CHAPTER 2 – ALTERNATIVES

This chapter displays, describes, and provides a summary comparison of the alternatives. They include:

Alternative A – No Action or no project
Alternative B – the Proposed Action, including mitigating features
Alternative C – an alternative action developed to respond to issue 1

Alternative A – No Action
This alternative is the required no action alternative. There would be no project. Current conditions and effects of this alternative are described in detail in Chapter 3.

Alternative B – Proposed Action
This alternative was developed to meet the purpose and need.

EROSION CONTROL TREATMENTS
Sheet Erosion

- Removal of invading or encroaching woody vegetation, lop, scatter & leave slash (limbs and tops) on soil surface or incorporate into surface of soil. Removal to be by mechanical means – i.e., Agra-axe (tree shears), chain saw, brush saw, and/or hand pruners.

- Site preparation of soil surface to increase irregularity, increase infiltration of rainfall, and provide an adequate seedbed. This will be done mechanically by use of some combination of harrow, dixie harrow, or similar item pulled behind a tractor and/or ATV.

- Seeding with appropriate native herbaceous species to include both warm and cool growing season species. Soil testing will be done and the results used in selecting species to plant, especially in the soils high in calcium carbonate.

- Application of compost mats incorporating mulch, fertilizer, and seed in specific areas where topsoil has been seriously compromised.

- Closure of specific areas to off road vehicle travel, including construction of physical barriers, signing, and enforcement.

- Exclude livestock use from seeded areas until recovered.

- In Treatment Area 2 mesquite shrubs will be cut and the cut stumps painted with herbicide to prevent sprouting.

Channel Treatments

- Construction of rock and wire check dams in first order channels (Heede 1976, 1977).

- Headcut armoring by sloping headcut to approximately 3:1 slope and armoring with rock.

- Maintenance of existing and partially functional rock and wire check dams.

Refer to Map Exhibit for Treatment Area locations.
Area 1. Wickiup Pasture. Thinning of junipers and pinyons to return to savannah aspect with lopping and scattering slash, site preparation, and seeding on approximately 90 acres of Terrestrial Ecosystem Survey (TES) units 385 and 381 and on about 100 to 120 acres of TES unit 447, with small inclusion of TES unit 402. Stabilization on approximately 1.5 miles of channels. This includes repairing CCC era check dams using comparable rock. Construct approximately 15-20 new rock and wire check dams. Headcut armoring on one headcut approximately 1.5 feet deep by 50 foot perimeter. Treat one large headcut that is 8 feet deep by 50 feet wide at head by either headcut armoring and toe check dams, check dam of gabions, or compacted earth detention dam. Close area to off road travel, sign, and construct physical barrier along key areas of perimeter where entrance likely.

Area 2. Wickiup Pasture. Treat approximately 30 acres where mesquite is dominant woody plant, plus 50 acres where juniper is dominant with scattered mesquite shrubs, essentially all on TES unit 381. Removal of mesquite shrubs and majority of junipers to reduce competition with herbaceous plants and increase protective ground cover. Mesquite treatment by sawing or clipping stems and applying the herbicide triclopyr to cut stems to prevent sprouting. Retain mesquite which is tree size and which is adjacent to Wickiup Draw. Juniper treatment via saw or tree shears. Lop and scatter slash, scarify soil, seed with mix of native warm and cool season grass, forbs & shrubs. Control channel headcuts with rock & wire check dams, headcut armoring and maintenance of CCC era check dams. Armor one major headcut approximately 6’ deep by 30’ perimeter. Construct rock and wire check dams on small headcuts on first order channels. Close area to off road travel, and construct off road travel barrier and/or fence paralleling FR 618.

Area 3. Winter Pasture. Removal of small junipers and pinyons with lop and scatter of slash, site preparation, and seeding on approximately 100-120 acres on TES units 381 and 403. Repair CCC check dams using comparable rock. Construct new rock and wire check dams to protect integrity of functioning CCC era dams and in additional areas on first order drainages with active headcuts. Apply compost mats with seed in selected areas where topsoil has been severely depleted. Close area to off road vehicle use, sign, and construct barrier paralleling FR 618. Construct electric fence to protect seeded area until full recovery has been achieved.

Area 4. Winter Pasture. TES units 403 and 404. This area is the most complex and diverse of the four treatment areas. Channel treatments will include a number of small rock and wire check dams on headcuts in first order channels, including several just downstream from Hollingshead Tank plus maintenance on several CCC rock and wire check dams. Juniper thinning with lop and scatter of slash, including some placement as filter strips paralleling drainages, and seeding will be done on approximately 100 acres within this area.

