

## Chapter 3 - Environmental Consequences

The current conditions as expressed in the affected environment section reflect both the direct, indirect and cumulative effects of all past and present management activities across the landscape. The effects upon various resources, such as plants, soils, wildlife, etc., that are anticipated as a consequence of implementing each alternative are discussed in the sections below. At the same time, these resources will be and have been, impacted by other factors. These are called “cumulative effects” and they encompass past, present and foreseeable future actions. Cumulative effects are discussed at the end of each of the following resource sections.

It is recognized that other unforeseeable cumulative factors can impact the ability of the ecosystem to reach desired conditions. While, for example, severe or long term drought and catastrophic wildfire can and will likely occur over ecological time, there is no way to predict their intensity and extent so no estimation of effects is made.

### Riparian, Watershed/Hydrology, Soil Condition

#### Affected Environment

##### Riparian Condition:

Big Lake Allotment: On the Big Lake Allotment, approximately 5 miles of lentic and lotic riparian areas were assessed. Of this, 1 ½ miles were Non-Functioning, ½ mile was Functioning-At-Risk, and 3 miles were rated as Proper Functioning Condition.

Burk Allotment: On the Burk Allotment, approximately 8 ¾ miles of lentic and lotic riparian areas were assessed. Of this, 4 miles were rated as Non-Functioning, 4 1/8 miles as Functioning-At-Risk, and 5/8 miles as Proper Functioning Condition.

On the Burk Allotment, SU Pasture contains riparian areas in unsatisfactory condition. These areas all fall under special riparian objectives (stubble height) targets that should allow substantial improvement.

The Chambers Draw area has the most significant contiguous area (3 ½ miles) in unsatisfactory riparian condition. Although this lentic area was Non-Functional, it showed an upward trend as sedges and rushes were attempting to re-colonize the draw.

Molina Springs Allotment: The Molina Springs Allotment contains no streamcourses and only ¼ mile of xeroriparian system in a bedrock canyon which is rated as Proper Functioning Condition.

Bush Creek Allotment: Steeple Creek (1.2 miles) on the allotment is rated as Functioning At Risk condition, with an upward trend. The lower portion of Bush Creek consists of a reach 0.9 miles long, of which about 0.7 miles is on the Bush Creek Allotment. All of this reach (0.9 miles) is rated as Non-Functioning condition.

## **Watershed Condition / Hydrology:**

A general assessment of watershed condition of the Forest was completed as part of the environmental analysis for the Forest Land Management Plan. The allotments are located within the Upper Little Colorado fifth code watershed which is rated satisfactory, the Upper Black River Watershed which is rated satisfactory, and the upper Blue River fifth code watershed which is also rated satisfactory. Areas within the ponderosa pine and mixed conifer vegetation types are generally in satisfactory watershed condition, primarily due to an accumulation of needle cast litter, which adds hydraulic roughness to the surface and protects topsoil from runoff and accelerated erosion. Watershed conditions within the high elevation grasslands are generally satisfactory except for a few localized areas of concentrated use.

Unsatisfactory watershed conditions are associated primarily with the pinyon-juniper vegetation type and with the transition between pinyon-juniper and ponderosa pine types in areas having moderate to heavy tree canopy cover. Such areas are primarily found on the Molina Springs Allotment, but generally don't apply to the Burk, Big Lake, and Bush Creek Allotment.

**Big Lake Allotment:** Approximately 85% of the Big Lake Allotment is forested. Much of this area is made up of dense forest conditions with few open areas that contain a vigorous herbaceous component. The acres that are not forested (approximately 15% of the allotment) are dominantly in the riparian areas. Of the non-forested acres, 279 acres are wetland and 199 acres are upland meadows. Livestock and elk have concentrated use within the riparian areas. Limited use outside of riparian areas has occurred.

**Burk Allotment:** A small portion of Burk Allotment's East and West Pastures (southern portions) consist of steep slopes with forested overstory. The same is true for portions of Railroad Pasture. Approximately 200 acres of the allotment are mixed conifer forest. These areas contain little or no forage value for livestock, as they have extremely sparse herbaceous component, most of which is inaccessible to livestock. Livestock are attracted to the wet meadow areas, and with stock waters located in the bottoms, there is little incentive for livestock to move away from the bottoms. This has resulted in the heavy use in the bottoms and unsatisfactory riparian conditions, while the upland meadows receive relatively lower amounts of use. The majority of the Burk Allotment's SU Pasture is upland meadow which supports good forage production. The few acres that are classified as riparian areas (479 wetland acres) across the allotment are manageable either as separate entities or in conjunction with the rest of the pasture as critical areas.

**Molina Springs Allotment:** The Molina Springs Allotment consists of upland grassland and woodland (pinyon and juniper overstory) with slightly more woodland than grassland. The Molina Springs Allotment consists primarily of poor condition rangeland (estimated as moderate ecological similarity to potential natural community). This rating is in part due to the dominant composition of blue grama understory and trace occurrence of other native species. Pinyon pine and juniper tree cover has also become a factor substantially reducing the amount of herbaceous understory vegetation. The amount of bare ground on this allotment is substantial and has likely increased over the years, although current soil erosion rates are still under the tolerance threshold. Bare ground can be viewed as potential area

available to support additional live grass plants with increased overall forage production. Litter is generally lacking from the bare soil interspaces within the grassland, while some areas are covered with large amounts of rock. Plant litter is mostly found beneath trees, consisting of needle cast. During field visits, a number of grass species were found in trace quantities. . The species found included: side-oats grama, spike muhly, wolf-tail, vine mesquite, hairy grama, and deer grass.

**Bush Creek Allotment:** The upland areas of Bush Creek Allotment are in variable condition. Within the Mountain Pasture, there is no water available to domestic animals except on adjacent private lands. The south half of this pasture (in close proximity to private land) is very steep and contains a species mix that includes predominantly weeds and annual forbs. Ground cover is less than sufficient in heavily used places such as the trail that has developed leading to a small saddle. This has caused a gully to form, which is in the process of stabilizing near the base of the hill, but has yet to stabilize at the top of the gully system. Water bars and seeding will be necessary to help recover this area.

Bush Creek Allotment contains 28 acres of riparian areas out of a total of 312 acres. Most of this is in the Steeple Pasture which contains little riparian vegetation that the horses might utilize. The horses typically water in the Blue River instead of in the Steeple Canyon riparian area. Riparian area in the Bush and Mountain Pastures is found in Bush Creek. Effects on the Bush Creek riparian area are being mitigated in the preferred alternative (proposed action). Livestock grazing in the riparian area of the Bush pasture will be deferred until the existing dike along Bush Creek is addressed. The dike and stream channel configuration are beyond the scope of this analysis.

Within the upland portion of the allotment, mapping unit 630 contains most of the present forage production. Mapping unit 130 is steep and brushy, and contains a browse component, but understory herbaceous production is very limited due to shallow rocky soils that are also erosive.

## **Soil Condition**

Soil condition is impaired in localized areas, primarily within riparian areas. This is a result of mechanical impacts by combined wild and domestic ungulates. Soil compaction and hoof shear of streambanks is occurring in some areas. Localized areas of stream channel side and down cutting are occurring. Data on soil conditions is included in the Watershed/Hydrology Riparian Soils and Air Quality Specialist Report and Range Specialist Report which are included in the process record.

**Big Lake Allotment:** Terrestrial Ecosystem Survey (TES) survey derived Universal Soil Loss Equation (USLE) values of erosion rates found on Big Lake Allotment show that all mapping units have current erosion rates lower than tolerance rates. As most of the Big Lake Allotment is densely forested, ground cover of soils is not a problem due to needle cast and normal organic litter.

**Burk Allotment:** Reviewing the TES survey derived USLE erosion rates, all current rates are lower than tolerance rates. Most local areas that are exceptions to acceptable erosion rates are related to wetland areas or riparian areas in unsatisfactory riparian condition.

**Molina Springs Allotment:** The TES mapping units found on Molina Springs Allotment are dominantly on low 0-15% slopes, except for MU 516 which is found on 40-80% slopes. According to TES mapping units, soil condition on the Molina Springs Allotment are in satisfactory condition with erosion rates less than tolerance levels. Map unit 516 has a current erosion rate higher than tolerance levels, which is related to the Datil parent material that is nearly sterile and erodes rapidly on steep slopes. Some nearly vertical outcroppings of Datil material are found along the west facing slopes on the west side of the allotment. These areas are naturally eroding and sloughing.

**Bush Creek Allotment:** As derived from TES USLE tolerance values, current erosion rates are lower than tolerance rates; therefore this allotment meets expectations in terms of current erosion rates and current ground cover. Exceptions do occur, such as small patches of weeds or small rills or gullies that need stabilizing. These areas will need addressing as rills can grow into gullies, and cover consists of pinyon/juniper overstory with annual weeds for understory; amounting to a high erosion potential. Within the upland portion of the allotment, mapping unit 630 contains most of the present forage production. Mapping unit 130 is steep and brushy, and contains a browse component, but understory herbaceous production is very limited due to shallow rocky soils that are also erosive. Overall, Bush Creek Allotment showed good soil condition with adequate ground cover.

## **Environmental Consequences**

The effects analysis (direct / indirect and cumulative) for Riparian, Watershed/Hydrology, and Soils for this report was based on 5th and 6th code Hydrologic Unit Code (HUC) boundaries.

### **Direct and Indirect Effects of Alternative 1- No Action (No Grazing) on Riparian Condition, Watershed / Hydrology, and Soils**

**Big Lake Allotment:** The Big Lake Allotment contains several key riparian areas that are in unsatisfactory condition (functional at risk and non-functional). The No Action Alternative will eliminate soil compaction and the use of riparian obligate plants and other herbaceous species within riparian areas by livestock. This will result in an increase in plants such as carex and juncus in riparian areas with root systems capable of withstanding peak flows in riparian areas. The presence of non-native Kentucky bluegrass is expected to decrease over time. Species composition within lentic riparian areas is expected to be restored to potential plant community. In addition, the No Action alternative will result in elimination of bank shearing by livestock. This will reduce headcutting and resultant erosion and downstream sedimentation. The No Action Alternative is expected to result in improvement in existing riparian conditions on the allotment. The rate of riparian recovery is expected to be the same for the No Action and Proposed Action Alternatives because a minimum of 5 years of rest is planned in the Proposed Action and only incidental livestock grazing will be allowed thereafter contingent upon attaining satisfactory riparian conditions.

