, it is unclear what indirect impacts the grazing alternatives on the Windmill Allotment might have. Alternatives that tend to improve ground cover and decrease soil compaction and bare ground, will lead to improved watershed conditions and reduce the livestock grazing contributions to cumulative effects. Grazing alternatives D and F would tend to be the best for improving watershed conditions, followed by Alternatives A & G and last C. This would be true for all fish species.

**Spikedace:** Historically, spikedace were widespread in the Gila River basin including samples taken from the Verde River, Wet Beaver Creek, and West Clear Creek in the 1930's (Minckley 1993). Today, spikedace are primarily found in the upper Verde River above the Coconino boundary. A short stretch of the Verde River mainstem, in the immediate vicinity of the confluence of Sycamore Creek, continues to support spikedace. Sampling in the spring of 1995 confirmed their presence near the confluence of Sycamore Creek. Below the confluence of Sycamore Creek, fish samples begin to be dominated by non-native species and spikedace have not been collected in several years.

Spikedace inhabit the water column of moving water generally less than 3 feet deep. They often congregate at the downstream end of riffles, eddies, and shear zones along sand and gravel bars. Juvenile spikedace are found in slower velocity waters along the stream margins (USFWS 1991). Spikedace feed primarily on aquatic and terrestrial insects (Minckley 1973).

In winter, spikedace appear to seek out protected areas, either cobble streambanks or slow-velocity areas in the lee of gravel bars. Spawning occurs in shallow sand and gravel-bottomed riffles. Physical

cover in the form of instream or overhead objects does not appear to be a factor in the habitat requirements of the species (Propst et al., 1986).

Declines in spokedace populations throughout its range are largely attributed to loss and modification of habitat, and the introduction and spread of non-native species. The Final Rule for listing the spokedace identified potential threats relating to forest management which include grazing, mining, riparian and watershed conditions (USFWS 1986).

The affected reach of spokedace habitat on or adjacent to the Windmill Allotment includes the Verde River mainstem from the confluence of Sycamore Creek downstream approximately 1/2 mile.

Habitat quality in the affected reach is characterized by a restricted floodplain and steep walled canyons that limit access from the east side. The channel substrate is primarily cobble and boulders (Sullivan and Richardson 1993). The affected reach is adjacent to the Windmill Allotment and Duff Mesa pasture.

The affected habitat is adjacent to Duff Mesa pasture. In Alternatives A, C, F and G, Duff Mesa pasture is scheduled to receive a maximum of 675 head for 23-38 days during the winter grazing period. In Alternative F, this pasture would receive yearlong rest 1 year in 6 years. In Alternative D, Duff Mesa pasture would be grazed with 375 cattle for 35 days during the winter. In all alternatives, cattle using this pasture are excluded from the Verde River and Sycamore Creek which border the western and northern portions of this pasture. No direct impacts associated with grazing on the Windmill Allotment are anticipated in the affected reach. Grazing impacts are evident in this reach due to allotments on the Prescott National Forest.

Indirect effects of Alternatives A, C, D, F and G on spokedace habitat are also anticipated to be minimal. Indirect effects on the affected reach can occur from management activities in the upper Verde watershed which is above the Windmill planning area and from activities in the Sycamore Creek watershed. Under the preferred alternative, a number of pastures within the Sycamore Creek watershed will not be grazed. These include Upper Sycamore, Lower Sycamore, Black Mountain and Casner. Indirect effects in the Sycamore Creek watershed will also be reduced if the objectives of improving watershed conditions on the Windmill Allotment are met. Alternative B would have no indirect effects from cattle grazing.

In order to minimize the indirect effects of grazing on the Windmill Allotment, the objectives of Alternatives

A, C, D, F and G are to improve watershed conditions through greater control of cattle. These alternatives incorporate rest into most pastures over a 4- to 5-year period, improve cattle distribution through fencing and water developments, reduce grazing periods within pastures, and generally exclude riparian areas in the winter portion of the allotment. The shorter grazing periods and resting of pastures in these alternatives are expected to improve watershed conditions in the short- and long-term.

Given the cumulative actions that have occurred on public and private land that contributed to the decline in aquatic ecosystems and native fish communities, the recovery of these areas will likely be through cumulative improvements as well. Specific to grazing, elk populations above the Mogollon Rim and livestock use of the Verde River corridor due to allotments on the Prescott National Forest will continue to have direct and indirect impacts on spokedace habitat in the Verde River. The confluence of Sycamore Creek and the Verde River is the site of Packard Ranch and is also a popular trailhead to access Sycamore Canyon and Sycamore Canyon Wilderness. Increased use of this area could impact riparian and aquatic habitats.

Alternative B (No Grazing) will not affect spokedace or their habitat on the Allotment. Alternatives A, C, D, F and G will not directly affect spokedace or spokedace habitat on the Allotment because the Verde River and Sycamore Creek have been fenced to exclude cattle. However, the grazing alternatives may indirectly affect spokedace habitat on the Allotment because grazing may alter turbidity and peak flows in the Sycamore Creek Watershed. Alternatives that increase ground cover and reduce soil compaction and bare ground, coupled with other watershed best management practices, should minimize the potential indirect effects on spokedace and their habitat.

**Loach Minnow:** In 1938, C. L. Hubbs collected loach minnows in Beaver Creek and the Verde River mainstem near Camp Verde. This is the only known collection of loach minnow from the upper Verde River system and they have not been reported since (Minckley 1993). It is unclear whether loach minnow have been extirpated from the Verde River drainage, or if they have been collected during fish surveys because they are difficult to sample. Loach minnow inhabit the interstitial spaces of stream substrates and are difficult to capture using ordinary sampling techniques. Their absence may also be a result of mistaken identity. Loach minnow resemble speckled dace that can be abundant in streams of the Verde drainage. It is conceivable that loach minnow have

been misidentified as speckled dace when numerous speckled dace are collected. Until an extensive inventory is conducted that targets loach minnow and confirms their absence in the Verde River watershed, potential habitat for loach minnow will be evaluated in the Windmill Allotment planning area. This cautious approach seems warranted considering loach minnow in Eagle Creek on the Apache-Sitgreaves National Forests have recently been collected after several years of "absence" and despite fairly regular sampling efforts.

Loach minnow inhabit relatively shallow riffles with moderate to swift currents and gravel-cobble substrates. They are essentially a bottom dweller in these environments. Adult loach minnow typically occupy the interstices of cobble-size substrates (that occasionally have dense growths of filamentous algae). Larval and juvenile loach minnow are usually found in shallower, slower water over sand substrate (Propst and Bestgen, 1991).

Loach minnow are opportunistic, benthic insectivores, largely deriving their food supplies from among riffle-dwelling, larval mayflies, blackflies and midges. Loach minnow appear to actively seek their food among bottom substrates, rather than pursuing animals entrained in the stream drift (USFWS 1991a).

Spawning of loach minnow occurs in spring (March to June) when maximum daily water temperatures exceed 60°F. Adhesive eggs are deposited on the underside of flattened cobble-size rocks in the same riffles occupied by adults during the remainder of the year. The nest is guarded by the male, and possibly the female as well.

Loach minnow's preference for gravel/cobble substrates makes it susceptible to habitat modifications that reduce riffle habitat or cover the substrate with fine sediment. Forest management activities which potentially increase stream sedimentation, such as grazing, can affect the quality of habitat for loach minnow. Non-native predators, especially flathead catfish and channel catfish, both of which are found in the Verde River, can directly reduce loach minnow populations.

Although loach minnow were only collected in the Verde River mainstem near Camp Verde and in Beaver Creek near its confluence with the Verde, the potential habitat for loach minnow in the Windmill Allotment planning area is considered to be the Verde River mainstem from the confluence of Sycamore Creek to the confluence of Oak Creek, and the mainstem of Oak Creek from its mouth upstream to Slide Rock.

Habitat quality in the affected reach of the Verde River is similar to that described for Colorado squawfish and razorback sucker. The affected reach in Oak Creek is approximately 35 miles long with mixed ownership patterns. Private lands are primarily concentrated around Cornville, Sedona and within Oak Creek Canyon. Above Sedona, Oak Creek has the characteristics of a cold water stream, has a relatively narrow floodplain and a cobble/boulder substrate. Below Sedona, the floodplain widens, the stream has a lower gradient and slower velocities, receives more sunlight and the dominant substrate is sand and cobble (Sullivan and Richardson 1993, NAU 1995). Threats to habitat quality on public lands include grazing, recreation, and increased sedimentation from management activities within the watersheds. Loach minnow are also threatened by the presence of non-native species in Oak Creek and impacts to habitat on private lands such as stream diversions.

Loach minnow prefer to inhabit relatively shallow, swift water with gravel-cobble substrates. Protection and maintenance of streambank stability and riparian vegetation is important for maintaining the stream channel morphology and reducing the amount of sediment generated from bank erosion. Management activities that reduce bank stability and riparian vegetation can increase bank erosion during flood events and result in altered channel characteristics detrimental to loach minnow habitat. Grazing and recreation activities on public lands have been identified as threats to maintaining bank and riparian conditions along the Verde River and Oak Creek. Management activities in the watersheds that increase sedimentation may also affect loach minnow habitat by filling the interstitial spaces of the gravel-cobble substrates that loach minnow prefer.

Proper implementation of Alternatives A, C, D, F and G and the Forest Plan standards and guidelines should protect potential loach minnow habitat. No grazing is planned along the Verde River and livestock from the Windmill Allotment are excluded from utilizing the river by fencing and topographic features. These alternatives also limit livestock access to Oak Creek to three water gaps. The remainder of Oak Creek is excluded from grazing by fences and topographic features.

Indirect effects of Alternatives A, C, D, F and G on loach minnow habitat can occur through changes in the condition of the Verde River and Oak Creek watersheds. The indirect effects of grazing will most likely influence runoff patterns and sediment movement through the watershed. Increased turbidity



could affect loach minnow by affecting invertebrate production and by filling the interstitial spaces in stream substrates that is the preferred habitat of loach minnow. Alternative B would have no indirect effects from cattle grazing on Forest Service lands.

In order to minimize the indirect effects of grazing on the Windmill Allotment, the objectives of Alternatives A, C, D, F and G are to improve watershed conditions through greater control of cattle. These alternatives incorporate rest into most pastures over a 4- to 5-year period. Improve cattle distribution through fencing and water developments, reduce grazing periods within pastures, and generally exclude riparian areas in the winter portion of the allotment. The shorter grazing periods and resting of pastures in these alternatives are expected to improve watershed conditions in the short- and long-term.

While improving watershed conditions is a step in the right direction, the cumulative impacts of activities, both on forest and off, within the watershed will continue to pose a threat to loach minnow habitat in the Verde River and Oak Creek. The range improvements identified in the preferred alternative will take up to 10 years to implement and then the benefits may take several years to be realized. During this time, additional activities will occur in the watershed and the benefits of changing the grazing strategy may be masked in such highly modified environments. But in the long term, these improvements will help keep management options open and should not result in aggravating the conditions downstream.

**Gila Trout:** Historically, Gila trout inhabited the upper Gila River and San Francisco River in New Mexico and tributaries to the Verde River drainage in Arizona. Collections from Oak Creek prior to 1890 and in 1913 were determined to be Gila trout. It is likely that trout samples taken from Oak Creek and West Clear Creek in 1892 and 1894, and which were later misplaced, were also Gila trout (Minckley 1993). Today, Gila trout are only found in New Mexico and have been extirpated from the waters of Arizona. Habitat modifications and the introduction of rainbow trout and other non-native species probably led to the disappearance of Gila trout from the waters on the Coconino National Forest shortly after the turn of the century. Reductions in the distribution and numbers of Gila trout throughout their historic range led to its listing as an endangered species in 1967.

Like other salmonids, Gila trout are found in small, cool, headwater streams that seldom exceed 70 degrees Fahrenheit. Substrates are typically rocky and hiding cover is provided by boulders, deep pools,

or large woody debris. Gila trout require cool water streams, with gravel/cobble substrates that are generally free from sand and finer particles, and deep pools. Gila trout are carnivorous and feed primarily on aquatic and terrestrial insects (Minckley 1973).

Spawning occurs in the spring when water temperature exceeds about 45°F and stream flow recedes. Fish select spawning sites (redds) based on substrate and depth of water. They prefer to spawn in substrates comprised of small pebbles or finer material.

Threats to Gila trout include the introduction of non-native species and modification of habitat due to land management practices. Gila trout have been replaced in most of their native range by introduction of non-native predatory and competitive fish, primarily brown and rainbow trout. Their habitat has been modified by management activities such as grazing, recreation, and road building that impact bank stability, increase sedimentation, and alter channel conditions.

The affected habitat for Gila trout is considered to be the mainstem of Oak Creek from Sterling Springs to Grasshopper Point and the West Fork of Oak Creek. These reaches are addressed in the Forest Plan as Management Areas (MA) 12 - Riparian and Open Water, MA 1 - Wilderness, and MA 14 - Oak Creek Canyon.

The West Fork of Oak Creek is located in Red Rock-Secret Mountain Wilderness and habitat conditions are relatively undisturbed. Although relatively inaccessible, increased recreational use of this area can impact riparian conditions important for the maintenance of fish habitat. The mainstem of Oak Creek also provides relatively good quality habitat, but private land ownership and houses within the floodplain, the presence of Highway 89 in the narrow valley bottom, increased recreational use, and routine stocking of rainbow trout, threaten the quality of habitat in Oak Creek and the potential re-establishment of Gila trout.

Implementation of any Windmill alternative will have no direct effects on Gila trout habitat. Pastures are located above the Mogollon Rim, so livestock cannot access Oak Creek Canyon or the perennial portions of the West Fork of Oak Creek.

Indirect effects of Alternatives A, C, D, F and G on Gila trout habitat can occur through changes in the condition of the Oak Creek watershed, including the West Fork of Oak Creek. The indirect effects of grazing will most likely influence runoff patterns and

sediment movement through the watershed. Alternative B would have no indirect effects from cattle grazing on Forest Service lands.

In order to minimize the indirect effects of grazing on the Windmill Allotment, the objectives of Alternatives A, C, D, F and G are to improve watershed conditions through greater control of cattle. These alternatives would incorporate rest into most pastures over a 4- to 5-year period, improve cattle distribution through fencing and water developments, reduce grazing periods within pastures, and generally exclude riparian areas in the winter portion of the allotment. The shorter grazing periods and resting of pastures in these alternatives are expected to improve watershed conditions in the short- and long-term.

Improving watershed conditions is important for minimizing indirect impacts to Gila trout habitat and to protect the "Unique Water" status of Oak Creek. By meeting the water quality objectives for Oak Creek, Gila trout habitat should be maintained. Oak Creek is a popular destination and as recreational activities in the canyon increase and private land is developed in the Oak Creek floodplain, the cumulative impacts of these actions could threaten the quality of fish habitat in Oak Creek.

### Sensitive Species

There are 41 sensitive species with known or potential habitat on the Windmill Allotment. These species are identified on the Regional Foresters sensitive species list; are Federal candidate species; or are listed by the State of Arizona as wildlife of special concern. Impacts from alternatives on sensitive species are displayed on the Table 21, shown previously. Information about 14 sensitive species which will not be impacted by any of the alternatives is located in the Appendix. The 27 sensitive species which may be impacted by one or more of the alternative are discussed below.

**Common Black-Hawk:** The Winter Division of the Windmill Allotment contains potential, suitable and occupied habitat for the Common black-hawk (*Buteogallus anthracinus*). Black-hawks nest in deciduous trees in riparian areas and feed on crayfish, amphibians, reptiles and fish.

Alternative B (No Grazing) will not affect black-hawks on the allotment. Alternatives A, C, F and G exclude grazing from the riparian areas with flowing water which is considered the highest quality habitat. Black-hawks can be found in Dry Beaver Creek where perennial water occurs only in pools. Dry Beaver

Creek will be grazed in December and May of every year as livestock are moved between summer and winter ranges as follows: 250 cattle in Alternatives A and F, 250 head in Alternative C, and 150 head in Alternative D. Short (10 day) grazing periods in December when riparian vegetation is dormant will help minimize grazing impacts. However, even short grazing durations such as the 5-10 day period in May during the growing season can impact riparian vegetation and streambanks. Aquatic and terrestrial prey items in addition to recruitment of future nest sites could be impacted. Other possible impacts to black-hawks and their habitats include flooding, recreational activities and human development.

**Navajo Mountain Mexican Vole:** No known populations of Navajo Mountain Mexican voles (*Microtus mexicanus navaho*) exist within the allotment, but there is potential habitat on the allotment for this species. About 10 vole populations exist within a 15-mile radius of the allotment. Voles occupy meadows and riparian areas above the Mogollon Rim. They also occur within forested areas where tree densities are low. They are dependent on grasses and other herbaceous vegetation. Cattle tend to concentrate in this species habitat and forage on its main food and cover. Grazing may disturb the reproduction, foraging, or other life requirements of this species.

Alternative B (No Grazing) will have no effect on this subspecies due to the absence of permitted cattle in vole habitat on Forest Service lands. Grazing on State lands may cumulatively impact voles or their habitat through soil compaction and grazing which would remove food or cover.

All other alternatives will directly impact vole habitat. Cattle grazing will remove vegetation and seed heads that provide food and cover. Because cattle tend to concentrate in wet meadows, this will likely create a denser, more compacted soil which could have negative effects on burrowing animals like voles. Plant vigor and species composition could be affected as well. Because cattle use in individual pastures will be rotated annually and will only occur during the summer, successful breeding by voles is likely to occur annually somewhere on the allotment. Impact levels vary based on expected meadow and forage conditions for alternatives. Impacts decrease as meadow conditions improve. Action alternatives arranged in relative order from most to least impact are: C, A, F, G, and D. Alternative C has the most negative impact due to the longer grazing periods in Mill and Fry Park. Alternative A has reduced grazing periods in Mill and Fry Park. Alternative F has reduced grazing periods in Mill and Fry Park and also

will improve small meadows in the Foxboro summer area by reduced grazing periods made possible by an additional fence. Alternative G contains similar features as Alternative F but will further improve meadow conditions by reduced cattle numbers in Munds Pocket and Foxboro summer areas. Alternative D has greatly reduced cattle numbers which will lessen the utilization on this species key habitat components. Alternatives A, F, G and D exclude cattle grazing from wet meadows, a key habitat for the voles.

Cumulative effects to vole habitat under all alternatives will occur from timber sales, wildlife grazing in wet meadows and spring areas, and by recreational activities on the allotment. Vole habitat may also decline in quality due to the lack of fire, a natural force, which maintained herbaceous vegetation in the ponderosa pine type.

**Northern Goshawk:** There are 7 known post-fledgling areas (PFAs) on or adjacent to the allotment for the Northern goshawk (*Accipiter gentilis*). Only portions of the allotment have been surveyed according to protocol developed by Kennedy and Stahlecker (1991), mainly in preparation for timber sales or in response to informal sightings. All suitable habitat for goshawks in this allotment was considered occupied for the purposes of this analysis.

The Final Environmental Impact Statement For Amendment of Forest Plans was in the public comment period during the development of alternatives for the Windmill Allotment. That EIS discloses the effects of amending forest plans in the Southwestern Region of the Forest Service to implement an ecosystem approach for management of northern goshawk habitat. Alternative G (proposed action) included a section on guidelines for grazing management. A table displays allowable utilization on key forage species in key areas during the growing season. Allowable utilization varies based on range condition and the management strategy. The document also states the guidelines for specific allotment management or strategies not covered by the table may vary when determined through the Integrated Resource Management process.

Goshawks hunt primarily in forested conditions where forage production is usually low to moderate and cattle utilization of the forage is low. Cattle concentrate their foraging activities in meadows and more open areas where their nutritional needs can be met with minimal energy expenditure. The differing foraging strategies result in minimal overlap of goshawk hunting areas with key cattle utilization areas.

These forest dwelling birds use an estimated 5,400 acres of semi-open to closed canopy forest with a variety of age and size classes of trees for foraging and intermediate to closed canopy areas for nest locations and raising their young in post fledgling areas (600-acre PFAs). Their habitat often includes small meadows (up to six acres in size) and riparian areas. Goshawks prey on medium-sized birds and mammals which in turn rely on snags, downed logs, rocks, oaks and forbs, grasses and shrubs for their food and cover. Research on the Coconino National Forest has shown that some goshawk territories expand greatly during the winter because goshawks foray into pinyon-juniper habitat (Hall 1995).

Alternative B (No Grazing on Forest Service lands) will not affect goshawks on the Allotment. Grazing on State lands under this alternative could impact foraging habitat for one known goshawk or for undetected goshawks. Other alternatives may impact individual goshawks on the allotment but probably will not cause a trend toward federal listing or loss of viability of the species. Abundance of some prey items may be reduced within a portion of the foraging area of individual goshawks. This would most likely result in goshawks switching to other prey items or shifting foraging patterns. Cattle grazing is not expected to significantly effect the overall prey availability because goshawks cover large areas when foraging, have a broad diet, hunt opportunistically and some goshawk prey species find food or shelter or both in habitat components unaffected by cattle grazing such as logs, rock outcrops, snags and live trees. In addition, during any 1 year, portions of pastures or entire pastures will not be grazed by cattle and mineral supplements that attract cattle will be rotated annually and not placed in PFA's. Also, goshawks forage in forested areas and small meadows, and cattle graze mainly in larger grassy bottoms.

Cumulatively, northern goshawks have been affected by and in the foreseeable future, are likely to be affected by timber sales, recreation and lands activities, prescribed or wildfire or the lack thereof, grazing by wildlife and from activities associated with lands in other ownership such as State, private and the Department of Defense. Effects to this species are documented in biological evaluations prepared for Federally funded projects permitted on CNF lands.

**Wetland birds:** Effects from alternatives were evaluated for the following shorebirds: American avocet (*Recurvirostra americana*), American bittern (*Botaurus lentiginosus*), Black-crowned night-heron (*Nycticorax nycticorax*), Black-necked stilt (*Himantopus mexicanus*), Great egret (*Casmerodius albus*), Long-billed curlew (*Numenius americanus*), Snowy egret

(*Egretta thula*), Sora (*Porzana carolina*) and White-faced ibis (*Plegadis chihi*). These species have been sighted on or near the Windmill Allotment, but no nest sites have been documented for them on the allotment.

The areas of Rogers Lake, perennial waters below the Mogollon Rim, and Foxboro Lake were probably historical nesting habitats and perennial waters below the rim may currently provide some suitable nesting habitat for these species. However, most suitable habitat has been reduced or eliminated because of human development, cattle grazing, recreational uses, roads and the diversion of water. Other potential nest sites within 1 mile of the allotment include Dry Lake, Odell Lake and the Verde River (especially the Tavascol marsh area). All of these shorebird species may use riparian areas and stock tanks on the allotment for foraging as they migrate through the area.

Historic cattle management of riparian areas on the allotment has been poor and has damaged potential habitat for these wetland species. However, recent management has excluded most of Sheepshead, Spring Creek, Sycamore Creek and Verde River from cattle. All action alternatives will exclude the remaining portion of Sheepshead, along with Oak Creek and Windmill Allotment's portion of Rogers Lake from cattle. Areas excluded from cattle or with reduced graze periods will have an improvement in formerly degraded habitat for these species.

Historic cattle management has also included the construction of stock tanks which have become new habitats for wetland birds who use the tanks mainly during migratory stopovers. Under the action alternatives, stock tanks and springs within the allotment will be used by 90 to 675 cattle for periods of 10 to 45 days. Foraging habitat will be improved by spring protection and reduced graze periods in wet and dry meadows. Cattle grazing can reduce the emergent and shoreline vegetation at these tanks, reducing the quality of both migratory and potential nesting habitat. Under all alternatives, many of these areas will also be used by elk throughout most of the year. Alternative B (No Grazing on Forest Service lands) will not affect these birds. However, the habitats of these wetland birds could be affected by other factors such as improper road locations and recreational activities.

**American Redstart:** This warbler is associated with low elevation willow, alder forests or mixed coniferous-deciduous forests. They feed on insects and fruit. Transient observations are rare and this is outside their normal breeding range. Only one breeding redstart is known along Oak Creek within 5 miles but

outside the allotment. Potential habitat occurs in Spring Creek or some of the Oak Creek tributaries. This species is parasitized by cowbirds.

Alternative B (No Grazing on Forest Service lands) will not directly or indirectly affect redstarts or their habitat because no grazing will occur in known or potential habitat. State land grazing occurs greater than 5 miles from breeding birds so facilitated cowbird parasitism is not likely. Alternatives A, C, D, F and G permit cattle outside of known or potential habitat so no changes to habitat structure or habitat vegetation composition will occur. All alternatives permit cattle within 5 miles of the known nest or potential nesting habitat during the redstart breeding season. Since 5 miles is within the distance that cowbirds may travel from foraging to nest sites, parasitism of redstart nests could occur which could negatively affect reproduction. Cumulatively, recreation in known or potential habitat could disturb birds or their habitat.

**Pine Grosbeaks:** No pine grosbeaks are known to nest on the Coconino National Forest although potential nesting habitat exists, including on Windmill. Migratory or wintering populations may be expected particularly during years of food shortages when their range expands. Wintering flocks prefer open coniferous forests and open hillsides with juniper where they forage on pine seeds, juniper berries, acorns and pinyon nuts. This species is parasitized by cowbirds.

No alternative is expected to have a direct or indirect effect to nesting habitat or mast crops such that food sources would be impacted. Overall improvements in watershed and soil conditions expected to benefit habitat in A, C, F, and G. Although the likelihood of birds nesting here is low, due to lack of historical sightings, all the alternatives will result in grazing during the breeding season within the foraging distance for cowbirds. This could impact the reproductive success of the bird due to facilitated parasitism.

**Yellow-billed Cuckoo:** The Yellow-billed cuckoo (*Coccyzus americanus*) is a riparian species and is associated with lowland riparian woodlands, willow and alder thickets, and occasionally deserts and farmlands. There is suitable and/or occupied habitat on and near the Windmill Allotment. The bird feeds on insects, fruit and small vertebrates, and nests in shrubs, trees and vines.

Alternative B will not affect the species. Alternatives A, C, F and G exclude grazing from most of the lowland riparian areas and occupied habitat. How-

ever, the indirect effects of grazing in the watershed may indirectly affect the habitat but not to the extent to exclude the species. The mitigation measures of cows not grazing lowland riparian habitat is expected to improve habitat conditions.

**Zone-tailed Hawk:** The zone-tailed hawk (*Buteo albonotatus*) is a neotropical migrant and is famous for mimicking turkey vultures. It nests in steep walled canyons, riparian areas and montane conifer forests and feeds on small mammals, birds, reptiles, amphibians and invertebrates. There is known nesting and foraging on Windmill Allotment. Alternative B will not impact this species on Forest Service lands. Alternatives A, C, D, F and G may impact this species. Grazing may influence the abundance and availability of prey items. Zone-tails may shift their foraging patterns, however, no impact on current zone-tail reproduction is expected. Existing nest structures will not be affected, however the recruitment of future nest sites could be impacted by grazing in Dry Beaver Creek.

Cumulatively, zone-tails could be affected by timber harvest, recreational activities, grazing by wildlife and prescribed or wild fire.

**Arizona Bugbane:** Arizona bugbane (*Cimicifuga arizonica*) is a rare plant associated with moist, shady, cool microsites, often in canyons. Two of the three known populations on the allotment are accessible by grazers. Between 5 and 10 percent utilization of terminal ends with some trampling has been observed in one population due to either stray cow or elk. Light utilization has been observed in a second population and none in the third. A conservation assessment and strategy has been prepared for this species in which inventory, monitoring and protective guidelines and schedules were identified. The Forest is up-to-date on inventory and monitoring schedules.

Alternative B (No Grazing) will not affect Arizona bugbane on the allotment. Cattle grazing under Alternatives A, C, F and G will occur within pastures containing populations of Arizona bugbane and could result in grazing on some of the plants. No impact to the overall health of the population is expected because the species is not a preferred forage species and portions of the known populations are inaccessible to cattle. No salting or gathering will occur adjacent to known populations. Other events or activities that may affect Arizona bugbane include recreational activities, grazing by wildlife, cattle grazing in other allotments, catastrophic fires and natural occurrences such as rockfalls, flooding, drought, plant diseases and insect infestations.