WILDLIFE HABITAT IMPROVEMENTS

Area 5. Boulder Pasture, emphasis on mule deer habitat. Within this 80 acre area of past fuelwood sales, treat about 40 acres On an opportunity basis – i.e., where there are clumps or groups of browse plants of sufficient number and size to warrant treatment -- do mechanical disturbance to existing browse plants, primarily turbinella oak and silktassel, using crushing or clipping. Remove competing small junipers and use slash to protect browse plants during initial recovery and resprouting.

Area 6. Boulder Pasture, emphasis on mule deer habitat. Within this 115 acre area of old fuelwood sales, treat about 30 acres of deeper, less rocky soils similar to Area 5.

Area 7. Boulder Pasture, emphasis on mule deer habitat. Enhance browse in areas having some already present by thinning young pinyon and juniper to reduce competition. These are generally some of the rockier soils. Stimulate browse growth by treatments of mechanical brush crushing, clipping and/or jackpot burning during the dormant season. Silktassel and turbinella oak are the most common browse plants, with secondary amounts of mountain mahogany. A few areas where cliffrose is established but has grown out of reach and decadent will be treated by cutting the primary stems to within a few feet of the ground and placing pinyon and/or juniper slash from removed nearby trees as protection so that new growth can become well established without being immediately consumed by browsing ungulates. Because of cliffrose's sensitivity to fire it will not be burned. Within an overall area of about 140 acres treat approximately 40-50 acres.

Area 8. Boulder Pasture, emphasis on mule deer habitat. Same as Area 7. Within an overall area of about 60 acres treat about 20-30 acres.

Area 9. Bald Hill Pasture, emphasis on mule deer habitat. Past fuelwood sales are less open than in Areas 5 and 6 in the Boulder Pasture. Treatments are generally similar to those in the Boulder pasture for browse stimulation and forage enhancement. Out of an overall area of about 200 acres approximately 60-80 acres will be treated, predominantly with the same treatment as Areas 7 and 8. A small portion on some of the deeper, less rocky soils adapted to grassland or savannah vegetative composition will have site preparation with dixie harrow or equivalent and seeding with native cool season herbaceous species in order to reduce spring browsing on the limited browse resource.

Area 10. Indian Flat Pasture, emphasis on mule deer habitat. In this 7 acre past fuelwood sale area remove enough small pinyon and junipers remaining after past activities to

maintain a savannah aspect, using Agra-Axe or saw. On an opportunity basis mechanically stimulate existing browse – primarily turbinella oak and skunkbush, with occasional mountain mahogany – with crushing or clipping. Any mountain mahogany to be protected with slash from removed junipers. The size and configuration is such that a browsing animal will not be more than 5 chains from cover.

Area 11. Indian Flat Pasture, emphasis on mule deer habitat. Similar to Area 10 with similar treatment. Acreage about 15 acres.

Area 12. Indian Flat Pasture, emphasis on mule deer habitat. This is a more recent fuelwood area that was burned and seeded to weeping lovegrass, comprising about 25 acres. There is only a very limited amount of young juniper and pinyon and maintenance will be primarily along the north edge, nearer to the large seral grassland on the adjacent Walker Basin Allotment. On an opportunity basis existing browse will be mechanically stimulated as in Areas 10 and 11.

Area 13. Indian Flat Pasture, emphasis on mule deer habitat. This area of about 110 acres will include treatments to return to a savannah aspect on areas with predominantly young junipers. About 30-50 acres will be treated with Agra-Axe and/or saw to remove junipers on soils most adapted to browse. Layout will be such that a browsing animal is always less than 10 chains from effective hiding cover. Where there is no existing browse there will be seeding with native browse and forbs, and slash will be lopped and scattered over the seeding to protect seedlings from browsing.

Area 14. Indian Flat Pasture, emphasis on mule deer habitat. Similar to Area 13. Approximately 30-50 acres treated within an overall area of about 100 acres.

Area 15. Indian Flat Pasture, emphasis on antelope habitat. This will be an expansion of existing seral grassland on the adjacent Walker Basin Allotment to the north by treating an existing sparse stand of pinyon and juniper. It comprises approximately 25 acres and is on soils suitable for seral grassland. Some past fuelwood sales have resulted in thinning the stand. Slash will be lopped to within 24 inches of the ground to maintain visibility for antelope. A few large pinyon and or juniper trees with self pruned crowns that would not significantly affect visibility will be left. Herbaceous species desirable for antelope forage will be planted.

Area 16. Painted Tank Pasture, emphasis on antelope habitat. Maintenance of past treatment to achieve a seral grassland by removing small junipers and pinyons with Agra-Axe and/or saw on about 170 acres. Lop slash to within 24 inches of ground. Large portions of area have very few junipers due to soil characteristics. Clear an additional area, expected to be less than 2 acres, to increase visibility for antelope watering at Bessie Tank. On an opportunity basis, i.e., the next time it is dry, clean Bessie Tank.

Area 17. Painted Tank and Buckhorn Pastures, emphasis on antelope habitat. Maintenance similar to Area 16 on about 115 acres. Major portions of area have very few junipers.