Riparian recovery will improve water quality, soil stability, water infiltration and groundwater recharge. As the vast majority of Big Lake allotment's grazing capacity consists

of riparian areas, little change or improvement in upland areas of dense tree cover would be expected as these areas were never much used by livestock.

**Burk Allotment:** The no-action alternative would allow faster and more uniform riparian recovery, greater remaining ground cover in the high elevation montane meadows, an increase in health and vigor of warm season species and better watershed condition by providing more ground cover. Density of herbaceous plants would increase in upland meadows resulting in less bare ground. As livestock watering out of Big Lake would not occur, there would be less potential to affect water quality within the lake, and the possibility of faster water quality improvement.

**Molina Springs Allotment:** The no-action alternative would eliminate use of plants by livestock and allow more ground cover to remain within the grasslands of the allotment. However considering elk grazing; this is not expected to result in a significant difference. The herbaceous composition will likely remain a blue grama monotype. Sediment yield to Nutrioso Creek may decrease slightly, however, until the pinyon/juniper overstory is reduced and the herbaceous understory increases in cover, no major changes are expected.

**Bush Creek Allotment:** The no-action alternative would not affect watershed outputs to a significant extent. Locally, improvements in ground cover may increase over a grazing alternative. Livestock trailing to water on private land, with resultant concentration of surface runoff would be reduced on a local scale. The small reach of Bush Creek within the allotment would not be expected to improve as its condition is a function of other impacts such as the dike and arena area.. The condition of Steeple Canyon riparian area would improve at about the same rate as it is currently, as the horses have little impact to this area.

### **Cumulative Effects of Alternative 1- No Action (No Grazing) on Riparian Condition, Watershed / Hydrology, and Soils**

Activities within the fifth and sixth code watersheds of the allotments were analyzed for cumulative effects in the Specialist Report for Watershed / Hydrology, Riparian, Soils, and Air Quality (PR # 51). For each allotment, livestock management of adjacent allotments was considered. Because sedimentation and water quality affect aquatic species and their habitat, downstream effects were analyzed. The spatial and temporal scale analyzed for cumulative effects on aquatic species is described for each allotment in the text below.

#### **Big Lake Allotment:**

Cumulative effects analysis considered other past, present and future foreseeable actions on the Big Lake allotment and surrounding allotments. A temporal bound of ten years was used to capture the effects resulting from changes in livestock management and affects of other activities that have occurred at the larger scale. Because sedimentation and water quality affect aquatic species, the geographical scale analyzed also included the Big Lake Allotment and all perennial habitats extending downstream from the allotment for 15 miles.

Streams analyzed for sediment delivery include the North Fork of the East Fork of the Black River (NFEFBR) extending below Mandan Pasture and the East Fork of the Black River

(EFBR) to approximately 2 miles below Buffalo Crossing. The NFEFBR and EFBR river corridor is excluded from livestock for approximately 12 miles of the total 15 miles in the action area. Past disturbances include timber harvest activities, road and trail construction/maintenance, high recreational use and some areas affected by wildfire. Grazing by wild ungulates also occurs. Use of riparian obligate species in early spring by elk has been noted. Amount of future use will be dependent upon Arizona Game and Fish Department Hunt numbers and weather and climate which affect elk populations. Current Federal management activities within the action areas include: campground maintenance at 4 campgrounds in the vicinity of the East Fork Black River; and regular road maintenance within the Black River corridor. The area analyzed encompasses three allotments: Udall, Black River and PS. A Decision in 2002 on the Udall Allotment reduced livestock numbers, balanced permitted livestock use with capacity and resulted in four livestock enclosures along the NFEFBR. The Black River Allotment is in non-use by livestock. The term grazing permit for this allotment was waived back to the Forest Service in 2002. A decision on the PS allotment in 1999 balanced permitted livestock use with capacity and established utilization guidelines and resting of each pasture every other year. The decisions on the above allotments are expected to result in long term improvements in riparian and watershed conditions.

Recent large-scale events in the action area include the 2004 Three Forks wildfire (accidental human ignition) which burned 7,900 acres in the Black River watershed resulting in short term effects to EFBR aquatics from ash and sediment flows. The result of the fire behavior observed during the incident is a mosaic pattern of burn severity within the fire perimeter of which most (4636 acres) was low severity. There were 3 accidental, direct aerial deliveries of fire retardant (Fire-Trol) to streams within the Three Forks Fire. One direct delivery occurred along an unnamed tributary of the Black River upstream of Three Forks in T6N-R28E-S36 (NW¼). A second load of retardant was delivered across a tributary to Boneyard Creek below Melanie Spring in T6N-R29E-S21 (NW¼). A third load of retardant was delivered across a tributary to Boneyard Creek one mile west of North Spring in T6N-R29E-S21 (NE¼). The ash, sediment, and accidental retardant drops resulting from wildfire suppression efforts on the Three Forks Fire adversely affected aquatic species in the EFBR.

Non-Federal ongoing actions include use of a 43 acre private parcel of pasture land within the Udall allotment located on the NFEFBR, just above Crosby Crossing. This riparian parcel appears to be continuously well utilized for intensive livestock grazing with trampled banks and heavily utilized sedge/rush riparian.

The Apache Sitgreaves National Forests Public Motorized Travel Management Plan is the only foreseeable future action identified on the Apache-Sitgreaves Schedule of Proposed Actions within the 5<sup>th</sup> code watershed which could add to effects on watershed, riparian condition and soil condition. The current proposal is to designate a system of roads, trails and areas that will be open to public motorized use. The proposal is expected to eliminate or greatly reduce cross country travel. Although only minor localized impacts from cross country travel are occurring in the Big Lake Allotment, elimination of off road travel would lessen impacts to vegetation and provide an overall improvement in watershed and soil condition.

The No Action alternative is expected to result in improvement in water quality in the Black River resulting from complete rest of the allotment from livestock grazing for the next ten years. Recovered riparian conditions will contribute to higher water quality, greater water storage in functioning floodplains and stream banks which contribute to greater perennial flows with lower peak discharges, cooler discharge water due to more shading from longer stubble heights, and better fish and macro invertebrate habitat. Within the forested portion of Big Lake Allotment, no major changes are anticipated as large ungulate use within dense canopy cover has always been extremely limited. The greatest amount of improvement on the Big Lake Allotment will be on about 478 acres of riparian and meadow habitat. Locally, the potential improvements will be highly beneficial, but within a larger scale, the potential to significantly improve conditions at for example the 5th code scale, will not be significant. Upland recovery would not be significant on Big Lake allotment as this area is dominated by dense forest that was never extensively used by livestock.

With the elimination of livestock from the allotment, livestock impacts to streamside habitats and uplands will be removed and there will be a reduction in sediment delivery to aquatic habitats. Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative sediment inputs from other ongoing activities will occur but sedimentation effects from implementation of this action are expected to be at near natural levels. Collectively, when combined with the past, present and future foreseeable activities sedimentation is expected to be less than what is anticipated for Alternative 2.

Recent changes in management of adjacent allotments are expected to result in improvement in riparian, soils and watershed condition within the watersheds. The No Action alternative is not expected to result in significant cumulative effects.

### **Burk Allotment –**

Analysis of cumulative effects considered the Burk allotment and surrounding allotments. A temporal bound of ten years was used to capture the effects resulting from changes in livestock management and affects other activities that have occurred at the larger scale. Because sedimentation and water quality affect aquatic species, the geographical scale includes the Burk allotment and the NFEFBR below East, West and SU Pastures and the EFBR drainage, to approximately 5 miles above Buffalo Crossing. The 15 mile action area also includes lower Burro Creek and upper West Fork Black River from just west of Railroad Pasture downstream for several miles to the PS Ranch area (approx. 2 miles below the West Fork campground).

Past disturbances include timber harvest activities, road and trail construction/maintenance, high recreational use and some areas affected by wildfire. Current Federal management activities within the action areas include: campground maintenance at 4 campgrounds in the vicinity of the East Fork Black River; 1 campground in the West Fork Black River corridor; and regular road maintenance adjacent to the Black River. The action area encompasses two allotments containing the EFBR drainage: Udall and Black River and 3 allotments containing the WFBR drainage: Reservation, West Fork and PS. The Reservation allotment was part of Grazing Allotments Reconfiguration Project of 2005. This resulted in the exclusion of

livestock grazing in rangelands with narrow stringers of riparian habitat closely associated with T & E species (Apache Trout) and fishing habitat (PR # 53). The more accessible upland pastures were retained for livestock use. The reconfiguration is expected to result in improvement in soils, watershed and riparian condition. A decision in 2005 on the West Fork allotment eliminated livestock use of Home, Boggy, Centerfire, and Wildcat Creeks and the Black River. As previously mentioned, the PS allotment receives rest every other year. The EFBR corridor in these allotments is excluded from livestock for all of the total 15 miles in the action area. The WFBR corridor in these allotments is excluded from livestock for approximately 12 miles of the total 15 miles in the action area.

Recent large-scale events in the action area include the 2004 Three Forks wildfire in the Black River watershed, described in Cumulative effects for the Big Lake Allotment.

Non-Federal ongoing actions include use of a 43 acre private parcel of pasture land within the Udall allotment located on the NFEFBR, described in Cumulative effects for the Big Lake Allotment.

Effects of the no-action alternative would be notable at the local scale, and likely insignificant at larger scales. The effects of Burk Allotment in conjunction with other activities within the watershed would become insignificant and difficult or impossible to discern. The overall impact to watershed outputs (sediment, water quality and water quality) from Burk Allotment become insignificant at the HUC 5 scale. At a more local scale (HUC 6) impacts/recovery to riparian areas and ground cover could be measured, however under the no livestock grazing alternative conditions remaining from impacts of past effects would become very difficult to discern over time. Overall, the Black River watershed has few impacts that show up on a watershed scale. The no livestock grazing alternative would theoretically contribute to higher water quality, but may not be measurable. Riparian condition would steadily improve, but have little impact over a large (HUC 5) scale. Resulting better riparian condition may contribute to higher infiltration rates on floodplains and wetlands and better wildlife habitat. Longer stubble heights going into winter would contribute to riparian recovery as well as improvements in water quality and temperature and fish habitat downstream. Upland meadow conditions would be expected to improve with more new plants, more litter cover, more infiltration, less bare ground, and less overall soil erosion.

