APACHE-SITGREAVES NATIONAL FORESTS

RESOURCE SAFEGUARDS

WATERSHED AND HYDROLOGIC RECOVERY THROUGH SOIL STABILIZATION AND VEGETATION REGENERATION

RECOMMENDED GUIDELINES FOR WATERSHED STABILITY AND VEGETATION RECOVERY PERTAINING TO RESTOCKING BURN AREAS WITH DOMESTIC LIVESTOCK: WILDFIRE AND MANAGED IGNITION FIRES

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2008

APACHE-SITGREAVES NATIONAL FORESTS
SPRINGERVILLE, ARIZONA

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RESOURCE SAFEGUARDS – WATERSHED STABILITY AND RECOVERY THROUGH SOIL STABILIZATION AND RECOVERY & VEGETATION REGENERATION AND RECOVERY

RECOMMENDED GUIDELINES PERTAINING TO RESTOCKING BURN AREAS WITH DOMESTIC LIVESTOCK (NATURAL AND IGNITED FIRES)

INTRODUCTION

The purpose and intent for writing this paper is to address restocking of burned areas with livestock in response to a series of landscape scale fires that have occurred on the Apache-Sitgreaves National Forests (A-SNFs) over the past several years from the Rodeo-Chediski fire in 2002 on the Sitgreaves portion of the forests to a series of fires (2004-2008) along and below the Mogollon Rim on the Apache portion of the forests.

The A-SNFs has a general, but unwritten policy that rangelands are to be rested from grazing for at least two growing seasons following fire. A blanket policy of withholding livestock grazing on a burned area for two or more growing seasons is open to question (Sanders 2000). According to Sanders (2000), the decision to graze or not to graze the first year following any fire may vary from one pasture to another within an allotment, depending on the many variables affecting plant survival, growth and reproduction. Because of the many variables involved, such decisions should be made on a case by case basis based on some predetermined minimum threshold. The point of predetermined minimum thresholds is to eliminate personal biases and let the land tell us when and if it is ready and capable to support domestic livestock grazing activities. The rest of this paper deals with these thresholds and the rational for them.

Fire can have a dramatic impact on watershed soil and vegetation. The magnitude of this impact is dependant on numerous factors including soil type, soil cover, steepness of slope, plant species, season of the fire, fire intensity, vigor of the plants prior to the fire, associated species and climatic conditions during and following the fire. Once a watershed has been burned, the land manager is faced with numerous difficult choices including determining how long to rest a particular burn area prior to restocking. This decision is often controversial but very important since grazing management following burning has the potential to significantly affect watershed health including soil stability, productivity and plant species composition and productivity.

Ecosystems are dynamic and fluctuate in response to environmental factors; nevertheless, they establish some degree of stability over time. Fire is a natural factor in most wildlands and is linked to the dynamics of many plant communities and animal populations (Eco-Links 2000), and it is probable that no ecological site with its associated plant communities has developed without being influenced by fire (Vallentine 1971). However, when induced regression occurs as a result of a large- landscape scale fire, a reduction in the amount of primary vegetation production and accelerated erosion can be expected to occur. The effects of wildfire on forest ecosystems of western North America (Stewart 1951, Weaver 1974, Covington and Moore 1994) and the potential natural vegetation types of the A-SNFs (Gori and Enquist 2003, Schussman 2006ab, Schussman and Gori 2006, Schussman and Smith 2006ab, Smith 2006abcd, Gori and Bates 2007, Smith 2007) have been relatively well described. In general, wildland fire occurs naturally and plays varying roles in nearly all terrestrial ecosystems. Because different types of ecosystems produce and accumulate fuel more quickly than others, the wildland fire frequency and intensity are determined by the type and the stage of development of the ecosystem in which it occurs. Depending on the fire regime, many species have evolved adaptation to fire, making fire important for competition with other species, or even necessary for reproduction. Fire, in a natural or prescribed form, is important to the maintenance and health of most ecosystems.