**Arizona Cinquefoil:** At least six populations of Arizona cinquefoil (*Potentilla multifoliolata*) are known within the Windmill Allotment. This plant species is fairly abundant on the Coconino National Forest in its preferred habitat which consists of shallow, rocky drainage bottoms with poorly developed soils in ponderosa pine forests from approximately 6,400 to 7,800 feet in elevation. These areas usually have substrates of basalt boulders and sandstone bedrock and soils of moist, gravelly loam and sand and clay (30 percent). They also usually have intermittent surface flows or shallow subsurface water.

Alternative B (No Grazing on Forest Service lands) will not affect this species although cumulatively, populations on State lands could be grazed. Alternatives A, C, F and G are expected to result in grazing on the plants. Some individual plants or populations of plants within grazed pastures may be negatively impacted on a short-term basis. Rotational grazing will ensure that plants are not continuously grazed and are able to successfully flower in most years. No loss of species viability is expected. Other events or activities that could affect this species on the allotment include flooding, recreational activities, wildlife uses, or cumulative effects in the watershed that may influence drainage in ephemeral washes.

**Arizona Leatherflower:** Arizona leatherflower (*Clematis hirsutissima* var. *arizonica*) is a rare clonal plant. Surveys have not located this species on the Windmill Allotment and the nearest population (three plants) is approximately one quarter of a mile from the allotment boundary. Unsurveyed potential habitat is located within the allotment and there is a moderate probability that the species occurs here. This plant is found in shallow, rocky limestone or basalt soils above the Mogollon Rim and is often associated with trees, rocks or logs that provide shade to either the entire plant or its roots. Cattle are suspected herbivores of this plant elsewhere in its range and thus may impact this plant by removal of foliage and flowers or by trampling.

Alternative B (No Grazing on Forest Service lands) will not affect Arizona leatherflower. Grazing under Alternatives A, C, F and G could impact Arizona leatherflower if there are currently unknown populations within the Allotment. Any future discovery of new populations will require an evaluation of impacts. Other factors that may affect the leatherflower include timber sales, fire (or lack of it), grazing by wildlife, recreational activities and grazing by cattle elsewhere in the plant's range.

**Ripley Wild Buckwheat:** The Ripley wild buckwheat (*Eriogonum ripleyi*) is a rare wild buckwheat, located between 2000 and 6000 feet in elevation on specific soil types. There are scattered locations of Ripley wild buckwheat from Skeleton Bone Ridge to the southwestern boundary of the allotment. It has a small range and threats include soil disturbance associated with off-road vehicles, mining and recreation. There are no documented impacts from cattle grazing. The plant occupies a soil type which is droughty and has low forage production. Trampling of plants may occur in cattle concentration areas.

Alternative B will not affect Ripley wild buckwheat on Forest Service lands. Grazing under Alternatives A, C, D, F and G could impact individual plants. Plants located within Section 1 pasture are and will continue to be excluded from grazing. Plants occurring within the area to be excluded for protection of *Purshia subintegra* will also be protected. Plants which occur within the remaining grazed portion of the Gyberg pasture and the Duff Flat pasture will be exposed to grazing. Some of these plants occur along the fenceline which separates the two pastures and are the most likely plants to be impacted by cattle trailing along the fence. Construction of the pipeline in Duff Flat South under Alternatives A, C, D, F and G will increase cattle utilization in the vicinity of potential habitat for Ripley wild buckwheat. A survey for rare plants will be conducted to determine placement of the trough to mitigate potential impacts. Other impacts to this species include recreational uses such as horseback riding, mountain bike riding and hiking on existing and proposed trails in the vicinity of Dead Horse Ranch State Park, land exchange and urbanization.

**Verde Valley Sage:** There are scattered locations of Verde Valley sage *Salvia dorrii* spp. *mearnsii* from Skeleton Bone Ridge to the southwestern boundary of the allotment. This plant usually grows in areas with steep slopes and very poor soils that often have no capacity for cattle grazing. Formal plant surveys (Southwestern Field Biologists 1993) documented that this sage probably was not browsed by cattle. However, 1995 surveys on the Prescott National Forest found plants adjacent to a stock tank had been moderately grazed.

Alternative B (No Grazing) will not affect Verde Valley sage populations on the Windmill Allotment on Forest Service lands. Alternatives A, C, D, F and G could result in grazing and trampling of some plants near areas of cattle concentration. Most of the plants will not be grazed because: some plants are already excluded from grazing within Section 1, plants

occurring within the area to be excluded for protection of *Purshia subintegra* would be protected from cattle and some other plant locations occur in areas not favored by cattle. Plants which occur within the remaining grazed portion of the Gyberg pasture and the Duff Flat pasture will be exposed to grazing. Some of these plants occur along the fenceline which separates the two pastures and are the most likely plants to be impacted by cattle trailing along the fence. Construction of the pipeline in Duff Flat South under Alternatives A, D, F and G will increase cattle utilization in an area in the vicinity of potential habitat for Verde Valley sage. A survey for rare plants will be conducted to determine placement of the trough to mitigate potential impacts. Other impacts to this species include recreational uses such as horseback riding, mountain bike riding, and hiking on existing trails and on trails proposed in the vicinity of Dead Horse Ranch State Park, land exchange and urbanization.

**Tusayan Flame Flower:** Tusayan flame flower (*Talinum valldulum*) is a low-growing succulent perennial herb. It occurs in openings within the ponderosa pine and pinon-juniper vegetation types between 5,590 and 7,300 feet in elevation. It occupies rocky areas with shallow soil. This habitat is depauperate of palatable forage. There are no known populations of Tusayan flame flower on the allotment. Suitable habitat is present and few surveys have been conducted. The plant is very small and is generally recognizable for only a limited period of time after snow melt in the spring and following summer rains. There is a moderate probability that the plant occurs within the Allotment.

Alternative B (no grazing) will not impact this species on Forest Service lands. The action alternatives may impact this species due to trampling or compaction. Grazing on this species is not known to occur.

**Gila Chub:** One of only three populations of Gila chub (*Gila intermedia*) known to occur on the Coconino National Forest exists in Spring Creek on the Windmill Allotment. The perennial portions of Spring Creek have been fenced on NFS lands to exclude cattle. Riparian vegetation and aquatic habitat has improved following the exclusion of cattle. These fish typically occupy pools and other quiet water habitats in small streams. Habitat changes and the introduction of non-native fishes throughout the range of the Gila chub have caused concern for this species.

Alternative B (No grazing) will not affect Gila chub on Forest Service lands. Alternatives A, C, D, F and G

will not directly affect Gila chub or Gila chub habitat because cattle are excluded from Spring Creek. However, all grazing alternatives may indirectly affect Gila chub habitat because grazing may alter turbidity and peak flows in the Spring Creek watershed.

**Speckled Dace:** Speckled dace (*Rhinichthys osculus*) are highly adaptable minnows that exist throughout the western United States, including the Verde River, Oak Creek, Sycamore Creek and Spring Creek on the Windmill Allotment. Populations in the upper reaches of these systems appear healthy, but those in the lower reaches are less abundant (Minckley 1993). Reductions in speckled dace numbers in other parts of their historic range, especially in systems below 5,000 feet in elevation, have caused concern for the speckled dace in the Gila River basin which includes the Verde River.

Speckled dace inhabit shallow, rocky streams that are usually less than 2 feet deep. Spawning occurs in spring and again in late summer probably in response to runoff events and photoperiod (Minckley 1973). Speckled dace feed on a variety of foods including small aquatic insects, detritus and algae.

Alternative B (No Grazing) will not affect speckled dace on the allotment on Forest Service lands. Alternatives A, C, D, F and G may affect speckled dace habitat on the allotment by changing watershed conditions.

**Roundtail Chub:** Roundtail chub (*Gila robusta*) exist in the Verde River, Sycamore Creek and Oak Creek. In addition, they were reportedly found in Dry Beaver Creek, but have not been sighted there for several years. Fish surveys conducted in December 1995 failed to find roundtail chub in Dry Beaver Creek. Although widespread in the Windmill Allotment region, roundtail chub populations have noticeably declined throughout much of their historic range (Minckley 1993).

Alternative B (No Grazing) will not affect roundtail chub on the allotment on Forest Service lands. Alternatives A, C, D, F and G may affect roundtail chub on the allotment. Most of the roundtail chub habitat is excluded from grazing. However, Dry Beaver Creek will be grazed in December and May of every year as cattle are moved between summer and winter ranges as follows: 250 cattle in Alternatives A and F, 250 head in Alternative C, and 150 head in Alternative D. Short (10 day) grazing periods in December when riparian vegetation is dormant will help minimize grazing impacts. However, even short grazing durations such as the 5-10 day period in May

during the growing season can impact riparian vegetation and streambanks.

Grazing can indirectly affect fish and their habitat by changing vegetative and soil conditions within the watershed. Vegetation and soil conditions influence rates of erosion and associated sediment delivery to stream channels in addition to infiltration and runoff patterns. Indirect effects to fish habitat correspond with vegetation and soil conditions. Alternatives can be rank from least to most indirect impacts to fish habitat based on a comparison of expected vegetative and soil conditions as follows: B, D, F, A, G, and C.

**Chiricahua Leopard Frog:** None of the surveys conducted on the allotment have located this species although there may be potential habitat. The nearest known population is 17 miles from the allotment. The distribution of this species overlaps with northern leopard frogs at higher elevations and with lowland leopard frogs at lower elevations. It prefers permanent streams, pools, springs, stock tanks and side channels of rivers within desert scrub, grassland and oak and pine/oak woodland habitats. Riparian vegetation is an important habitat component. Impacts to frogs or habitat result from habitat degradation, removal of streamside vegetation, streamside trampling, competition and predation from introduced species such as bullfrogs, crayfish or fish.

Alternative B (No Grazing) will not affect this species because no grazing will occur in known habitat. Alternatives A, C, D, F and G may affect individual frogs if they are present, but is not likely to affect population viability because this species is not known from the allotment; most riparian areas will be fenced but some grazing in riparian areas will occur in all alternatives. This would result in compaction and vegetation removal while the frogs are there and may result in altered water temperatures and pH levels. Some increase in sedimentation and turbidity may result due to upland grazing and could influence food or cover conditions. Cumulatively, frogs and their habitat will continue to be influenced by recreation, ungulate grazing, non-native aquatic species, drought, flooding and possibly activities on private land.

**Northern Leopard Frog:** None of the surveys conducted for northern leopard frogs (*Rana plimens*) have located any on the allotment. However, potential habitat exists and is associated with permanent waters and wet meadows. Alternative B (No Grazing) will have no effect on this species due to the absence of cattle in its habitat on Forest Service lands. Alternatives A, C, F and G may affect individuals but is not

likely to affect the viability of the species or contribute to federal downlisting. Most riparian areas will be fenced, but some grazing will occur in all action alternatives within some riparian areas. Grazing in riparian areas can compact soils, destabilize banks, remove or trample vegetation and alter water temperatures and pH levels. Grazing activities outside of the riparian area but within the watershed degrade soil condition which results in increased sedimentation and turbidity in the water. Grazing in the uplands as well as grazing in the riparian areas result in effects that influence food and cover relationships for frogs. Under all alternatives, frog habitat will continue to be influenced by recreation, wildlife, interaction with crayfish, bullfrogs, and non-native fish species, activities on private land, water diversions and flooding.

**Lowland Leopard Frog:** Known and potential habitat for the lowland leopard frog (*Rana yavapaiensis*) exists on the Windmill Allotment and is associated with permanent waters from sea level to 4,800 feet in elevation. These frogs are seldom found in association with bullfrogs because bullfrogs prey on them. Alternative B (No Grazing) will not affect lowland leopard frogs because it does not allow cattle in frog habitats on Forest Service lands. All other alternatives may affect individuals but is not expected to influence viability or contribute towards federal listing of the species. Impacts to the lowland leopard frog are similar to those specified for the northern leopard frog. Under all alternatives, frog habitat will continue to be influenced by recreation, wildlife, interaction with crayfish, bullfrogs and non-native fish species, activities on private land, water diversions and flooding.

**Mexican Garter Snake:** Mexican garter snakes (*Thamnophis eques*) may be found up to 6,200 feet in elevation in areas with shallow slow-moving or impounded waters. There is occupied habitat along the Verde, Oak Creek and Sycamore drainages. Alternative B (No Grazing) will not affect this species because habitat will either be deferred or excluded from grazing and cattle will be absent from the watershed on Forest Service lands. All other alternatives may affect individuals but will not likely affect the viability or contribute to federal downlisting of the species. Grazing in riparian areas can compact soils, destabilize banks, remove or trample vegetation and alter water temperatures and pH levels. Grazing activities outside of the riparian area but within the watershed degrade soil condition which results in increased sedimentation and turbidity in the water. Grazing in the uplands as well as grazing in the riparian areas result in effects that influence food and

cover relationships for the Mexican garter snake. Cattle in the watershed may indirectly influence the quality of this snake's habitat but will not directly affect the habitat or the snake. Effects from flooding, recreation, activities on private land, water diversions and crayfish, bullfrogs and non-native fish species are expected to be major influences on this snake and its habitat.

**Narrow-headed Garter Snake:** Narrow-headed garter snakes (*Thamnophis rufipunctatus*) are found in large streams with shallow rocky pools. Potential habitat exists in the Verde, Oak Creek and Sycamore drainages. Alternative B (No Grazing) will have no effect on this species because of the absence of cattle in the watershed and riparian areas on Forest Service lands. All other alternatives may affect individuals but will not likely affect viability or contribute to federal downlisting of the species. Impacts to the narrow-headed garter snake are the same as those specified for the Mexican garter snake. Cattle grazing in the watershed may influence the quality of available habitat but will not directly affect the habitat or the snake. Recreation, major flood events, activities on private land, water diversions and crayfish, bullfrogs and non-native fish species are expected to be major influences on this snake and its habitat.

## Air Quality

Livestock grazing on the Coconino National Forest does not impact air quality over the long-term. Under Alternatives A, C, D, F and G, short-term, isolated effects on air quality in the Windmill Allotment may occur from dust when cattle are herded and transported and from odor in the immediate vicinity of the animals. Alternative B (No Grazing) will not affect air quality on the allotment on Forest Service lands.

## Social Concerns

The social impacts of cattle use and management on the Windmill Allotment relate to public perceptions of the appropriate use of public lands, customs and traditions of the area and community and permittee lifestyles in relation to forest resources. These impacts are closely related to the urbanization of Northern Arizona in general and specifically of Flagstaff, Sedona, the Verde Valley and other small communities adjacent to the allotment. Also, an ever-increasing number of people from around the world are coming to visit National Monuments, Forests and Parks, State parks and cultural, historic and spiritual sites.



Northern Arizona has long been a rural area in the State with a rich history of social and economic ties to agricultural land uses. Many new residents are coming from larger urban areas in search of a rural lifestyle and what they perceive as a better quality of life. This migration reflects a reversal of the typical rural-to-urban migration pattern that occurred in most of the United States before the 1970s and is changing the long-term economic base of Northern Arizona from agriculture to recreation and tourism (USDI Bureau of Land Management and USDA Forest Service 1994). With urbanization comes changes in values and beliefs. These changes usually challenge existing ways of life and often cause conflicts between natives of rural areas and ex-urbanites. New residents usually have no historical ties to the rural areas they move into, yet many of these people soon ask local residents and governments to make changes to accommodate their urban values. Over the long-term, rural natives may feel they are losing control of their communities and then may consider those communities less desirable places to live.

Another important trend is the increasing popularity of Northern Arizona for recreation, especially for people from the urban centers of Phoenix, Tucson and Southern California. Recreational use throughout the Windmill Allotment is fairly heavy now and is expected to increase in the future (see the Recreational and Wilderness Resources sections in this chapter).

Many Native American shrines within the Windmill Allotment are still used by people practicing their traditional spiritual beliefs. Native American tribes and individuals protect knowledge of the locations of many of these centuries-old sites.

The Sedona area, including forest lands, is a center for the new-age movement. The term "new-age" includes a broad spectrum of beliefs and values and generally describes the belief that the human mind has a potential far beyond academic knowledge and traditional religious tenets (USDA Forest Service 1992). Those involved in this movement have spiritual ties to the landscape of the Sedona area and repeatedly visit specific sites that have special meanings in their belief system. People and businesses involved in the new-age movement are now a notable part of the social and economic structure of the general Sedona area.

## **Ranching and the Community**

Ranching has been a way of life in Northern Arizona since the late 1800s when large numbers of cattle and sheep grazed the area. The values, attitudes and

beliefs of the ranchers and other people trying to make a living in this rural area were incorporated into the social structure and self-image of Northern Arizona.

The current permittees of the Windmill Allotment are natives of Arizona and have been in the cattle business most all their lives. The permittees acquired the Windmill Allotment in 1979 when the Forest Service combined nine smaller allotments to form one large allotment. In 1983 and 1984, two more small allotments were incorporated into the large Windmill Allotment. The permittees manage the overall cattle operation with help from both seasonal and year-round ranch hands. Cattle and ranching are the permittee's main source of income, but not their sole source. The permittees contribute to the social structures of communities around the allotment by providing some direct and indirect jobs for residents of those communities, revenues for county, city and federal governments, and the lifestyle associated with ranching for their family, their employees and other people associated with ranching in the area.

## **Public Perception**

Forest visitors vary widely in their reactions to seeing cattle on National Forests or other federal lands. Reactions depend on viewers' personal values, opinions and whether they are accustomed to seeing cattle. Tourists traveling along Interstate 17 may stop to take pictures of a cow herd in a meadow because to them this is a pleasant pastoral scene. But to wilderness buffs who dislike any kind of "unnatural" structures or animals on landscapes, the presence of cattle, which indicates the presence of humans, disrupts their perception of National Forests as truly wild places.

To campers or picnickers who like to go to the same places in which cattle like to congregate, the presence or leavings of cattle in those areas may detract from recreationists' experiences there or even cause them to move to different sites. The actual presence of cattle may not disturb horseback riders or hikers, but encountering several fences while traveling across an area is often inconvenient for them. People on foot generally climb over fences and horse riders travel along fences until they find gates. The growing number of people using forests, especially near urban communities, may increase the potential for conflicts between cattle and people on allotments.

Several tracts of private lands lie within and adjacent to the Windmill Allotment. Most of the people living on these lands like the open space and rural feeling

the Coconino National Forest provides and accept cattle grazing as a use of the forest as long as cattle do not damage their private lands or the forest's resources. However, the Forest Service does occasionally receive complaints about cattle wandering onto unfenced private lands or outside allotment boundaries when fences are cut or gates are left open.

Native Americans who visit traditional shrines and gather plants, pine boughs, or tree poles for use in spiritual ceremonies have not expressed concern about cattle use on the allotment as long as the items they need are not destroyed or disturbed by cattle. New-age spiritualists probably view cattle use of National Forest lands according to their individual values and encounters with cattle during trips to spiritual sites.

Increasing numbers of people in the community and throughout the country believe rangeland management should emphasize protecting resources rather than just managing cattle. Many of these people also believe cattle grazing, if properly managed, can be compatible with resource protection. These people generally support multiple-use of forests as long as uses do not damage basic resources and are in the interest of the American people. However, some people strongly object to cattle grazing anywhere on National Forest lands under any type of management.

### **Social Impacts Expected Under Each Alternative**

Not permitting cattle grazing on the Windmill Allotment (Alternative B) will resolve direct conflicts between recreationists and homeowners and will satisfy the visual concerns of those who do not wish to see any cattle on the Coconino National Forest. However, for those who enjoy the pastoral sense and ambiance of the western lifestyle, removing cattle may detract from their experiences and enjoyment of rural National Forest lands.

Those who feel cattle grazing is an appropriate use of public lands may not approve of removing cattle from the allotment. These people may not only express concerns about the impacts of not permitting cattle grazing on this allotment, but may also question the legitimacy of mutually beneficial land management goals. The uncertainty of short-term grazing permits may also be unacceptable to these people.

Alternative B will also eliminate the main source of income and possibly a way of life for the permittee of the Windmill Allotment and his employees. These

changes will cause conflicts within the communities and families of the permittee and his employees.

The permittee feels Alternatives D and G will also eliminate the main source of income and possibly a way of life for the permittee of the Windmill Allotment and his employees. He believes that the additional costs of new improvements and a decrease in income from a reduction in cattle numbers will force them out of business and their way of life.

Alternatives A, C and F will keep the ranch operating, thereby maintaining the incomes of the permittee and his employees. As long as the ranch continues to operate, however, the permittee and his employees will help perpetuate the customs, traditions and lifestyle long associated with cattle grazing. This, in turn, will contribute to the lessening, though still important, rural sense of the community in areas around the allotment.

Alternatives A, C, D, F and G will also emphasize permit administration more than in the past. This may improve the permittee's compliance with the permit which, in turn, may resolve some conflicts caused by direct contacts between cattle and recreationists in the Coconino National Forest or landowners adjacent to the allotment.

### **Economic Concerns**

Domestic cattle grazing contributes to the livelihoods of permittees as well as to the economies of local communities and counties. Individual allotments provide incremental contributions to local economies, so changes in several allotments could cumulatively impact those economies. The Windmill Allotment lies in both Coconino and Yavapai County, so the allotment affects the economies of these counties.

### **Economies of Coconino and Yavapai Counties**

The economies of Coconino and Yavapai Counties gain revenues from several sources: county sales taxes, state-shared sales taxes, highway user revenues (gasoline taxes), property taxes and National Forest fees. The greatest revenues come from the county and state-shared sales taxes. National Forest fees, which include payments from timber harvesting, mining and recreational and cattle grazing uses, are an important part of county revenues but provide only a fraction of available funds.

National Forest fees paid to Coconino County dropped from \$4.2 million in 1989 to \$1.5 million in 1994. Most of these fees came from timber harvesting revenues. Less than 4 percent, or \$46,000, came from cattle grazing fees on the Coconino National Forest in 1994. Coconino County also receives fees from uses on the Kaibab and Apache-Sitgreaves National Forests. Yavapai County receives \$365,873 per year from fees on the Coconino and Prescott National Forests. Both counties use National Forest fees for highway maintenance and schools.

The decrease in total National Forest fees to Coconino County over the past few years is beginning to substantially impact the operating budget for county roads and schools. This county's highway department receives funding only from the highway users fund and forest fees. The county will continue to receive funds from National Forest lands as available, but budget forecasts predict that revenues for road maintenance from these sources will decrease in the future. National Forest fees paid to Yavapai County have not declined as dramatically as those paid to Coconino County over the years because timber harvesting is not an important use on forested areas below the Mogollon Rim in this county. In fact, forest fees allocated to Yavapai County's highway department probably have not decreased over the last 10 years.

The budgets for schools in Coconino and Yavapai Counties have been extremely constrained over the last several years even though school populations are

Table 22. Economic Effects on Coconino and Yavapai Counties from Implementing Each Alternative on Forest Service Lands.

Economic Effects	Ait. B	Ait. A,C,E,F	Ait. D	Ait. G
Direct and Indirect Jobs (#) (About 1.14 jobs per 100 cattle)	0	14.27 to 14.32	7.24	12.43 to 12.83
Federal Payments to Counties (\$)*	0	5,141 to 5,126	2,607	4,476 to 4,620

\* The amount shown under the alternatives is a projection of 25% of all grazing fees to Coconino and Yavapai Counties at the 1996 grazing fee rate of \$1.35. Not shown in this amount are the taxes that counties collect on range structural improvements. These taxes are based on a percentage of the assessed values of those improvements.

increasing. One likely reason for these constrained budgets is the sharp decline in forest fees as an available revenue source. As for county road funds, the contribution from cattle grazing fees to school funds is small in comparison to timber harvesting revenues. Nevertheless, the loss of some grazing fee revenues has contributed to the overall decrease in school funding. School districts in many area communities recently presented bond funding options to voters in an effort to increase funding for schools.

The permittee of the Windmill Allotment directly contributes revenues to Coconino and Yavapai Counties through property taxes on range structural improvements. He also pays taxes to the state for using Federal and State lands for a commercial purpose. These state taxes equal a percent of the assessed value of the permit based on grazing fees.

### Economic Impacts Expected Under Each Alternative

Estimates of direct and indirect jobs and payments to counties from federal receipts provide a relative comparison of economic effects that could occur because of changes in cattle grazing. Table 22 estimates effects expected on these indicators in Coconino and Yavapai Counties from implementing Alternatives A thru G on the Windmill Allotment.

Under Alternative B, the loss of the Windmill Allotment permit will eliminate \$5,141-\$5,162 (at the 1996 fee rate) from the treasuries of Coconino and Yavapai Counties. This loss, by itself, is not substantial. However, if a larger portion of the ranching industry were lost in these counties, their budgets would be substantially impacted. The counties will also lose revenues from taxes on structural improvements and the state will lose tax revenues based on the permittee's use of federal and state lands.

The loss of jobs shown for Alternative B in Table 22 above can be misleading because not all jobs associated with the permit will be eliminated if no grazing is allowed on the allotment. That is, all jobs directly associated with and some jobs indirectly associated with the permit will be eliminated. However, some jobs indirectly associated with the permit will still exist because they are supported by other ranches and portions of communities that use ranching supplies and services on the Windmill Allotment.

Under Alternatives A, C and F, ranching on the Windmill Allotment will help maintain current jobs within communities around the allotment and revenues for Coconino and Yavapai Counties and the

State. If changes are made in the use of the Windmill Allotment in the future, contributions to state, county and local economies from fees, taxes and jobs associated with cattle grazing on the allotment will change accordingly.

An estimate of gross revenue is created by estimating the amount of calves produced each year for each alternative. The following figures are used in the calculation (although these figures may vary widely): 90 percent cow to calf ratio, 500 lb. per calf at \$0.80 per pound. The estimated gross revenue for Alternatives A, C and F is \$423,000 per year. Alternative B's estimated gross revenue is \$0. The estimated gross revenue for Alternatives D and G is \$207,000 and \$333,000, respectively.

Under Alternatives D and G, jobs and revenues will be reduced, theoretically, with reduction in the numbers of cattle. However, the ranch feels these reductions would put them out of business.

Table 23 shows the benefit/cost (B/C) ratio, social well-being rating, and environmental quality rating for each alternative. These rating system were developed by following the standard procedures in the "Range Project Effectiveness Analysis Procedures Handbook" (Forest Service Handbook 2209.11).

The economic analysis is somewhat misleading in that all the alternatives are based on costs for Alternative A, except for Alternatives B (No Graze) and Alternative C (Current Management). Alternative A was used because Alternatives D, F and G have these same costs plus additional ones.

The social analysis is based on 4.53 equivalent person years, low income distribution, a ranching operation that depends more than 50 percent on National

Forest lands, low minority participation and varied degrees of demonstration opportunity. The differences between the alternatives occur because the demonstrated opportunities in Alternatives C and D have less expected opportunity and thus less value for improvement than the other alternatives.

Environmental ratings relate to changes in soil stability, water quality, desired future vegetation, visual quality and wildlife habitat. The major differences between the alternatives occur in reduced erosion, water quality and desired future vegetation. Alternatives A, C and F are all full permitted number alternatives and are projected to be about 20 percent over estimated current capacity. These alternatives can do this by implementing range improvements and obtaining improved distribution. Alternatives D and G are less than full numbers. Alternative D is based on 35 percent use levels. Alternative G is based on estimated proper stocking and approximately 50 percent use levels. Both allow for condition improvement above current estimated capacity and project increases over sustained numbers of cattle and this explains a higher environmental rating.

## Recreation, Wilderness and Special Designations

The following is a summary of effects of the alternatives on recreation, wilderness and special designation area values.

### Recreational Activities

In short, no alternatives will negatively affect recreational activities on the Coconino National Forest in the allotment or people's overall enjoyment of the forest.

### Wilderness

Three wilderness areas lie adjacent to or partially within the Windmill Allotment. These are Munds Mountain, Red Rock-Secret Mountain and Sycamore Canyon. Wilderness lands on the allotment are eligible for cattle grazing, but are only being grazed under the action alternatives

Table 23. Benefit/Cost Ratio, Social Well-being Rating and Environmental Quality Rating for Each Alternative.