With the implementation of this alternative, no measurable cumulative effects to aquatic species will occur. Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative sediment inputs from other ongoing activities, described above, will occur but sedimentation effects from implementation of this action is not expected to be at a level to measurably affect aquatic species or the suitability of habitats, including substrate embeddedness and water quality parameters.

## **Molina Springs Allotment –**

The area analyzed for cumulative effects includes the Molina Springs allotment and surrounding allotments. A temporal bound of ten years was used to capture the effects resulting from changes in livestock management and affects other activities that have occurred at the larger scale. Because sedimentation and water quality affect aquatic species, the geographical scale includes Nutrioso Creek from 0.5 mile below Nelson Reservoir to and including the Little Colorado River (LCR), to approximately 7 miles above the Coyote Creek confluence with the LCR. The Picnic Allotment is located just west of the Molina Springs Allotment on the Forest. The entire Nutrioso Creek stream corridor between the Picnic and Molina Springs allotments is excluded from livestock grazing, from Nelson Reservoir to the Forest boundary. A basalt rim occurs above the creek on both sides and the corridor provides a buffer from soil movement which may occur from the adjacent mesas. The North Escudilla allotment lies to the east and south of the Molina Springs Allotment. North Escudilla has been operating under Annual Operating Instructions that require proper grazing and management of the allotment. Utilization guidelines are in place for the allotment.

Ongoing disturbances include road maintenance, and a myriad of activities associated with the state and private land adjacent to most of Nutrioso Creek once it leaves the Forest boundary. A primary impact to aquatic species of concern in the action area is associated with water removal (diversions) for use on private land and storage of flows in reservoirs such as Nelson Reservoir (0.5 mile above the action area on Nutrioso Creek). Nelson Reservoir seepage provides the majority of base flow to Nutrioso Creek, below the reservoir. Reservoir spills provide for “peak flows” in the system, along with flows from a main tributary, Rudd Creek, and lesser unnamed tributaries. Land development, livestock grazing and other agricultural uses also occur on lands adjacent to Nutrioso Creek off of the Forest.

Cumulative effects of the no-action alternative (no livestock grazing) would not differ substantially from the proposed action. Use by wildlife such as elk would continue, and the allotment is expected to remain dominated by blue grama without significant changes/improvements in composition. This area is part of the Nutrioso Creek watershed and the Coyote Creek watershed. The majority flows into Nutrioso Creek, an intermittent stream (rarely perennial). The remainder of Nutrioso Creek is impacted by private lands with housing, tilled agricultural fields, pasturelands, and wildland on National Forest and state lands also used as grazing lands. The no livestock grazing alternative has potential to improve upland watershed conditions to some limited degree, however, cumulatively improvements in the Molina area will not be measurable even at a 6th code (HUC) scale. The only way the Molina area could significantly change for the better is by deliberate efforts to improve composition by seeding native grasses, by thinning the pinyon and juniper overstory, and perhaps by limiting wildlife impacts. As there are no key riparian areas on this allotment, no improvements in this category can be expected. Effects of the No Action Alternative would not be expected to result in significant cumulative effects.

Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative sediment inputs from other ongoing and future foreseeable activities, described above, will occur but sedimentation effects from implementation of this action is not expected to be at a level to measurably

affect aquatic species or the suitability of habitats, including substrate embeddedness and water quality parameters

### **Bush Creek Allotment**

The area analyzed for cumulative effects includes the Bush Creek allotment and surrounding allotments. A temporal bound of ten years was used to capture the effects resulting from changes in livestock management and affects other activities that have occurred at the larger scale. Because sedimentation and water quality affect aquatic species, the geographical scale selected for analysis includes a 15 mile segment of the Blue River from the allotment to the Sycamore Canyon confluence with the Blue River. Current management activities within the action areas include: regular road maintenance adjacent to the Blue River corridor. Non-Federal activities include: private land activities in the community of Blue including water diversion, stream channel and floodplain modification including channelization and diking, and regular road maintenance adjacent to the Blue River corridor. Blue River flooding damage to FR 281 results in regular road maintenance immediately adjacent to the Blue River resulting in streambank damage and high erosion rates. Numerous low water crossings occur further contributing to stream destabilization in localized areas. The area analyzed encompasses 4 allotments containing the Blue River drainage: Cow Flat, Fish Hook, Steeple Mesa and Raspberry. Decisions on these allotments have resulted in balancing of livestock use with capacity, livestock use during the proper grazing season, utilization standards, and no regrazing of pastures. Pastures on the Cow Flat allotment are rested every other year. The Blue River corridor in these allotments is excluded from livestock grazing. This has eliminated direct effects on the corridor by livestock. Additional ground cover could be expected with implementation of the No Action Alternative, reducing sedimentation from upland sources.

Recent large-scale events in the action area include the 2003 Blue River Complex wildfire (19,000 acres) in the Blue River watershed. The ash and sediment generated from wildfire suppression efforts adversely affected aquatic species in the Blue River.

Cumulative effects of the No Action Alternative would not be significant at either a HUC 5 or HUC 6 scale of analysis. The small piece of Bush Creek on the allotment is dominantly influenced by channelization as well as the Red Hill Allotment. The no-livestock grazing alternative is not expected to change this section of Bush Creek; therefore Bush Creek's contribution to the Blue River bed load and water quality would not be expected to change either. Steeple Creek's condition and its contribution to the Blue River system would likewise not be expected to change under the no action alternative as it is improving at near maximum rates. The upland watershed condition of Bush Creek Allotment has room for improvement, however effects are not likely to be significant at a watershed scale. Locally, improvements to watershed condition could reduce soil movement, however current rates of soil movement approach natural rates (according to USLE). Bush Creek Allotments contribution to cumulative effects under the no livestock grazing alternative would likely be insignificant at any watershed scale.

Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative stream sediment inputs from other ongoing activities will occur, but sedimentation effects from implementation of this

action is not expected to be at a level to measurably affect aquatic species or the suitability of habitats, including substrate embeddedness and water quality parameters.

## **Direct and Indirect Effects of Alternative 2-Proposed Action on Riparian Condition, Watershed / Hydrology, and Soils**

### **Big Lake Allotment:**

The rate of improvement in riparian, watershed / hydrology and soil conditions is expected to be the same for the No Action and Proposed Action Alternatives in the first five years. This is because a minimum of 5 years of rest is planned in the Proposed Action and only incidental livestock grazing will be allowed thereafter contingent upon satisfactory riparian conditions. Substantial improvement is expected in the riparian and wetland areas. No changes are expected in the densely forested part of the allotment.

In the past, livestock were allowed to water directly out of Big Lake and runoff from both allotments (Burk and Big Lake) entered Big Lake and Crescent Lake. This allowed potential to impact water quality of both lakes through nutrient loading, sediment loading, and bacterial contamination. Livestock from the Big Lake allotment do not have access to Big Lake. Therefore, the proposed action does not result in direct effects to water quality from livestock use. Nutrient loading, sediment loading and bacterial contamination from incidental livestock grazing following 5 years of rest is expected to be minimal. The pastures are far removed from the allotment and adequate filter strips are present to limit movement of nutrients, sediment and bacteria from entering the lake.

Due to the planned 5 year rest of the Big Lake allotment, downstream effects on water quality are expected to diminish. Although there currently is no significant or identified problem with Black River water quality; it can be said that with riparian recovery, what potential impacts there were, will further be reduced. It is expected that floodplain function will rebound to greater effectiveness, which helps maintain water quality downstream, as well as providing greater infiltration to bank storage and groundwater.

### **Burk Allotment:**

The total acreage of the Burk Allotment includes about 5600 acres, and it consists of upland meadow (4372 acres) and riparian / wetland (479 acres) acreage.

- 1) Some soil compaction by livestock within lentic riparian areas is expected to occur where livestock water and graze. In lentic meadows this can lead to incised channels and draining of stored soil moisture, triggering type conversion from native sedge/rush vegetation types to non-native bluegrass meadows. Bluegrasses do not function well under flooded conditions and do not produce near the forage quantity that native sedges can. Existing headcuts, gullies, incised channels and draining of soil moisture in riparian areas are expected to reduce and heal, with strong trends toward fully functioning condition. An increase in plants such as carex and juncus within lentic riparian areas which are capable of withstanding peak flows is expected. These changes are expected due to: the number of pastures available for use by

livestock, resting of pastures, control of timing, intensity and duration of livestock grazing and adaptive management options such as herding, fencing and possible future upland water developments. Improvements in riparian condition in Alternative 2 are expected to occur at a slower rate than Alternative 1.

- 2) Direct effects of the proposed action would include some degree of stream bank damage as a result of bank shearing by ungulate hooves as well as removal of vegetation providing protective cover. This has been a concern on the Burk allotment in the past, and is anticipated to remain a challenge due to the fact that grazing animals are naturally attracted to riparian areas. These impacts can further result in increased sediment transport which accumulates with channel distance especially if downstream channels are also in less than desirable condition. Sediment in streams is mainly handled through deposition on functioning floodplains, however if channels are incised and cannot reach floodplains, sediment stays in the channel and can increase with stream distance. It is difficult to attribute sediment to a specific single action such as an allotment or a given pasture; however riparian condition is a good indicator of how well sediment is handled in the system. Mitigation measures and management options have been added to this proposed action to help alleviate this concern and allow meeting riparian goals. These include conservative use levels assigned in the uplands and riparian areas, residual end of season stubble height requirements within riparian areas, adaptive management measures and monitoring of riparian conditions. Improvements in riparian condition in Alternative 2 are expected to occur at a slower rate than in Alternative 1.
- 3) The proposed action is expected to improve species diversity and ground cover in upland montane meadows. Improper livestock grazing has historically contributed to limiting forage species diversity and an increase in bare ground. SU pasture and other meadow- dominated pastures will allow dispersal of impacts by livestock and improve distribution of use. This is anticipated to result in more litter remaining at the end of the grazing season, less soil compaction, more regeneration of new grass plants and less bare soil. Improvements in upland montane meadow condition in Alternative 2 are expected to occur at a slower rate than in Alternative 1.
- 4) Livestock from the Burk Allotment have access to and water on a portion of the north shore of Big Lake. The direct effect of livestock directly watering out of Big Lake will not change until additional livestock waters are installed. Direct effects include cattle stirring up bottom sediments causing turbidity, as well as directly affecting nutrient loading from body waste during watering. Big Lake has no current water quality issue specifically addressed by ADEQ or EPA; however Crescent Lake is listed as EPA impaired due to pH problems. ADEQ is currently (2008) investigating potential causes.