Numerous studies document how wildfire changes properties of the soil (Knoepp and Swank 1993), which leads to changes in hydrology (Helvey 1980), erosion rates (Megahan and Molitor 1975, Campbell et al. 1977, Tiedemann et al. 1979, Durgin 1985, DeBano 1991, Walsh et al. 1992, Knoepp and Swank 1993), stream characteristics (Helvey 1980, Morris and Moses 1987), and vegetation regrowth (Grier 1975, Harvey et al. 1980, Stark 1980, Hungerford et al. 1991, Vose and Swank 1993). Site characteristics including vegetation cover, soil erodibility, and steepness of slope can influence the rate of soil and nutrient loss caused by burning (Wells et al. 1979). Changes in nutrient cycling and soil physical properties caused by fire may have adverse effects on long-term productivity (Helvey 1980, Morris and Moses 1987), and should be considered during management activities. Overall, intense wildfire tends to increase the sensitivity of sites to further soil disturbance (Helvey 1980, Morris and Moses 1987) and erosion.

Other studies describe how fire removes or kills vegetation and reduces downed wood (Mackay and Cornish 1982), thereby changing habitat for both terrestrial and aquatic organisms (Holechek et al. 2001). The effects of fire on plant survival and regeneration can be both beneficial (Wright and Bailey 1982, Barbour et al. 1987) and harmful (Wright and Bailey 1982) depending on several variables, including individual plant species, associated species, plant vigor prior to the fire, season of the fire, intensity of the fire, and climatic conditions before, during and after the fire (Sanders 2000, Miller and Findley 2001).

The impacts of grazing management before and after a fire have a dramatic effect on the response of vegetation to the fire, and what one can expect in the long term (Stinson 2001). According to Stinson (2001), fire results in changes in animal behavior, such as, grazing pattern, plant preference, utilization level, forage consumption, and frequency of grazing use. Wild and domestic animals are attracted to recently burned areas resulting in greater utilization of the burned area than surrounding vegetation (Pase and Granfelt 1971, Bunting et al. 1987). Grazing animals frequently concentrate on a burn because the herbage or browse is more accessible, palatable, and nutritious (Wright and Bailey 1982). Plant growing points may also be exposed, increasing the likelihood of damage from a foraging animal (Stinson 2001). Carbohydrate reserves of sprouting plants are usually depleted because of energy required to regenerate after a fire. Repeated use of these plants can cause considerably reduced vigor, and sometimes death of key forage or browse species (Stinson 2001).

GRAZING CAPABILITY (COVER, COMPOSITION, AND PRODUCTION)

The Apache-Sitgreaves National Forests Plan (A-SNFs FP) direction is to evaluate forage improvements and maintain acres in satisfactory or better condition, i.e., range and watershed conditions are stable or improving (p. 129). Further A-SNFs FP direction is to control grazing through management and/or fencing to allow for adequate revegetation of treated areas (p. 149). Additional A-SNFs FP direction is to maintain or, where needed, enhance soil productivity and watershed condition (p. 15). Additional A-SNFs FP guidance can be found in Appendix A.

One of the initial concerns for ecosystem managers following a fire is to allow litter to accumulate. Most fires will consume a majority of plant residue and litter. This is important since litter is required for soil development and productivity, and watershed protection. For example, a litter layer often performs the following ecological functions:

1. Protects soil against erosion (e.g., raindrop impact, overland flows and wind),
2. Detains overland flow, and facilitates soil infiltration and permeability,
3. Enhances forage production, and

4. Buffers against dry conditions by aiding moisture retention and reducing soil moisture loss.

Therefore, in order to promote these important ecological functions, post-fire livestock management must promote the establishment of a litter layer.

Another initial concern for ecosystem managers following a fire is to ensure that both plant vigor and seed production is restored. Generally, plants will establish by either sprouting and/or from seed. The rate of recovery under natural revegetation depends upon many factors such as the kind and amount of plants in the residual cover, the presence of an adequate seed source, soil conditions, and weather (Vallentine 1971, Miller and Findley 2001). Revegetated areas (from seeding or natural regeneration) should be properly managed. According to NMIRC (1973) and Holechek et al. (2001), all seedings should be protected from grazing by animals through the second growing season, or until the seeded/regenerated species are well established. Therefore, the decision to restock livestock to watersheds impacted directly or indirectly by fire should be solely resource based. While ecosystem recovery rates and conditions will vary from site to site, a basic forest-wide approach is preferred in the assessment regarding the decision to restock watersheds or not, after large-landscape scale disturbance, with livestock is consistent and well founded.