Alternative	B/C	Social Well-Being	Environmental Quality
A	1.01 Favorable	3.1 High	2.1 Favorable
B	(No graze/no B/C)	1.0 Low	2.1 Favorable
C	1.1 Favorable	2.0 Moderately Low	1.4 Marginal
D	.86 Marginal	2.0 Moderately Low	3.4 Highly Favorable
F	.99 Marginal	3.1 High	2.1 Favorable
G	.94 Marginal	3.1 High	3.2 Highly Favorable

when passing through these areas to and from summer and winter range. Consequently, no problems between people and cattle presently occur but for short time periods. Therefore, no alternative will directly impact these areas except for use of the trails for this short period of time.

### **Special Designations**

Three research natural areas exist within the Windmill Allotment: Casner Canyon Research Natural Area, West Fork of Oak Creek Research Natural Area and Verde Valley Botanical Area. One quiet area exists within the allotment: Rattlesnake Quiet Area. The three research natural areas will not be grazed by cattle under any alternative. The Rattlesnake Quiet Area will not be grazed under Alternative B (No Grazing) but will be under all action alternatives. However, intensified cattle management under these alternatives will sufficiently control grazing to prevent damage. In conclusion, no alternative will notably affect the two research natural areas, botanical area or the quiet area on the allotment.

### **Scenery**

People generally like to see grass-covered ranges with little bare dirt visible within the grass. In range management this is measured as ground cover and consists of green grasses that have some seed heads and a healthy look; dead logs, sticks and needles that appear natural; full, green shrubs; and wildflowers. Rangelands with good mixtures of these ground cover components tend to be healthy and healthy rangelands tend to be scenic. However, more wildflowers, considered scenic by most people, tend to grow in areas with poorer range conditions because many wildflowers are invader species (plants that out-compete overgrazed forage species).

Presently, ranges on the Windmill Allotment lack some ground cover components in some areas. For example, large meadows in the Mill Park Division and

some areas in the Munds Pocket/Foxboro Division show few seed heads and much bare soil between plants. By the end of summer on the allotment overall, few seed heads are present, grass plants are relatively short and some water sources appear trampled. Mainly elk and cattle cause these conditions. The Vegetation section of this chapter describes how each alternative will affect overall range health on the allotment. Areas in which range health will decrease will probably become less scenic, those in which range health will be unaffected will retain their current scenic conditions, and those in which range health will improve will probably become more scenic.

Fences can decrease the beauty of areas. Although old fences may be accepted as part of the existing scenery of areas, new fences, especially across meadows, may not be. Other structures such as dirt tanks, water pipelines, cattle guards, drinkers and water storage tanks also affect visual aspects of landscapes. For example, a large dirt tank with high berms located in the middle of a large meadow may reduce scenic qualities in that meadow. Most structures built in the past do not blend with natural landscapes and these structures will remain on the allotment under any alternative. The structural improvements that will be constructed under all action alternatives may affect the scenery of these areas. However, these improvements will be designed to blend into the natural landscapes, when possible.

### **Heritage Resources/Traditional Cultural Properties**

Currently, cattle do not impact standing ruins or historic structures on the Windmill Allotment. In addition, current inventories and knowledge indicate that any alternative will not affect cultural resources on the allotment. However, all structural improvements under all action alternatives will meet archeological clearance requirements before implementation.



# Monitoring

## Planned Monitoring

Monitoring on the Windmill Allotment over the next 10 years will include: compliance, allotment inspections, range readiness, forage production, rangeland utilization, condition and trend, soil and riparian condition, and threatened and endangered species habitat.

**Compliance:** Throughout each grazing season, compliance monitoring will be done by Forest Service personnel to determine accomplishment of the terms and conditions of this permit, Allotment Management Plan, and annual operating instructions.

**Allotment Inspections:** Allotment inspections are a written summary done each fall by Forest Service personnel to document compliance monitoring and to provide an overall history of that year's grazing. This document may include weather history, the year's success, problems, improvement suggestions for the future, and monitoring summary.

**Range Readiness:** Each spring before cattle move above the Mogollon Rim, range readiness will be assessed by Forest Service personnel to determine if vegetative conditions are ready for cattle grazing. The range is generally ready for grazing when cool season grasses are leafed out, forbs are in bloom, and brush and aspen are leafed out. These characteristics indicate the growing season has progressed far enough to replenish root reserves so that grazing will not negatively impact these forage plants.

**Forage Production:** Production surveys in the Munds Pocket area will be done within the first 5 years to resolve the area's capacity issues. Cattle numbers will be maintained or lowered as a result of evaluating these figures.

**Rangeland Utilization:** Utilization monitoring is an estimate of the available forage by weight consumed or trampled through grazing and is expressed as a percent of current years biomass removed. Utilization monitoring is designed to assess key forage utilization levels by cattle and elk during the year and from year to year. Key forage species for this allotment include western wheatgrass, blue grama, squirreltail, and Arizona fescue in the summer range and needlegrass, blue grama, black grama, sand dropseed, and sideoats grama in the winter range. Utilization monitoring will be conducted by the permittee and spot checked by Forest Service personnel throughout the year in every grazed pasture. This monitoring will calculate an overall utilization value for a pasture: 1) before cattle go into a pasture, 2) within 5 days after cattle leave a pasture, and 3) at the end of the grow-

ing season in the fall. Utilization will be averaged into the following five categories: no-use (0-10 percent), light (11-20 percent), moderate (21-50 percent), high (51-70 percent) and extreme (71 percent +). The goal for utilization will be 50 percent or less by cattle throughout the year with this intensive livestock grazing system. In addition, key site and key species monitoring will be conducted at a minimum of one per herd in each of following habitat types: pine (oak), riparian, mountain meadow, and aspen, if these habitat types are grazed by cattle. Utilization monitoring will also occur in selected pastures rested from cattle grazing by Forest Service and/or Arizona Game and Fish Department personnel.

**Condition and Trend:** Watershed and vegetative condition and trend monitoring will help determine the effectiveness of the new Allotment Management Plan. Two types of transect monitoring techniques will be used for this analysis: Parker 3-step and paced transects, and paired nested rooted frequency and cover transects. Both these transects will include photo points.

Parker 3-step and paced transect monitoring points were established throughout this allotment in the 1950-60's. These transects are one of best historic records of range condition and trend. The photo points and vegetative ground cover data show how the site has changed over time. Sixty transects above the Mogollon Rim and 60 below the Mogollon Rim currently exist throughout the allotment. From all these transects we will select at least 15 transects located in key areas that represent various TES soil units currently in unsatisfactory condition or within threatened, endangered or sensitive species habitat, such as mountain meadows, pine-oak, pinyon-juniper, and desert grassland. Forest Service and ranch personnel will update the vegetative ground cover data or at least retake the photo points at these sites every 3 years to help determine long-term trend throughout this allotment. In key areas where the Parker 3-step and paced transects don't currently exist, new vegetative ground cover transects, with 300 points, will be established using TES ground cover definitions.

At least three new paired nested rooted frequency and cover monitoring transects will be established within the allotment to record statistically how vegetative frequency and ground cover changes over time. These paired transects will compare similar cattle grazed and ungrazed sites as near to each other as possible. Nested rooted frequency plots record ground cover and plant species composition, frequency, and cover data. At each site a permanent tenth acre transect

will be established. Five random lines will be run out from this transect and 10 plots per line will be read using a standard canopy cover frame. These transects will be read every 5 years by Forest Service personnel. Likely sites for these plots include the following exclosures: Wheatfield (Wheatfield pasture), Purshia (Purshia pasture), and Yellow Flat (Rogers Lake pasture). These plots will be used to help determine the effectiveness of the new Allotment Management Plan and long-term range and watershed trend.

**Precipitation:** Precipitation is currently recorded within or near the Windmill Allotment at Sedona Airport, Turkey Butte Fire Lookout, East Pocket Fire Lookout, and Flagstaff National Weather Service Office at Bellemont. Additional rain gauges will be established at the winter and summer (Mill Park and Newman Park) headquarters of the Windmill ranch by the Windmill permittee. This data will be recorded throughout the year and summarized in the annual inspection.

**Soil and Riparian Condition:** The Intergovernmental Agreement between the Forest Service and the State of Arizona that controls water quality and the Clean Water Act requires implementation and effectiveness monitoring. The objectives of monitoring are to: 1) collect data sufficient to assist line officers and resource managers in evaluating effects of management activities on soil and water resources; and, 2) support changes in management activities to protect soil and water quality. Monitoring will help determine how successfully managers are implementing guidance practices and how effectively those practices are protecting soil and water quality. Arizona Department of Water Quality (ADEQ) will continue to monitor water quality in the area.

Evaluating watershed condition will be assessed using information from the monitoring schemes above. Monitoring of plant abundance, ground cover, species diversity and estimates of overall soil condition (using the methods throughout this monitoring section) will indicate whether or not management practices are effectively meeting management goals. Trends toward improvements in key species abundance and diversity should indicate that management practices are effectively improving soil condition and by inference, maintaining or improving downstream water quality and complying with water quality standards. Conversely, decreases in plant abundance and species diversity may indicate that management practices are not effective and need to be changed. Environmental factors, especially precipitation, will be considered when evaluating monitoring results.

At the end of 10 years, all planned improvements will be in place. Overall effectiveness will be evaluated on a yearly basis and intensively again at the end of the 10-year permit period. The annual operating plans will make adjustments to pasture graze periods, pasture rest periods and cattle numbers to respond to results of the previous year's annual monitoring, weather conditions, and as improvements are implemented.

An improving trend for riparian vegetation and stream channel conditions should indicate that management practices are effectively benefiting water quality. Conversely, decreases in riparian vegetation or channel condition indicate that management practices are not effective and need to be changed. Environmental factors, especially flooding, will be considered when interpreting monitoring results. Several Fixed Station, Biocriteria Program, and other water quality monitoring sites are located within or near the allotment. These sites have and are being used to track long-term conditions and trends at critical points in a watershed and to develop biological criteria for stream segments. Information from these sites will be considered in evaluating the effectiveness of management practices, but may be of limited value considering the multitude of potential influences affecting each monitoring site.

The management practices detailed in the Affected Environment of Water Quality section of this document will become part of the terms and conditions of the grazing permit. Implementation of management practices will be monitored through enforcement of permit terms and conditions throughout the 10-year period.

**Threatened, Endangered and Sensitive Species:** Threatened, endangered and sensitive species monitoring is covered by the preceding monitoring schemes, with some additional monitoring to fully cover specific plant and animal species.

Four 25 x 25 foot exclosures will be placed in pine-oak Mexican spotted owl restricted habitat with permanent photo points. This will give a relative gauge of utilization and species use in areas of moderate forage production. These areas will be used as the key area monitoring points for the Mexican spotted owl and northern goshawk guidelines in the Coconino Forest Plan. The exact locations and key species will be determined in the future and may be moved if necessary to better meet monitoring objectives.

Riparian habitat will be monitored with permanent photo points within all riparian exclosures. A list of



the present and future riparian exclosures include: T-6 Spring, Fain Spring, Willard Springs, Oak Creek, Verde River, Spring Creek, Sheepshead Spring, Coffee Creek, and National Forest portion of Roger's Lake. Dry Beaver, Jacks Canyon and Dry Creek are the only riparian areas easily accessible to cattle and these areas will also be monitored by permanent photo points. If cattle grazing is determined to be detrimental to the long-term health of these grazed riparian sites, grazing management will be further adjusted to reduce grazing effects or these areas will be excluded from cattle grazing.

*Purshia subintegra* monitoring will adhere to the following plan. There will be a minimum of five visits to the grazeable *purshia* populations with the objective of detecting early use, mid-use and utilization after cows have left one pasture and before they have entered another. If greater than 20 percent use by cattle on individual plants is detected (using the twig length measurement method, Interagency Technical Reference 1996), cows will be removed from the pasture or temporary fencing will be installed to prevent further use. U.S. Fish and Wildlife Service will be notified. More than five visits may be appropriate depending on local climatic conditions or local vegetation growth rates.

Coconino National Forest will survey the following suitable habitat for southwestern willow flycatcher occupancy ever year for the life of the permit: Sheepshead, Stagesop, Red Rock Crossing, Winter Cabin, Tapco, and any potential habitat that becomes suitable during the life of the permit. Should any

suitable sites become occupied, Coconino National Forest will assist and cooperate with Arizona Game and Fish Department (lead agency for monitoring) in order to monitor for nesting success and cowbird parasitism. Coconino National Forest will coordinate with personnel conducting ongoing research regarding monitoring as well. For non-Forest occupied habitat at Tuzigoot and Tavasci, Coconino National Forest will cooperate and assist as possible with survey efforts. If these sites are determined to have breeding flycatchers, Coconino National Forest will either: 1) initiate cowbird trapping as outlined in the U.S. Fish and Wildlife Service's September 27, 1995, Windmill Biological Opinion immediately upon occupancy regardless of whether assistance can be gained from Arizona Game and Fish Department; or 2) immediately remove cattle from the Windmill pasture(s) located within a 5-mile radius of southwestern flycatcher location(s) and reinitiate consultation with the U.S. Fish and Wildlife Service to determine an adequate site-specific solution. Flexibility with the 5-mile radius will be used if current research or subsequent management direction indicates that a different radius would be more appropriate.

**Rationale:** This monitoring program gives the best data possible to monitor the effectiveness of this new management strategy while staying within the projected Forest Service budget. This is insured mainly because of the cooperation by the Forest Service, Windmill Ranch, and the Arizona Game and Fish Department in collecting this information.



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## List of Agencies and Individuals Consulted

American Fisheries Society, AZ-NM Chapter

American Land Rights Association

American Wildlands

The Arboretum at Flagstaff

Arizona Cattlegrowers

Arizona Department of Environmental Quality

Arizona Department of Water Resources

Arizona Game and Fish Department

Arizona Hiking and Equestrian Trails

Arizona National Guard, Camp Navajo

Arizona Riparian Council, Arizona State University

Arizona State Land Department

Arizona State Parks: Red Rock and Dead Horse

Arizona Water Resources Commission

Arizona Wildlife Federation

Arizona Woolgrowers Association

Coconino County Board of Supervisors

Coconino County Farm Bureau and Cattlegrowers  
Forest Guardians  
Grand Canyon Trust  
Greater Gila Biodiversity Project  
Hopi Tribe  
Keep Sedona Beautiful, Inc.  
Maricopa Audubon Society  
Natural Resource Conservation Services  
Navajo Nation  
The Nature Conservancy, Northern Arizona Field Office  
Northern Arizona Audubon Society  
Northern Arizona Council of Governments  
Northern Arizona University  
Rocky Mountain Elk Foundation  
Sedona Adventures  
Sedona Red Rock Jeep Tours  
Sierra Club, Plateau Group

Sierra Club, Verde Valley Group  
Society for Range Management  
Sonoran Bioregional Diversity Project  
Southwest Center for Biological Diversity  
Southwest Forest Sciences complex  
The Wildlife Society, Arizona Chapter  
World Survival Foundation  
United States Environmental Protection Agency  
United States Fish and Wildlife Service  
University of Arizona  
Yavapai-Apache Indian Community  
Yavapai-Prescott Tribe  
Yavapai County Board of Supervisors

During the planning and analysis process for this assessment, the Mormon Lake, Peaks and Sedona Ranger Districts contacted 50 additional individuals interested in or concerned about cattle grazing on the Windmill Allotment.

# Summary of Changes Between the Draft and Final Environmental Impact Statement

The following is a list of changes from the Draft Environmental Impact Statement (DEIS) to this Final EIS. These changes are the result of comments made to the draft document throughout the review period. Only major changes are described here.

- Alternative B was presented in the DEIS as the no grazing alternative. This was not entirely accurate. State Trust Lands within the allotment area could still be grazed by livestock because the Forest Service does not administer the grazing leases on State Trust Lands. Alternative B was altered to reflect this change throughout the FEIS. A clarification of the ownership of State Trust Land range improvements was also added (improvements are owned by the lessee).
- The wording on the Decision to be Made section was changed to better meet the intent of the analysis. DEIS — The decision to be made by the Forest Supervisor is what management strategy to use on the Windmill Grazing Allotment. FEIS — The decision to be made by the Forest Supervisor is what lands on the Windmill Grazing Allotment that are currently grazed, are going to continue to be grazed and in what manner.
- Alternative C, current management, was changed to include only the structural improvements that exist in the current Allotment Management Plans. This removed the planned White Flats structural improvements from this alternative. The White Flats improvements had been planned to keep cattle out of the Oak Creek housing developments.
- The southwestern willow flycatcher 4.2-mile radius in the DEIS was changed to 5 miles. The change was the result of findings in the Biological Opinion from the U.S. Fish and Wildlife Service. The radius was changed throughout the document along with effects of the radius change.
- A new section displaying the effects to Yuma clapper rail, *Rallus longirostris yumanensis*, was added. This sub-species was discovered adjacent to the allotment after the DEIS was published.
- A new section displaying the effects to black-footed ferrets, *Mustela nigripes*, was added. Although occupied and potential prairie dog habitat had been identified within the allotment boundaries prior to the publishing of the DEIS, these locations were not of sufficient acreage to support a prairie dog complex that could potentially support ferrets. After the DEIS publication, additional prairie dog colonies outside the allotment were discovered for which further analysis seemed appropriate.
- Effects to Forest Service Sensitive species long-billed curlew, *Numenius americanus*, was added. This migratory wading bird has potential habitat within or adjacent to the allotment.
- The effect for Forest Service Sensitive species American redstart, *Setophaga ruticilla*, was changed from a determination of "no impact on the species" to "may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability" for Alternatives A, C, D, F and G.
- The effect for Forest Service Sensitive species pine grosbeak, *Pinicola enucleator*, was changed from a determination of "no impact on the species" to "may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability".
- The effect for Forest Service Sensitive species Tusayan flame flower, *Tallium valtdulum*, was changed from a determination of "no impact on the species" to "may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability".
- The effect for Forest Service Sensitive species Gila woodpecker, *Melanerpes uropygtalis*, was changed from a determination of "may impact individuals, but is not likely to result in a trend toward federal listing or loss of viability" to "no impact on the species".
- A new section displaying the effects to Chiricahua leopard frog, *Rana chiricahuensis*, was added. This species can potentially occupy habitat intermediate between that occupied between lowland leopard frogs and northern leopard frogs, both of which were analyzed in the DEIS.
- The findings, mitigation and monitoring from the Biological Opinion for listed species affected by the preferred alternative are displayed.
- A new section describing the effects to cryptogamic soils was added to the DEIS. These effects were considered before the DEIS was published but were not displayed.
- A new grazing capacity explanation was developed for the FEIS. We made a mistake in the

DEIS when stating that all alternatives have the same grazing capacity and removed this sentence from the document. The authors of this statement felt that capacity is based on a percent of the total amount of forage production in low moisture years. This amount is a maximum value that creates a limit on the amount of grazing that can do no harm to the location's vegetation. They did not consider that capacity is not an unchangeable value and can increase or decrease depending on management goals or intensity. However, this statement in the DEIS did not change our range of alternatives or alternative affects because capacity is different for each alternative and was analyzed as varying. In fact, the major difference in alternatives is capacity. The new expanded definition found in the glossary of the FEIS describes carrying capacity as the average number of livestock and/or wildlife which may be sustained on a management unit compatible with management objectives for the unit. In addition to site characteristics, it is a function of management goals and management intensity (1997 Region 3 USFS Rangeland Handbook).

- A new monitoring section was developed to better meet the goals for the allotment. See the Preferred Alternative and Monitoring sections of this document.
- Table 18, Water Quality Status of Watersheds Affected by the Windmill Allotment, was updated to better display the water quality status for this area. See Table 18 within this document.
- Additional Best Management Practices (BMP's) or Guidance Practices were added to the DEIS to better meet the goals for this allotment. The changes were developed and reviewed by ADEQ and are as follows:

**Planned Grazing Systems** - Grazing systems are alternately rested and grazed in a planned sequence. See each alternative for specifics on how this practice is now displayed.

**Proper Grazing Use** - Grazing at an intensity that will maintain enough cover to protect the soils and maintain or improve the quantity and quality of desired vegetation. See each alternative for specifics on how this practice is adopted.

**Streambank Protection** - Stabilizing and protecting streambanks against scour and erosion through vegetative and structural

rehabilitation means. Livestock grazing will not be allowed in Oak Creek, Sycamore Creek, Verde River, Spring Creek, and Sheepshead Spring. Above the Rim, ungulate grazing will be restricted or eliminated at T-Six Spring, Fain Spring, and Willard Spring.

**Trough or Tank** - To provide watering facilities for animals at selected locations. See Table 1 for new tank construction, pipeline construction, and water lot development. These improvements are intended to increase distribution of livestock and wildlife.

**Fencing** - Fencing is intended to improve livestock and wildlife management, control access, prevent soil loss, and improve water quality. See Table 1 for a list of fencing improvements.

- Site specific practices for the Windmill Allotment include the following:

In all the dry meadows, progress toward improved soil conditions by one or more of the following: reducing graze periods, relocating or removing stock tanks, building waterlot fences around tanks, splitting pastures, and obliterating or re-routing roads in meadows.

Reduce graze periods to less than or equal to 20 days during fast plant growth as much as possible. Fast forage growth is usually mid-July thru August and mid-March to mid-May with flexibility for when rains arrive. This will reduce regrazing of forage regrowth by cattle which is better for plant health and vigor.

Incorporate year-long rest from cattle into every pasture wherever possible in the summer range rotations. This year-long rest from cattle improves overall forage health by allowing more plants to reach maturity and reproduce.

Increase variability of pasture deferment, which means to schedule a different season of use each year of the rotation for each pasture.

The summer cattle range is not used before the cool season species have finished their fast forage growth (June 1st or later) to allow these plants to reach maturity.

In riparian areas below the Mogollon Rim, reduce time of cattle grazing or exclude from cattle grazing. Riparian areas identified are

portions of Verde River, Oak Creek, Dry Creek, Sheepshead Creek, Spring Creek, Coffee Creek and Jacks Canyon.

Riparian communities grazed by cattle above the Rim will receive reduced graze periods by cattle and varied season of use. Several of these areas will be fenced and excluded from cattle grazing. Riparian areas identified are: T-6 Spring, Willard Spring, Fain Spring and a portion of Rogers Lake.

Sweep cattle out of riparian areas above and below the Mooney Trail after moving them along the trail between summer and winter ranges.

Move cattle between pastures and summer and winter ranges according to each area's readiness for grazing.

Ensure that the permittee complies with the terms and conditions of the allotment permit.

# Comments and Responses to the DEIS

**Rachel Thomas • 1-10-97**

*"Our public lands should be managed for productivity and multiple-use. For the best results, land management decision should be made by people who have to live long term with the consequences of the decisions, to some agency employee or organization who is on the job for a year or a few years then moves on."*

We agree that our public lands should be managed for productivity and multiple use. By law, the Forest Supervisor is the decisionmaker for this analysis. However, this analysis was developed from comments made by Forest Service employees, other agency employees, ranch employees, various organizations, and members of the general public. We believe we can make the best land management decision for cattle grazing on the Windmill Allotment by using everyone's input.

*"No action should be accomplished without considering the economic impact on local communities along with their customs, traditions and cultures."*

The economic analysis in the DEIS covers these points within the Social Concerns and Economic Concerns sections.

*"The involvement of state and local governments along with every land user in the area including ranchers, loggers, miners, fisherman, recreation people, hunters, school boards, fire boards to name a few should be the first requirement for a plan such as the one you are proposing."*

We have made an attempt to involve as many of these people as possible in this process. A list of agencies and individuals consulted are listed in this document within the Preparers/Consultation section.

Rachel Thomas  
Box 4637  
Huachuca City, Arizona 85616

January 10, 1997

Peaks Ranger District  
Reference: Windmill EIS.  
5075 N. Hwy 89,  
Flagstaff, Arizona 86004

Reference 62 FR 1087-1088, January 8, 1997 pertaining to the Coconino National Forest, Arizona; Draft Environmental Impact Statement, Windmill Range Allotment.

Our public lands should be managed for productivity and multiple use. For the best results, land management decision should be made by people who have to live long term with the consequences of the decisions, not some agency employee or organization who is on the job for a year or a few years then moves on.

No action should be accomplished without considering the economic impact on local communities along with their customs, traditions and cultures.

The involvement of state and local governments along with every land user in the area including ranchers, loggers, miners, fishermen, recreation people, hunters, school boards, fire boards to name a few should be the first requirement for a plan such as the one you are proposing.

Regarding the grazing management, request you add the following two references to your list of references for grazing management.

The Prairie Keepers by March Houle, A wildlife biologist  
Beyond the Rangeland Conflict by Dan Daggett, An 1992 Sierra Club award winner.

Request I be provided a copy of the Environmental Impact Statement and any other documents pertaining to this action.

Sincerely  
  
Rachel Thomas

*"Regarding the grazing management, request you add the following two references to your list of references for grazing management."*

People on our ID team are familiar with these good books, but we did not cite them in our DEIS.



**June M. Gibbons • 1-15-97**

*"As an avid hunter person, I am somewhat inclined to prefer Alternative B, your no action alternative, due to the amount of visible riparian damage caused by cattle grazing. However, I will fairly reserve my comments until I have had an opportunity to review your NEPA document."*

Alternative B is an alternative that will be considered by the Forest Supervisor.

Mr. Fred Trevey  
Conconino Forest Supervisor  
Peaks Ranger District  
5075 North Highway 89  
Flagstaff, AZ 86004

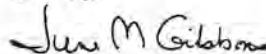
Subject: Windmill Environmental Impact Statement

Dear Mr. Trevey:

Would you please provide me with a copy of the subject EIS when it is released. I am also interested in reviewing the various maps associated with the Windmill Allotment Planning Area.

As an avid hunterperson, I am somewhat inclined to prefer Alternative B, your no action alternative, due to the amount of visible riparian damage caused by cattle grazing. However, I will fairly reserve my comments until I have had an opportunity to review your NEPA document.

Sincerely,



June M. Gibbons  
2240 East Ross Avenue  
Phoenix, AZ 85024-4429

## American Rights Association • 9-4-97

We mailed the following letter to the American Rights Association on October 16, 1997:

Thank you for your letter dated September 4, 1997 requesting an extension of the comment period for the Draft Environmental Impact Statement (DEIS) for the Windmill Range Allotment.

The DEIS was mailed to people on our current mailing list on August 19, 1997 and mailed to you on September 10 following the receipt of your letter. We are extending the comment period to October 28, 1997. This will allow you the minimum 45-day comment period. I am doing this because you were mailed the DEIS later than other interested parties, and because we were unaware of your interest in this project.

Your name has been added to our Windmill mailing list. The Windmill project has been on our Schedule of Environmental Analysis for several years. Let us know if you would like your name added to the Schedule's mailing list. That way you could be kept up-to-date on other projects that you may be potentially interested in. We expect our Forest Plan revision to start in 1999. You might also be interested in being on this mailing list. Until we hear from you, I will not add you to either mailing list.



### American Land Rights Association National Inholders Association

National Headquarters:  
30218 NE 82<sup>nd</sup> Avenue (PO Box 400)  
Battle Ground, Washington 98604  
Phone: (360) 687-3087  
FAX: (360) 687-2973

Legislative Office:  
1217 "E" Street, NE  
Washington, DC 20002  
Phone: (202) 546-2545  
E-Mail: [alra@pacfler.com](mailto:alra@pacfler.com)  
[www.landrights.org](http://www.landrights.org)  
FAX: (202) 547-7513

September 4, 1997

Bruce C. Greco  
Flagstaff Center District Ranger  
4373 S Lake Mary Rd  
Flagstaff, AZ 86001

Please send me a copy of the EIS for the Windmill Allotment. Please place my name on the mailing list for all future documents and communications pertaining to this action.

We believe there should be a minimum 90-day extension to the comment period. There has not been sufficient time to review and comment on this plan.