A direct effect of livestock watering out of Big Lake is the addition of pollutants to Big Lake from body waste, however no water quality issues have been raised to date by ADEQ or EPA concerning Big Lake. Recent allotment boundary reconfigurations

have resulted in about 80% of Big Lake's shore line no longer accessible to livestock for watering. In addition, there are efforts underway to provide additional water for livestock in Railroad and SU pastures, which may allow fencing off the rest of Big Lake (about a mile and a quarter) from direct livestock impacts. This is anticipated to happen as soon as funds can be secured. Therefore, long-term impacts of livestock watering in Big Lake are not expected to result in detrimental effects to water quality. In the short-term, the rate of improvement in water quality is expected to be faster with Alternative 1, however over the long-term, no differences are anticipated between Alternative 1 and Alternative 2.

- 5) Indirect effects of nutrients passing through fenced buffer strips around Crescent Lake and Big Lake will continue, although this should be minor. Currently, most of Railroad and SU Pastures are not in contact with either lake, except for sections left open for livestock watering. The "buffered" area refers to all areas fenced away from the lakes. Soils should absorb or retain nearly all potential nutrients passing into these buffers. The proposed action is not expected to result in unacceptable concentrations of livestock along the "buffered" pasture fence line near Big Lake and Crescent Lake. The effects of nutrients from elk will remain unchanged. There are no significant effects differences anticipated between effects of Alternative 1 and Alternative 2.

**Molina Springs Allotment:** The direct and indirect effects of implementing the preferred alternative on Molina Springs Allotment are limited. The area is small (about 3300 acres or 5.5 sections) and there are no sensitive wetlands or riparian areas outside of the ¼ mile bedrock canyon reach at north end. This showed no livestock impacts whatsoever.

Direct and Indirect Effects would include:

- 1) Removal of forage that could potentially be ground cover, resulting in higher surface runoff potential. Little change in ground cover is expected, as the blue grama dominated community does not produce much ground cover anyway. There is a substantial element of bare ground in this vegetation type which represents water runoff potential, as well as potential space to establish more grass plants. Much of the pasture has a gentle gradient, which allows greater infiltration and somewhat compensates for potentially added bare ground. There are no signs of excessive runoff in Molina Springs draw (outside of road-related rutting). There are no significant effects differences anticipated between Alternative 1 and Alternative 2.
- 2) **Soil compaction** during potentially wet or damp soils from late rains or early snow. Due to a very short season of use and only in alternating years, soil compaction by livestock is expected to be minimal. Soils also have a Datil Formation influence, meaning they contain significant amounts of quartz sand, which can take some amount of compaction without significant effects from soil crusting and breakdown of soil structure. However, Datil soils are known to erode easily, due to their silty texture, low organic content, and high detachability. Soil erosion is expected to be minimal because most of the allotment is flat or gentle terrain. Steep slopes which

are more susceptible to erosion on the allotment and not accessible to livestock grazing. There are no significant effects differences anticipated between Alternative 1 and Alternative 2.

- 3) **Contributing runoff and sediment** to Nutrioso Creek and the Coyote Creek watershed. The portion of the Coyote Creek watershed affected by this allotment is very small and amounts to 0% of the 5<sup>th</sup> and 6<sup>th</sup> code watersheds. The majority of the allotment drains into Nutrioso Creek, however most goes into sections of the creek that are normally dry. Therefore, sediment can at best discharge in pulses during peak runoff periods. The allotment only covers 3% of the 5<sup>th</sup> code Nutrioso Creek HUC and between 0 and 15% of various 6<sup>th</sup> code HUC sub-watersheds. This is a small percentage and even the 15% within a 6<sup>th</sup> code HUC is not expected to pose problems. Sediment can potentially wind up in Lyman Lake, however the majority of sediment seems to generate out of the Coyote Creek watershed. The upper reach of Nutrioso Creek was recently proposed to be de-listed off the ADEQ 303d list after sediment (turbidity) problems have largely been addressed and corrected. The lower reach is still listed as having turbidity problems, however it is ephemeral. There are no significant effects differences anticipated between Alternative 1 and Alternative 2.

**Bush Creek Allotment:** Direct and indirect effects:

- 1) Although contributions to sediment would not be measurable, direct effects of improving upland watershed condition even on a small patch of ground is anticipated to contribute to improved downstream conditions.

Planned improvements to address gullies and trailing directly behind private lands within the Mountain Pasture are anticipated to alleviate erosion problems. Additional plans address the patch of poor range condition in the Mountain Pasture near private land. This patch of limited size contains gullies that have not been stabilized; areas composed dominantly of weeds and limited ground cover over shallow soils among significant tree cover (pinyon and juniper). This area's sediment contribution can be considered above threshold on a small local scale, and therefore it contributes to anthropogenic sediment sources within the Blue River system. In terms of sediment contribution, there are no significant effects differences anticipated between Alternative 1 and Alternative 2.

The proposed action is expected to result in an increase in ground cover and minor improvement in vegetative conditions on the allotment except in areas where overstory species limit improvement potential.

- 2) Livestock grazing will not occur within the Steeple Canyon riparian area of the allotment in the proposed action alternative. Therefore, no direct effects from livestock grazing will occur in this riparian area. Livestock grazing occurs in the uplands away from the riparian area.

- 3) The proposed action does not allow livestock grazing within the Bush Creek riparian area of the allotment. Therefore, no direct effects from livestock grazing will occur in this riparian area. Livestock grazing occurs in the uplands away from Bush Creek.

### **Cumulative Effects of Alternative 2-Proposed Action on Riparian Condition, Watershed / Hydrology, and Soils**

Spatial and temporal scales used for analysis and other past, ongoing and future foreseeable actions are the same as described in the Cumulative Effects section of the No Action Alternative.

#### **Big Lake Allotment Cumulative Effects:**

Due to the planned 5 year rest of the new Big Lake allotment, downstream effects on water quality are expected to diminish. The proposed action is expected to result in improvement in riparian and upland conditions. The Grazing Allotments Reconfiguration Project of 2005, adjacent to the Big Lake Allotment, resulted in over 24,000 acres (17 pastures) excluded from livestock grazing. The areas excluded in this project were primarily forested areas containing narrow riparian stringers in drainage bottoms. This project has resulted in a reduction of livestock grazing impacts on riparian areas. The cumulative effects of this project would be beneficial over the long term when considered along the proposed action. Although there currently is no significant or identified problem with Black River water quality; impacts to riparian condition will be further reduced. It is expected that floodplain function will rebound to greater effectiveness, which helps maintain water quality downstream, as well as providing greater infiltration for bank storage and groundwater.

Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative sediment inputs from other ongoing and future foreseeable activities will occur but sedimentation effects from implementation of this action is not expected to be at a level to measurably affect aquatic species or the suitability of habitats, including substrate embeddedness and water quality parameters. Improvements over existing conditions should occur on the allotment and are expected to benefit aquatic species and the suitability of habitats, including substrate embeddedness and water quality parameters. A more detailed discussion of cumulative effects on aquatic species can be found in a description of effects to Wildlife later in this document.

The Grazing Allotments Reconfiguration Project of 2005 resulted in approximately 80% of the Big Lake shoreline no longer accessible to livestock, thereby reducing effects by livestock on water quality.

Wildlife use of Big Lake is continuing and contributes to a decline in water quality of Big Lake, but concentrated use by wildlife is not apparent. Recreational use also contributes to decline in water quality. Off road travel is prohibited within the Big Lake recreation area which helps provide protection to soils from erosion and subsequent sedimentation.

The Big Lake Wildland Urban Interface Treatment is listed on the Schedule of Proposed Actions for the District. A proposal is in being developed to reduce fuels on the area near

Big Lake. Actual treatment is scheduled to occur in 2011. Treatment equipment and disposal of slash can result in ground disturbance and sedimentation. Use of best management practices is expected to provide protection to soil and watershed conditions. These BMP's have been found to be effective on other WUI treatment areas such as Greer WUI and Eagar South WUI.

No water quality issues have been raised to date by ADEQ or EPA concerning Big Lake.

Alternative 2 is not expected to result in significant cumulative effects on water quality of Big Lake, Crescent Lake or the Black River.

The proposed action is designed to improve resource conditions, but improvement will occur more slowly than the No Action Alternative.

### **Burk Allotment Cumulative Effects:**

Downstream effects of Burk allotment are confined to potential affects to the Black River. The allotment contributes at most 16 and 18% of the watershed area to two tributaries of the Black River, however potential impacts such as sediment and nutrient contribution are now further reduced by the addition of SU pasture, which dilutes the same number of animals over a greater area. Contributing downstream effects of Burk allotment are negligible. There are no major activities on the Black river downstream of the Burk Allotment, and minor activities such as dispersed recreation are negligible as well.

Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative sediment inputs from other ongoing and future foreseeable actions will occur but sedimentation effects from implementation of this action is not expected to be at a level to measurably affect aquatic species or the suitability of habitats, including substrate embeddedness and water quality parameters. A more detailed discussion of cumulative effects on aquatic species can be found in a description of effects to Wildlife later in this document.

Crescent Lake has a possible water quality problem (pH) that may be tied to nutrient loading, however actual causes are yet undetermined. Crescent Lake is listed with EPA as an impaired water body. Livestock do not water directly out of Crescent Lake. Wildlife use of Crescent Lake is continuing but concentrated use by wildlife is not apparent. Addition of nutrients by wildlife is considered to be minor. There are no other ongoing or future foreseeable activities with potential to add nutrients to Crescent Lake.

Management of the adjacent allotments as described in Cumulative Effects of the No Action Alternative has resulted in reduction in grazing impacts. The cumulative effect of the proposed action would be beneficial over the long term when considered with management of the adjacent allotments and other ongoing and future foreseeable actions at the larger scale. Improvements in riparian condition, watershed / hydrology, and soils would be slower than Alternative 1 (No Action)..