According to USDA (1997), grazing capability of a land area is dependent upon the interrelationship of the soils, plants and animals. Grazing capability is a qualitative expression of the inherent ability of an ecosystem to support grazing use by various classes of livestock on a sustained yield basis; that is maintaining the stability and productivity of the site. According to Stinson (2001), proper grazing management before and after a fire has a major impact on fire effects, vegetation changes, economics, and rehabilitation success. In analyzing fire effects, several site selection criteria should be considered including the site potential, the ecological condition, the presence of desirable and invader plant species, the acreage of burn within the management unit, and the livestock management. The consideration and implementation of these factors determines the success of a post fire rehabilitation effort.

GRAZING CAPACITY (FORAGE PRODUCTION AND UTILIZATION)

Ecosystems have limits to their ability to withstand grazing and support livestock. This limit depends upon physical and climatic factors, and the kind and amount of vegetation each area supports (Stoddart 1960). It also varies with the season of use and the kind of animals being grazed (Stoddart et al. 1975). Within the context of the physical limitation of the resource, selection of the correct stocking rate is the most important of all grazing management decisions from the standpoint of vegetation, livestock, wildlife and economic return (Holechek et al. 2001).

Grazing can alter a plant community directly, indirectly or both. Direct effects are plant removal by consumption and trampling. Studies by Dietz (1975) and Smoliak et al. (1976) point out that excessive [generally greater than 25 percent] removal of grass leaves will have an adverse effect on grass root development (Smoliak et al. 1976). This does result in reduced plant growth, less forage production and lower plant vigor and lower reproduction. Willoughby (1997) conducted a complete literature review on the use of grazing utilization guidelines and on the effects of lower stocking rates on the recovery of watersheds and recommended a conservative approach. Holechek's (1988) literature review indicates that 50 percent or higher allowable forage utilization levels appear to be applicable only to humid or annual rangelands and lower levels are appropriate in conifer forests, mountain shrub lands and oak woodlands where rangelands are in less than good condition. Indirect effects may be loss of seed source or soil damage. Moderate to heavy grazing can reduce plant density, cover, biomass, root growth, vigor and reproductive ability (Smoliak et al. 1976). Collectively, these factors can alter the relative composition and structure of grass, forb, shrub and tree components in an area.

Plants provide for ecosystem productivity and health by enriching soils, providing soil cover, protecting watersheds from runoff and wind erosion, and providing habitat for non-ungulate wildlife and invertebrates. Beyond the grazing affects on the plants, livestock activity can produce compacted soils, and damage stream banks and channels. The combinations of these changes to the biotic and physical landscapes also affect the relative composition and structure of grass, forb, shrub and tree components in an area and overall watershed health.

Once the minimum thresholds for forage composition and production, and ground cover have been met, A-SNFs FP direction (p. 77-3) is to balance permitted use with grazing capacity. One of the most important aspects of range management is the determination of the capacity of the land base to support livestock (Stoddart 1960, Stoddart et al. 1975, Taylor 1984, Holechek et al. 2001). Grazing capacity is a qualitative expression of:

1. The ability of a land area to support grazing use on a sustained yield basis; i.e., maintaining the soil stability, and productivity of the plant cover (Mueggler 1965, Stoddart et al. 1975, FSH 2209.21.22 & 54, USDA 1997).
2. The optimum (not necessarily the maximum) use of that land by grazing animals. This relates to considerations of residuals for plants, water infiltration and soil protection needs (Deitz 1975, Branson et al. 1981).
3. Wildlife species and population levels. A-SNFs FP direction is that the needs of wildlife will be considered when establishing livestock grazing capacity (p. 75), and to allow sufficient forage to accommodate wildlife… (p. 75-1). Additional A-SNFs FP guidance can be found in Appendix A.
4. The balance of animal numbers with capacity. Stocking rates are based upon forage availability (Rollins, No date). The forage resource and grazing animals must be in balance at all times and if there is to be a temporary imbalance, it should be in favor of the plant rather than the animal, where long term sustainability and productivity is the goal (Stoddart et al. 1975), such as in the case of post fire recovery.