Thank you,

Elizabeth A. West  
Assistant Director

/na

## Arizona Wildlife Federation • 9-25-97

*"We have found serious technical flaws and legal flaws that do not meet the requirements of the National Environmental Policy Act (NEPA). As an example, you state on page 54, paragraph 3, under "Explanation of Grazing Capacity," that "Grazing capacity will not change under any alternative. The grazing capacity established under the current permit will be followed under all the grazing alternatives." The above statement is a clear violation of NEPA as it does not allow for adequate alternatives in the EIS and decision making documents."*

A new grazing capacity explanation was developed for the FEIS. We made a mistake in the DEIS when stating that all alternatives have the same grazing capacity and removed this sentence from the document. The authors of this statement felt that capacity is based on a percent of the total amount of forage production in low moisture years. This amount is a maximum value that creates a limit on the amount of grazing that can do no harm to the location's vegetation. They did not consider that capacity is not an unchangeable value, rather it can increase or decrease depending on management goals or intensity. However, this statement in the DEIS did not change our range of alternatives or alternative effects because capacity is different for each alternative and was analyzed this way. In fact, the major difference in alternatives is capacity. The new expanded definition found in the glossary of the DEIS describes carrying capacity as the average number of livestock and/or wildlife which may be sustained on a management unit compatible with management objectives for the unit. In addition to site characteristics, it is a function of management goals



ARIZONA WILDLIFE FEDERATION  
844 N. Country Club Drive, Suite E  
Mesa, Arizona 85201  
602-644-0077

September 25, 1997

Mr. Bruce Greco, District Ranger  
Mormon Lake Ranger District  
4373 S. Lake Mary Road  
Flagstaff, AZ 86001

Dear Mr. Greco:

Thank you for the opportunity to review and comment on the Draft EIS for the Windmill Grazing Allotment. It is evident that a lot of time and effort has gone into the analysis of the Windmill Allotment. However, we have found serious technical and legal flaws that do not meet the requirements of the National Environmental Policy Act (NEPA). As an example, you state on page 54, paragraph 3, under "Explanation of Grazing Capacity," that "Grazing capacity will not change under any alternative. The grazing capacity established under the current permit will be followed under all the grazing alternatives." The above statement is a clear violation of NEPA as it does not allow for adequate alternatives in the EIS and decision making documents. In addition, on page 1, you state that range conditions have seriously declined and riparian areas and mountain meadows are in poor condition with downward trends. These poor range conditions clearly call for livestock reduction for restoration of these areas. The various rest/rotation systems proposed in the DEIS will not restore riparian and mountain meadow areas in a timely manner. You are only prolonging the problem of overstocked rangelands and over grazing of the Windmill Allotment. It is clearly evident that the USFS needs to seriously revisit the stocking rate/grazing capacity issue at this time, based on the "best available data" and professional experience of range conservationists, wildlife biologists (including Arizona Game and Fish Department biologists), and other professional rangeland specialists and managers.

Another serious issue that is not addressed in the DEIS is a forage allocation (AUM's) process for livestock, wildlife and watershed conditions. The Arizona Wildlife Federation hereby requests that forage allocation tables with analysis for consumptive and non-consumptive uses be included in the FEIS. The forage allocation tables should include AUM's allocated to livestock and wildlife, including elk, deer and antelope, with conversion factors (i.e. 1 cow = 2 elk). Also, please include animal numbers and percentage of AUM's allocated to each species (except non-big game). The report should also include a new section under Social and Economic Concerns which discusses the social and economic values of wildlife, particularly the big game species, including elk, deer and antelope. Please include the demand for elk, deer and antelope permits.

Established 1923 - Formerly The Arizona Game Protective Association - State Affiliate of The National Wildlife Federation, Washington, D.C.  
First place award winner of Arizona's "Take Pride in America" Award 1989 & 1990

and management intensity (1997 Region 3 USFS Rangeland Handbook).

*"You state that range conditions have seriously declined and riparian areas and mountain meadows are in poor condition with downward trends. These poor range conditions clearly call for livestock reduction for restoration of these areas. The various rest/rotation systems proposed in the DEIS will not restore riparian and mountain meadow areas in a timely manner. You are only prolonging the problem of overstocked rangelands and over grazing of the*

*Windmill Allotment. It is clearly evident that the USFS needs to seriously revisit the stocking rate/grazing capacity issue at this time, based on the "best available data" and professional experience of range conservationists, wildlife biologists (including Arizona Game and Fish Department biologists), and other professional rangeland specialists and managers."*

Capacity issues generated considerable discussions during development of the alternatives. The alternatives address these issues specifically within the Alternatives sections of the DEIS and FEIS. However, reducing livestock numbers is not the only answer to these problems. We believe length of graze and length of rest are also important factors in grazing management. But, all of these options occur in various degrees in the present range of alternatives. The information used in this analysis included old and new production-utilization studies, TES, tree stand database, and professional opinions from the USFS, AGFD, and permittees.

*"Another serious issue that is not addressed in the DEIS is a forage allocation (AUM's) process for livestock, wildlife and watershed conditions. The Arizona Wildlife Federation hereby requests that forage allocation tables with analysis for consumptive and non-consumptive uses be included in the FEIS. The forage allocation tables should include AUM's allocated to livestock and wildlife, animal numbers and percentage of AUM's allocated to each species (except non-big game). The DEIS does not adequately address wildlife population levels (i.e. elk herd levels) in the various DEIS Alternative section. The livestock versus wildlife issue is a major concern that requires full NEPA analysis. The Arizona Wildlife Federation requests that 50% of available forage (AUM's) be allocated for wildlife species."*

There is considerable data available from the Arizona Game and Fish Department, Universities, and other sources on the economic value of elk, deer, antelope, etc., for hunting, wildlife photography and other recreational pursuits.

The DEIS does not adequately address wildlife population levels (i.e. elk herd levels) in the various DEIS Alternative section. The livestock vs. wildlife issue is a major concern that requires full NEPA analysis. The Arizona Wildlife Federation requests that 50% of available forage (AUMs) be allocated for wildlife species. Specific concerns and comments are provided as follows:

- Pg. 1 – Purpose of the Action: This paragraph seems to be in conflict with page 54 (i.e. grazing capacity will not be changed).
- Pg. 6 – Goal 5: The four-herd breeding program should not be a "given" for the proposed action and all alternatives (violation of NEPA). Other types of appropriate livestock operations that would improve rangeland conditions in a timely manner should be included in the Alternatives section. The various types of livestock operations should be fully considered in the decision process and not just the permittee's current operation.
- Pg. 14 & 15 – Table 1: Please provide costs on improvements and breakdown by USFS (taxpayer) and permittee instead of lumping costs together.
- Pg. 10 – Discussion of Options: Forage utilization levels are key to improvement of rangeland conditions, particularly in riparian and mountain meadow areas. The timely field monitoring of utilization levels should be the main factor used for movement of livestock and not length of grazing time.
- Pg. 12 – Annual Operating Plans: Even though short-term adjustments are made in the Annual Operating Plan, it is obvious that long-term stocking levels need major reductions to improve rangeland conditions on the Windmill Allotment. Annual Operations Plan "adjustments" will not meet the goals and "Desired Future Conditions" described on page 2 of the DEIS.
- Pg. 14 – Alternative A (Proposed Action): Year long rest should be mandatory for summer pastures, as well as winter pastures, to improve range conditions, particularly in riparian and mountain meadow pastures.
- Pg. 15 – Alternative A (Proposed Action): Water access gaps for livestock in Oak Creek should be eliminated. Water should be pumped from Oak Creek to storage tanks and troughs that are located out of fenced riparian areas. In Dry Creek and Jack's Canyon, grazing should be eliminated until the riparian areas are in "proper functioning condition." When the riparian areas are determined to be in proper functioning condition, grazing may be continued on a rest rotation and limited basis that will have minimal impact on the area.

The Arizona Game and Fish Department (AGFD) is responsible for managing wildlife populations in the State and the Forest Service is responsible for managing habitat on Forest Service lands. The Forest Service coordinates with and is responsive to AGFD.

We do not believe that allocating forage to livestock, wildlife, and watersheds is the best method to maintain or improve rangelands. There are too many variables that cannot be accurately accounted for when allocating forage (i.e., pasture size, animal distribution, management intensity, forage species

composition, weather, animal recruitment, animal mortality, topography, waters, or pasture rest). Getting a proper value for the amount of forage available is difficult at best and the ending value may be subjective and inaccurate. Some reasons for this are the lack of predictability in how all these variables interact and the lack of knowledge about some variables including weather, precipitation patterns, and animal recruitment or mortality. During the analysis of Windmill, we could estimate the effects of current numbers of livestock and wildlife (using herd size estimates provided by AGFD). In the different alternatives, we tried to improve vegetative and/or watershed conditions where needed. The methods for improvement included adjustments in livestock numbers or grazing strategies as well as structural improvements. AGFD has the opportunity to adjust elk or other wildlife use as appropriate through changes to hunting seasons or hunt structures. Changes in vegetation or watershed condition may not be detectable over the life of the permit but by improving grazing management in the preferred alternative, we hope to change the current range trend and speed up the rate of positive change.

However, we did allocate forage by default in the DEIS. Within the capacity section of this document, we explain how we developed and used TES and stand data base information as an estimate for forage production. Then we took an estimate of elk numbers, a variety of livestock numbers, and various proper use factors to examine capacity. Because these were rough estimates, we just used this information as guides for potential problem areas. However, we do not feel this information was adequately detailed to proceed with an allocation. We did not have enough site specific data about forage production or elk numbers and movement patterns to create a defensible allocation of

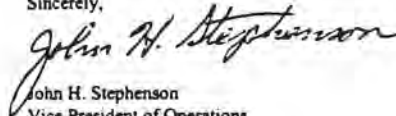
Pg. 26 – Preferred Alternative: Splitting the Luke Mountain pasture a third time is inappropriate. The ecological site class of the Luke Mountain pasture can produce only a given amount of forage; another prime example of over-stocking and where livestock reductions are necessary.

Pg. 37 – Condition and Trend by Vegetation Type: A “Summary Table” is necessary to provide overall range conditions/trends for the Windmill Allotment. The table should include range condition, acreage and percent of total for uplands, riparian areas and mountain meadows. The overall Windmill Allotment condition appears to be poor/fair with static/downward trends, another clear indication of long-term overgrazing that requires significant reductions of current livestock stocking levels.

Pg. 64 – Affected Environment and Effects of Alternatives on Wildlife: There is no economic analysis to substantiate that 35% utilization and lower cattle numbers are not economically viable. The current maximum cattle numbers of 1252-1257 cannot be used as the “economically viable” stocking rate for the Windmill Allotment. Of the alternatives described in the DEIS, Alternative ‘D’ is clearly the “preferred alternative” that will improve range conditions/trends, proper functioning conditions of riparian areas and mountain meadow areas. Alternative ‘D’ is the only alternative that will meet the goals and desired future conditions described on page 2 of the DEIS in a timely manner. The stocking levels of 635 cattle (maximum) appears to be appropriate based on data provided in the DEIS.

Thank you for the opportunity to comment on the Windmill Allotment DEIS.

Sincerely,



John H. Stephenson  
Vice President of Operations  
Arizona Wildlife Federation

JS/vn

cc: Mr. Tom Britt, Supervisor  
Region II, AZ. Game & Fish Dept.  
3500 S. Lake Mary Rd.  
Flagstaff, AZ 86001

Tom Lustig  
NWF Legal Counsel

forage. This information is available in the project record. Elk and other wildlife use and effects by alternative are presented in this document within the Wildlife section.

*“The report should also include a new section under Social and Economic Concerns which discusses the social and economic values of wildlife, particularly big game species, including elk, deer and antelope. Please include the demand for elk, deer and antelope permits.”*

Within the wildlife section we display the effects on each of these three species for each alternative. The benefit/cost ratio analysis within the Economic Concerns section includes hunter visitor days for each alternative. The specifics of the benefit/cost analysis is available in the project record. All the alternatives, except C, improve habitat for these species. Elk, deer, and pronghorn antelope populations would vary little between alternatives.

Game Management Unit and Species	Number of Permits*	Number of First Choice Applicants*	Percent of management Unit within Windmill
6A Elk	4,552	21,271	20
6A Mule Deer	1,900	4,967	20
6A Whitetail Deer	320	403	20
6A Pronghorn	18	225	20
6B Elk	585	1,390	50
6B Mule Deer	725	647	50
6B Whitetail Deer	425	260	50
6B Pronghorn	120	311	50

\*Numbers provided by the Arizona Game and Fish Department, 5-year mean, 1991-1995.

*"Pg. 1 - Purpose of Action: This paragraph seems to be in conflict with page 54 (i.e. grazing capacity will not be changed)."*

This page has been updated as a result of your comments.

*"Pg. 6 - Goal 5: The four-herd breeding program should not be a "given" for the proposed action and all alternatives (violation of NEPA). Other types of appropriate livestock operations that would improve rangeland conditions in a timely manner should be included in the Alternatives section. The various types of livestock operations should be fully considered in the decision process and not just the permittee's current operation."*

Alternative development is explained in the Alternative Development section through the Alternative Description section of this document. Other herd strategies were considered during this process but did not make the alternatives discussed in detail because they could not address all the goals for the allotment area. In addition, topography such as Mogollon Rim, large drainages and mountains, limits our ability to combine herds together for a significant length of time.

*"Pg. 14 & 15 - Table 1: Please provide costs on improvements and breakdown by USFS (taxpayer) and permittee instead of lumping costs together."*

Bottom of Table 1, within the DEIS and FEIS.

*"Pg. 10 - Discussion of Options: Forage utilization levels are key to improvement of rangeland conditions, particularly in riparian and mountain meadow areas. The timely field monitoring of utilization levels should be the main factor used for movement of livestock and not length of grazing time."*

We agree that utilization monitoring is important and we have added more information to the existing monitoring plan to explain our intentions in more detail. However, if we were to use utilization monitoring solely, the overgrazing of a single grass plant would not be addressed. We believe that if the regrowth of a grazed plant is consumed by an ungulate before the plant has fully recovered, then by definition the plant is overgrazed. Length of graze does address the reuse of a grass plant by removing cattle before the plant regrowth is tall enough for cattle to consume. Utilization monitoring by itself does not take this factor into account.

Other methods to improve rangeland conditions include adjustment of cattle numbers, timing and rest. These were all analyzed in the DEIS. The field monitoring that we have planned in the preferred alternative includes timely field visits prior to cattle coming on to ensure range readiness, during the grazing period, immediately after the grazing period, and after the growing season in the fall. The planned improvements are designed to improve conditions in riparian and meadows in particular.

*"Pg. 14 - Alternative A (Proposed Action): Year-long rest should be mandatory for summer pastures, as well as winter pastures, to improve range conditions, particularly in riparian and mountain meadow pastures."*

Year-long rest varies by alternative from no cattle grazing on Forest Service lands in Alternative B to varying length and season of use for the remaining alternatives. The majority of the riparian areas are excluded from grazing in all alternatives, see the Alternative Description section of this document and Table 11.

*"Pg. 15 - Alternative A (Proposed Action): Water access gaps for livestock in Oak Creek should be eliminated. Water should be pumped from Oak Creek to storage tanks and troughs that are located out of fenced riparian areas. In Dry Creek and Jack's Canyon, grazing should be eliminated until the riparian areas*

are in "proper functioning condition." When the riparian areas are determined to be in proper functioning condition, grazing may be continued on a rest rotation and limited basis that will have minimal impact on the area."

The proposed water gap (<5 acres each) points in Alternatives A, D, F, and G on Oak Creek will have very limited effects on riparian vegetation because these areas will be located on dry Bermuda grass flats, which can tolerate heavy use by cattle. These areas are scheduled to be used on a limited basis. The effects of using water gaps on rare species has been analyzed and consultation with USFWS has occurred where needed. Alternative B eliminates cattle grazing. Alternative B is analyzed for riparian effects.

*"Pg. 26 - Preferred Alternative: Splitting the Luke Mountain pasture a third time is inappropriate. The ecological site class of the Luke Mountain pasture can produce only a given amount of forage; another prime example of over-stocking and where livestock reductions are necessary."*

Livestock reductions are one method to meet goals in the Luke Mountain area (Alternatives B, D, and G). Additional fencing is another method to meet these goals by reducing the amount of time the pasture is grazed. We agree that Luke Mountain pasture only produces a given amount of forage. However, by dividing the pasture into smaller units, we have better control of the cattle and can change the way cattle utilize the forage. With more pastures cattle graze any one area for less time, they graze more in the uplands on less desirable forage species, the rest periods between cattle grazing is longer and more seasonal deferment of use is possible.

*"Pg. 37 - Condition and Trend by Vegetation Type: A "Summary Table" is necessary to provide overall range conditions / trends for the Windmill Allotment. The table should include range condition, acreage and percent of total for uplands, riparian areas and mountain meadows. The overall Windmill Allotment condition appears to be poor / fair with static / downward trends, another clear indication of long-term overgrazing that requires significant reductions of current livestock stocking levels."*

Division	Vegetation Type	Condition	Trend
Munds Pocket/Foxb	Ponderosa Pine	Poor to good	Static
	Transition	Poor to fair	Static
	Meadow	Poor to fair	Static to downward
Mill Park	Pinyon-Juniper	Poor	Downward
	Ponderosa Pine	Poor to good	Static
	Mountain Meadow	Poor	Static
Winter	Pinyon-Juniper	Very poor	Downward
	Desert Grassland	Poor to good	Static to Upward
	Desert Shrub Chaparral	Poor to fair Very poor to good	Static Static to downward

All this information is provided within the Affected Environment of Vegetation, Watershed, Riparian and Soils section of the FEIS. Exact acreages for each Terrestrial Ecosystem Soil Unit are available in the project record.

*"Pg. 64 - Affected Environment and Effects of Alternatives on Wildlife: There is no economic analysis to substantiate that 35% utilization and lower cattle numbers are not economically viable. The current maximum cattle numbers of 1252-1257 cannot be used as the "economically viable" stocking rate for the Windmill Allotment."*

This information is found within the Economic section of the FEIS. The Windmill permittees feel that Alternative D (35 percent use) is not viable to them because the fixed costs of running the ranch would not be reduced with a reduction in the number of cattle. However, Alternative D is still a viable alternative and may be selected by the decision maker.

## Virginia Ridel • 9-30-97

*"Some people felt that the NEPA (EIS) process for this allotment took way to long."*

This allotment is large and complex with several threatened, endangered, and sensitive species. It took time to deal with important issue such as capacity, conditions of mountain meadows, conditions of riparian areas, and watershed conditions in general on such a large scale. Through this time period, we also had to deal with changing regulations. In addition, limited funding for this project and other Forest range management priorities during this same time period have slowed this process.

VIRGINIA R. RIEDEL  
P. O. Box 3414  
Flagstaff, AZ 86003-3414  
520-527-1353  
e-mail: [virgie@infomagic.com](mailto:virgie@infomagic.com)

September 30, 1997

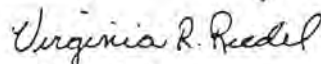
Bruce C. Greco  
Flagstaff Center District Ranger  
4373 South Lake Mary Road  
Flagstaff, AZ 86001

RE: Windmill Allotment DEIS

Dear Mr. Greco:

I first met Glen Morrison over 4 years ago. In the course of our conversation, he mentioned then that the Windmill Allotment was nearly complete on the DEIS. Four years has passed and the work on this Allotment is still not complete. It is time--it is passed time--to take action. Either sign it and let the man have full authorization to graze livestock or deny it! Make a clear decision and take responsibility for that action!

Sincerely,



Virginia R. Ridel



## Arizona State Land Department • 10-10-97

*"Alternative B eliminates scheduled livestock grazing on the Windmill Allotment for 10 years. This section needs to be modified to indicate that grazing would be eliminated on the Forest Service land within the Windmill Allotment. If Alternative B were implemented, State Trust lands would still be utilized for livestock grazing."*

We agree and changed the wording in Alternative B and throughout the document. We also assume that fences would need to be maintained or built to assure cattle remained on State land.

*"New or removal of old structural and non-structural improvements on State Trust land must be done with approval of the Arizona State Land Department and lessee of record."*

We agree and recognized that any new or removal of old structural improvements on State Trust land made within this document was only meant as suggestions for the State and the lessee of record to possibly better manage these lands. Suggestions or recommendations for non-structural improvements (roads in this case) were not made for any State lands.

*"The draft EIS states, on page 60, that "Cattle grazing on state lands included in the Windmill Allotment is presently administered by the Coconino National Forest through a signed agreement included in the Allotment Management Plan. The Arizona State Land Department is not aware of any signed agreement relinquishing the administration of State Trust Lands within the Windmill Allotment to the Coconino National Forest."*



### Arizona State Land Department

3860 LAKE MARY ROAD  
FLAGSTAFF, ARIZONA 86001



Mr. Bruce Greco, District Ranger  
Mormon Lake Ranger District  
4373 S. Lake Mary Rd.  
Flagstaff, Az. 86001

October 10, 1997

RE: Windmill Allotment Draft EIS

Mr. Greco:

I have received and reviewed the Draft Environmental Impact Statement for the Windmill Allotment. The following comments are provided regarding the Draft EIS and the State Trust Lands within the Windmill allotment.

#### ALTERNATIVE B - No Action Alternative

Under this alternative, the draft EIS states: "Alternative B eliminates scheduled livestock grazing on the Windmill Allotment for 10 years."

This section needs to be modified to indicate that grazing would be eliminated on the Forest Service lands within the Windmill Allotment. If Alternative B were implemented, State Trust lands would still be utilized for livestock grazing.

#### CONSTRUCTION OF STRUCTURAL IMPROVEMENTS

All the proposed alternatives recommend construction of structural improvements (i.e. fences, pipelines, etc.). Some of these proposed improvements are to be located on State Trust Lands.

Structural improvements may not be constructed on State Trust Lands without State Land Department approval. The approval process generally takes 60-90 days and must be initiated by the lessee of record.

Additionally, several Tables within the EIS document suggest that the State will assist with funding for various structural improvements. The State Land Department has no funding mechanism to assist lessee's with the cost of structural improvements.

We agree and changed the wording in this section to say that cattle grazing on State lands is administered by the Arizona State Land Department.

#### REMOVAL OF EXISTING STRUCTURAL IMPROVEMENTS

Some of the proposed alternatives recommend removal of structural improvements (i.e. fences, pipelines, stockponds, etc.). Some of these structural improvements may be located on State Trust Lands.

Structural improvements constructed on State Trust Lands, with the authorization of the State Land Commissioner, are owned by the lessee of record. As such, lessee approval and State Land Department notification will be required prior to the removal of any improvements located on State Trust Lands. In certain cases, particularly where water rights are involved, State Land Department authorization will also be required.

#### CONSTRUCTION OF NEW ROADS

Some of the proposed alternatives recommend the construction of new roads. Some of these proposed roads may be located on State Trust Lands.

Construction of new roads on State Trust Land will require the approval of the State Land Department. Approval may be obtained two ways:

- 1) A new road can be considered a structural range improvement. Approval may be granted through the process previously described.
- 2) A Right-of-Way for the construction and maintenance of a public access road. Approval may be granted after application and processing by the Rights-of-Way Section.

#### REMOVAL OF EXISTING ROADS

Some of the proposed alternatives recommend removal of existing roads. Some of these existing roads may be located on State Trust Lands.

In most cases, closure of existing roads on State Trust Land requires the approval of the Arizona Game and Fish Commission. If the road closure is determined to be in the best interest of the Trust, the State Land Department will assist the Coconino National Forest with the road closure process.

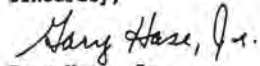
ARIZONA STATE TRUST LANDS - ADMINISTRATION

The draft EIS states, on page 60, that "Cattle grazing on state lands included in the Windmill Allotment is presently administered by the Coconino National Forest through a signed agreement included in the Allotment Management Plan."

The Arizona State Land Department is not aware of any signed agreement relinquishing the administration of State Trust Lands within the Windmill Allotment to the Coconino National Forest.

The Arizona State Land Department appreciates the opportunity to comment on this document. If you have any questions or if the Land Department can be of any assistance, please contact me at 520-774-1425.

Sincerely,



Gary Hase, Jr.  
Range Resource Manager

c: S. Williams  
file

## Renz D. Jennings • 10-10-97

*"The area is sufficiently inhabited to make it inappropriate for grazing cattle. The permittee is too disengaged from the oversight of this herd and their effects to be permitted to run cattle in such areas. The permittee is allowed his cattle to overwhelm the land of others with little regard to their interests. The damage to the investments of private landowners (even without considering the public investment in public lands) must be greater than the minimal investments the permittee may have made in the vicinity to justify such aggressive grazing. 300 to 400 cattle watering on Lower Oak Creek cannot be beneficial to the creek. In effect the permittee has been allowed to internalize profit by externalizing cost."*

Arizona is an open range state that by law requires private landowners to fence their private land from livestock. However, in Alternatives A, D, F and G, Echo Canyon subdivision will be excluded from cattle grazing to remove livestock impacts from Oak Creek. Permittee compliance is an important part of all action alternatives and is also part of their grazing permit (refer to Efficiently Operating and Complying with the Allotment Management Plan section, Monitoring section, Guidance Practices section and Monitoring section).

Renz and Dianna Jennings  
6413 South 26th Street  
Phoenix, AZ 85040  
(602) 268-4219

October 10, 1997

District Ranger  
Mormon Lake Ranger District  
4373 S. Lake Mary Road  
Flagstaff, AZ 86001

Dear District Ranger:

Last year, approximately 300-400 cattle descended on my property at 3305 N. Echo Canyon Road in Page Springs, Arizona. According to the range conservationist, Mike Hanneman, the cattle were grazing on the Windmill Allotment. For four or five days the cattle trampled and grazed vegetation to the ground. They knocked down and broke long-watered sight-break trees. They rubbed up against the house, embedding their hair in the wood. The cattle invaded other neighbor's property to similar effect.

When I attempted to contact the cattle owner, I was told by the range conservationist that he was precluded from revealing the owner's identity. Instead, he offered to call the permittee, and ask him to call me.

I never heard from the owner.

Here is what is wrong, besides lack of good neighborliness:

- The area is sufficiently inhabited to make it inappropriate for grazing cattle.
- The permittee is too disengaged from the oversight of his herd and their effects to be permitted to run cattle in such areas.
- The permittee is allowing his cattle to overwhelm the land of others with little regard to their interests.
- The damage to the investments of private landowners (even without considering the public investment in public lands) must be greater than the minimal investments the permittee may have made in the vicinity to justify such aggressive grazing.
- 300 or 400 cattle watering on Lower Oak Creek cannot be beneficial to the creek.
- In effect the permittee has been allowed to internalize profit by externalizing costs.

As a landowner within the Windmill Allotment, I request that Alternative B be selected or that my area be deleted from the permittee's allotment. As a landowner and a citizen, I request that the permittee's permit be reduced to a size that can be responsibly managed.

Sincerely,

  
Renz D. Jennings

## Southwest Center for Biological Diversity • 10-11-97

*"The Forest Service fails to consider a reasonable range of alternatives as required by NEPA. Four of the six alternatives are nearly equal in their permitting numbers. The no action alternative is not honestly or seriously analyzed, and is only included as token compliance with NEPA."*

The alternatives were developed from the issues. Each of the issues is directly linked to an alternative. The building of the alternatives is described within the Alternative section of the DEIS and FEIS. The range of alternatives is also presented in the Alternative section. Alternative B (no grazing) is equally analyzed throughout the FEIS.

*"The FS claims to be engaging in an impartial analysis of the Windmill Allotment, but the DEIS suggests otherwise. The FS, per the Multiple Use Sustained Yield Act and the National Forest Management Act, must manage for multiple uses and it must look at alternative uses of the land other than grazing. If the benefits of these alternative uses outweigh the benefits from grazing then cows should be removed. With its predetermined outcome of the grazing status quo, the FS is foreclosing an objective analysis of this area and is demonstrating its unwillingness to even consider the possibility that cows should be removed or extremely reduced in numbers."*

The mission of the Forest Service is to manage for multiple uses and the DEIS follows this mission. The range of alternatives in the DEIS does include removing cattle from the allotment area (Alternative B). Alternatives D and G reduce cattle numbers. All alternatives are equally analyzed for their effects and each will be considered for implementation.