### **Molina Springs Allotment Cumulative Effects:**

This small allotment with 2 pastures partly drains into Coyote Creek, an ephemeral wash, and most drains into Nutrioso Creek, an intermittent stream; and both eventually discharge into the Little Colorado River north of the Forest boundary. Sediment loads do eventually transfer downstream into perennial rivers (Little Colorado River and Lyman Lake/reservoir). Lyman Lake is on State lands; however substantial sediment loads from the Coyote Creek watershed are a recognized problem affecting the lake's storage capacity. Lyman Lake is used for irrigation water storage, as well as recreation and fishing. A State park is located at Lyman Lake that receives recreational use predominantly during the summer months.

In terms of runoff quantity and quality, the contribution of Molina Springs Allotment would be indiscernible from natural variation. The Nutrioso Creek watershed currently has little impacts. The Nutrioso Creek watershed is affected by additional grazing allotments, some Stewardship and WUI contract activity in near future (months away), a limited amount of urban development and roads. Nutrioso Creek had a Total Maximum Daily Load (TMDL) defined problem with sediment loading, but this has been corrected and the Creek is proposed to be delisted (ADEQ); a first in Arizona history. The Coyote Creek watershed has a known high sediment discharge due to soil parent materials (Datil formation, volcanic ash), ground cover and erosion issues both on Forest lands and state lands to the north, and drainage instabilities throughout the watershed. On state lands, drilling exploration activity is currently adding unpaved road mileage to the watershed. As Coyote Creek is ephemeral, sediment loads are carried through the system in pulses. Currently, Lyman Lake's storage capacity (located just below Coyote Creek / Little Colorado River confluence) is said to be 1/3 to 1/2 full of sediment within its 93 year life so far. It was originally built in 1915.

Although Picnic Allotment is located just west of Molina Springs Allotment, the entire stream corridor of Nutrioso Creek in the area is excluded from livestock grazing, from Nelson Reservoir to the Forest boundary. Direct effects to Nutrioso Creek from livestock grazing do not occur in the area analyzed. The North Escudilla allotment lies to the east and south of the Molina Springs Allotment. North Escudilla has been operating under Annual Operating Instructions that require proper grazing and management of the allotment. Utilization guidelines are in place for the allotment. Sedimentation resulting from livestock grazing on the Molina Springs allotment is negligible. In terms of Molina Allotment's contribution to solute concentration of runoff, this effect would be negligible as runoff predominantly drains into dry drainages. The addition of sedimentation from the allotment is negligible and will not result in a significant cumulative effect.

### **Bush Creek Allotment Cumulative Effects:**

Currently, there are no identified water quality problems in the Blue River; however an ADEQ TMDL study is scheduled for 2008 to investigate high coliform bacteria counts. Bush Creek allotment's largest potential to impact water quality is through high sediment discharge out of Bush Creek, which is in Non-Functioning condition. However, it must be recognized that the vast majority of Bush Creek is affected by the Red Hill Allotment upstream of Bush Creek Allotment that only contains about a 1/4 mile of the creek near the mouth.

In terms of runoff attributable to the allotment management activity, this would not be measurable as the size of Bush Creek Allotment contributes only 0.16% of the upper Blue River 5<sup>th</sup> code watershed. If comparing to the whole Blue River watershed (three 5<sup>th</sup> code watersheds), then the allotment amounts to an even more insignificant portion of the watershed, and less yet at a 4<sup>th</sup> code scale. The amount of discharge attributable specifically to Bush Creek allotment management would disappear in the normal range of variability of discharge that is encountered across nearly 400,000 acres of the Blue River watershed ranging in elevation from over 9000 feet down to 3600 feet. The expected effect this allotment potentially has on runoff quantity of flow is negligible. This allotment's effect on runoff timing is negligible.

Unpaved roads occur within the Blue River drainage. The roads are maintained, however their location often does not allow proper handling of drainage into buffers before they discharge into established drainages. The Blue Road, as well as the Pueblo Park Road in places directly discharge into drainages, adding substantial sediment to the drainage network.

The upper part of the Blue River drainage has had past and recent impacts from logging activities. Most road mileage in the Blue drainage is located in this section of the watershed; however a good part of it has healed since its use over 40 years ago. Ground cover has largely recovered with needle cast and vegetation. A number of old logging roads may still contribute to sediment and water yield in that they were built in the bottoms of drainages, limiting floodplain function and contributing to sediment loading. Recent logging activities (Stewardship contracts near Alpine are in San Francisco River watershed) primarily are centered around urban areas focusing on thinning to reduce wildfire risk. Most disturbances in these areas are of relatively short duration, and bare areas readily heal over with vegetation and litter cover in a few years at most. Some of this type of activity may have extended onto the extreme upper watershed of the Blue River while most of the watershed area is within the San Francisco River watershed. There has been some but overall very little new road construction to support this activity. The impact of this activity is considered short term (years to less than a decade) and negligible over long term (decades to centuries).

The northern most portion of the Blue River drainage is grazed by elk. This portion of the Blue River watershed typically has 100% ground cover from coniferous needle cast, and elk grazing is likely negligible in terms of sediment or runoff contribution. Further down the Blue River, deer and other wildlife predominate rather than elk. Their effect on sediment and runoff is negligible and immeasurable as their numbers are relatively limited and their theoretical contribution can be considered as part of natural background levels.

The Blue River drainage has had numerous fires which have contributed to sediment yield. Most of these have been well below the Bush Creek allotment and little or no fire has occurred in the Bush Creek or Steeple Canyon drainage in the last 25 years. Most fire in the Blue River drainage has occurred in the lower half of the river, which includes the lower two of the three 5<sup>th</sup> code watersheds of the Blue River.

Management of the adjacent allotments as described in Cumulative Effects of the No Action Alternative has resulted in reduction in livestock grazing impacts. Most ground cover measurements are within (USLE) guidelines, though exceptions obviously exist in small localized places.

Other past, present and future foreseeable actions are also described in Cumulative Effects of the No Action Alternative. The cumulative effect of the proposed action would be negligible over the long term when considered with management of the adjacent allotments and other ongoing and future foreseeable actions at the larger scale. Improvements in riparian condition, watershed / hydrology, and soils would be slower than the No Action Alternative.

Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative stream sediment inputs from other ongoing activities will occur, but sedimentation effects from implementation of this action is not expected to be at a level to measurably affect aquatic species or the suitability of habitats, including substrate embeddedness and water quality parameters.

## **Vegetation**

### **Affected Environment**

The current vegetation condition and trend on the Burk, Molina Springs and Big Lake Allotments is based on data collected between years of 1954 to 2005. Vegetative condition and trend data has been collected from cluster and paced transects. The sites measured are located in key representative areas and generally have higher grazing preference and a greater response to change in grazing management. Ecological conditions are also identified at each cluster or paced transect sites as shown in the Region 3 FSH 2209.21. The field data sheets are located at the Springerville Ranger District office and are included in the Project Record. The results of the surveys in each allotment are discussed below.

#### **Big Lake Allotment:**

According to surveys conducted in 1957 to 1990, the Big Lake Allotment was generally in Fair range condition with a static trend. After 2003, the range condition and trend appears to have declined. Undesirable species were more prominent than desirable species. Increased growth of ponderosa pine and other tree saplings was evident. Typically, stream bottoms have received heavier grazing pressure than the timbered portion of the pastures. Recovery from grazing appears to be very minimal because of the continued grazing by wild ungulates after the livestock have been removed.

#### **Burk Allotment:**

On Full Capacity (FC) and Potential Capacity (PC) rangeland on the Burk Allotment, four Parker Three Step sites and seven additional paced transects were read 2005. The surveys conducted in 1954 to 1958 showed that the meadows and uplands on the Burk Allotment were predominantly in good range condition with an upward trend. In 1984 to 2001, the allotment remained in good range condition with static trend. The 2005 surveys on the East and West Pastures revealed that areas adjacent to riparian and uplands declined in range condition and trend. Areas adjacent to riparian were mostly in fair range condition with static

and downward trend and poor range condition in localized areas with apparent downward trend. The range condition in the upland is mostly in Fair condition with downward trend. In Railroad Pasture, the upland was in good range condition with smaller areas near the lake in Fair and Poor condition. Along the riparian areas, many upland and undesirable species were observed encroaching on sites. This encroachment may be contributed to many factors, including response to recent drought causing drier conditions in bottoms, followed by increased use by elk and livestock. With these changes, wet meadow forage components are diminishing. Range condition, forage utilization and distribution have been impacted by a combination of prolonged drought conditions, past allotment management, and high elk use before and after the livestock grazing period.

### **Molina Springs Allotment:**

Survey data collected reveals that in general, range condition has been stable for several decades. The changes in trend from year to year likely the result of prolonged drought conditions, past livestock grazing and the fluctuation of yearly precipitation that has occurred over those years.

The ASNF's Terrestrial Ecosystem Survey (TES) provides a list of species in the potential natural community (PNC) for each terrestrial ecosystem unit (TEU). The species list provided by the ASNF's Terrestrial Ecosystem Survey (TES) identifies Bogr, a warm season species, as the primary grass species for all mapping units. This is consistent with survey data collected which showed Bogr dominating the vegetation composition. However, during a field visit in 2007, numerous other species were observed. The recovery of other species besides Bogr may have resulted from the changes in season of use, shortening the duration of grazing, and reducing livestock numbers. Surveys also indicate current percentages of vegetation, litter, bare ground and rock on the allotment are similar to those described in TES for each soil mapping unit.

It has also been observed that the current pinyon/juniper canopy on primary rangeland on the allotment is greater than desired when compared to historic levels. Changes in livestock management are not expected to influence conditions in any significant way in the woodland areas. The forage production is anticipated to change very little or to decline in the absence of woodland treatments.

Signs of mortality and poor plant vigor were evident during the recent drought period. The allotments north of Escudilla Mountain (including Molina Springs) appeared to be impacted, even more so than the high elevation allotments. From year 2000 to 2005, winter and summer precipitation was very low on the allotment. Forage production was minimal. In 2006, the summer precipitation was plentiful and forage production was abundant. The recovery of forage growth during and after the monsoon was observed to be rapid. This is likely because seed sources are plentiful in the soil.

### **Bush Creek Allotment:**

Approximately 94% of the allotment contains a forested component of pinyon juniper or ponderosa pine with moderate tree canopy density.