An analysis of available capacity must be made to determine the appropriate stocking level, grazing season, and/or length of grazing period to be initiated based on overall forage production, forage availability, and established forage utilization levels. Many of the burn area acres become "potential capacity" areas as a result of producing 100 pounds of dried forage biomass or less per acre cannot be used by grazing animals under proper management because soil stability is impaired, and/or there is insufficient vegetative ground cover to protect the soil (USDA 1997). The requirement is to ensure that the physiological needs of the plants are being met for long-term ecosystem productivity and health so that the forage requirements of both livestock and wild ungulates can be met.

As mentioned earlier, fire changes animal behavior by influencing grazing patterns, preferences, utilization rates, and forage consumption. These changes are generally attributed to changes in forage productivity, availability and quality and often cause wildlife and livestock to congregate on burned areas. Therefore, range structural developments must be adequately functional, within Forest Service standards, to control livestock and support the management objectives and number of the animals being grazed.

Fire also has the potential to prepare large areas for the introduction and establishment of noxious and invasive weeds.

RECOMMENDED MINIMUM LIVESTOCK RESTOCKING THRESHOLDS FOR RESTOCKING AFTER ALL FIRES

The recommended minimum livestock restocking thresholds after burns are presented in table 1. These are minimum thresholds and may be superseded by site-specific objectives for projects or after wildfire. All five items within table 1 should be met before any restocking of burned areas occurs. Thresholds implemented pasture-wide when 20 percent or more of pasture acreage is burned.

Table 1. Minimum livestock restocking thresholds based on the soil and vegetation resources[1], noxious and invasive weeds, and range structural developments. Items I, II, III, VI and V all should be met before any restocking occurs.

I. Soil Stability (Ground Cover)[2]
A. Minimum of 75% of the natural basal vegetation, standing dead and effective organic ground cover[3] (combined) as defined by TES (Laing et al. 1987) for the map unit being inventoried or if this data is not available;
B. Minimum of fair soil condition
II. Vegetation Grazing Condition Capability (Plant Composition)
A. Minimum of mid-seral community similarity (USDA 1997) as defined by TES[4] for the map unit being inventoried or appropriate Ecological Site Description (BLM, NRCS various dates) or if this data is not available;
B. Minimum of fair range condition[5]
III. Vegetation Grazing Condition Capability (Forage Production)
A. Minimum of 100 lbs dry weight equivalent forage per acre as defined by R3 (USDA 1997); and
B. Implementation of a very conservative utilization level[6] on key forage species until project vegetation objectives have been met, or in the case of wildfire, to at least pre-burn conditions.
IV. Structural Range Developments[7]
A. Structural range developments are meeting FS standards and are adequate to maintain or support grazing management
V. Noxious and Invasive Weeds
A. As a minimum all burn areas should be inventoried for the presence of noxious and invasive weeds (White 2008) and appropriate action(s) should be taken prior to restocking[8]

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[1] Vegetation type influences surface runoff, sediment loss and infiltration (Welch et al. 1991). Bunchgrasses, such as Arizona fescue, side oats grama, blue grama, mountain muhly, and others, when healthy, have a deep root system that create an environment more conducive to water infiltration than plants with shallow root systems (Blackburn et al. 1986). According to Welch et al. (1991) sites with vegetation composed of deep-rooted perennial bunchgrass generally have a higher rate of infiltration than similar sites occupied with perennial sod forming grasses. In addition, vegetation acts as a physical barrier to runoff and water moves more rapidly across closely grazed grass than grasses left with several inches of stubble height (Welch et al. 1991). Many of the burn area acres become Potential Capacity (PC) range. Areas which could be used by grazing animals under proper management but where soil stability is impaired and/or there is insufficient vegetative ground cover to protect the soil (USDA 1997). Some burn area acres may even become No Capability areas (where natural soil loss exceeds the tolerance soil loss, the rangeland has unstable soil conditions and is classified as No Capacity (NC) range. It cannot be used by livestock without long term damage to the soil resource or plant community. These areas are not counted towards an estimated grazing capacity even though livestock use may occur (FSH 2209.21.20).

[2] How much soil cover is adequate? This varies with different soil textural characteristics and topography, but a general rule is a minimum of 50-70% organic (living and dead) material covering the soil surface (Packer 1951, Orr 1970). Various researchers recommend thresholds of 50, 60, 65, and 70%, Gifford (1984) Orr (1970), Bailey and Copeland (1961), and Packer (1951), respectively, for adequate soil cover protection and moisture infiltration. Grazing should not start before the minimum cover level is reached (Bailey and Copeland 1961, Welch et al. 1991).