### Southwest Center for Biological Diversity

*protecting and restoring the southwest's deserts, rivers, forests, and wildlife*



October 11, 1997

District Ranger  
Mormon Lake Ranger District  
4373 S Lake Mary Road  
Flagstaff, AZ 86001

We are in receipt of the Draft Environmental Impact Statement (DEIS) for the Windmill Allotment. Please objectively consider and constructively respond to the following comments:

- The Forest Service fails to consider a reasonable range of alternatives as required by NEPA. Four of the six alternatives are nearly equal in their permitting numbers. The no action alternative is not honestly or seriously analyzed, and is only included as token compliance with NEPA.

- The FS claims to be engaging in an impartial analysis of the Windmill Allotment, but the DEIS suggests otherwise. The FS, per the Multiple Use-Sustained Yield Act and the National Forest Management Act, must manage for multiple uses and it must look at alternative uses of the land other than grazing. If the benefits of these alternative uses outweigh the benefits from grazing then cows should be removed. With its predetermined outcome of the grazing status quo, the FS is foreclosing an objective analysis of this area and is demonstrating its unwillingness to even consider the possibility that cows should be removed or extremely reduced in numbers.

- The DEIS fails to mention what the current number of permitted livestock. Without this baseline it is impossible to even place the proposed action in context. The DEIS states that the pastures are in mostly poor condition with some in fair condition. Since we are not told the current numbers of livestock, it is unclear how the Forest Service is responding to this situation.

- The proposed \$216,000 to be spent on structural improvements is baffling. It is even more amazing that the Forest Service and the American public will be footing the vast majority of this bill. Where is the usual funding emergency that prevents the Forest Service from conducting necessary monitoring? Why isn't there any money to study or survey for threatened,

Tucson Office PO Box 710 Tucson, AZ 85702-0710 TEL: 520 623 5252, ext. 308 FAX: 520 623 9797  
E-mail: [bsaagee@sw-center.org](mailto:bsaagee@sw-center.org) <http://www.swcenter.org/orga/sw-center>

1

*"The DEIS fails to mention what the current number of permitted livestock. Without this baseline it is impossible to even place the proposed action in context. The DEIS states that the pastures are in mostly poor condition with some in fair condition. Since we are not told the current numbers of livestock, it is unclear how the Forest Service is responding to this situation."*

Alternative C is the current number of livestock with the current management system, see the Alternative section of the FEIS.

*"The proposed \$216,000 to be spent on structural improvements is baffling. It is even more amazing that the Forest Service and the American public will be footing the vast majority of this bill. Where is the usual funding emergency that prevents the Forest Service from conducting necessary monitoring? Why isn't there any money to study or survey for threatened, endangered, and sensitive species? This is not a general comment about Forest Service funding policies, but is specific to this analysis. For example, proposed expenditures include removing water tanks, building cattle guards, building water pipelines, etc. Yet it appears that money is not being allocated to legally required expenditures. For example, the DEIS states that unsurveyed potential habitat exists for sensitive species Arizona leatherflower, lowland leopard frog, and narrow-headed garter snake, yet those surveys have not been conducted and are not proposed in the DEIS to be conducted. The Forest Service must get its priorities straight and start spending money on legally mandated wildlife surveys and monitoring, instead on improvements that should be borne by the permittee, who is already reaping a substantial subsidy courtesy of United States taxpayers."*

All the alternative tables explain who will pay for the alternatives as is found within the Alternative section of the FEIS. The majority of Forest Service dollars will come from a portion of the grazing fee collected from this and other grazing permits, called range betterment dollars. The monitoring section is in the FEIS. As stated in the Wildlife section of the FEIS, unsurveyed habitat for Arizona leatherflower, lowland leopard frogs, narrow-headed garter snakes, as well

endangered, and sensitive species? This is not a general comment about Forest Service funding policies, but is specific to this analysis. For example, proposed expenditures include removing water tanks, building cattle guards, building water pipelines, etc. Yet it appears that money is not being allocated to legally required expenditures. For example, the DEIS states that unsurveyed potential habitat exists for sensitive species Arizona Leatherflower, Lowland Leopard Frog, and Narrow-headed Garter Snake, yet those surveys have not been conducted and are not proposed in the DEIS to be conducted. The Forest Service must get its priorities straight and start spending money on legally mandated wildlife surveys and monitoring, instead on improvements that should be borne by the permittee, who is already reaping a substantial subsidy courtesy of United States taxpayers.

- Related to the above point, given the high diversity and abundance of threatened, endangered, and sensitive species (TES) on this allotment, and the extremely limited benefits of grazing, the Windmill proposed action is in violation of NFMA's requirement to discontinue grazing if alternative uses would be more beneficial for the land. There are 54 TES on Windmill! One of only four populations of Arizona Cliffrose in the world are on this allotment. In addition, rare populations of Arizona Bugbane and Ripley Wild Buckwheat are present. The Forest Service's resolve to conduct business as usual is illegal.

- Per NFMA, a proper suitability analysis must be done. Above discussions strongly indicate that this area is not suitable for grazing.

- All TES plant populations must be fence or otherwise protected. The DEIS is very flip about grazing's destructive effects on these populations, such as Arizona Cliffrose and Arizona Bugbane. Four populations of Cliffrose in the world and the Forest Service stands by and lets one be grazed! This is a blatant violation of NFMA viability regulations.

- The Verde Valley Botanical Area should be closed to all grazing. It is classic that the Forest Service even grazes Botanical Areas. The Forest Service should learn that its OK not to graze everywhere.

- The "Effects to Riparian Areas" section on page 48 is embarrassingly inadequate. The FEIS must contain a detailed scientific analysis of this allotment's effect on the many riparian areas contained within its borders. In addition, justifying grazing because elk impacts would be "just as severe" needs to be documented scientifically. If these impacts are really just as severe, that would mean elk, like cattle, have destroyed nearly every riparian area west of the 100<sup>th</sup> Meridian. Where are the studies to prove this? We haven't seen them.

- The effects of grazing to uplands is not adequately addressed.

This concludes our comments at this time. Please send the Final EIS when complete.

Sincerely,

  
Brian Segee

2

as other species exists on Windmill. In the DEIS it is clearly stated in Alternative A of the Alternative Description section that surveys for threatened, endangered, and sensitive species are planned prior to implementation of all improvements. These costs are generally borne by the Forest Service. Surveys and monitoring for southwestern willow flycatcher are discussed in the Wildlife and Monitoring sections of the FEIS. In Alternative F, nearly all riparian areas are proposed for fencing to exclude cattle. Many of these are potential habitat for lowland leopard frogs and narrow-headed garter snakes. In some instances,

only the specific locations directly impacted by a fence will be surveyed and in such cases, it is inferred that potential habitat is protected from the direct effects of cattle grazing without species specific surveys being conducted.

*"Related to the above point, given the high diversity and abundance of threatened, endangered, and sensitive species (TES) on this allotment, and the extremely limited benefits of grazing, the Windmill proposed action is in violation of NFMA's requirement to discontinue grazing if alternative uses would be more beneficial for the land. There are 54 TES on Windmill! One of only four populations of Arizona cliffrose in the world are on this allotment. In addition, rare populations of Arizona bugbane and Ripley wild buckwheat are present. The Forest Service's resolve to conduct business as usual is illegal."*

Windmill proposed action is not a violation of NFMA as you claim. NFMA directs the preparation of Forest Plans which provide broad direction for all resource planning and activities. This FEIS uses the Coconino Forest Plan, which allows livestock grazing in this area.

There are not 54 TES species on Windmill. There are 57 species for which there is known or potential habitat within or adjacent to the allotment.

Impacts to rare plants are discussed within the Wildlife section of the FEIS. Significant negative impacts to population viability is not expected for any of the Forest Service sensitive species under any of the alternatives. Grazing potential or occupied habitat for rare plants is not illegal. The effects of grazing on these species has been analyzed by Forest Service biologists and botanists. The U.S. Fish and Wildlife Service (USFWS) has reviewed the biological assessment and evaluation for those listed species which may be affected by this action. The monitoring for *Purshia* and Arizona bugbane tier to existing Recovery Plans and Conservation Assessments and were developed in conjunction with the USFWS. The Biological Opinion for the preferred alternative states that this action is not likely to jeopardize the continued existence of *Purshia* (USDI Fish and Wildlife Service 1997).

*"Per NFMA, a proper suitability analysis must be done. Above discussions strongly indicate that this area is not suitable for grazing."*

The 1997 USDA Forest Service, Region 3 Rangeland Analysis and Management Handbook explains that suitability determinations are to be made at a broad programmatic level in Forest Plans.

A letter from the Washington Office of the Forest Service on April 25, 1997 explains suitability the best and it reads as follows: Regional Offices have requested clarification of requirements for determining capability and suitability of lands for domestic livestock grazing in land resource management planning, especially plan revision. To promote consistent understanding of the statutes and regulations, we are removing inconsistent direction found in FSM 2210.5, FSM 2211, FSM 2212.11, and FSH 2209.14 from the directives system. The National Forest Management Act requires the identification of the suitability of lands for resource management (16 USC 1604(g)(2)(A)). The capability and suitability of lands for domestic livestock grazing is determined at the land and resource management planning level. However, it is not necessary or desirable to identify in the land and resource management plan the capability or suitability of lands for domestic livestock grazing on a site specific basis. Land and resource management plan management prescriptions and associated standards and guidelines are derived, in part, from the criteria used in capability and suitability determinations. These management prescriptions and standards and guidelines are applied as part of the environmental analysis when determining whether to authorize domestic livestock grazing on a specific site. Rangelands identified as capable and suitable for domestic livestock grazing in the land and resource management plan may include areas that are not appropriate for domestic livestock grazing when analyzed at the site specific level, such as some wetlands or some campgrounds. Therefore, the appropriate site specific decision would be not to allow grazing on those specific areas. On the other hand, in some situations domestic livestock need not be prohibited from areas not identified in the plan as capable and suitable. For example, a forested area with insufficient forage to support domestic livestock may not be identified as capable and suitable but the presence of domestic livestock drifting from an adjacent suitable area may not conflict with other uses. In this situation, it would not be necessary to physically prevent access to the forested area by domestic livestock but there would be no forage allocation made.

*"All TES plant populations must be fence or otherwise protected. The DEIS is very flip about grazing's destructive effects on these populations, such as Arizona cliffrose and Arizona bugbane. Four populations of cliffrose in the world and the Forest Service stands by and lets one be grazed! This is blatant violation of NFMA viability regulations."*

The TES plant species effects by alternative are given within the Wildlife section of the DEIS and FEIS. Grazing in potential or occupied habitat for rare plants is not illegal. Coconino National Forest has analyzed effects to these species and monitoring and mitigation has been proposed where needed. The Biological Opinion for the preferred alternative states that this action is not likely to jeopardize the continued existence of *Purshia* (USDI 1997). A biological assessment for each of the TES species is in the project record. The Region 3 Regional Office is conducting population viability analysis. To be consistent with the National Forest Management Act, it is appropriate for the analysis to be conducted at the Forest Plan level, not a site specific level. With the mitigation and monitoring proposed, we do not believe the preferred alternative will jeopardize the viability of rare species in the interim.

The bulk of the Arizona cliffrose population is proposed for exclusion with the Gyberg fence, closure of Forest Road 9538A, and construction of three gates. Monitoring and protection if needed will be done for the isolated populations outside of the Gyberg pasture. Prior actions to protect the plant include road closures, exclusion from OHV traffic, and signs.

Arizona bugbane experiences light grazing and trampling by cattle and/or elk in some populations and none in others. Monitoring and evaluation of this plant occurs according to the schedule in the Conservation Assessment. Drought and flooding appear to play a more significant role in affecting these populations.

Some grazing is permitted under the Recovery Plan for *Purshia subintegra*. The effects of the preferred alternative on Arizona cliffrose and how this interfaces with the Recovery Plan is described in detail in the Wildlife section of the DEIS and FEIS. A Biological Opinion on the effects of Alternative F was received October 28, 1997. The USFWS gave us conservation recommendations that are discretionary agency activities that minimize or avoid adverse effects of a proposed action, and are as follows:

1) Permit livestock grazing in the Duff Flat South and Gyberg Pastures during October through January only, when *Purshia* are not actively growing and when most seedlings are not emerging, as recommended in Recovery Action 3b.1 of the Arizona Cliffrose Recovery Plan.

2) Permit livestock to use the Duff Flat South and Gyberg Pastures no more than once every 2 years, to minimize effects to *Purshia* as recommended in

Recovery Action 3b.1 of the Arizona Cliffrose Recovery Plan.

3) Continue monitoring of *Purshia* as outlined in the BAE (April 24, 1997) and consultation should be reinitiated if livestock utilization of *Purshia* exceeds 20 percent of current years growth.

4) Complete the Verde Valley Botanical Area Management Plan;

5) Total forage allocation should also consider other wildlife use in the Windmill Allotment, in situations where poor and declining range conditions exist, forage allocation levels should be further reduced.

The following paragraph is our response to these conservation recommendations.

During the analysis, the Forest considered changing the rotation of the Mill Park Herd to meet the letter of the Recovery Plan but felt that there would be unacceptable impacts to watersheds and that improvements in watershed conditions would not occur. Watershed improvements, particularly in the winter range, are important for habitat and/or individuals of rare fish and southwestern willow flycatchers. By definition, a grazing rotation implies that the use of one pasture has an effect on how the other pastures are used. Because of the locations of Duff Flat South and Gyberg pastures (in the middle and far end of the allotment), these pastures need to be used at varied times of the year to give the other pastures varied use and rest. In order to meet the watershed objectives of the allotment, the rotations as proposed will maximize pasture rest (deferred and year-long) and will allow pastures to be grazed during different periods of time each year. Generally speaking, it is poor grazing management to graze a given pasture at the same time each year. To meet the letter of the Recovery Plan, the Forest also considered fencing all or part of known populations or fencing individual populations. Estimated costs ranged from \$11,250 to \$15,000, above and beyond the costs associated with the creation of the *Purshia* pasture. It was felt that fencing would be an unnecessary cost because of the low likelihood that cattle would be in vicinity of the *Purshia subintegra* populations. For the cattle to be in the *Purshia* populations, they would have to travel through rough country and heavy brush that surround the known populations. In addition, there is a significant lack of water to help draw cattle into such rough areas. The Forest is committed to protecting this rare plant. We think a focused monitoring effort will validate our prediction that utilization amounts and timing of cattle use on



*Purshia* will be consistent with the Recovery Plan. The monitoring plan is as follows: there will be a minimum of five visits with the objective of detecting early use, mid-use and utilization after cows have left one pasture and before they have entered another. If greater than 20% use (cattle and wildlife) on individual plants is detected, or if use on the plants by cattle occurs more frequently than every other year, cows will be recovered from the pasture or temporary fencing will be installed to prevent further use. USFWS will be notified. More than five visits may be appropriate depending on local climatic conditions or local vegetation growth rates. There are no plans to complete the Verde Valley Botanical Area (VVBA) Management Plan in the foreseeable future although management is active in this area. Any activities that may affect *Purshia* within VVBA tie to the Recovery Plan for that species and consultation with USFWS occurs when needed. Planning and implementation of road closures and trail use to restrict the use of OHV and bicycles to planned trails or routes is ongoing. There is active coordination with Dead Horse Ranch State Park concerning trails that lead from this popular recreation area into VVBA and surrounding areas.

Arizona bugbane (*Cimicifuga arizonica*) has a Conservation Assessment and Strategy Plan for the Coconino and Kaibab National Forests (May 1995) and pages 28-35 provide a summary of conservation actions schedule. This schedule provides for monitoring and inspections in known populations through 2003. This monitoring and inspection schedule was incorporated into this project (page 86). Monitoring has documented that some grazing has occurred to some of these populations. Use by cattle has been light and populations and regeneration has not been affected.

*"The Verde Valley Botanical Area should be closed to all grazing. It is classic that the Forest Service even grazes Botanical Areas. The Forest Service should learn that its OK not to graze everywhere."*

Grazing is not an excluded activity in botanical areas. The Coconino National Forest Land and Resource Management Plan (FLMP) contains management direction for Management Area 17, Special Areas on pages 193-194. Management emphasis is described in the Wildlife section of the DEIS and FEIS and page 194 on the FLMP. Standards and guidelines are on pages 195-196 of the FLMP. It is our interpretation that protecting and maintaining the ecological integrity of a botanical area does not always mean exclusion of all disturbance factors, which in this case, could include human caused disturbances such

as grazing, trails, and recreational use. All the alternatives in this document call for exclusion of the Verde Valley Botanical Area from livestock grazing.

*"The "Effects to Riparian Areas" section on page 48 is embarrassingly inadequate. The FEIS must contain a detailed scientific analysis of this allotment's effect on the many riparian areas contained within its borders. In addition, justifying grazing because elk impacts would be "just as severe" needs to be documented scientifically. If these impacts are really just as severe, that would mean elk, like cattle, have destroyed nearly every riparian area west of the 100th Meridian. Where are the studies to prove this? We haven't seen them."*

The Riparian section of the FEIS discusses riparian condition on the allotment. Table 14 discusses the condition of allotment's riparian areas and the existing impacts from grazers and other types of impacts. Table 16 displays the anticipated effects to riparian areas by alternative. Prediction of these effects are based on an "average year" and cannot account for the wide variability of climatic conditions and events typical to the area's weather. Most of the riparian areas below the rim are excluded from livestock grazing so that any impacts from the different alternatives are a result of upland soil condition. This condition is described in the narrative section and displayed by alternative in Table 16. Given the wide range of natural variability in storm events, the naturally limited soil productivity, and the diversity of activities within the watersheds, a simple relationship between alternative action and resulting effect is uncertain. Riparian areas above the rim seem to be less effected by storm events than by grazing during the entire growing season.

Forage use monitoring has been conducted for several years on the Coconino National Forest. This cooperative effort between the Arizona Game and Fish Department and the Forest Service assesses vegetation use by all grazing ungulates and is site specifically measured. Utilization estimates are then extrapolated based on terrestrial ecosystem mapping units. This documentation is the basis for estimating the effects to riparian areas and mountain meadows above the rim. This documentation is available in the project record.

*"The effects of grazing to uplands is not adequately addressed."*

Some modifications were made in the FEIS to this section. We have also added a section on Cryptogamic soils to the FEIS.

**William H. Kruse • 10-13-97**

*"The DEIS suggest about \$6700 more for Alternative F over A but it was not clear that all of this difference was for fencing. If it is only for fencing, then I think it would be a good long-term investment."*

Yes, it is all for constructing new fences and cattleguards, refer to Table 8.

*"Livestock impacts on the SWF appear to be greater in Alternative F than in A, where in 2 out of 6 years, the livestock cause the problem. Could strategies be developed for these two years which would ameliorate some of the concerns, i.e. adjusted entry dates, better livestock distribution, cowbird trapping, etc. It appears from the discussion that livestock impacts are not well known, that interaction with USFWS is forthcoming, and the permittees are willing to cooperate with livestock moves and adjusting grazing schedules."*

Alternative F's cattle rotations were our best attempt to meet the SWWF goals while maintaining the overall watershed objectives and still permitting cattle grazing. See the Alternative Development section, Alternative F Description section and the Wildlife section of the DEIS and FEIS. We intend to follow the conditions outlined in the Biological Opinion (USDI 1997) and its amendment (USDI 1998). We will continue to conduct SWWF monitoring. If SWWF's are found within a 5-mile radius of Windmill cattle, then we will do one of the following: remove Windmill cattle from a cowbird foraging radius during the SWWF breeding season or trap cowbirds in flycatcher locations and re-initiate consultation with USFWS.

*"A third suggestion in favor of Alternative F is the combination of the adjustment on the Foxboro and the grazing reductions on the Highway Camp and Little T-*

13 October 1997

Mr. Bruce Greco, Flagstaff Center District Ranger.  
Holman Lake Ranger District  
4373 S. Lake Mary Road  
Flagstaff, Arizona 86001

Thank you for the opportunity to review your Draft Environmental Impact Statement for the Windmill Grazing Allotment. I must apologize for this last minute "ditch" attempt to get it in by your deadline of Oct. 13th. Nevertheless, I am interested in this in that I have worked on parts of this allotment in the past and I know personally many of the preparers of this DEIS; they certainly are well qualified and have produced a fine document. Probably twenty years ago, I had the opportunity to provide input into an AMP for the Windmill Allotment. Now as then, I have great respect for the professionalism of your staff and I find it difficult to second guess their analysis and intent.

After studying the document fairly thoroughly, I will comment on Range Conservation aspects only and base them on the suggestion that you reconsider Alternative F in lieu of your proposed Alternative A.

In the general analysis and discussion about the various alternatives it appears that a lot of support is in there for much of the grazing aspects, interactions, and management options provided by Alternative F. One important aspect is splitting the Lake Mountain Pasture. More often than not, splitting large pastures generally provides more management options in the long term and can aid in short term planning. The DEIS suggests about \$6700 more for Alternative F over A but it was not clear that all of this difference was for fencing. If it is only for fencing, then I think it would be a good long term investment.

Livestock impacts on the SWWF appear to be greater in Alternative F than in A, where in 2 out of 6 years, the livestock cause the problem. Could strategies be developed for these two years which would ameliorate some of the concerns, i.e. adjusted entry dates, better livestock distribution, cowbird trapping, etc. It appears from the discussion that livestock impacts are not well known, that interaction with USFWS is forthcoming, and the permittees are willing to cooperate with livestock moves and adjusting grazing schedules.

A third suggestion in favor of Alternative F is the combination of the adjustment on the Foxboro and the grazing reductions on the Highway Camp and Little T-six pastures. Elk and livestock grazing patterns are highly interactive in this area and any management option that helps this situation should be considered, although livestock reductions may be the only one. I remember livestock grazing problems on the Foxboro 20 years ago, and the elk populations were not as high then.

Fourth, allowing for yearlong rest in pastures needing that type of deferment (Gyberg, Duff Mesa, and Skeleton Bone) certainly can be an incentive to better range management, particularly in that type of ecosystem. Some arid ranges need two precipitation regimes to recover adequately. If the deferment could be coincided with better than average precipitation seasons, recovery objectives can be enhanced.

Finally, and to expand a little on this last point, yearly grazing plans should be flexible and easily adjusted. I was not able to glean from the DEIS what was the policy on annual grazing plans and whether or not they could be adjusted. Pages 26-30 show some grazing schedules which appear fairly fixed. Is it possible to defer grazing, alter entry dates, increase numbers of livestock on some pastures if the forage is good, or poor? Could these types of management options be utilized within a few months period, within the grazing year, to say take the advantage of unusual precipitation patterns; high or low? Or to enhance the management of the SWWF habitat? Answers to these and other questions would help one to better understand the process of selecting the preferred alternative

*Six pastures. Elk and livestock grazing patterns are highly interactive in this area and any management option that helps this situation should be considered, although livestock reductions may be the only one. I remember livestock grazing problems on the Foxboro 20 years ago and the elk populations were not as high then."*

Others have had the same concerns and that is why both Alternatives D and G where developed and is

found within the Alternative D and G Descriptions sections in the DEIS and FEIS. We agree that the elk populations are higher now than they were 20 years ago, but the management of cattle grazing has improved in the last 20 years through an increase in the number of pastures and changes in the timing and season of use.

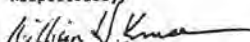
*"Fourth, allowing for yearlong rest in pastures needing that type of deferment (Gyberg, Duff Mesa, and Skeleton Bone) certainly can be an incentive to better range management, particularly in that type of ecosystem. Some arid ranges need two precipitation regimes to recover adequately. If the deferment could be coincided with better than average precipitation season, recovery objectives can be enhanced. Yearly grazing plans should be flexible and easily adjusted. I was not able to glean from the DEIS what was the policy on annual grazing plans and whether or not they could be adjusted. Pages 26-30 show some grazing schedules which appear fairly fixed. Is it possible to defer grazing, alter entry dates, increase numbers of livestock on some pastures if the forage is good, or poor? Could these types of management options be utilized within a few months period, within the grazing year, to say take the advantage of unusual precipitation patterns; high or low? Or to enhance the management of SWF habitat?"*

The answers to these questions are given under the note section of the Preferred Alternative of the FEIS, under Annual Operating Plans in Items Common to

management option.

I am certain some of these thoughts were already discussed and examined by your DEIS team. They are thorough. Nevertheless, I thank you for the opportunity to examine the draft for myself and to express the thoughts I did have. I will be interested in seeing the final document. If there are additional efforts I could make or if you have questions about these comments, please feel free to contact me.

Respectfully,



William R. Kruse, Range Scientist (retired).

All Alternative section of the FEIS, and in the Monitoring section of the DEIS and FEIS. But in addition, we plan to monitor and make adjustments to any alternative that is selected to best meet our goals for the allotment. For instance, cattle numbers on all the alternatives are maximums and numbers may be reduced for a variety of reasons annually.

## Forest Guardians • 10-14-97

"We believe that no term permits should be reissued until you conduct a thorough analysis of the areas' suitability for grazing as defined in your regulations. The full text of 36 CFR Sec 219.20 reads: In forest planning, the suitability and potential capability of National Forest System lands for producing forage for grazing animals and for providing habitat for management indicator species shall be determined as provided in paragraphs (a) and (b) of this section. Lands so identified shall be managed in accordance with direction established in forest plans. (a) Lands suitable for grazing shall be identified and their condition and trend shall be determined. The present and potential supply of forage for livestock, wild and free-roaming horses and burros, and the capability of these lands to produce suitable food and cover for selected wildlife species shall be estimated. The use of forage by grazing and browsing animals will be estimated. Lands in less than satisfactory condition shall be identified and appropriate action planned for their restoration. (b) Alternative range management prescriptions shall consider grazing systems and facilities necessary to implement them; land treatment and vegetation manipulation practices; and evaluation of pest problems; possible conflict or beneficial interactions among livestock, wild free-roaming horses and burros and wild animal populations, and methods of regulation these; direction for rehabilitation or ranges in unsatisfactory condition; and comparative cost efficiency of the prescriptions. 36 CFR Sec 219.3 defines "suitability" as: The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses forgone. A unit of land may be

### FOREST GUARDIANS



October 14, 1997

RE: The Windmill Allotment / Morrison Lake, Peaks and Seiders Ranger Districts, Coconino National Forest

To District Ranger:

Forest Guardians is interested in your planning efforts for the Windmill Range Allotment. We have numerous general concerns and a few specific concerns as well. We reserve the right to submit more specific comments at a later date. However, the following will address our primary concerns, which is that livestock grazing in this area will continue to damage the biotic integrity and water quality of the area.

#### Suitability Concerns

We believe that no term permits should be reissued until you conduct a thorough analysis of the areas' suitability for grazing as defined in your regulations.

The full text of 36 C.F.R. Sec. 219.20 reads:

In forest planning, the suitability and potential capability of National Forest System lands for producing forage for grazing animals and for providing habitat for management indicator species shall be determined as provided in paragraphs (a) and (b) of this section. Lands so identified shall be managed in accordance with direction established in forest plans.

(a) Lands suitable for grazing shall be identified and their condition and trend shall be determined. The present and potential supply of forage for livestock, wild and free-roaming horses and burros, and the capability of these lands to produce suitable food and cover for selected wildlife species shall be estimated. The use of forage by grazing and browsing animals will be estimated. Lands in less than satisfactory condition shall be identified and appropriate action planned for their restoration.

(b) Alternative range management prescriptions shall consider grazing systems and the facilities necessary to implement them; land treatment and vegetation manipulation practices; and evaluation of pest problems, possible conflict or beneficial interactions among livestock, wild free-roaming horses and burros and wild animal populations, and methods of regulation these; direction for rehabilitation of ranges in unsatisfactory condition, and comparative cost efficiency of the prescriptions.

36 CFR Sec 219.3 defines "suitability" as:

The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses forgone. A unit of land may be suitable for a variety of individual or combined management practices.

We believe that an analysis of "the economic and environmental consequences of the alternative uses forgone" must be conducted to

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suitable for a variety of individual or combined management practices. We believe that an analysis of "economic and environmental consequences of the alternative uses forgone" must be conducted to determine if commercial livestock production is even appropriate in these areas. This analysis must take into account the impacts on federally listed and Forest Service sensitive species, water quality, recreation, fishing and hunting and other public values that will

*undoubtedly be impacted if you decide to reissue term grazing permits for this area."*

The 1997 USDA Forest Service-Region 3 Rangeland Analysis and Management Handbook explains that suitability determinations are to be made at a broad programmatic level in Forest Plans.