Table 2. Vegetation Condition and Trend

Cluster #	Vegetation Condition/Trend		
	1968	1997	2006
1	P→□	P↓□	F↑□

The table above shows the current vegetation range condition and trend on the Bush Creek Allotment. The 2006 survey revealed that majority of the allotment is in fair range condition with an upward trend. Out of the 312 total acres of the allotment, 278 acres is in fair condition, 10 acres in poor range condition, and 24 acres is considered No Capacity range which occurs along the Steeple Creek. Compared to 1997 survey, the cluster site improved from poor to fair condition with an upward trend. Soil condition and trend also showed an increase with an upward trend.

### **Environmental Consequences**

#### **Direct and Indirect Effects of Alternative 1-No Action (No Livestock Grazing) on Vegetation**

Livestock grazing would not occur and there would be no direct or indirect effects from livestock on the allotments with selection of the No Action Alternative. However, wildlife will continue to graze on the allotments, concentrating in riparian areas on the Big Lake, Burk and Bush Creek Allotments creating localized impacts. This concentration is not expected to occur in the small riparian inclusion on the Molina Springs allotment. The degree of disturbance and intensity of impacts to riparian vegetation would be primarily dependent on elk populations, which are affected by Arizona Game and Fish Department Hunt numbers, and annual climatic condition.

The following narratives for each allotment focus on the effects on vegetation in the uplands. Additional information regarding effects on riparian vegetation has been previously provided in the Environmental Consequences section for Riparian, Watershed/Hydrology, and Soil Condition of this document.

#### **Big Lake Allotment**

##### **Vegetation**

In areas with dense tree canopy cover (approximately 77% of the allotment), vegetation may not change much in plant diversity and density. On forested areas with more open canopies, (approximately 8% of the forested acres), the most productive soils would support a plant community with tall vigorous grasses. In this case, the warm and cool season species would increase and trend towards PNC. Vegetation on soils with shallow gravelly surface may not change much in plant diversity and density. This alternative may initially provide the best

benefit to the plant community in the upland where potential exists for improvement in vegetation production for the short term (< 10 years) on these small open areas.

However, over time (> 10 years) the vegetation in these small openings may stabilize in the absence of disturbance as wild ungulates continue to concentrate in riparian areas. In addition, as dense canopy cover increases with accumulation of litter, the understory vegetation would decrease in the absence of disturbance. Eliminating livestock grazing on the allotment could have some negative effects over the long term (>10 years) such as increased invasive plants and runoff, affecting watershed condition. Clary and Webster (1989) found that permanent removal of grazing would not guarantee maximum herbaceous plant production.

Bakker and Moore (2007) reported that understory vegetation is more controlled by the ponderosa pine overstory than by recent livestock grazing or by temporal dynamics. According to their study conducted near Flagstaff, Arizona, vegetation changes between 1912 and 1941 revealed that grass cover declined by 25% beneath pine canopies, but almost doubled in open areas. Similar effects are expected in the mixed conifer forested area of the Big Lake Allotment.

With the No Action alternative, where potential exists on the allotment, range condition and trend is expected to improve to Fair or better range condition with static or upward trend for a short term (<10 years). Range condition may decline or remain in static trend in the absence of grazing or other disturbances such as wildfire or vegetative treatment to reduce tree densities on the allotment. The ability of improvement in range condition and trend will be most influenced by climatic conditions.

## **Burk Allotment:**

### **Vegetation**

Lack of livestock grazing would allow for an increase in litter, composition, density and vigor of plant community in upland meadows and subalpine grassland over a ten year period. These areas make up approximately 86% of the allotment.

However, over time (approximately 10 + years) the vegetation on the upland meadows and subalpine grassland may stabilize in the absence of disturbance as wild ungulates continue to concentrate in riparian areas. This situation has been observed on the neighboring Pool Corral Allotment where upland vegetation was considered to be overgrown due to lack of disturbance (such as grazing or fire) to promote new grass growth (National Riparian Team 2008). Such changes may occur on the majority of the allotment, which contains about 86% of upland meadows and subalpine grassland. This may lead to an increase in invasive plants and runoff, affecting watershed condition. Clary and Webster (1989) said that permanent removal of grazing would not guarantee maximum herbaceous plant production. In addition, vegetation diversity and density may not change much in areas of mixed conifer forest (approximately 6% of the allotment) due to dense canopy cover.

In a 2006 range survey, encroachments of iris, cinquefoil and fleabane, which are unpalatable to livestock, were observed along the riparian areas and on the uplands. This encroachment may be contributed to many factors, including response to recent drought causing drier conditions in bottoms, followed by increased use by elk and livestock. With these changes, some wet meadow forage components are decreasing. Range condition, forage utilization and distribution have been impacted by a combination of prolonged drought conditions, past allotment management, and elk use before and after the livestock grazing period.

Under this alternative, vegetative conditions on the uplands are expected to improve to Fair or better range condition with static and upward trend, except in areas where over-story canopy limit improvement potential. The ability of improvement in range condition and trend will be most affected by climatic conditions.

### **Molina Springs Allotment:**

#### **Vegetation**

No significant vegetation changes are expected to occur immediately with the no grazing alternative. Blue grama would continue to be the dominant species. The current ecological status of the allotment is estimated to be in moderate similarity. The existing warm and cool season species appears to be meeting or trending towards the PNC. Plant composition has not changed significantly over 45 years with light to moderate grazing impacts. Vegetation on the allotment is in a steady state, and unlikely to make any transitions even if livestock grazing is completely removed.

Due to variability of precipitation, plant community and soil types on the Molina Springs Allotment, plant diversity and density may increase in some areas and decrease in other areas. The most productive soils would support a plant community with tall vigorous grasses. In this case, blue grama, a warm season, species would continue to dominate and trend towards PNC. Establishment of other cool season species are likely to occur but not in great amount. Vegetation on soils with shallow gravelly surfaces may not change much in plant diversity and density.

This alternative may initially provide the best short term benefit to the plant community by increasing the density and vigor of plants. However, over time vegetation on the allotment may decrease in forage production and quality as previously described for the Big Lake and Burk Allotments. Little change in forage production and quality is expected where it is limited by overstory tree composition. Forest land consisting of pinyon / juniper forest occurs on 55% of the allotment. Improvement potential is limited in this area due to tree cover.

### **Bush Creek Allotment:**

#### **Vegetation**

Lack of livestock grazing would allow an increase in litter, composition, density and vigor of the herbaceous plant community on approximately 57% of the allotment in the short term (<10 years). This area is made up primarily of scattered tree cover with adequate growing

space for herbaceous or browse plants. In these areas, the most productive soils would support a plant community with tall vigorous grasses. In this case, the warm and cool season species would increase and trend towards PNC. However, over time (>10 years) the vegetation on these areas may decrease in forage value in the absence of other disturbance or use of the herbaceous plants. As a result, the upland species would become static or decline in vegetation density, diversity and vigor. Clary and Webster (1989) said that permanent removal of grazing would not guarantee maximum herbaceous plant production. According to Holechek, the two studies he evaluated provided evidence that long term grazing exclusion can result in vegetation stagnation.

On Management Unit (MU) 130 and 131 (approximately 43% of the allotment), vegetation may not change much in plant diversity and density. These areas typically have soils with a shallow gravelly surface and occur on steep slopes.

Where potential exists on the allotment, range condition and trend is expected to improve to Fair or better range condition with static or upward trend, except in areas where over-story canopy, or shallow gravelly soils limit improvement potential. The ability of improvement in range condition and trend will be most affected by climatic conditions.

## **Cumulative Effects of Alternative 1 –No Action (No Livestock Grazing) on Vegetation**

### **Big Lake Allotment:**

Analysis of cumulative effects considered the Big Lake allotment and surrounding allotments. A temporal bound of ten years was used to capture the effects resulting from changes in livestock management and affects of other activities that have occurred at the larger scale.

Adjacent allotments include the Burk, Udall, and Black River Allotments. The Big Lake Conservation Area is located immediately south of the Big Lake Allotment. This is a 24,000 acre area which is excluded from livestock grazing. The Burk Allotment is currently undergoing analysis. Details of the proposed action are included in this document. The proposed action for the Burk Allotment is expected to result in improvement in vegetative conditions. A decision on the Udall Allotment was made in 2002 which resulted in balancing permitted livestock use with capacity, identification of utilization guidelines and 4 riparian enclosures. The Black River allotment is currently non-stocked with livestock.

Past, present and future foreseeable action on the analysis area that would have an effect on vegetation resource include: livestock grazing, wildlife grazing and recreational activities. Livestock grazing historically at higher numbers during the early to mid 20<sup>th</sup> century likely resulted in soil erosion and altered vegetative conditions in the riparian and upland areas. Management on adjacent allotments has resulted in improvements in vegetative conditions. Some minor incidences of unauthorized livestock grazing may occur due to down fences or gates left opened by the general public, resulting in short term effects to vegetation. Use by elk is expected to continue in the riparian areas. Early spring grazing by elk has been

observed on these allotments. No livestock grazing is authorized in the Big Lake Recreation Area. Other authorized activities in the project which are likely to continue include dispersed camping, hiking, hunting and vehicle use on the unsurfaced roads. Impacts from these activities are short term and primarily consist of minor ground disturbance in popular camping areas. Impacts on vegetation from recreational activities are minimal. The Travel Management rule is a future foreseeable action which is expected to eliminate or limit cross country travel. This would limit damage to vegetation caused by off road travel, but currently damage to vegetation is minimal from this activity in the area.

The Three Forks Fire burned through Blanca Cienega Trap 1 in 2004. The north and east side of the fenceline to the trap has been reconstructed. The recovery of understory vegetation on the ridgetop has been successful.

In summary, recent decisions on management of adjacent allotments are expected to result in improvements in vegetative conditions from balancing permitted livestock numbers with capacity, implementation of utilization guidelines and rest periods provided from livestock grazing. Other activities on the surrounding allotments are resulting in primarily minimal localized adverse effects on vegetation. The No Action Alternative will result in improvements in vegetative condition, but will not result in a significant cumulative effect.

#### **Burk Allotment:**

Analysis of cumulative effects considered the Burk allotment and surrounding allotments. A temporal bound of ten years was used to capture the effects resulting from changes in livestock management and affects other activities that have occurred at the larger scale.

Past, present and future foreseeable action on the analysis area that would have an effect on vegetation resource include: livestock grazing, Wildlife grazing and recreational activities.