[3] Effective litter cover is considered to be at least one-half inch thick or deep as defined in FSH 2209.21.42.83.3f.

[4] Ecologically, a 34-66% community similarity is equivalent to mid-seral and is an expression of the status of health of the vegetation and soil relative to their combined potential to produce a sound and stable biotic community.

[5] Range condition is the key to sustaining ranch productivity (McGinty and White 1994). Range condition as evaluated and ranked by the FS is a subjective expression of the status of health of the vegetation and soil relative to the land's ability or value for grazing livestock (USDA 1997). Health and stability are evaluated relative to a standard that reflects the composition, density and vigor of the vegetation as well as physical characteristics of the soil (A-SNFs FP 1987).

[6] Proper use based on physiological needs of key forage species as defined in FSH 2209.21.53.2 and allowable use as defined in FSH 2209.21.53.3.

[7] This includes pipelines, spring developments, tanks, troughs, fences, etc. Reconstruct range structural developments to original construction standards or better according to R3 Structural Range Improvement Handbook (FSH 2209.22) FSM 2244. Install structural range improvements to obtain proper livestock management and to meet objectives contained in forest land and resource management plans and allotment management plans (FSM 2242.2). Also see USDI and USDA (1988).

[8] Region 3 (USDA 1999) Noxious Weed Classification System.

Additional Considerations for Managed Ignition Fire Projects or Mechanical Thinning/Fuels Reduction Treatments

Establishment of site specific vegetation and watershed objectives for management ignition (prescribed) fires are also valuable in determining when and at what level restocking will occur. In the past, objectives may have been limited to reduction of risk from wildfire due to heavy fuel loading or reduction of tree and/or shrub canopies. Implementing measurable objectives to improve existing conditions can provide additional thresholds to achieve before partial or full stocking levels are allowed. In some cases, there may be a need to place limitations on grazing use prior to burning for the accumulation of fine fuels to meet fire intensity and spread objectives.

Some examples of objectives may include:

- ✓ Use fire to improve ecological status of "Back 40" pasture to high-mid seral condition. Exclude livestock for first two years, implement conservative stocking levels (equivalent to 20 percent utilization) until a high mid-seral (similarity index of 50 percent plus) condition is attained.
- ✓ Increase forage production by 50 percent and improve ground cover to a minimum of 60 percent by reducing overstory components through mechanical thinning or management ignition fire.
- ✓ Restore X acres of the Great Basin Grassland PNVT within the project area by reducing woodland canopy cover to less than 10 percent.
- ✓ Exclude livestock grazing within the XYZ pasture until the average forage base reaches 300 lbs/acre and ecologic status reaches mid- to high-seral state.

SUMMARY

According to Stinson (2001), proper site management based on specific objectives and plant species is essential in the management of fire effects. Improper grazing management can easily nullify efforts put into prescription burning or wildfire rehabilitation, as well as impede natural vegetative recovery after wildfire. Impacts of long-term grazing management before and after a fire can be easily overlooked; therefore, proper grazing management including the appropriate kind of livestock, the stocking rate, the season and the intensity of utilization, and the length and frequency of use are most important.

The period of nonuse by livestock necessary after a fire varies considerably with the vegetative composition, site conditions, resource conflicts, and severity and/or objectives of the burn. Grazing closures apply to prescribed fires and wildfires, whether they are artificially reseeded or recovery is by natural means. In some situations, the only way to ensure nonuse of critical areas after a fire is to construct fences.

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APPENDIX A - ADDITIONAL APACHE-SITGREAVES NATIONAL FORESTS FOREST PLAN DIRECTION

Additional A-SNFs FP direction exists to guide development of stocking levels and livestock management subsequent to recovery from burns. The A-SNFs FP provides a general context within which to make the decision to restock or not.