A letter from the Washington Office of the Forest Service on April 25, 1997 explains suitability the best and it reads as follows: Regional Offices have requested clarification of requirements for determining capability and suitability of lands for domestic livestock grazing in land resource management planning, especially plan revision. To promote consistent understanding of the statutes and regulations, we are removing inconsistent direction found in FSM 2210.5, FSM 2211, FSM 2212.11, and FSH 2209.14 from the directives system. The National Forest Management Act requires the identification of the suitability of lands for resource management (16 USC 1604(g)(2)(A)). The capability and suitability of lands for domestic livestock grazing is determined at the land and resource management planning level. However, it is not necessary or desirable to identify in the land and resource management plan the capability or suitability of lands for domestic livestock grazing on a site-specific basis. Land and resource management plan management prescriptions and associated standards and guidelines are derived, in part, from the criteria used in capability and suitability determinations. These management prescriptions and standards and guidelines are applied as part of the environmental analysis when determining whether to authorize domestic livestock grazing on a specific site. Rangelands identified as capable and suitable for domestic livestock grazing in the land and resource management plan may include areas that are not appropriate

determine if commercial livestock production is even appropriate in these areas. This analysis must take into account the impacts on federally listed and Forest Service sensitive species, water quality, recreation, fishing and hunting and other public values that will undoubtedly be impacted if you decide to reissue term grazing permits for this area.

#### Endangered Species Act and Viability Concerns

We are concerned that the project is not consistent with the Mexican spotted owl recovery plan which specifically calls for riparian and upland protection on all allotments in the Region. This new guidance is completely ignored and thus permits are not consistent with new Forest Plan direction.

We believe the Environmental Impact Statement also fails to comply with your mandate to ensure the biological viability of wildlife species throughout the planning region. The Forest Service must identify and protect all potential habitat for the Southwest Willow Flycatcher. The proposed grazing plan must create a five (5) mile buffer during the Southwest Willow Flycatcher nesting season to deter cowbird parasitism.

NPMA directs the Secretary of Agriculture to issue plans that will "provide for diversity of plant and animal communities...in order to meet overall multiple-use objectives..." (16 U.S.C. 1604(g)(1)(B)). To insure viability, habitat must be provided to support at least a minimum number of reproductive individuals. This duty requires "requires planning for the entire biological community - not for one species alone. See *Seattle Audubon Society v. Moseley*, 798 F. Supp. 1484, 1489 (W.D. Wash. 1992). As we have stated in other documents, we believe that no site-specific project should go forward until the Region has ensured the Region-wide biological viability of sensitive riparian obligate species is ensured. Watershed degradation as a result of this action could unquestionably lead to a loss of biological viability of numerous species.

#### Clean Water Act Concerns

The decision to approve the permit in question also must also comply with the Clean Water Act by addressing point source water pollution issues at the allotment area and by seeking and obtaining certification from the Arizona Department of Environmental Quality under section 401.

Section 401(a)(1) of the Clean Water Act, 33 U.S.C. 1341(a)(1), provides, in pertinent part: "Any applicant for a Federal license or permit to conduct any activity...which may result in any discharge into the navigable water, shall provide the licensing or permitting agency a certification from the State...that any such discharge will comply with the CWA. No license or permit shall be granted until the certification required by this section has been obtained..."

Although the Clean Water Act refers to discharges into "navigable waters", this term is defined to encompass all "waters of the United States". This phrase has been construed to include virtually all surface waters and has nothing to do with traditional concepts of navigability. Even "normally

for domestic livestock grazing when analyzed at the site-specific level, such as some wetlands or some campgrounds. Therefore, the appropriate site-specific decision would be not to allow grazing on those specific areas. On the other hand, in some situations domestic livestock need not be prohibited from areas not identified in the plan as capable and suitable. For example, a forested area with insufficient forage to support domestic livestock may not be identified as capable and suitable but the presence of domestic livestock drifting from an adjacent suitable area may not conflict with other uses. In this situation, it would

not be necessary to physically prevent access to the forested area by domestic livestock but there would be no forage allocation made.

*"We are concerned that the project is not consistent with the Mexican spotted owl recovery plan which specifically calls for riparian and upland protection on all allotments in the Region. The new guidance is completely ignored and thus permits are not consistent with new Forest Plan direction."*

We believe that implementation of any of the alternatives besides Alternative C in the DEIS will substantially protect more riparian habitat than current management and result in net improvements in upland conditions. We have consulted with the USFWS and they have concurred with our finding of "may affect, not likely to adversely affect the Mexican spotted owl". The Effects of Alternative on Plant Vigor and Reproductive Health Related to Plant Utilization section, Riparian section and the Wildlife section of the FEIS address specifics for this species and riparian and upland conditions. Some further explanations were added to the Forage Utilization section and a new Cryptogamic soil section has been added to the FEIS. In addition, our monitoring program meets the specified monitoring in the Coconino National Forest Plan as updated by Amendment 11, which focused on Mexican spotted owl and northern goshawks and has also been reviewed by the USFWS (USDI Fish and Wildlife Service 1997).

*"We believe the Environmental Impact Statement also falls to comply with your mandate to ensure the biological viability of wildlife species throughout the planning region. The Forest Service must identify and protect all potential habitat for the Southwest Willow Flycatcher. The proposed grazing plan must create a*

dry arroyos" have been held to fall within the scope of Clean Water Act regulation. Continued livestock grazing in the permit area will continue to result in point source water pollution through soil erosion channeled through gullies and wastes emitted directly into perennial and ephemeral tributaries. Further ground trampling in shaded areas, easily accessible areas and around water developments, leads to compaction, decreased infiltration, which in turn lead to increased runoff.

Ultimately, compacted soils lead to increased upland erosion, erosion of ephemeral and perennial stream banks, decreased bank stability, increased sedimentation and degradation of the hydrologic cycle.

The Forest Service must seek and obtain certification from the State of Arizona under section 401 of the Clean Water Act before granting a permit to extend grazing on the affected allotment and before permitting water developments which concentrate grazing in or near riparian, wetland, or other ecologically sensitive water resource areas.

#### Cryptogamic Soils

An additional concern is that the EIS makes no mention of the existence of or critical role of cryptogamic soils, especially in the piñon/juniper woodland ecosystem type. It is completely inexcusable for any analysis of livestock grazing within this ecosystem type to ignore the critical role cryptogams play in maintaining hydrologically functioning watersheds. Rather than go through all the literature, I recommend reviewing the recent Forest Service General Technical Report, "Terrestrial Cryptogams of Piñon-Juniper Woodlands in the Southwestern United States: A Review." This review concludes that cryptogams are vital to maintaining watershed health and that livestock grazing out and has had devastating effects on the cryptogamic soil crusts. I urge you to include the current status of cryptogamic soils on these allotments.

In conclusion, we believe that no term permits should be renewed at this time, and that protection of the critical area that continues to be degraded by livestock grazing needs further consideration. Commercial livestock production in this area is an outrageous abuse of public land that deprives citizens of the healthy public land we deserve - and does so at significant taxpayer expense. Consider the cost of habitat destruction and the high price of loss of endangered species when pursuing the Windmill Range Allotment. This seems the greatest cost of all, and one that we all will suffer.

If you have any questions or concerns about my comments, please do not hesitate to contact me. I look forward to your decision.

Sincerely,

*Dick Cameron*

Dick Cameron

*five (5) mile buffer during the Southwest Willow Flycatcher nesting season to deter cowbird parasitism."*

Potential SWWF habitat within the Windmill Allotment is not grazed. There are a number of actions that can be taken to deter cowbird parasitism. The Forest will take one or more of the following actions should suitable habitat become occupied during the life of this permit: remove cattle from the effected flycatcher radius during the breeding season (currently a 5-mile radius) or trap cowbirds during this

same time period and consult with the USFWS. This applies to all alternatives, except the no action, Alternative B. The Wildlife section of the FEIS addresses specifics for this species.

*"NFMA directs the Secretary of Agriculture to issue plans that will "provide for diversity of plant and animal communities...In order to meet overall multiple-use objectives..." 16 USC 1604(g)(3)(B). To insure viability, habitat must be provided to support at least minimum number of reproductive individuals. This duty requires "requires planning for the entire biological community - not for one species alone. Seattle Audubon Society V. Moseley, 798 F. Supp. 1484, 1489 (W.D. Walsh, 1992). As we have stated in other documents, we believe that no site-specific project should go forward until the Region has ensured the Region-wide biological viability of sensitive riparian obligate species is ensured. Watershed degradation as a result of this action could unquestionably lead to a loss of biological viability of numerous species."*

Sensitive species effects are explained within the Wildlife section of the FEIS. A biological assessment for each of the sensitive species is in the project record. The Region 3 Regional Office is conducting population viability analysis. To be consistent with the National Forest Management Act, it is appropriate for the level of analysis to be conducted at Forest Plan not site specific level. With the mitigation and monitoring proposed, we and the USFWS do not believe the preferred alternative will jeopardize the viability of rare species in the interim.

*"The decision to approve the permit in question also must also comply with the Clean Water Act by addressing point source water pollution issues in the allotment area and by seeking and obtaining certification from the Arizona Department of Environmental Quality under section 401. Section 401(a)(1) of the Clean Water Act, 33 USC 1341(a)1, provides, in pertinent part: "Any applicant for a Federal license or permit to conduct any activity...which may result in any discharge into the navigable water, shall provide the licensing or permitting agency a certification form the State...that any such discharge will comply with the CWA...No license or permit shall be granted until the certification required by this section has been obtained..." Although the Clean Water Act refers to discharges into "navigable waters" this term is defined to encompass all "waters of the United States". This phrase has been construed to include virtually all surface waters and has nothing to do with traditional concepts of navigability. Even "normally dry arroyos" have been held to fall within the scope of Clean Water Act regulation. Continued livestock grazing in the*

*permit area will continue to result in point source water pollution through soil erosion channeled through gullies and wastes emitted directly into perennial and ephemeral tributaries. Further ground trampling in shaded areas, easily accessible areas and around water developments, leads to compaction, decreased infiltration, which in turn lead to increased runoff. Ultimately, compacted soils lead to increased upland erosion, erosion of ephemeral and perennial stream banks, decreased bank stability, increased sedimentation and degradation of the hydrologic cycle. The Forest Service must seek and obtain certification from the State of Arizona under section 401 of the Clean Water Act before granting a permit to extend grazing on the affected allotment and before permitting water developments which concentrate grazing in or near riparian, wetland, or other ecologically sensitive water resource areas."*

To respond to the objectives defined by Congress in the Federal Water Pollution Control Act and by the State of Arizona as defined in the Arizona Environmental Quality Act (1986), the Forest Service and the State of Arizona have entered into an intergovernmental agreement. As a result, the Forest Service agrees to develop and use Best Management Practices (BMP) for each project or plan. The BMP's are designed to limit nonpoint source pollution from activities, such as livestock grazing and building of structural range improvements like fences, tank construction, and pipelines.

The allotment management plan (AMP) that will result from Alternative F in the Windmill Draft FEIS is the basis for water quality certification. The management plan is designed to comply with State Water Quality Standards by prescribing management practices that will improve or maintain soil condition, stream channel condition, and riparian condition, and will consequently maintain or improve water quality benefits of waters located within the allotment. The AMP will contain three elements necessary for water quality certification:

1. Non attainment waters and unique waters potentially effected by the activity have been identified.
2. Management Practices or BMP's have been designed to comply with water quality standards.
3. Monitoring is planned that will evaluate and demonstrate the effectiveness of management practices.

Following a decision for the future management of the Windmill Allotment, a request for water quality

certification will be made to the Arizona Department of Environmental Quality.

*"An additional concern is that the EIS makes no mention of the existence of or critical role of cryptogamic soils, especially in the pinyon-juniper woodland ecosystem type. It is completely inexcusable for any analysis of livestock grazing within this ecosystem type to ignore the critical role cryptogams play in maintaining hydrologically functioning watersheds. Rather than go through all the literature, I recommend reviewing the recent Forest Service General Technical Report, "Terrestrial Cryptogams of pinyon-juniper Woodlands in the Southwestern United States: A Review." This review concludes that cryptogams are vital to maintaining watershed health and that livestock grazing can and has had devastating effects on the cryptogamic soil crusts. I urge you to include the current status of cryptogamic soils on these allotments."*

We did consider cryptogamic soils in our analysis but these soils never came up as a public issue until this letter. We believe the range of alternatives with different cattle numbers and management intensities address these concerns. However, we did add a new section to the FEIS as follows:

Cryptogamic soils occur below the Mogollon Rim in sandstone and limestone soils within the pinyon-juniper woodland, transition, and desert grassland communities on this allotment. Approximately 24% of these soil types will not be grazed in any of alternatives. Of the approximate 76% cryptogamic soil types remaining, grazing will have an effect on these soils through hoof action from cattle. Alternative B will have the least effect because cattle will only graze on State Trust Lands. The rest of the alternatives are ranked from least to most effect as follows: D, G, (A, C, F). This ranking was made by the number of cattle permitted in each alternative.

Cryptogamic soils are typically found in low forage production areas. Cattle impacts are lower in these areas because cattle are more attracted to higher forage productive sites. Trailing and gathering cattle through cryptogamic soil areas may have an effect on these soils but even this activity is limited on these low forage production sites.



## United States Environmental Protection Agency • 10-15-97

*"While we support the overall goals of the proposed allotment management plan, we are concerned with the minimum focus of preferred Alternative F on the grazing capacity and poor/declining range conditions in parts of the Munds Pocket and Foxboro herd range. The EIS clearly indicates conditions in these areas are in poor to fair condition which are static or declining (pg. 37-38). While we recognize heavy elk use contributes to the problem, we recommend a strong written commitment in the FEIS to complete the proposed forage production survey (pg.) for these areas and adjust the cattle stocking levels based upon the results of this study. We note that results of the forage production survey could also be used by the Arizona Game and Fish Department to ensure proper management of the elk population. Furthermore, we urge reconsideration of Alternative G or a modification of preferred Alternative F to address critical resource needs in the Munds Pocket and Foxboro herd range."*

There are other ways to address the capacity issue and poor/declining range conditions besides just reducing cattle and/or elk numbers. Alternative F does address grazing capacity and poor/declining range condition by an increase in management intensity. Capacity issues generated considerable discussions during development of the alternatives. The alternatives address these issues specifically in the Alternative Description sections of the FEIS. However, reducing livestock numbers is not the only answer to these problems. We believe length of graze and length of rest, are also important factors in grazing management. But, all of these options occur in various degrees in the present range of



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION IX  
75 Hawthorne Street  
San Francisco, CA 94105

October 15, 1997

Bruce Greco  
District Ranger  
Attn: Mike Hanneman  
Mormon Lake Ranger District  
Coconino National Forest  
4373 S. Lake Mary Road  
Flagstaff, AZ 86001

Dear Mr. Greco:

The Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (FEIS) for the project entitled **Windmill Allotment, Mormon Lake, Peaks and Sedona Ranger Districts, Coconino National Forest, AZ**. Our review is pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

The Forest Service proposes to implement a revised grazing management plan for the Windmill Allotment to address meadows and riparian areas that are in poor condition; management of threatened, endangered and sensitive species; administrative inefficiencies (one allotment plan versus three); fragmentation; and livestock/elk conflicts. Six alternatives are evaluated in detail: Alternative A would maintain existing stocking levels (1252-1257 livestock), increase active herd management, decrease grazing periods, and increase grazing rotations and number of pastures. Alternative B, the no action alternative, would discontinue grazing for the next 10 years. Alternative C would continue the existing management system. Alternative D responds to grazing capacity and proper use guideline issues and would significantly reduce the existing stocking level to 635 livestock. Alternative F responds to grazing capacity issues in the Foxboro summer range and watershed issues in Mill Park winter range. This alternative would be the same as Alternative A with additional adjustments to the Luke Mountain pasture to reduce grazing periods on several other sensitive pastures. Alternative G responds to grazing capacity and poor/declining range conditions in parts of the Munds Pocket and Foxboro herd range. This alternative would reduce the stocking level to 1090 - 1125 livestock, adjust additional grazing periods and create additional pastures. All action alternatives (A, D, F, G) include range improvements such as meadow enhancement; road closures; exclusion of cattle from Oak Creek, Sycamore Creek, Verde River, and riparian springs; and structural improvements such as fencing, pipelines, stock tanks and cattleguards. The Forest Service's preferred alternative is Alternative F.

alternatives. The information used in this analysis included old and new production-utilization studies, TES, tree stand database, and professional opinions from USFS, AGFD, and the permittees. We are committed to do further capacity studies in these areas of concern .

*"We also recommend the FEIS include specific information on water quality monitoring and enforcement*

*measures to ensure full compliance with the proposed allotment management plan. Fall back options in case adequate funding and resources are not obtained should be suggested to ensure full implementation if monitoring indicates continuing decline of rangeland conditions."*

The BMP's and Table 18 have been updated to include this information. Further information on fixed station locations is available in the 1996 Arizona Department of Environmental Quality's "Arizona Water Quality Assessment".

Several Fixed Station, BioCriteria Program, and other water quality monitoring sites are located within or near the allotment. These sites have and are being used to track long-term conditions and trends at critical points in a watershed and to develop biological criteria for stream segments. Information from these sites will be considered in evaluating the effectiveness of management practices, but may be of limited value considering the multitude of influences affecting each monitoring site. Monitoring of plant abundance, ground cover, species diversity and estimates of overall soil condition will indicate whether or not management practices are effectively meeting water quality goals.

The monitoring plan in the DEIS is the minimum that the Forest Service, permittee and others are committed to do for the next 10 years. The fall back option for inadequate funding and resources beyond the scope of this decision will require at least a Supplement to the FEIS and a partial or completely new decision.

*"The DEIS describes by alternative the number of pastures where estimated forage use exceeds 50% of estimated production, the general rule of thumb in*

EPA commends the Forest Service and permittee for their commitment to increased livestock management to address poor conditions in riparian areas and meadows; threatened, endangered, and sensitive species; and cattle/elk conflicts. We especially applaud the commitment to exclude cattle from sensitive aquatic, riparian, and endangered species habitat. We fully support attempts to provide for more even livestock distribution, use of rest/rotation, and reduced grazing periods. We recognize the need to balance resource improvements with the economic viability of the livestock operation. Achieving the correct balance can be difficult. Thus, we urge a conservative approach and use of adaptive management and monitoring to ensure natural resource improvements are being realized. To support these efforts and the improvement of range resources it is critical that the Forest Service allocate adequate resources (staffing and funds) to ensure commitments are fully met. We note and support the monitoring and adaptive management measures described on pages 31-32. Where riparian and sensitive habitat resources are in very poor condition as a result of grazing practices, we urge further consideration of no use agreements for specific pastures and a reduction of permitted livestock.

While we support the overall goals of the proposed allotment management plan, we are concerned with the minimum focus of preferred Alternative F on the grazing capacity and poor/declining range conditions in parts of the Munds Pocket and Foxboro herd range. The EIS clearly indicates conditions in these areas are in poor to fair condition which are static or declining (pgs. 37-38). While we recognize heavy elk use contributes to the problem, we recommend a strong written commitment in the FEIS to complete the proposed forage production survey (pg. 7) for these areas and adjust the cattle stocking levels based upon the results of this study. We note that results of the forage production survey could also be used by the Arizona Game and Fish Department to ensure proper management of the elk population. Furthermore, we urge reconsideration of Alternative G or a modification of preferred Alternative F to address critical resource needs in the Munds Pocket and Foxboro herd range.

We also recommend the FEIS include specific information on water quality monitoring and enforcement measures to ensure full compliance with the proposed allotment management plan. Fall back options in case adequate funding and resources are not obtained should be suggested to ensure full implementation if monitoring indicates continuing decline of rangeland conditions.

Because of the above concerns, we have classified this DEIS as category EC-2, Environmental Concerns - Insufficient Information (see attached "Summary of the EPA Rating System"). Additional detailed comments are enclosed. We appreciate the opportunity to review this DEIS. Please send two copies of the Final EIS to this office at the same time it is officially filed with our Washington, D.C. office. If you have

*range management for assuring adequate plant vigor and reproduction. We note that the preferred Alternative F would result in exceeding the 50% utilization rule in 13 out of 76 pastures, while Alternative G would result in only 1 out of 77 pastures (pg. 53). We urge modification of preferred Alternative F to reduce this exceedance level or consideration of Alternative G as the preferred alternative."*

The values were taken from a spreadsheet that was intended to be used as an indicator of potential problems and the values were never meant to indicate


the actual amount of forage use or production. We have made a commitment to analyze capacity in the Munds Pocket area no matter which alternative is selected.

*"Preferred Alternative F allows grazing within potential endangered Southwestern willow flycatcher habitat 2 years out of 6 to provide management flexibility for yearlong rest periods in the desert pastures (pg. 11). While we fully support yearlong rest for sensitive desert pastures, we remain concerned with the proposed grazing in potential habitat for an endangered species which is susceptible to parasitism by cowbirds attracted to cattle. Thus, we encourage reconsideration of management options, emphasis on short grazing periods during the nonbreeding or outer limits of the breeding season, and continued collaboration with the US Fish and Wildlife Service on willow flycatcher recovery efforts. The FEIS should describe the specific monitoring actions which will be conducted to ensure the proposed grazing has no adverse effect on the Southwestern willow flycatcher. We acknowledge and support the Forest Service's commitment to exclusion of cattle in critical willow flycatcher habitat, a cowbird trapping program, and collaboration with willow flycatcher conservation efforts."*

We have clarified and changed the Wildlife section of the DEIS in response to the Biological Opinion from the USFWS. We have now committed to either stay out of the SWF flycatcher radius in occupied sites during the breeding season (currently a 5-mile radius) or trap cowbirds and reinstate consultation with the USFWS.

*"The DEIS states that the Forest Service (Region 3) and Arizona Department of Environmental Quality (ADEQ) have entered into a Nonpoint Source Intergovernmental*

questions, please call me at (415) 744-1584, or invite your staff to call Ms. Laura Fujii of my staff at (415) 744-1601.

Sincerely,  
  
David J. Farrell, Chief  
Federal Activities Office

Enclosure: (2 pages)

Filename: windmill.dei  
M1002930

cc: US Fish and Wildlife Service  
AZ Game and Fish Dept.  
AZ DEQ  
AZ Cattlegrowers Association

[EPA DEIS COMMENTS\\_AFS\\_WINDMILL ALLOTMENT\\_COCONINO\\_NF\\_OCT\\_1997\\_002930](#)

#### COMMENTS

##### Alternatives

1. The DEIS describes by alternative the number of pastures where estimated forage use exceeds 50% of estimated production, the general rule of thumb in range management for assuring adequate plant vigor and reproduction. We note that the preferred Alternative F would result in exceedance of the 50% utilization rule in 13 out of 76 pastures, while Alternative G would result in only 1 out of 77 pastures (pg. 53). We urge modification of preferred Alternative F to reduce this exceedance level or consideration of Alternative G as the preferred alternative.

2. Preferred Alternative F allows grazing within potential endangered Southwestern willow flycatcher habitat 2 years out of 6 to provide management flexibility for yearlong rest periods in the desert pastures (pg. 11). While we fully support yearlong rest for sensitive desert pastures, we remain concerned with the proposed grazing in potential habitat for an endangered species which is susceptible to parasitism by cowbirds attracted to cattle. Thus, we encourage reconsideration of management options, emphasis on short grazing periods during the nonbreeding or outer limits of the breeding season, and continued collaboration with the US Fish and Wildlife Service on willow flycatcher recovery efforts. The FEIS should describe the specific monitoring actions which will be conducted to ensure the proposed grazing has no adverse effect on the Southwestern willow flycatcher. We acknowledge and support the Forest Service's commitment to exclusion of cattle in critical willow flycatcher habitat, a cowbird trapping program, and collaboration with willow flycatcher conservation efforts.

*Agreement whereby the Forest Service will endeavor to minimize and mitigate all potential nonpoint source pollution activities (pg. 54). The Forest Service will focus on development and implementation of preventative or mitigating land management practices, generally referred to as Best Management Practices (BMP's) or Guidance Practices (GP's Arizona Terminology). It is EPA's position that implementation and compliance with BMP's and GP's do not, of themselves, ensure compliance with Water Quality Standards and maintenance of beneficial uses. Implementation, effectiveness,*

validation, and trend monitoring is critical in ensuring BMP's and GP's are controlling nonpoint source pollution and demonstrating full compliance with the Clean Water Act. The FEIS should provide specific information on water quality monitoring activities (e.g., turbidity, arsenic) which will be conducted by either the Forest Service or ADEQ to ensure BMP's and GP's are adequate."

We have revised the monitoring section to more clearly describe planned implementation, effectiveness, and trend monitoring of management practices prescribed for the Windmill Allotment. We have also included fixed station and other monitoring information in Table 18. Implementation monitoring will be conducted throughout the 10-year period by evaluating compliance with the terms and conditions of the grazing permit. This monitoring will assess whether the grazing activity is carried out as planned. Effectiveness monitoring will focus on evaluating the effects of livestock grazing management practices on soil condition, and whether these practices have the desired effect of controlling nonpoint source pollution. Given the location of management practice implementation relative to fixed station water quality monitoring sites and the variety of land uses within the watershed areas, it is doubtful that a relationship between project activity and measurements of turbidity, arsenic, etc. at fixed stations can be established.

*"The DEIS clearly states that other management issues are of importance within the Windmill Allotment. For instance, there is heavy recreational use, active timber management, and road closures (pg. 3). The DEIS also states that the Windmill Allotment will serve as a guide for analysis of these other non-grazing management actions (pg. 3). We urge caution in relying heavily or exclusively upon the present grazing and allotment*

#### Water Resources

1. The DEIS states that the Forest Service (Region 3) and Arizona Department of Environmental Quality (ADEQ) have entered into a Nonpoint Source Intergovernmental Agreement whereby the Forest Service will endeavor to minimize and mitigate all potential nonpoint source pollution activities (pg. 54). The Forest Service will focus on development and implementation of preventative or mitigating land management practices, generally referred to as Best Management Practices (BMPs) or Guidance Practices (GPs, Arizona terminology). It is EPA's position that implementation and compliance with BMPs and GPs do not, of themselves, ensure compliance with Water Quality Standards and maintenance of beneficial uses. Implementation, effectiveness, validation, and trend monitoring is critical in ensuring BMPs and GPs are controlling nonpoint source pollution and demonstrating full compliance with the Clean Water Act. The FEIS should provide specific information on water quality monitoring activities (e.g., turbidity, arsenic) which will be conducted by either the Forest Service or ADEQ to ensure BMPs and GPs are adequate.

2. As stated on page 61, EPA supports the Watershed Demonstration Project which includes the Oak Creek Watershed, a state-designated Unique Water (pg. 62). We encourage use of an inclusive process such as the comprehensive resource management process to ensure all stakeholders are involved in watershed management and BMP development discussions.

#### National Environmental Policy Act (NEPA)

The DEIS clearly states that other management issues are of importance within the Windmill Allotment. For instance, there is heavy recreational use, active timber management, and road closures (pg. 3). The DEIS also states that the Windmill Allotment will serve as a guide for analysis of these other non-grazing management actions (pg. 3). We urge caution in relying heavily or exclusively upon the present grazing and allotment management EIS to ensure full compliance with the requirements of NEPA. The present EIS can and should be referenced, utilized for information, and considered in cumulative impact analysis evaluations. However, nonallotment management actions, such as timber sales, are clearly separate Federal actions which should be evaluated in their own, versus tiered, NEPA documents.

*management EIS to ensure full compliance with the requirements of NEPA. The present EIS can and should be referenced, utilized for information, and considered in cumulative impact analysis evaluations. However, nonallotment management actions, such as timber sales, are clearly separate Federal actions which should be evaluated in their own, versus tiered, NEPA documents."*

This is the way we understand our NEPA regulations also.

**United States Department of the Interior • 10-21-97**

*"The Department of the Interior has reviewed the Draft Environmental Impact Statement (EIS) for the Windmill Range Allotment, Coconino National Forest, Coconino and Yavapai Counties, Arizona, and has no comments to offer. Thank you for the opportunity to comment on this document."*

Thank you for looking over the document.