Livestock grazing has occurred with the analysis area for over 100 years. Livestock grazing historically at higher numbers on two pastures during the early to mid 20<sup>th</sup> century likely resulted in soil erosion and altered vegetative conditions in the wet meadows and riparian areas. Livestock grazing would continue in the surrounding allotments (Rudd Knoll, Rudd Creek, Udall, Cross Bar, Big Lake and Reservation). Big Lake Recreation Complex is located to southwest of the allotment. Livestock grazing in these allotments should not have any negative effects to the vegetation on the allotment. Within the past 10 years, the surrounding allotments have been analyzed and upland vegetation had been improved as a result of implementing managed livestock grazing. Some unauthorized livestock grazing may occur due to down fences or gates left opened by the general public.

This alternative is expected to provide rest and recovery for the overall vegetation on the allotment. By eliminating livestock grazing, all forage would be available to wild ungulates. The project areas being a suitable wildlife habitat, high concentration of elk use may continue in the riparian areas. An increase in vegetative production and litter would benefit ground cover, reduce wind and water erosion and improve water quality.

A KV thinning project on approximately 46 acres is currently in progress in the south end of the East Pasture. The burning of piles will occur next year. The thinning of forest and prescribing burning of the piles would maintain or improve forest health by reducing canopy cover and increase herbaceous understory. It is expected that plant diversity, cover and vigor would increase following prescribed burning. Reduction in tree canopy and heavy fuels would reduce the threat of wildfire that could remove most of the plants and litter cover, sterilize the soil and create erosion.

Other authorized activities in the project which are likely to continue include camping, hiking, hunting and vehicle use on the unsurfaced roads. Impacts from these activities are short term and primarily consist of minor ground disturbance in popular camping areas.

### **Molina Springs Allotment:**

Analysis of cumulative effects considered the Molina Springs allotment and surrounding allotments. A temporal bound of ten years was used to capture the effects resulting from changes in livestock management and affects other activities that have occurred at the larger scale.

Livestock grazing historically at higher numbers from May to October on two pastures during the early to mid 20<sup>th</sup> century likely resulted in soil erosion and altered vegetative conditions. Livestock grazing would continue in North Escudilla and Picnic allotments which border the Molina Spring Allotment. Picnic Allotment was analyzed in 1999 and is currently operating under a new Allotment Management Plan with current management guidelines. North Escudilla Allotment is scheduled for out year analysis. North Escudilla has been operating under Annual Operating Instructions that requires proper grazing and management of the allotment. Utilization guidelines are in place for the allotment. Livestock grazing in the surrounding allotments would not have any negative effects to the vegetation on the allotment. Some unauthorized livestock grazing may occur due to down fences or gates left opened by the general public.

The encroachment of pinyon/juniper may close in open grassland in the absence of woodland treatment. The project areas being a winter wildlife habitat, high concentration of wild ungulate use may continue on the allotment.

Other authorized activities in the project which are likely to continue include camping, hiking, hunting, pinyon picking and vehicle use on the unsurfaced roads. Impacts from these activities are short term and primarily consist of minor ground disturbance in popular camping areas.

### **Bush Creek Allotment:**

The geographical extent of the cumulative effects analysis includes the allotment and the surrounding allotments.

Adjacent allotments include Red Hill, Cow Flat and Bobcat - Johnson. These allotments have undergone NEPA analysis. Key features of the decisions on these allotments included; balancing permitted livestock with capacity, proper grazing season (timing of forage growth),

establishment of utilization guidelines and exclusion of livestock from the Blue River corridor. These decisions are expected to result in long term improvement in vegetative conditions.

Past, present and future foreseeable action on the analysis area that would have an effect on vegetation resource include: livestock grazing, wildlife grazing and recreational activities.

Past yearlong livestock grazing due to lack of private land fencing and stocking at higher numbers from time to time on the three pastures may have contributed to soil erosion and altered vegetative conditions. The adjacent allotments have been analyzed. Improvements in vegetative conditions are expected to result from balancing permitting use with capacity, proper grazing season use, establishment of utilization guidelines and rest provided on the allotments. Some unauthorized livestock grazing may occur due to down fences or gates left opened by the general public.

Removal of livestock grazing would allow for an increase in plant species diversity and forage production in some areas and decrease in other areas due to different soil properties. Accumulation of litter would benefit ground cover, reduce wind and water erosion and improve water quality. However, the encroachment of pinyon/juniper may eventually close in on open grassland in the absence of woodland treatment and cause a decrease in plant and litter cover. Under this alternative, there would be no direct or indirect effects from livestock grazing on vegetation across the allotment, range condition, and trend. All forage would be available to wild ungulates.

Along with wildlife use of the allotment, other authorized activities in the area likely to continue include camping, hiking, hunting and vehicle use on the unsurfaced roads. Impacts from these activities are short term and primarily consist of minor ground disturbance in popular camping areas.

## **Direct and Indirect Effects of Alternative 2-Proposed Action on Vegetation**

### **Big Lake Allotment**

#### **Vegetation**

Livestock grazing effects to the vegetation occur by consumption (utilization) and trampling. Moderate to heavy grazing can result in reduced plant growth, less forage production and lower plant vigor depending on the timing of grazing, intensity and duration. Repeated grazing at high intensity will result in vegetation damage. If utilization levels consistently exceed desired levels, even during years of average or better forage production, a change in management practices may be needed. Grazing animals remove part of the vegetation and trample litter and seeds into the soil, which in turn can help promote seed regeneration. Trampling can also destroy newly emerged seedlings. These actions can have positive and negative effects on plant diversity. However, management of livestock within the framework of grazing systems can change or limit impacts to the vegetation resource and the soils (White, 2004).

In this alternative, the entire allotment will be rested for five years and thereafter grazing will be allowed for incidental use only if the riparian areas in satisfactory conditions and the uplands are in good or better range conditions. Livestock grazing impact would be minimal and is expected to recover faster than historic use.

Under this alternative, range condition and trend is expected to improve to Fair or better range condition with static or upward trend, except in areas where over-story canopy limits improvement potential. The ability of improvement in range condition and trend will be most affected by climatic conditions. With the implementation of the management guidelines below, plant vigor, composition, density of desirable plants (warm and cool season species) and forage production would continue to improve in the riparian areas as well as on the upland where potential exists. However, forage production, diversity and density may eventually decline due to continued encroachment of trees on upland meadows and small subalpine grassland.

The desirable riparian vegetation such as *Carex* spp., *Juncus* spp., and other hydric species would increase and trend towards Potential Natural Community (PNC). Riparian areas and meadow areas may still receive extensive use by wildlife during the critical growing season. Wildlife use of the cool season species would continue to be a concern in the spring time, particular in riparian areas rated as functional at risk and non-functional.

The allotment would be rested for five years and only after desired riparian conditions, and range conditions and trend are met, livestock grazing will be allowed to improve another area with resource concerns.

The following management guidelines would apply during occasional instances of incidental use. Proper forage utilization, grazing intensity and duration by livestock would be established to mitigate the effects:

- Range readiness would determine the entry date, which normally occurs after June 15. This would allow the onset of cool season species and production of seed heads.
- Maintain conservative use of 30% to 40% in the uplands to sustain or improve ground cover, increase warm and cool season species, and trend towards PNC with static and upward trend. Studies reviewed by Holechek concludes that managed livestock grazing can enhance rangeland vegetation by accelerating plant succession, increasing plant diversity, increasing plant productivity, and reducing plant mortality during drought. Holechek went on to say that these positive impacts of livestock grazing are most likely to occur when grazing intensities are light to conservative. Conservative use is defined as grazing intensity as depicted as a utilization level at the end of the growing season as 31% to 40% (FSH 2209.13 –Grazing Permit Administration Handbook Chapter 90 – Rangeland Management Decisionmaking, 2007).
- Implement managed livestock grazing system (deferred or rest rotation grazing) to provide rest and deferment from livestock grazing for vegetation recovery
- Maintain 6-8 inches of stubble height at the end of the growing season in riparian areas to minimize soil erosion and maintain or improve watershed condition.

- Livestock distribution would be improved by use of salting, mineral blocks and/or herding. With improved distribution, defoliation effects should be spread across a greater proportion of available forage plants.

### **Burk Allotment:**

#### **Vegetation**

Under this alternative, where potential exists on the allotment, range condition and trend is expected to improve to Fair or better range condition with static or upward trend, except in areas where over-story canopy limits improvement potential. The ability of improvement in range condition and trend will be most affected by climatic conditions.

Management guidelines to mitigate the effects of livestock grazing on vegetation are the same as described for the Big Lake allotment, except that the Burk Allotment will not be initially rested for five years. With the implementation of the management guidelines, plant vigor, composition, density of desirable plants (warm and cool season species) and forage production would continue to improve.

### **Molina Springs Allotment:**

#### **Vegetation**

No significant vegetation changes are expected to occur immediately with the proposed action alternative. Blue grama would continue to be the dominant species. The current ecological status of the allotment is estimated to be moderate similarity. Holechek et al evaluated vegetative differences over a 6 year period on adjoining conservatively grazed and grazing excluded (22 years) on shortgrass rangelands in northwestern New Mexico. The 6 year study (1999-2004) showed little difference in perennial grass standing crop, total vegetation cover, vegetation composition, or rangeland ecological conditions between adjacent areas receiving conservative winter grazing and long-term (22 year) grazing exclusion (Holechek et al, 2006).

Due to fluctuation of precipitation, plant community and soil types on the Molina Springs Allotment, plant diversity and density may increase in some areas and decrease in other areas. The most productive soils would support a plant community with tall vigorous grasses. Establishment of other cool season species are likely to occur but not in great amount. Whereas, on soil with shallow gravelly surface vegetation may not change much in plant diversity and density. Forage production, plant composition, diversity and density may eventually decrease due to continued encroachment of trees on the open grassland.

Based on data collected, it was determined that the plant community on Molina Springs had changed over time to Pinyon/Juniper/Blue grama dominance through state and transition process. Plant composition has not changed significantly over 45 years with light to moderate grazing impacts. We believe the ecosystem is in a steady state, and unlikely to make any transitions even if livestock grazing is completely removed. In comparison with

alternative 1, the degree of changes is expected to be minimal that only through surveys that similarity would be determined.