Area 18. Buckhorn Pasture, emphasis on mule deer habitat. Within this area of about 90 acres there will be treatments of about 30-40 acres to develop new forage in the midst of an area of pinyon-juniper southwest of Buckhorn Tank No. 3. Areas will be treated with the Agro-Axe to return to a savannah aspect, leaving any large alligator juniper – larger than 12 inches trunk diameter. Layout will be such that an animal will be no more than 10 chains (660 feet) from hiding cover at any point within the treated area. Seeding will then be done with a mixture of native cool season grass, forbs, and appropriate browse species. Browse seeding will be protected by slash lopped and left over it.

Area 19. Buckhorn Pasture, emphasis on mule deer habitat. This small 8 acre area was previously treated. It is along the access route for Area 18. Treatment similar to Areas 10 and 11, i.e., remove small pinyon and junipers remaining after past activities enough to maintain a savannah aspect, using Agra-Axe or saw. On an opportunity basis mechanically stimulate existing browse – primarily turbinella oak and skunkbush, with occasional mountain mahogany – with crushing or clipping. Any mountain mahogany to be protected with slash from removed junipers.

Area 20. Buckhorn Pasture, emphasis on mule deer habitat. This area was previously treated to return it to a savannah aspect, leaving the larger alligator junipers and some groups of junipers. Within the portions where browse is found do mechanical disturbance to existing browse plants -- primarily turbinella oak, skunkbush, and mountain mahogany -- using crushing or clipping and remove small junipers or pinyons competing with the browse. Use slash from nearby small junipers to protect browse plants during initial recovery and resprouting. In other parts of the area having more productive soils for herbaceous vegetation conduct maintenance by removing smaller junipers and pinyons in order to maintain a savannah aspect. The total amount to be treated is approximately 200-250 acres of the 370 acres in this area. Layout of areas to be treated will be to achieve a pattern where a browsing animal would be within 10 chains of cover throughout the treated area.

Area 21. Buckhorn Pasture, emphasis on mule deer habitat. Maintenance on past pinyon-juniper removal treatments to continue a savannah aspect. In addition site preparation and seeding with cool season herbaceous plants to reduce spring browsing on the east and northeast side of Buckhorn Mountain. Treatment of about 50 acres within this 70 acre area.

Area 22. Buckhorn Pasture, emphasis on mule deer habitat. Same treatment as Area 21 with treatment of about 30 acres of the 40 acre area.

A part of the ranch's cost share in habitat improvement will be the work necessary to ensure that fences meet standards and guidelines for antelope habitat in the pastures with antelope use. This includes removal of abandoned, unused fences and inspection and adjustment of any bottom fence wires to ensure meeting the requirements for smooth wire at the specified heights. The abandoned fence paralleling the north boundary of the Indian Flat Pasture will be removed. Fences in identified antelope habitat will be

inspected during project implementation and required adjustments will be done at that time or within one grazing season. These fences include:

- North boundary of Indian Flat and Painted Tank pastures
- North boundary of Buckhorn pasture from junction with Painted Tank Pasture approximately 0.8 miles to north-south drainage intersecting boundary
- Division fence between Indian Flat and Painted Tank pastures
- Division fence between Painted Tank and Buckhorn pastures

These total to approximately 4.5 miles

Alternative C – Action Alternative modified to address issue

Alternative C was developed as a result of issues raised by respondents, specifically that of the effects of herbicide use. In this alternative Treatment Area 2 would not have the cutting of mesquite and herbicide application to the cut stumps. All other treatments remain the same as Alternative B.

Alternatives Considered but Not Developed in Detail

The alternative of mechanical treatment of mesquite in Area 2 was considered. However, as stated in Purpose and Need in Chapter 1, the soil in this area has calcareous material within the profile and root plowing to eliminate sprouting would bring calcareous material to the surface and hinder plant establishment. Thus it would not adequately meet the purpose and need of the project.

Mitigation Measures for Action Alternatives

For both Alternatives B and C there are a number of mitigation measures which would be a part of the implementation. The Soil and Water Conservation Practices Handbook (FSH 2509.22) was developed in concert between the Forest Service, Southwestern Region, and the Departments of Environmental Quality from Arizona and New Mexico. It contains a number of specific best management practices (BMP's) designed to prevent or reduce nonpoint source pollution to the level compatible with water quality goals. In addition the following specific mitigation measures apply to both Alternatives B and C.

Conduct archaeological surveys prior to land disturbing treatments. Identify and protect sites as specified in the project clearance. This may mean total avoidance by mechanized equipment. In other instances it may mean hand clearing and lopping of slash, and seeding with herbaceous species only and will not allow surface soil scarification for site preparation.