**United States Department of the Interior**

OFFICE OF THE SECRETARY  
Office of Environmental Policy and Compliance  
600 Harrison Street, Suite 515  
San Francisco, California 94107-1576

October 21, 1997

ER 97/492

Mr. Fred Trevey, Forest Supervisor  
Coconino National Forest  
2323 E. Greenlaw Lane  
Flagstaff, AZ 86004

Dear Mr. Trevey:

The Department of the Interior has reviewed the Draft Environmental Impact Statement (EIS) for the Windmill Range Allotment, Coconino National Forest, Coconino and Yavapai Counties, Arizona, and has no comments to offer.

Thank you for the opportunity to comment on this document.

Sincerely,

A handwritten signature in cursive script that reads "Patricia Sanderson Port".  
Patricia Sanderson Port  
Regional Environmental Officer

cc Director, OEPC (w/orig incoming)  
Regional Director, FWS, Portland

## Arizona Game and Fish Department • 10-24-97

*"Questions about the grazing capacity of the land were raised throughout the planning process. The core group conducting the comprehensive analysis for the allotment attempted to develop innovative ways to answer these questions about capacity. The planning process raised additional questions which remained unresolved at the conclusion of the process, such as the extent to which use by cattle and elk currently exceeds capacity on parts of the allotment."*

The range of alternatives covers this "unresolved" capacity concern by varying the numbers of livestock in several of the alternatives as well as time of livestock grazing and length of rest periods. Further, each alternative calls for additional production studies within the first 5 years of implementation in the Munds Pocket area to insure grazing capacity has been set at the appropriate level. If the evaluation of the monitoring results indicates a need for change, we will proceed to modify the AMP and if a great change is indicated, we may have to revisit our environmental analysis.

*"The expected utilization in sensitive areas presented in Table 17 (page 53) shows expected use for all livestock grazing alternatives to be well above acceptable levels. Given present conditions on the allotment, these expectations are disconcerting because unacceptable levels of utilization are inconsistent with the general goals and desired future conditions identified in the Draft EIS. In Table 17, the expected utilization levels are the same for all livestock grazing alternatives. We disagree with the assumption that utilization would remain the same under alternatives A, C, D, F, and G. The Department believes that changes in livestock stocking levels can result in different utilization levels and changes in*



### GAME & FISH DEPARTMENT

2221 West Greenway Road, Phoenix, Arizona 85023-4199 (602) 942-7888

Chairman, Michael M. Longoria, Flagstaff  
Michael M. Longoria, Flagstaff  
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Michael M. Longoria, Flagstaff

Director, Thomas W. Bradley  
Thomas W. Bradley  
Thomas W. Bradley  
Thomas W. Bradley

October 24, 1997

Mr. Fred Trevey, Forest Supervisor  
Coconino National Forest  
2323 E. Greenlaw Lane  
Flagstaff, Arizona 86004

Re: Draft Environmental Impact Statement (EIS) for the Windmill Allotment

Dear Mr. Trevey:

The Arizona Game and Fish Department (Department) has been involved in the Windmill Allotment planning process from its inception, and we appreciate being given that opportunity. The Department has reviewed the Draft EIS for the Windmill Range Allotment and the following comments are provided for your consideration in preparing a Final EIS.

The descriptions of existing conditions on pages 1 and 2 of the Draft EIS identify areas of the allotment which are in very poor, poor, and fair condition. Many of these areas exhibit either declining or static trends in condition. Documentation of these conditions is repeated throughout the Draft EIS.

Questions about the grazing capacity of the land were raised throughout the planning process. The core group conducting the comprehensive analysis for the allotment attempted to develop innovative ways to answer these questions about capacity. The planning process raised additional questions which remained unresolved at the conclusion of the process, such as the extent to which use by cattle and elk currently exceeds capacity on parts of the allotment.

The expected utilization in sensitive areas presented in Table 17 (page 53) shows expected use for all livestock grazing alternatives to be well above acceptable levels. Given present conditions on the allotment, these expectations are disconcerting because unacceptable levels of utilization are inconsistent with the general goals and desired future conditions identified in the Draft EIS. In Table 17, the expected utilization levels are the same for all livestock grazing alternatives. We disagree with the assumption that utilization would remain the same under alternatives A, C, D, F and G. The Department believes that changes in livestock stocking levels can result in different utilization levels and changes in range condition. Other sections of the Draft EIS also suggest that this is the case.

An Equal Opportunity Reasonable Accommodations Agency

*range condition. Other sections of the Draft EIS also suggest that this is the case."*

The utilization levels in Table 17 are only expectations, however, both the Forest Service and the AGFD have Windmill Allotment and other area data showing this high grazing use in these sensitive sites. The utilization levels in these sensitive areas vary little by alternative because these sensitive areas are so attractive to both cattle and elk. Reducing cattle

numbers primarily affects the amount of use you get in areas that are less attractive to the cattle and does little to reduce use in these attractive sensitive areas. However, the alternatives do reduce use in many of these sensitive areas by excluding them from grazing and makes an effort to move the remainder of these areas toward the goals set in this document by reducing graze periods and increasing rest periods.

*"In reviewing the Draft EIS, the Department concentrated on the question of whether the Alternatives would meet the goals proposed on pages 2, 5, and 6. The methods of meeting the goals described in the Draft EIS may not be enough to change negative trends into the positive trends that all parties want to achieve for the benefit of the land, the ranch and wildlife resources. It is worth noting that the only riparian areas on the allotment with improving trends at this time, are those below the rim where elk use is less and from which wildlife have been excluded."*

This could be true but through adaptive management, we have the ability to make adjustments during the implementation period if necessary to meet these goals.

*"The Proposed Action (Alternative A) depends on changes in timing of grazing, the creation of new pastures and altering water sources to improve range condition while maintaining current cattle numbers. The fatal flaw in the dependence on time management to resolve poor conditions on parts of this allotment is that time management requires managing the time of rest for the forage plants. With significant numbers of wild grazing animals in the system, this is impossible to accomplish. Therefore, time management can not accomplish the goals of the Draft EIS."*

Mr. Fred Trevey  
October 24, 1997  
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In reviewing the Draft EIS, the Department concentrated on the question of whether the Alternatives would meet the goals proposed on pages 2, 5 and 6. The methods of meeting the goals described in the Draft EIS may not be enough to change negative trends into the positive trends that all parties want to achieve for the benefit of the land, the ranch and wildlife resources. It is worth noting that the only riparian areas on the allotment with improving trends at this time, are those below the rim where elk use is less and from which livestock have been excluded.

The Proposed Action (Alternative A) depends on changes in timing of grazing, the creation of new pastures and altering water sources to improve range condition while maintaining current cattle numbers. The fatal flaw in the dependence on time management to resolve poor conditions on parts of this allotment is that time management requires managing the time of rest for the forage plants. With significant numbers of wild grazing animals in the system, this is impossible to accomplish. Therefore, time management can not accomplish the goals of the Draft EIS.

To improve range condition under the Proposed Action, future Forest Service funding must be adequate to permit the Forest Service to meet their obligations. The Draft EIS calls for the Forest Service to assume monitoring and maintenance responsibilities. The Department is concerned that Forest Service funding and staffing are currently being cut to levels that will make it difficult for the Forest Service to visit the ranch on a regular basis, much less to accept new responsibilities for maintenance and monitoring.

The rainfall and snowfall in this part of Arizona is unpredictable and dry years have consistently outnumbered wet years. Given this uncertainty, the grazing strategy must provide an adequate margin for the growth of forage plants to often exceed their use before any improvement in range conditions can be realized. The Department does not believe that an adequate margin for growth will be provided by implementation of the Proposed Action and that continuing grazing at current levels, in the face of downward trends in vegetative conditions, will not achieve the desired conditions described in the Draft EIS. For all these reasons, the Department believes implementation of Alternative A will not meet the resource goals identified in the Draft EIS.

The Department would like to offer a modification of Alternative D that we believe will have a better chance of meeting the goals of the Draft EIS than the Forest Service's Proposed Action. This proposal includes a cut in livestock numbers to the levels in Alternative D with enough monitoring to determine when specific allotment objectives are being met. As these objectives are met and maintained, we propose that cattle numbers be increased in a step-wise fashion until all objectives are met and the cattle

This may be true, depending on the level of wildlife numbers that is set in the next Arizona State Comprehensive Plan approved by the Arizona Game and Fish Commission. However, Alternative A was an attempt to meet the goals of the allotment area with current elk populations. Alternative A attempts to eliminate cattle grazing of plant regrowth.

*"To improve range condition under the Proposed Action, future Forest Service funding must be adequate*

to permit the Forest Service to meet their obligations. The Draft EIS calls for the Forest Service to assume monitoring and maintenance responsibilities. The Department is concerned that Forest Service funding and staffing are currently being cut to levels that will make it difficult for the Forest Service to visit the ranch on a regular basis, much less to accept new responsibilities for maintenance and monitoring."

The Forest Service monitoring and maintenance responsibilities set in the DEIS are minimum requirements that we have set to continue this grazing permit. If future funding does not permit this obligation to occur, the permittee may assist in these responsibilities or other funding sources/partnerships may need to be found.

*"The rainfall and snowfall in this part of Arizona is unpredictable and dry years have consistently outnumbered wet years. Given this uncertainty, the grazing strategy must provide an adequate margin for the growth of forage plants to often exceed their use before any improvement in range conditions can be realized. The Department does not believe that an adequate margin for growth will be provided by implementation of the Proposed Action and that continuing grazing at current levels, in the face of downward trends in vegetative conditions, will not achieve the desired conditions described in the Draft EIS. For all these reasons, the Department believes implementation of Alternative A will not meet the resource goals identified in the Draft EIS"*

Grazing capacity for Alternative A has been set by past and present production-utilization studies and rangeland inspections that use low moisture years to set capacity.

Mr. Fred Trevey  
October 24, 1997  
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numbers are restored to levels identified in Alternative G. Once all objectives are achieved, we suggest an evaluation to determine if cattle numbers could be further increased to meet or exceed current numbers.

The Department recognizes that forage use by elk plays a role on this allotment. After consulting with the Forest Service, the Department has reduced elk herds on portions of this allotment. We are willing to make a special effort to work closely with the Forest Service on our management of elk in this area to help achieve the goals identified for the Windmill Allotment. It is our hope that range condition can be improved to benefit the land, the ranch, and wildlife.

If you have any questions concerning these comments, please do not hesitate to contact Rick Miller, the Department's Habitat Program Manager in Region II at (520) 774-5046.

Sincerely,



David L. Walker,  
Project Evaluation Program Supervisor  
Regional Supervisor

DLW:ra

cc: Bruce Graco, District Ranger, Mormon Lake Ranger District,  
Coconino NF  
Ken Anderson, District Ranger, Sedona Ranger District,  
Coconino NF  
✓Mike Hanneman, Range Conservationist, Mormon Lake Ranger  
District, Coconino NF  
Tom Britt, Regional Supervisor, Region II, Flagstaff

*"The Department would like to offer a modification of Alternative D that we believe will have a better chance of meeting the goals of the Draft EIS than the Forest Service's Proposed Action. This proposal includes a cut in livestock numbers to the levels in Alternative D with enough monitoring to determine when specific allotment objectives are being met. As these objectives are met and maintained, we propose that cattle numbers be increased in a step-wise fashion until all objectives are met and the cattle numbers are restored to levels identified in Alternative G. Once all objectives are achieved, we suggest an evaluation to determine if*



*cattle numbers could be further increased to meet or exceed current number."*

The Forest Supervisor has the option of selecting and implementing Alternative G as it currently stands in the DEIS. The districts' have the option to make yearly adjustments in cattle numbers at a lower level to meet management objectives (for example, to Alternative D numbers). The numbers of cattle in each

alternative are permitted maximums for the allotment. We believe the monitoring plan in the DEIS is the minimum we need to do to insure the selected alternative is achieving the goals of the allotment, with our current regulations and budget. If more money or volunteers become available for rangeland monitoring, a more intensive monitoring plan could be tiered to this plan.

## Jeff Burgess

*"To start with, in the background section of the EIS you explain that the planning group, "focused on judging where forage dietary needs and grazing use were out of balance with the lands ability to produce forage with upward trends and designing management actions to respond to problem areas." I assume this means they wanted to assess the level of forage production and adjust total ungulate numbers accordingly.*

*But then in your proposed action, Alternative A, it states that, "This alternative uses permittee and range conservationist knowledge to determine proper cattle numbers, grazing periods, grazing rotations, and pasture splits." In short you decided not to make a decision on the stocking rate.*

*Not only did you fail to make a decision about it, you didn't even analyze the issue thoroughly in the draft EIS, as is required by law. "*

Stocking rate or capacity issues generated considerable discussions during development of the alternatives. Within the Alternative Description sections of the DEIS, the alternatives address these issues specifically. The information used for forage production and total ungulate numbers in this analysis included old and new production-utilization studies, TES, tree stand database, and professional opinions from USFS, AGFD, and the permittees. Further, each alternative calls for additional production studies within the first 5 years of implementation in the Munds Pocket area to insure grazing capacity has been set at the appropriate level.

*"The most glaring omission is the lack of discussion about the ration of forage to be allocated to elk versus cattle. Why wasn't this issue addressed.*

January 14, 1998

1922 E. Orion Street  
Tempe, AZ 85283

Mr. Bruce Greco, District Ranger  
Mormon Lake Ranger District  
Coconino National Forest  
4373 S. Lake Mary Road  
Flagstaff, AZ 86001

Dear Mr. Greco,

I am writing to submit comments on your draft Environmental Impact Statement (EIS) for the Windmill grazing allotment.

When I wrote to you on 12/27/97 to complain that I had never received a copy of the draft, I did not know it had been issued in August and the official comment period had closed 10/13/97, all of which preceded my November request to be placed on your range projects mailing list. Thank you for sending me a copy of the draft so promptly and for offering me the opportunity to comment on it.

To start with, in the background section of the EIS you explain that the planning group, "focused on judging where forage dietary needs and grazing use were out of balance with the lands ability to produce forage with upward trends and designing management actions to respond to problem areas." I assume this means they wanted to assess the level of forage production and adjust total ungulate numbers accordingly.

But then in your proposed action, Alternative A, it states that, "This alternative uses permittee and range conservationist knowledge to determine proper cattle numbers, grazing periods, grazing rotations, and pasture splits." In short, you decided not to make a decision on the stocking rate.

Not only did you fail to make a decision about it, you didn't even analyze the issue thoroughly in the draft EIS, as is required by law. The most glaring omission is the lack of discussion about the ratio of forage to be allocated to elk vs. cattle. Why wasn't this issue addressed?

It is such an important issue on the adjacent Apache-Sitgreaves National Forest that a public planning group, dubbed the Ari-Pine Resource Coalition, suggested in 1993 that forage be allocated at a ratio of 70% for cattle and 30% for elk along their portion of the Mogollon Rim. I think the general public would support a 50/50 split but seeing as the historical allocation in most places has exceeded 90% for cattle, I'll support the 70/30 split as a good starting place.

Of the information which was in the EIS regarding the appropriate stocking rate, some of it is confusing. Alternative D, for instance, proposes to reduce the stocking rate

*It is such as an important issue on the adjacent Apache-Sitgreaves National Forest that a public planning group, dubbed the Ari-Pine Resource Coalition, suggested in 1993 that forage be allocated at a ratio of 70% for cattle and 30% for elk along their portion of the Mogollon Rim. I think the general public would support a 50/50 split but seeing as the historical allocation in most places has exceeded 90% for cattle, I'll support the 70/30 split as a good starting place."*

We do not believe that allocating forage to livestock, wildlife, and watersheds is the best method to maintain or improve rangelands. There are too many variables that cannot be accurately accounted for when allocating forage (i.e. pasture size, animal distribution, management intensity, forage species composition, weather, animal recruitment, animal mortality, topography, waters or pasture rest). Getting a proper value for the amount of forage available is difficult at best, and the ending value may be subjective and inaccurate. Some reasons for this are lack of predictability in how all these variables interact and lack of knowledge about some variables including weather, precipitation patterns, and animal recruitment or mortality. During the analysis of Windmill, we did estimate the effects of current numbers of livestock and wildlife (using herd size estimates provided by AGFD). In the different alternatives, we tried to improve vegetative and/or watershed conditions where needed. The methods for improvement included adjustments in livestock numbers or grazing strategies as well as structural improvements. AGFD has the opportunity to adjust elk or other wildlife use as appropriate through changes to hunting seasons or hunt structures.

Changes in vegetation or watershed condition may not be detectable over the life of the permit but by improving grazing management in the preferred alternative, we hope to change the trajectory of the current range trend and speed up the rate of change.

However, we did allocate forage by default in the DEIS. In the spreadsheet Capacity Concerns section of the FEIS we explain how we developed and used TES and stand data base information as an estimate for forage production. Then we took an estimate of elk numbers, a variety of livestock numbers, and various

to 635 head. But then on page 54 you state that, "Grazing capacity will not change under any alternative. The grazing capacity established under the current permit will be followed under all the grazing alternatives."

Does this mean you know what the allotment's total forage production is and the only thing that changes with the various management alternatives is how it will be allocated? If so, then why did you claim in the paragraphs above this statement that you really don't have a good idea of the allotment's forage production?

Also, if you really don't have a good idea of the allotment's forage production, why is that? Isn't this EIS process precisely the administrative opportunity you need to determine it?

Furthermore, there's a lot of discussion in the draft about how there was disagreement among the core planning group about forage production and utilization on the allotment. It appeared from the narrative that there were many conflicting opinions. Did they consider any facts derived from sound monitoring? It sounds like an effort to find a consensus was allowed to override the facts of the matter.

As for your proposal to leave the allotment's stocking rate, and grazing rotation, primarily in the hands of the permittee, what gives you confidence his stewardship will improve the condition of the land? According to the EIS, he's been the permittee for some time and there are resource problems on the allotment.

Furthermore, your proposed action will base forage utilization upon the time cattle are allowed to use each pasture, instead of upon the amount of forage they are utilizing. Do you have data which shows a certain amount of grazing time averages a certain amount of utilization? If so, this information should be included in the EIS. If not, you should drop your time controlled grazing scheme. I've never known them to work anywhere in Arizona anyway.

The identification of the allotment's appropriate stocking rate is a public issue and this EIS process is the appropriate place for its resolution. A good starting place, I think, are the forage utilization guidelines included in the regionwide forest plan amendments signed by your regional forester in 1996. They appear to suggest that maximum growing season forage utilization for the allotment should not exceed 35%. Does your preferred alternative comply with these guidelines?

If an ignorance about the allotment's overall forage production is the problem, then I suggest you make educated guesses using data already collected from similar local vegetative communities.

Another glaring omission in the EIS is the refusal to consider any alternative that did not maintain the current grazing permittee's "4-herd breeding program." It's likely that several effective management schemes were omitted from consideration because of this proviso. I believe NEPA requires you to consider all reasonable alternatives.

Another omission is the failure to analyze the social and economic values from a wider perspective than just the relatively minor contributions of public lands ranching. Elk hunting, for instance, is big business in Arizona.

I also want to address your riparian specific management proposals. On page 15 of the EIS you state that your preferred alternative will allow the desert riparian areas of Oak Creek, Dry Creek and Jacks Canyon to be grazed by cattle. Oak Creek will have three water gaps, which will be sacrifice areas, and Dry Creek and Jacks

proper use factors to examine capacity. Because these were rough estimates, we just used this information as guides for potential problem areas. This information is available in the project record. Elk and other wildlife use and effects by alternative are presented in the Wildlife section of the DEIS and FEIS.

*"Of the information which was in the EIS regarding the appropriate stocking rate, some of it is confusing. Alternative D, for instance, proposes to reduce the stocking rate to 635 head. But then on page 54 you state that, "Grazing capacity will not change under*

any alternative. The grazing capacity established under the current permit will be followed under all the grazing alternatives."

*Does this mean you know what the allotment's total forage production is and the only thing that changes is how it will be allocated? If so, then why did you claim in the paragraphs above this statement that you really don't have a good idea of the allotment's forage production?*

*Also, if you really don't have a good idea of the allotment's forage production, why is that? Isn't this EIS process precisely the administrative opportunity you need to determine it?"*

A new grazing capacity explanation was developed for the FEIS. We made a mistake in the DEIS when stating that all alternatives have the same grazing capacity and removed this sentence from the document. The authors of this statement felt that capacity is based on a percent of the total amount of forage production in low moisture years. This amount is a maximum value that creates a limit on the amount of grazing that can do no harm to the location's vegetation. They did not consider that capacity is not a unchangeable value and can increase or decrease depending on management goals or intensity. However, this statement in the DEIS did not change our range of alternatives or alternative affects because capacity is different for each alternative and was analyzed this way. In fact, the major difference in alternatives is capacity. The new expanded definition found in the glossary of the DEIS describes carrying capacity as the average number of livestock and/or wildlife which may be sustained on a management unit compatible with management objectives for the unit. In addition to site characteristics, it is a function of management goals and management intensity (1997 Region 3 USFS

Canyon will still be grazed during the hot season. This is unacceptable. There is no excuse for allowing cattle degrade any of them.


Above the Mogollon Rim, your preferred alternative would fence all ungulates out of three wet meadows, but fence only cattle out of Rogers Lake. Why aren't you proposing to also exclude elk from Rogers Lake? Decades of livestock abuse have degraded the wet meadows on the Rim to the point that the increasing elk populations are inhibiting their recovery. They need to be fenced from both ungulates, at least until they rebound to a threshold where they can take some use again.

I appreciate your table, beginning on page 40, wherein you identify, locate and describe all of the riparian areas on the allotment. But I suggest it would be even more useful if it included the grazing management proposed for each area.

Finally, there is much discussion in the EIS of your proposal's effect upon the federally listed threatened and endangered wildlife species found on the allotment. But it's unclear whether or not you have formally consulted with the U.S. Fish & Wildlife Service regarding your preferred alternative, as the law requires. Have you conducted Section 7 consultation for the Windmill allotment?

In conclusion, I oppose implementation of your preferred alternative for the reasons I've cited above. Of the alternatives presented in the draft EIS, the best one that would still permit livestock grazing is Alternative D.

Thank you for this opportunity to participate and please keep me updated on the status of this project, such as sending me a copy of the final EIS when it is issued. Sincerely,

  
Jeff Burgess  
ph 602-417-4314 (day)  
e-mail: jburgess@neta.com

cc: Forest Supervisor

Rangeland Handbook). The allotment's forage production issue is described in the above responses.

*"Furthermore, there's a lot of discussion in the draft about how there was disagreement among the core planning group about forage production and utilization on the allotment. It appeared from the narrative that there were many conflicting opinions. Did they consider any facts derived from sound monitoring? It sounds like an effort to find a consensus was allowed to override the facts of the matter."*

Yes, monitoring information used in this analysis included old and new production-utilization studies, TES, tree stand database, and professional opinions from USFS, AGFD, and the permittees. Several of the FEIS alternatives were developed because of the variation in opinion on production and utilization.

*"As for your proposal to leave the allotment's stocking rate, and grazing rotation, primarily in the hands of the permittee, what gives you confidence his stewardship will improve the condition of the lands? According to the EIS, he's been the permittee for some time and there are resource problems on the allotment."*

The permittee did have some say in the development of this FEIS, but they did not run this process. However, they did have the good knowledge on how the cattle and land interact from hands-on experience with this allotment over the years.

*"Furthermore, your proposed action will base forage utilization upon the time cattle are allowed to use each pasture, instead of upon the amount of forage they are utilizing. Do you have data which shows a certain amount of grazing time averages a certain amount of utilization? If so, this information should be included in the EIS. If not, you should drop your time controlled grazing scheme. I've never known them to work anywhere in Arizona anyway."*

Not true. Utilization is one of the tools we are using in our monitoring plan for this allotment. In the FEIS, we further defined our monitoring strategy because of your comments and others. However, we believe that limiting the length of time in any one pasture is important to reduce overgrazing and to be compatible to plant physiology. If you call these ideas time controlled grazing, then we disagree with how this type of livestock management works in Arizona.

*"The identification of the allotment's appropriate stocking rate is a public issue and this EIS process is the appropriate place for its resolution. A good starting place, I think, are the forage utilization guidelines included in the region-wide forest plan amendments signed by you regional forester in 1996. They appear to suggest that maximum growing season forage utilization for the allotment should not exceed 35%. Does your preferred alternative comply with these guidelines? If an ignorance about the allotment's overall forage production is the problem, then I suggest you make educated guesses using data already collected from similar local vegetative communities."*

We did address these use guidelines when preparing this FEIS, however, because of public responses on

this issue, we added additional language to the monitoring plan. The Coconino Forest Plan has this allowable use guide table (Amendment 11, page 66-1) for grazing by livestock and wildlife. This table shows a range of utilization percentages depending on livestock grazing management strategies (season-long, deferred and rest rotation) and range conditions (very poor to excellent). The table is intended to be used when site-specific information is not available and is very conservative. From our team's experience with range management in this area, we have chosen 50% or less use by cattle as our goal for the entire Windmill Allotment with its intensive grazing system. We believe that this level of use along with shorter cattle graze periods and longer rest periods meets the intent of the Forest Plan. We believe that utilization monitoring is only one of several tools we will use to meet the goals of this allotment.

*"Another glaring omission in the EIS is the refusal to consider any alternative that did not maintain the current grazing permittee's "4-herd breeding program." It's likely that several effective management schemes were omitted from consideration because of this proviso. I believe NEPA requires you to consider all reasonable alternatives."*

Alternative development is explained in the Alternative Development sections of the FEIS. Other herd strategies were considered during this process but did not make the final alternatives because they could not address all the goals for the allotment area. In addition, topography such as Mogollon Rim, large drainages and mountains limited our ability to combine herds together for a significant length of time. We believe we have a reasonable range of alternatives, because the alternatives address the issues identified.

*"Another omission is the failure to analyze the social and economic values from a wider perspective than just the relatively minor contributions of public lands ranching. Elk hunting, for instance, is big business in Arizona."*

The social and economic values were analyzed from a wide perspective. We did analyze the area for all alternatives including the alternative without cattle grazing. Hunter visitor days are part of the economic analysis.

*"I also want to address your riparian specific management proposals. On page 15 of the EIS you state that your preferred alternative will allow the desert riparian areas of Oak Creek, Dry Creek and Jacks Canyon to be grazed by cattle. Oak Creek will have three water*

*gaps, which will be sacrifice areas, and Dry Creek and Jacks Canyon will still be grazed during the hot season. This is unacceptable. There is no excuse for allowing cattle degrade any of them."*

Alternative A is not the preferred alternative. The preferred alternative is Alternative F in the DEIS. In the preferred alternative, Oak Creek watergaps will be grazed 5 out of 6 years from 30-50 days during the winter and spring. These watergaps were selected to have the least amount of impact to riparian habitat because they are Bermuda grass flats along the creek, which can tolerate heavy use by cattle. Dry Creek will be grazed 5 out of 6 years from 30-50 days during the winter and spring. Scattered sycamore and cottonwood trees exist on the lower portion of this ephemeral drainage with very few young trees. Jacks Canyon is grazed in December for 14 days and in May from 5 to 8 days. These short graze periods are expected to minimize impacts to the riparian vegetation. If through planned monitoring in these areas, we find that the newly developed grazing system is having a negative effect on these riparian areas, the livestock management will be adapted to minimize or eliminate the effects of cattle on these areas.

*"Above the Mogollon Rim, your preferred alternative would fence all ungulates out of three wet meadows, but fence only cattle out of Rogers Lake. Why aren't you proposing to also exclude elk from Rogers Lake? Decades of livestock abuse have degraded the wet meadows on the Rim to the point that the increasing elk populations are inhibiting their recovery. They need to be fenced from both ungulates, at least until they rebound to a threshold where they can take some use again."*

Only a very small portion (approximately 3%) of Rogers Lake is within this planning area. This small area is only wet when the lake is full (maybe 1 year in 8), and contains very little riparian values. The

majority of the lake is State Trust Lands (different permittee) or private land.