A-SNFS FP DIRECTION FOR RANGE MANAGEMENT

- ✓ Provide a program of range management that emphasizes high quality range forage and developments. Benefits are improved watershed conditions, improved range forage production, improved wildlife habitat, and enhanced visual quality (p. 15).
- ✓ Full capacity rangelands in unsatisfactory range condition will be treated through continued development of improved Allotment Management Plans (AMPs) as well as structural and non-structural range developments and pasture stocking rate adjustments (p. 63).
- ✓ Reseed wildfire areas that are not expected to establish within two years. Manage livestock to insure establishment (p. 73).
- ✓ Continue livestock grazing with increased emphasis on recreation, wildlife and fisheries resources, while maintaining basic soil and water values. The needs of wildlife will be considered when establishing livestock grazing capacity (p. 75).
- ✓ Continue to improve rangeland condition and resolve conflicts with other resource objectives (p. 75).
- ✓ No grazing capacity will be assigned to lands determined to be unsuitable for grazing. Where appropriate grazing will be eliminated from unsuitable lands (p. 77-3).
- ✓ As necessary, broadcast seed immediately following natural or planned burns with a warm and cool season seed mix on soils with moderate to high forage production, including forbs and browse species ratings to increase production for the site (p. 117).
- ✓ …Seed suitable areas in all range condition classes. Control grazing through management and/or fencing to allow for adequate revegetation of treated areas (p. 118).
- ✓ Grazing systems will consider various seasons of use, levels of utilization and exclusions, and classes of livestock (p. 126).
- ✓ Potential capacity lands may be assigned capacity at a later date as improvements [in range condition] are made (p. 129).
- ✓ Forage emphasis is to attain a composition of cool- and warm-season species (p. 129).
- ✓ …stabilize gullies to raise water table, scarify the soil, and seed with appropriate grass and forage species. Control grazing through management and/or fencing to establish vegetation (p. 130).
- ✓ As necessary, broadcast seed immediately following natural burns with a warm- and cool-season seed mix on soils with moderate to high forage production. Control grazing through management and/or fencing to allow for adequate revegetation of treated areas (p. 149 & p. 150).
- ✓ Permitted livestock use is consistent with and in compliance with the Term Grazing Permit and AMP. Actual use by permitted livestock numbers and wildlife populations are allowed to fluctuate with on-the-ground conditions while still allowing ecosystems to advance towards desired future conditions as described in specific AMPs. Fluctuations in actual use are necessary to reflect variations in resource capability due to drought, fire, disease or even highly productive wet years. Grazing allotments are stocked with the proper number and class of permitted domestic livestock and wildlife populations without unacceptable degradation to other resources and uses (Monitoring Item #14).
- ✓ All ecosystems, with added emphasis in the riparian and wetland ecosystems, are advancing towards healthy conditions described in site specific AMPs consistent with current social values and people's desires (Monitoring Item #15).

- ✓ AMPs are consistent with the A-SNFs FP and allow ecosystems to reach their desired future conditions described in site specific AMPs consistent with current social values and people's desires (Monitoring Item #16).
- ✓ The conditions of range nonstructural developments are satisfactory to meet forage production objectives consistent with soil, watershed, wildlife, ecosystem, and livestock needs (Monitoring Item #17).
- ✓ Identify changes in range condition and trend, determine shifts away from grass aspect due to increases in overstory, [burning, grazing, etc.] and recommend changes in management (p. 245).