In revegetation use only certified weed-free seed of native species. Use seed from local sources where available; otherwise use that from the closest environmental conditions to the project area, i.e., soil moisture and temperature regimes and associated vegetation. The identified invasive weed species will comply with the State of Arizona Department of Agriculture 2005 weed list.

Prepare and implement an invasive species prevention plan which includes survey, appropriate mitigation and/or avoidance, and cleaning of any project equipment entering area which could potentially transport seed of invasive species.

Protect erosion control seeded areas from livestock grazing until monitoring determines that vegetation is established to soil protection standards and that a specified grazing use may occur.

Minimize impact of vehicular access during project implementation. Clearing and surface disturbance to be done only enough to allow safe and efficient access for high clearance vehicles used in the project. Any disturbed areas used for access to be restored at conclusion of use for project access. Limit the number of vehicular trips off road to the minimum needed.

In maintenance of CCC era check dams use native rock similar to that used in original structures, i.e., sandstone or basalt. Sources are available within the pastures containing treatment areas.

In Areas 5 and 6 maintain existing screening from Forest Road 214 to reduce disturbance to browsing animals.

In areas 7, 8, and 9 any jackpot burning (burning of individual trees or small groups) will be done in the dormant season to minimize damage to featured browse plants. No burning will be done where cliffrose is present.

Protect agave plants from ground disturbing activities.

For Alternative B additional specific mitigation requirements are related to the use of herbicide in Treatment Area 2. A herbicide application plan will be prepared by a Coconino National Forest botanist certified in pesticide application and will be implemented. Specific BMP's are detailed in the Soil and Water Conservation Practices Handbook (FSH 2509.22). They include following all label instructions and legal requirements. Label directions are detailed and specific and include legal requirements for use. Other BMP's covering monitoring and evaluation, spill contingency plan, and cleaning and disposal of herbicide containers will be incorporated.

More detailed and specific explanation of BMP's for herbicide use management and coordination, and for integrated weed management practices are included in the appendix.

Monitoring

The Forest Service and the Ranch share the monitoring responsibility. The Annual Operating Instructions for the allotment will include the year's scheduled monitoring and responsibilities. Monitoring will be designed to evaluate and document achievement of objectives and compliance with mitigation measures.

Achievement of objectives:
Erosion control/nonpoint source pollution prevention monitoring will include

- Protective ground cover as percent of area
- Establishment of perennial herbaceous vegetation
- Headcut movement on first order channels
- Erosion and/or deposition in treated channels

Monitoring will be both qualitative (photo points) and quantitative (transects, channel cross-sections, etc.) and will include written evaluation of changes, or lack of changes, to watershed condition and to onsite erosion from both surface and channels.

Maintenance of antelope habitat
Photo points
Mapping of areas treated to achieve visibility standards

Enhancement of mule deer habitat
Photo points
Browse establishment plots

Compliance with mitigation measures
- Archaeological site protection – inspections and reports
- Herbicide handling and application according to label requirements and herbicide application plan - documentation
- Prevention of spread of invasive species through project activities – inspections and reports

Comparison of Alternatives

Table 1 compares alternatives in relation to the objectives and issues identified in Chapter 1.

Table 1. Comparison of Alternatives in Relation to Objectives and Issues

Objective/Issue	Alternative A	Alternative B	Alternative C
Objective Reduce nonpoint source pollution	No change from current condition	Sheet erosion treated on 505 acres. Channel stabilization on 3.8 miles	Sheet erosion treated on 425 acres. Channel stabilization on 3.8 miles.
Objective Maintenance & improvement of antelope habitat	Slow degradation of antelope habitat by encroachment of junipers	Maintenance & improvement of 285 acres of previously treated area. New treatment on 25 acres	Same as Alt. B
Objective Improvement of mule deer habitat	No change from current condition. Continued slow degradation of limited browse resource	Direct treatment of 400-450 acres to increase browse and herbaceous forage production including some past fuelwood sale areas. Maintenance of 275 acres past treatments.	Same as Alt. B
Issue Herbicide effects in the environment	No herbicide used	Herbicide triclopyr applied on cut stumps of mesquite within 80 acre Treatment Area 2, following all BMP's.	No herbicide used.
Issue Potential for invasive plant species to increase	Invasive plant, red brome, common in the project area. Presence may slightly expand or contract depending on weather patterns and opportunity for expansion into areas not having perennial herbaceous plants.	Establishment of cool season grasses & forbs should reduce opportunities for expansion of red brome in treated areas and may result in some reduction of area occupied.	Same as Alt. B, except that the 80 acre Area 2 will have much less establishment of perennial herbaceous plants.
Issue Off road vehicle recreation opportunities	Areas will remain open until completion of multi-Forest off road vehicle use plan (in progress). At that time routes not designated as open will be closed.	Approximately 700 acres will be closed to off road vehicle use at the time of implementation.	Same as Alt. B