*"I appreciate your table, beginning on page 40, wherein you identify, locate and describe all of the riparian areas on the allotment. But I suggest it would be even more useful if it included the grazing management proposed for each area."*

All the alternatives eliminate cattle grazing in riparian areas except for Dry Creek, Jacks Canyon, watergaps on Oak Creek (described above) and small springs off the Mogollon Rim that are difficult for cattle to reach. Cattle grazing effects are described in the Alternatives sections, Description of Riparian Vegetation section and the Riparian Habitats section.

*"Finally, there is much discussion in the EIS of your proposal's effect upon the federally listed threatened and endangered wildlife species found on the allotment. But it's unclear whether or not you have formally consulted with the US Fish & Wildlife Service regarding your preferred alternative, as the law requires. Have you conducted Section 7 consultation for the Windmill Allotment?"*

We consulted with the USFWS for this project and received a biological opinion from them on October 28, 1997, which was amended on May 28, 1998.

*"In conclusion, I oppose implementation of your preferred alternative for the reasons I've cited above. Of the alternatives presented in the draft EIS, the best one that would still permit livestock grazing is Alternative D."*

Alternative D is an alternative that will be considered for implementation by the Forest Supervisor.

*"Thank you for this opportunity to participate and please keep me updated on the status of this project, such as sending me a copy of the final EIS when it is issued."*

## **Teresa A. Clements**

*"I am writing to submit comments on your draft Environmental Impact Statement (EIS) for the Windmill Allotment.*

*First let me say that as citizen of the USA I do not understand why the needs or desires of any citizen(s) (in this case the cattle ranchers) are given preferential treatment with respect to our public lands (in this case our National Forests). I am opposed to cattle grazing on these lands not only because they degrade the land, foul the waters and spoil the wilderness experience but also because I am forced to pay for it by virtue of the fact that the ranchers pay so little for the privilege that all Americans are in fact subsidizing the cost of grazing."*

The mission of the Forest Service is to manage for multiple-uses and the alternative proposals within the DEIS follows this mission. The range of alternatives does include removing cattle from the allotment area (Alternative B). Alternatives D and G reduce cattle numbers. All alternatives are equally analyzed for their effects and each will be considered for implementation. Grazing fees on National Forest lands are set by Congress.

*"As a practical person I realize that grazing on National Forest lands can't be stopped immediately because peoples livelihoods are at stake. However; it seems to me perfectly reasonable that we could reduce grazing allotments and stocking rates over time. Do you agree? If so, how would you propose to start? I find the EIS confusing in this regard."*

Alternatives D and G reduce cattle numbers by varying degrees and are explained in the Alternative Description sections of the FEIS. The Forest Supervisor has the option to select any of these alternatives.

.....

February 14, 1998

Mr. Bruce Greco, District Ranger  
Mormon Lake Ranger District  
Coconino National Forest  
4373 S. Lake Mary Road  
Flagstaff, AZ 86001

Dear Mr. Greco:

I am writing to submit comments on your draft Environmental Impact Statement (EIS) for the Windmill grazing allotment.

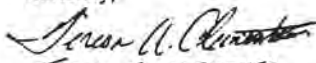
First let me say that as citizen of the U.S.A. I do not understand why the needs or desires of any citizen(s) (in this case the cattle ranchers) are given preferential treatment with respect to our public lands (in this case our National Forests). I am opposed to cattle grazing on these lands not only because they degrade the land, foul the waters and spoil the wilderness experience but also because I am forced to pay for it by virtue of the fact that the ranchers pay so little for the privilege that all Americans are in fact subsidizing the cost of grazing.

As a practical person I realize that grazing on National Forest lands can't be stopped immediately because peoples livelihoods are at stake. However, it seems to me perfectly reasonable that we could reduce grazing allotments and stocking rates over time. Do you agree? If so, how would you propose to start? I find the EIS confusing in this regard.

In my opinion a good place to start would be to prohibit all cattle grazing on the National Forest Wildernesses since they are a subset of the National Forests and are already more restrictive in allowed activities and more wild, primitive, inaccessible and therefore rarer than other public lands.

Thank you for this opportunity to participate and please keep me updated on the status of this project such as sending me a copy of the final EIS when issued.

Sincerely,

  
TERESA A. CLEMENTS

PO Box 927  
Jerome, Az 86331

*"In my opinion a good place to start would be to prohibit all cattle grazing on the National Forest Wildernesses since they are a subset of the National Forests and are already more restrictive in allowed activities and more wild, primitive, inaccessible and therefore rarer than other public lands."*

Grazing in Congressionally designated wilderness is explained in the Wilderness section of the DEIS and FEIS. Wilderness lands on this allotment are eligible

for cattle grazing, but are only being grazed when herds are actively moving from one pasture to another, passing through the wilderness to and from summer and winter range (2 to 3 days in the Red Rock-Secret Mountain Wilderness and 5 to 14 days in the Munds Mountain Wilderness).

*"Thank you for this opportunity to participate and please keep me updated on the status of this project such as sending me a copy of the final EIS when issued."*



# Glossary

## A

**Allotment.** An area designated for the use of a prescribed number and of livestock under one plan of management. Syn. range allotment.

**Allotment Management Plan.** A document that specifies actions to be taken to manage and protect rangeland resources to achieve a given set of objectives.

**Animal-Month.** A month's tenure upon a range by one animal. Not synonymous with animal-unit month.

**Animal-Unit.** Considered to be one mature (1,000 lb.) cow or the equivalent based upon average daily forage consumption of 26 lbs. of dry matter. Abbr. A.U.

**Animal-Unit Month.** 1. The amount of feed or forage required by an animal-unit for 1 month. 2. Tenure of one animal-unit for a period of 1 month. Not synonymous with animal-month. Abbr. A.U.M.

**Annual Operation Plan.** A yearly document that prescribes the annual plan of action for implementing management decisions of the Allotment Management Plan. The Annual Operation Plan must clearly specify the permittee's and the Forest Service's obligations for the current year.

## B

**Basal Area.** 1. (range) The area of ground surface covered by the stem or stems of a range plant, usually measured 1 inch above the soil in contrast to the full spread of the foliage. 2. (forestry) The area of the cross section at breast height of a single tree or of all the trees in a stand, usually expressed in square feet. This may be measured inside or outside the bark (usually the latter).

**Browse.** (n) That part of leaf and twig growth of shrubs, woody vines, and trees available for animal consumption. (v) To consume browse.

## C

**Canopy.** The vertical projection downward of the aerial portion of shrubs and trees, usually expressed as percent of ground so occupied.

**Carrying Capacity.** The average number of livestock and/or wildlife which may be sustained on a management unit compatible with management objectives for

the unit. In addition to site characteristics, it is a function of management goals and management intensity. It may also be described as the maximum stocking rate possible without inducing damage to vegetation or related resources. The rate may vary from year to year on the same area because of fluctuating forage production. Syn. grazing capacity.

**Community.** A group of one or more populations of plants and animals in a common spatial arrangement.

**Cool-Season Plant.** A plant which generally makes the major portion of its growth during the fall and spring. cf. warm-season plant.

## D

**Decreaser.** Plant species of the original or climax vegetation that will decrease in relative amount with continued overuse.

**Deferment.** Delay or discontinuance of livestock grazing on an area for an adequate period of time to provide for plant reproduction, establishment of new plants, or restoration of vigor of existing plants. cf. deferred grazing.

**Deferred Grazing.** The use of deferment in the grazing management of a range unit, but not in a systematic rotation including other units.

**Deferred-Rotation.** Any grazing system providing a systematic rotation of grazing deferment among pastures.

**Density.** (1) The number of individuals per unit area. (2) Refers to the relative closeness of individuals to one another.

**Dry Meadow.** A meadow dominated by grasses and characterized by soils that become moderately dry by mid-summer. cf. wet meadow.

## E

**Erosion.** (v) detachment and movement of soil or rock fragments by water, wind, ice, or gravity. (n) The land surface worn away by running water, wind, ice, or other geological agents, including such processes as gravitational creep.

## F

**Flexibility.** The ability to alter the grazing management plan to meet changing conditions.

**Forage.** (n) All browse and herbaceous foods available to grazing animals. These plants may be growing in or harvested from an area. (v) Act of consuming forage.

**Forage Production.** The weight of forage that is produced within a designated period of time on a given area. The weight may be expressed as green, air-dry, or oven-dry. The term may also be modified according to time of production—annual, current year's, or seasonal forage production.

**Frequency.** A quantitative expression of the presence or absence of individuals of a species in a population. For example, the ratio between the number of sample units that contain a species and the total number of sample units.

## G

**Grazing Capacity.** The average number of livestock and/or wildlife which may be sustained on a management unit compatible with management objectives for the unit. In addition to site characteristics, it is a function of management goals and management intensity. It may also be described as the maximum level at which grazing ungulates (livestock and big game animals) can graze an area without damaging vegetation and other resources.

**Grazing Intensity.** Management direction that reduces the amount of time that plants are subjected to grazing. Fencing existing pastures into smaller units, thus providing the control of animals needed to regulate the amount of time plants are both grazed and rested, intensifies grazing.

**Grazing Permit.** Official written permission to graze a specific number, kind, and class of livestock for a specified period on a defined allotment or management area.

**Grazing Period.** The length of time that livestock are grazed on a specific area.

**Grazing Season.** On public lands, an established period for which grazing permits are issued. May be established on private land in a grazing management plan.

**Growing Season.** In temperate climates, that portion of the year when temperature and moisture are usually most favorable for plant growth.

## I

**Increaser.** Plant species of the original vegetation in an area that increase in relative amount, at least for a time, under overuse.

**Introduced Species.** A species not a part of the original fauna or flora of the area in question. cf. native species.

**Invader.** Plant species that were absent or present only in small numbers in undisturbed portions of the original vegetation of a specific range site, but that become established and increase in numbers following disturbance or continued overuse of a site.

## N

**Native Species.** A species which is part of the original fauna or flora of an area.

**Nonuse.** 1. Absence of grazing on current year's forage production. 2. Temporarily not exercising a grazing privilege on grazing lands. 3. An authorization to refrain temporarily from placing livestock on public ranges without loss of preference for future consideration of grazing privileges.

## O

**Overgrazing.** Until recently overgrazing was considered to be overutilization of plants (at 50 percent or greater utilization). Time was not considered as a part of the overgrazing. Current thinking is that overgrazing is both a product of the percent of a plant that has been removed plus the amount of time the plant is continuously exposed to grazing animals. Also entering the equation is the amount of time elapsing from one grazing period to the next. If the regrowth of a grazed plant is utilized prior to the time required for the plant's full recovery, the plant becomes overgrazed.

**Overrest.** Rest of any perennial plant that is so prolonged that an accumulation of old material hampers growth and/or kills the plant. Normally, this condition is corrected by either grazing or burning.

## P

**Percent Use.** Grazing use of current growth, usually expressed as a percent of weight removed.

**Permittee.** One who holds a permit to graze livestock on state, federal, or certain privately-owned lands.

**Proper Use.** A degree and time of use of current year's growth which, if continued, will either maintain or improve the range condition.

## R

**Range Condition.** The current productivity of a range relative to what that range is naturally capable of producing.

**Range Condition Class.** One of a series of arbitrary categories used to classify range condition and usually expressed as either excellent, good, fair, or poor.

**Range Condition Trend.** The direction of change in range condition.

**Range Improvement.** 1. Any structure or excavation to facilitate management of range or livestock. 2. Any practice designed to improve range condition or facilitate more efficient utilization of the range. 3. An increase in the grazing capacity of a range.

**Rest Period.** A period of deferment included as part of a grazing system.

## S

**Season of Use.** The growth periods (spring, summer, or fall) of forage plants dictate the season of use, and the permitted grazing season is based on this. The time plants are subjected to grazing is not to be confused with the season of use.

**Seasonal Grazing.** Grazing restricted to a specific season.

**Species Composition.** The proportions of various plant species in relation to the total on a given area. Proportions may be expressed in terms of cover, density, weight, or some other unit of measure.

**Stocking Density.** The relationship between number of animals and area of land at any instant of time. This relationship may be expressed as animal-units per acre, animal-units per section, or A.U.M./ac.

**Stocking Rate.** The area of land which the operator has allotted to each animal-unit for the entire grazable period of the year. May be expressed as a ratio in various forms such as A.U./section, ac/A.U., or ac/A.U.M.

**Suitability.** 1. The adaptability of an area to grazing by livestock or wildlife. 2. The adaptability of a

particular plant or animal species to a given area. cf. suitable range, unsuitable range.

**Suitable Range.** 1. Range accessible to livestock that can be grazed on a sustained yield basis without damaging resources. 2. The limits of adaptability of plant or animal species. cf. unsuitable range.

**Summer Range.** Range that is grazed primarily during the summer growing season.

## U

**Unsuitable Range.** An area which may have value for wildlife but has no value for, or should not be used by, livestock because of steep topography, barrenness, dense timber, lack of forage, or unstable soils. cf. suitable range.

## W

**Warm-Season Plant.** A plant which makes most or all its growth during the summer and is usually dormant in winter.

**Watershed.** 1. A total area of land above a given point on a waterway that contributes runoff water to the waterway's flow. 2. A major subdivision of a drainage basin.

**Wet Meadow.** A meadow in which surface soil remains wet or moist throughout the summer. The meadow's vegetation is usually characterized by sedges and rushes.

**Winter Range.** Range that is grazed during the winter months.

## Y

**Yearlong Grazing.** Continuing grazing for a calendar year.

### Abbreviation Used      Meaning

Abbr.	abbreviation
Cf.	compare
(n)	noun
Syn.	synonym
(v)	verb

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Abbreviations Used

USDA - United States Department of Agriculture  
 USDI - United States Department of the Interior

# Appendix

## Threatened and Endangered Species For Which There is No Effect Under Any Alternative

**American Bald Eagle:** Nesting occurs at the southern boundary of the allotment along the Verde River with the Windmill Allotment on one side of the river and Prescott National Forest on the other. Potential nesting habitat occurs along the Verde River, Sycamore Creek, Dry Beaver Creek and Oak Creek. There is one known nest on the allotment. Eagles using this nest have reproduced successfully in the past but recent nest failures are attributed to accumulation of heavy metals in eggs (USDI Fish and Wildlife Service 1994). Nesting was successful in 1996-1998.

Wintering eagles also utilize the entire allotment, with their distribution patterns varying with climatic conditions. Eagles are generally on the Coconino National Forest from November to March. They concentrate around lakes off of the allotment (Lake Marys, Mormon Lake, Tremaine/Long Lake and Stoneman Lake) to capture waterfowl when the water is open. During "deep freeze" periods when these lakes are completely iced over, eagles cover large expanses as they forage opportunistically for terrestrial prey or move to ice-free water conditions in the Verde Valley. Waterfowl commonly continue further south into warmer climates, but the eagles do not move out of the Verde Valley. Eagles frequently forage along the Verde River for fish and waterfowl. Carrion, both big game and cattle, is used opportunistically allotment wide.

None of the alternatives will affect bald eagles within the Windmill Allotment. Grazing will not affect known or potential nests, perches, or roosts. Improvements, maintenance of existing structures and gathering activities are not expected to influence eagles or their habitat. Other activities that may affect eagles on the allotment include recreation, flooding, water diversion, and activities associated with lands outside the Coconino National Forest. A closure to reduce disturbance to nesting eagles has been in effect since 1994.

**American Peregrine Falcon:** One active peregrine falcon eyrie exists on the Windmill Allotment with eight active eyries within 2.25 miles of the exterior allotment boundary. The no-action alternative (B) will not affect peregrines. Grazing under the remaining alternatives will not affect falcons on the allotment for the following reasons: (1) peregrines nest high on cliff ledges that are inaccessible to cattle; (2) peregrines prey almost entirely on birds that they usually take on the wing; and (3) peregrines have very large foraging areas (normally about 12 km but as large as 20 km from nests). Grazing on State lands would have little effect on peregrine foraging.

Improvements and maintenance of existing range structures on the allotment will not disturb peregrine falcons or their habitat in any of the alternatives. Cattle management facilities where humans may be present for most of the day during over a several day period, such as corrals and the Mooney Trail, were evaluated relative to eyrie locations to determine potential for disturbance to breeding behavior. No facilities are located within 1 mile of eyries. Daily cattle management does not pose a threat to breeding behavior because it is a low intensity activity and generally does not occur in the vicinity of eyries. Eyries are located in rugged terrain whereas cattle utilize gentler terrain. Other activities that could cumulatively affect peregrine falcons or their habitat on the allotment include timber sales, construction activities, activities associated with private lands, activities under special use permits and recreational activities. Effects from these activities are dealt with separately as site- or project-specific issues arise, biological evaluations prepared and consultation with the US Fish and Wildlife as appropriate.

**Black-footed Ferret:** There are no known locations for this species on or adjacent to the allotment. Historically, the range of this species overlapped with prairie dogs, it's main prey species. One 5-acre prairie dog colony exists on private land within the allotment boundary. There are five prairie dog colonies adjacent to the allotment. All but two are on lands other than USFS ownership. It is not known if they are all active at this time. They range in size from 200 acres to 20 acres and range from 2-6 miles from the exterior allotment boundary.

Cattle grazing can influence prairie dog habitat through vegetation removal, trampling and compaction of burrows. Alternative B will not impact prairie dogs and, therefore, ferrets if present on USFS lands due to absence of grazing but grazing on State lands could occur within or adjacent to prairie dog colonies. Alternatives A, C, D, F and G will not directly impact known prairie dog colonies. Because these alternatives result in various degrees of increased rest, shorter duration in pastures and should result in meadow improvement, potential prairie dog habitat should maintain and hopefully improve over time. No loss of prairie dogs, habitat or ferrets if present are expected as a result of Windmill grazing. Cumulatively, prairie dogs are affected by canine distemper, the plague, predation from domestic dogs and wild predators and human development. Prairie dog shooting is legal.

**Brown Pelican:** A few collections/sightings have been recorded from large rivers and lakes on the

forest but none were on the Windmill Allotment. Pelicans are accidental visitors on the forest and this species appears throughout the state infrequently and usually during summer monsoons which drive them off course from their normal migration routes. These strays tend to be immature birds that are emaciated, in poor condition, and likely to die unless rehabilitated.

The alternatives will not affect Brown pelicans on the allotment because there is no known migratory route in this area; pelican presence appears to be largely accidental; and the allotment is outside the normal geographical range for the species.

**Colorado Squawfish:** Colorado squawfish have probably ranged along the Verde River up to Perkinsville according to bone samples taken from an archaeological site in Perkinsville (Minckley and Alger

1968). This range includes a portion of the Verde River adjacent to the Windmill Allotment. No other information is available on Colorado squawfish utilization of any habitat in the main stem or tributaries of the upper Verde River.

Reintroductions of Colorado squawfish into the Verde River were initiated in 1985 and these populations are considered experimental nonessential (USDI Fish and Wildlife Service 1985). Between 1991 and 1992, a radio-tagged Colorado squawfish was reported for a 3-week period in the Verde River approximately 11 miles above the confluence of Oak Creek. Therefore, this species might inhabit areas adjacent to the allotment. This re-introduced population is classified as an experimental nonessential population by the U.S. Fish and Wildlife Service. None of the alternatives would jeopardize the existence of this population.

## Sensitive Species For Which There Is No Effect From Any of the Alternatives

**Bats:** Four sensitive species of bats are known or thought to occur on the allotment as either permanent or part-time residents. These bats are the greater western mastiff bat (*Eumops perotis californicus*), red bat (*Lasiurus borealis [blossevillei]*), occult little brown bat (*Myotis lucifugus occultus*) and the Mexican free-tailed bat (*Tadarida brasiliensis*).

Alternative B will not affect these bats on the allotment. Alternatives A, C, F and G also will not affect these bats on the allotment because cattle grazing and associated activities should not affect roosts (cliffs, caves, rocks, downed logs, stumps and existing or recruitment snags and deciduous trees) or foraging by these bats in and around overstory trees. However, drinking and foraging by bats around tanks and other water sources may overlap with cattle use of these areas or tank maintenance. Cattle use or dredging of stock tanks may influence invertebrate productivity and composition. Changes in invertebrate productivity and composition in tanks may in turn influence bat distribution.

**Belted Kingfisher:** The Belted kingfisher (*Ceryle alcyon*) can be observed along streams, lakes, wetlands and stock tanks throughout the allotment where waters support prey species such as fish, amphibians, snakes, invertebrates and small vertebrates. Suitable nesting habitat is located below the Mogollon Rim. The only documented kingfisher nest on the forest is located within a riparian enclosure on the allotment.

Alternative B will not affect kingfishers on the Allotment. Alternatives A, C, F and G also will not affect kingfishers on the allotment because existing and potential kingfisher nest sites will not be impacted by cattle. Specifically, the highest quality potential nesting habitat (Verde River, Oak Creek, Sycamore) is excluded from grazing. In addition, nest burrows are generally on cliffs or vertical banks that cattle do not access, therefore any remaining potential nest sites within grazed pastures will not be impacted by cattle.

Foraging habitat in some locations may be affected because of grazing in the watershed, but because of the diversity of prey items in the kingfisher's diet and the emphasis on managing cattle to promote healthy riparian areas, impacts to kingfisher growth or reproduction are not expected. Other activities that may impact kingfisher feeding or nesting include flooding, water diversions, recreational activities and development.

**Common Ground Dove:** Common ground doves (*Columbina passerina*) are rare casual visitors of the

Coconino National Forest and may have potential habitat on the Windmill Allotment. Ground doves feed on seeds, insects and berries and nest between 1 and 21 feet above the ground. Previously identified habitats of this species include sandy cultivated lands, overgrazed pastures, river bottoms with mesquite or tamarisk, and farms with brush or weedy borders. Because few records exist of this species on the forest and because individuals seen are likely to be wanderers or migrants, no alternatives will affect ground doves on the allotment.

**Ferruginous Hawk:** Ferruginous hawks (*Buteo regalis*) are open-country birds that winter on the Windmill Allotment. They feed on jackrabbits, ground squirrels, prairie dogs and other rodents, and range widely as they opportunistically search for optimum hunting grounds. There is no known or suspected nesting of these hawks on the allotment.

Alternative B will not affect this species. Alternatives A, C, F and G also will not affect this species. Although small mammal abundance and availability may be influenced by cattle grazing, cattle rotation and high hawk mobility will allow hawks to acquire sufficient food resources. In addition, no actions to control prairie dog populations are proposed and only localized and minimal impacts to soil and vegetation are expected as a result of range improvements.

**Flammulated Owl:** Flammulated owls (*Otus flammeolus*) are neotropical migrants and are forest dwelling. Although few surveys have been conducted specifically for this species on the forest and most detections have been by-products of inventories of Mexican spotted owls, flammulated owls would be expected to occur in all forested and wooded habitats on the allotment that support trees with cavities for nesting. In addition, territories of these owls are known on the allotment and all potential habitat on the allotment is assumed to be occupied.

Alternative B will not affect this species. Grazing under Alternatives A, C, F and G will not affect existing or recruited snags used by this cavity-nesting species and will not influence the structural foraging habitat in the tree canopies. Grazing under these alternatives may influence owl prey associated with an herbaceous understory, but this influence would be reduced by deferred-rest rotation and deferred rotation grazing systems.

Grazing also will not affect flammulated owl territories on the allotment because cattle tend to concentrate in meadow areas unsuitable for the owls and the owl territories are in forested areas and commonly on



slopes which receive little to no grazing. No impact from new range structures or maintenance of existing structures is expected. Rotational grazing combined with varying intensities of grazing over the landscape will provide a variety of habitat conditions for production of insects for the flammulated owl's diet.

Of other activities that may affect the habitat of this species, timber harvesting and illegal firewood cutting probably have the greatest cumulative impacts. Minimal impacts would be expected from recreation and wildlife grazing.

**Gila Woodpecker:** Gila woodpeckers (*Melanerpes uropygialis*) are cavity nesters commonly seen along lower elevation riparian areas. They feed on insects, fruits and berries. Cattle grazing could potentially affect recruitment of nest trees if tree regeneration in riparian areas is grazed.

Alternative B will not affect this species. Alternatives A, C, D, F and G exclude cattle from most of this species habitat. However, Dry Beaver Creek will be grazed in December and May of every year as cattle are moved between summer and winter ranges as follows: 250 cattle in Alternatives A and F, 250 head in Alternative C, and 150 head in Alternative D. Short (10 day) grazing periods in December when riparian vegetation is dormant will help minimize grazing impacts. However, even short grazing durations such as the 5-10 day period in May during the growing season can impact riparian vegetation. The structure and age class distribution of the riparian trees may be modified, however sufficient trees should remain for future nest sites.

Other threats to this species habitat include flooding, recreation and loss of habitat due to human development.

**Gray Catbird:** Gray catbird (*Lucar carolinensis*) sightings are extremely rare on the forest and the few birds that have been observed are probably transients. The only known nesting of catbirds in Arizona is in dense riparian brush-willow in Apache County. Food of this bird consists of insects and fruits. No alternatives will affect this species because it is rarely on and has a low probability of residing on the allotment and any catbirds sighted on the allotment in the future will probably be transients. In addition, potential habitat for the catbird along the perennial low-elevation streams of the allotment will not be grazed.

**Osprey:** Ospreys (*Pandion haliaetus*) are fish-eating migrants. They are not known to breed on the

allotment but have been observed feeding at stock tanks, lakes and along major creeks and rivers on the Forest. Osprey prefer snags or dead-top trees near water for perching, hunting and resting. Cattle grazing on the allotment will not affect these sites. Grazing also will not affect potential nest sites or fish availability on the allotment. In addition, cattle grazing is excluded from the highest quality osprey foraging and potential nesting habitat found in the perennial low-elevation rivers and streams on the allotment.

**Swainson's Hawk:** The Swainson's hawk (*Buteo swainsoni*) is a migratory species and is found in semi-desert grasslands and desert scrub habitats in Arizona from late March until October. Prey includes insects, lizards and rabbits. No Swainson's hawks are known to breed on the forest, but potential foraging habitat for migrants occurs on the Windmill Allotment.

No alternatives will affect this species. Although cattle grazing and rotation under Alternatives A, C, F and G may impact the small mammal and insect populations on which the hawks feed, high hawk mobility will allow the hawks to acquire sufficient food resources during migration. Swainson's hawks have been heavily impacted by pesticides on their wintering areas in Argentina, but there is no proposal for use of pesticides on the Windmill Allotment.

**Cliff Fleabane:** Known and potential habitat for cliff fleabane (*Erigeron saxatilis*), a rare plant, exists on the allotment. This plant grows on vertical surfaces on dacite and Coconino sandstone. No alternative will affect this species because it is not accessible to cattle nor located in areas with abundant forage. However, other actions that may affect this species include recreational activities, blasting of suitable habitat on rock faces along highways to reduce safety hazards and natural occurrences such as rockfalls. Impacts from these or other Forest Service activities are analyzed on a site-specific basis.

**Flagstaff Pennyroyal:** Flagstaff pennyroyal (*Hedeoma diffusum*) grows on limestone outcrops within the ponderosa pine type between 6,640 and 7,000 feet in elevation. It is found along the canyon Mogollon Rim areas within the allotment from Harding Point west to Little Round Mountain. All known locations of this plant on the allotment are inaccessible to cattle and no new populations have been located in the cattle-accessible portions of the allotment that have been surveyed. No direct ungulate grazing of this plant has been documented anywhere on the forest, probably due to the plant's rock-hugging growth form.

No alternative will affect Flagstaff Pennyroyal because it is found within inaccessible locations within the allotment.

Cumulative impacts to the species are most likely to result from impacts to plants which occur outside of the allotment in the general area from Flagstaff south to Lake Mary where habitat for this plant occurs on much gentler terrain. On gentler terrain, grazing could impact plant habitat if cattle trail through habitat or increase soil erosion. Other activities which could impact the plant include: recreation,

timber harvesting, road construction, urban expansion, natural rockfalls, and increased overstory cover due to fire suppression. Plants within the allotment are protected from most of these impacts with the exception of natural rockfalls. Winter concentrations of deer and elk and their trailing off the Mogollon Rim areas could impact individual plants within the Allotment boundary. It is estimated that the Red-Rock Secret Mountain Wilderness contains millions of plants in remote, steep limestone canyons and bluffs that are protected from any management activities.