A-SNFS FP Direction for Soil/Watershed Management/Riparian Areas

- ✓ The maximum emphasis is provided to resolve unsatisfactory watershed conditions by the end of the fourth decade (p. 9).
- ✓ Improve vegetation condition in riparian areas. Improvements will be accomplished by reducing or in some cases eliminating adverse impacts from grazing, vehicles and over use by man (p. 15).
- ✓ Maintain, or where needed, enhance soil productivity and watershed condition… (p. 16).
- ✓ Emphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management strategies should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented (p. 52 and p. 55).
- ✓ Manage the ground surface layer to maintain satisfactory soil conditions i.e. to minimize soil compaction; and to maintain hydrologic and nutrient cycles (p. 54).
- ✓ Conserve soil and water resources; avoid permanent impairment of site productivity and ensure conservation of soil and water resources. The minimum soil and resource management requirement is to control surface water runoff and erosion at not less then tolerance conditions (p. 69).
- ✓ Plan/carry out fire rehabilitation where necessary to protect water and soil resources or to prevent unacceptable downstream damage (p. 69).
- ✓ Soil resource improvement will be accomplished on an opportunity basis (p. 71).
- ✓ Maintain and enhance riparian vegetation along streams to maintain suitable water temperature and other conditions for stream flow (p. 71).
- ✓ Accomplish/maintain soil resource improvement projects to prevent loss of soil productivity (p. 72).
- ✓ Soil resource improvement will be accomplished on an opportunity basis (p. 120).
- ✓ Recognize the importance and distinctive values of riparian areas when implementing management activities. Give preferential consideration to riparian area dependent resources (see glossary) in cases of unsolvable conflicts. Manage to maintain or improve riparian areas to satisfactory riparian condition (see glossary). Other resource uses and activities may occur to the extent that they support or do not adversely affect riparian dependent resources (p. 121).
- ✓ Management emphasis will be directed at areas with riparian dependent resources in the following order of priority: 1. Threatened and Endangered Species; 2. cold water fisheries; 3. warm water fisheries; and 4. all other riparian areas (p. 121).
- ✓ Forage utilization standards for riparian areas will be determined for each allotment at levels permitting timely achievement of fisheries and T&E objectives. The following general utilization guidelines will guide revisions for allotment management plans. Areas in unsatisfactory riparian condition 0 - 45% (p. 122).
- ✓ Tailor grazing strategies to individual riparian areas. Grazing strategies should be directed toward recovery of both biological systems (vegetation diversity and structure) and physical systems (channel characteristics and hydrology) (p. 126).
- ✓ Grazing systems will consider various seasons of use, levels of utilization and exclusions, and classes of livestock (p. 126).

- ✓ Determine grazing capability for livestock in each riparian area. The objectives for each riparian area should include livestock use when consistent with other resource objectives and riparian recovery goals (p. 126).
- ✓ Plan and accomplish erosion control projects on areas disturbed by project activities where the site is not expected to stabilize within two years or where water quality degradation will occur (p. 161).
- ✓ Manage for good riparian condition (p. 172). Manage for satisfactory riparian condition (p. 178).
- ✓ Defer from grazing until critical watershed and riparian areas are satisfactorily restored (p. 181).
- ✓ Meet Federal regulation, ensure that treatable Forest watersheds are in satisfactory condition by 2020, and assure productivity of the land is maintained (p. 196 and p. 250).
- ✓ Review riparian improvement projects for changes in ground cover, species composition, bank stability, adequacy of and compliance with recommendations (p. 197).
- ✓ Monitor projects to determine compliance with recommendations and suitability of recommendations and to insure water & soil quality standards are met. (Best Management Practice) (p. 197).
- ✓ To ensure that Forest riparian areas and wetlands are either in satisfactory ecological status or are trending towards the Desired Future Vegetation in a timely manner through tracking changes in riparian condition (p. 198).
- ✓ Riparian Area Dependent Resources - These are wildlife and fish habitat and watershed condition; and visual and water quality (p. 216).
- ✓ Satisfactory riparian condition - This means being in a condition where stream banks are stabilized, head cutting is not evident, riparian vegetation is present and increasing in density and vitality. Areas that do not approximate satisfactory riparian condition will be classified as being unsatisfactory riparian condition. Recovering areas will be classified as unsatisfactory riparian condition until riparian recovery objectives are met (p. 216).
- ✓ Projects are monitored to insure compliance with and adequacy of project related recommendation and to insure water and soil quality standards are being met through application of Best Management Practices (p. 251).
- ✓ Treatable watersheds are in a satisfactory condition to ensure soil productivity is maintained for future generations (Monitoring Item #27).

A-SNFS FP Direction for Wildlife Management

- ✓ Maintain wildlife habitat to maintain viable populations of wildlife species and improve habitat. This is accomplished "directly" through habitat management and "indirectly" through coordination of habitat management in conjunction with other resource activities (p. 14).
- ✓ Maintain habitat capability through direct treatments of vegetation, soil and water (p. 73).
- ✓ Special consideration will be given to critical big game winter range where big game winter range has been determined to be a limiting factor in achieving big game objectives (p. 75-1).
- ✓ Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of TES species (p. 77).
- ✓ Wildlife use will be controlled in areas in unsatisfactory condition where wildlife use is a significant causative factor affecting condition (p. 159).
- ✓ Maintain or improve existing habitat capability (p. 239).

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