The following management guidelines for proper forage utilization and grazing intensity by livestock would be established to mitigate the effects:

- Grazing would occur during the dormant season for approximately two months every other year, which would allow for improvement of the great majority of diverse grass and forbs species during the growing season.
- Twelve (12) months of rest from livestock grazing every other year should maximize opportunities for increased vigor and desired species diversity, and increase the occurrence of vegetative ground cover for soil protection. A total of 22 months of rest is provided before the allotment is grazed again, which will also provide for recovery from livestock grazing impact.
- Ten (10) months of deferment during the grazed year, which includes growing season rest for all types of forage vegetation across the allotment.
- Conservative use level of 30% to 40% would be measured at the end of the grazing use period. Frequency and intensity of grazing on the allotment would be managed to allow for adequate vegetative cover to protect soil, produce seed sources and meet wildlife forage needs.
- Livestock distribution would be improved by use of a new well, salting, mineral blocks and/or herding. With improved distribution, defoliation effects should be spread across a greater proportion of available forage plants

### **Bush Creek Allotment:**

Under this alternative, where potential exists on the allotment, range condition and trend is expected to maintain or improve to Fair or better range condition with static or upward trend, except in areas where over-story canopy limit improvement potential. Currently, the upland is rated Fair with some localized areas in Poor range condition. The ability of improvement in range condition and trend will be most affected by climatic conditions. With the implementation of the management guidelines, plant vigor, composition, density of desirable plants (warm and cool season species) and forage production would continue. However, forage production, plant composition, diversity and density may eventually decrease due to continued encroachment of trees on the small open grassland.

Riparian conditions would make some improvement with this alternative particular in those areas currently rated as functioning at risk and non-functional. The rate of recovery is likely to be very slow due to steep slope, water draining into creek from Pueblo Creek road and carrying substantial sediment in Steeple Creek Pasture. In the Bush Creek Pasture, the channel bottom has boulders and contains none or very little riparian vegetation. The desirable riparian vegetation such as *Carex* spp., *Juncus* spp., and other hydric species may eventually increase and trend towards Potential Natural Community (PNC). The whole growing season rest would promote hydric species to increase. However, riparian areas may still receive extensive use by wildlife during the critical growing season. Wildlife use of the cool season species would continue to be a concern in the spring time, particular in riparian areas rated as functional at risk and non-functional.

The following management guidelines for forage utilization and grazing intensity by livestock would be established to mitigate the effects:

- Grazing would occur during the dormant season for the great majority of diverse grass and forb species.
- Maintain conservative use of 30% to 40% in the uplands to sustain or improve ground cover, increase warm and cool season species, and with static and upward trend. Studies reviewed by Holechek concludes that managed livestock grazing can enhance rangeland vegetation by accelerating plant succession, increasing plant diversity, increasing plant productivity, and reducing plant mortality during drought. Holechek went on to say that these positive impacts of livestock grazing are most likely to occur when grazing intensities are light to conservative. Conservative use is defined as grazing intensity as depicted as a utilization level at the end of the growing season as 31% to 40% (FSH 2209.13 –Grazing Permit Administration Handbook Chapter 90 – Rangeland Management Decisionmaking, 2007).
- Implement managed livestock grazing system (rest or deferred rotation grazing) to provide rest and deferment from livestock grazing for recovery of vegetation.
- Use salting, mineral blocks and/or herding to improve livestock distribution. With improved distribution, defoliation effects should be spread across a greater proportion of available forage plants.

## **Cumulative Effects of Alternative 2 - Proposed Action on Vegetation**

Spatial and temporal scales used for analysis and other past, ongoing and future foreseeable actions are the same as described in the Cumulative Effects section of the No Action Alternative for each allotment.

### **Big Lake Allotment:**

Current management of adjacent allotments has been previously described in Cumulative Effects of Alternative 1 –No Action (No Livestock Grazing) on Vegetation. Current management of these allotments is expected to result in long term improvement in vegetative conditions. Improvements resulting from Alternative 2 would add to these beneficial effects. Other activities on the surrounding allotments are resulting in primarily minimal localized adverse effects on vegetation. Improvement in forage quality and quantity is expected to result from this alternative.

Under incidental grazing, the riparian areas would exhibit an upward trend at a faster rate than historical grazing. At this time, the stream banks that were once sheared and trampled would be stabilized and well vegetated with desirable riparian obligates such as sedges and rushes.

Under incidental grazing, the overall plant community would improve due to the placement of livestock on the allotments later than June 1. This alternative provides deferment for cool season species and early season use of the riparian obligates species from livestock impacts. The cool season species component is expected to continue improving over time. With a

later entry date, prolonged use and establishment of special preference for riparian areas would be less likely to occur with the onset of the summer rains. After mid-July, when summer rains bring on warm season production, grazing by livestock and wild ungulates would be less competitive. At this time of the year, wild ungulates are scattered and use is usually not as concentrated. Any concentration by livestock will be dispersed by management activities such as herding and salting.

Other authorized activities in the project area which are likely to continue include camping, hiking, hunting and vehicle use on the unsurfaced roads. Impacts from these activities are short term and primarily consist of minor ground disturbance in popular camping areas. Livestock grazing, in combination with wildlife grazing, recreational activities and natural events can cumulatively affect vegetative condition. When the effects of livestock grazing are added to the effects from the other activities, the overall cumulative effect on upland plant height and cover is only slightly greater than the No Action Alternative. This is because of the initial resting of the allotment for 5 years followed by only occasional incidental use when it would result in improvement on other areas. Cumulatively, condition and trend for upland vegetation is expected to improve when added to other activities and natural events.

#### **Burk Allotment:**

Livestock grazing would continue in the surrounding allotments (Rudd Knoll, Rudd Creek, Udall, Cross Bar, Big Lake and Reservation). Within the past 10 years, the surrounding allotments have been analyzed and vegetative conditions are expected to improve as a result of implementing current management. Improvements resulting from Alternative 2 would add to these beneficial effects

The overall plant community would improve due to the placement of livestock on the allotments later than June 1. This alternative provides deferment for cool season species and early season use of the riparian obligates species from livestock impacts. The cool season species component is expected to continue improving over time. With a later entry date, prolonged use and establishment of special preference for riparian areas would be less likely to occur with the onset of the summer rains. After mid-July, when summer rains bring on warm season production, grazing by livestock and wild ungulates would be less competitive. At this time of the year, wild ungulates are observed to be scattered and use is usually not as concentrated. Any concentration by livestock will be dispersed by management activities such as herding and salting.

The implementation of a rest rotation system would allow the riparian areas to exhibit an upward trend at a faster rate than historical grazing. At this time, the stream banks that were once sheared and trampled would be stabilized and well vegetated with desirable riparian obligates such as sedges and rushes.

Other authorized activities in the project which are likely to continue include camping, hiking, hunting and vehicle use on the unsurfaced roads. Impacts from these activities are short term and primarily consist of minor ground disturbance in popular camping areas.

When the effects of livestock grazing are added to the effects from the other activities, the overall cumulative effect on upland plant height and cover is nearly the same as the No Action Alternative. Management guidelines for livestock grazing are expected to maintain the health and vigor of the upland vegetation over time. Climatic conditions will provide the greatest influence on vegetative condition. Cumulatively, condition and trend for upland vegetation is expected to improve when added to other activities and natural events.

### **Molina Springs Allotment:**

Livestock grazing historically at higher numbers from May to October on two pastures during the early to mid 20<sup>th</sup> century likely resulted in soil erosion and altered vegetative conditions. Livestock grazing would continue in North Escudilla and Picnic allotments which border the Molina Spring Allotment. Picnic Allotment was analyzed in 1999 and is currently operating under a new Allotment Management Plan with current management guidelines. North Escudilla Allotment is scheduled for out year analysis. The North Escudilla allotment has been operating under an Annual Operating Instruction that requires proper grazing and management of the allotment. Long term improvement in vegetative conditions is expected to occur as a result of implementing managed livestock grazing.

Continuing with the short duration grazing every other year and implementation of conservation use level of 30% to 40% and better livestock distribution, any improvement in forage production and litter would benefit ground cover, reduce wind and water erosion and improve water quality. However, changes in livestock management are not expected to influence conditions in any significant way.

The project area provides winter wildlife habitat and use by wild ungulates will continue on the allotment. The encroachment of pinyon/juniper will continue and may eventually close in the open grassland areas on the allotment in the absence of woodland treatments.

Other authorized activities in the project which are likely to continue include camping, hiking, hunting and vehicle use on the unsurfaced roads. Impacts from these activities are short term and primarily consist of minor ground disturbance in popular camping areas.

When the effects of livestock grazing are added to the effects from the other activities, the overall cumulative effect on upland plant height and cover is nearly the same as the No Action Alternative. Management guidelines for livestock grazing are expected to maintain the health and vigor of the upland vegetation over time. Climatic conditions will provide the greatest influence on vegetative condition. Cumulatively, condition and trend for upland vegetation is expected to improve when added to other activities and natural events.

### **Bush Creek Allotment:**

Current management of the adjacent Red Hill, Cow Flat and Bobcat-Johnson allotments has been previously described in Cumulative Effects of Alternative 1 –No Action (No Livestock Grazing) on Vegetation. Current management of these allotments is expected to result in long term improvement in vegetative conditions. Improvements resulting from Alternative 2 would add to these beneficial effects.

The overall plant community would improve due to the placement of livestock on the allotments during the dormant season. Continuing with dormant season grazing and implementing conservation use level of 30% to 40% and getting better livestock distribution, any improvement in forage production and litter would benefit ground cover, reduce wind and water erosion and improve water quality. Under managed livestock grazing during the dormant season, any prolonged use and forage preference for riparian areas and upland would be less likely to occur. This alternative would provide deferment for cool season species and early season use of the riparian obligates from livestock impacts.

The encroachment of pinyon/juniper would continue and may eventually close in open grassland in the absence of woodland treatment.

Other authorized activities in the project which are likely to continue include camping, hiking, hunting and vehicle use on the unsurfaced roads. Impacts from these activities are short term and primarily consist of minor ground disturbance in popular camping areas.

Under managed livestock grazing during the dormant season, any prolonged use and forage preference for riparian areas and upland would be less likely to occur. This alternative would provide deferment for cool season species and early season use of the riparian obligates from livestock impacts.

When the effects of livestock grazing are added to the effects from the other activities, the overall cumulative effect on vegetative conditions is nearly the same as the No Action Alternative. Management guidelines for livestock grazing are expected to maintain the health and vigor of the upland vegetation over time. Climatic conditions will provide the greatest influence on vegetative condition. Cumulatively, condition and trend for vegetation is expected to improve when added to other activities and natural events.

## **Wildlife**

### **Affected Environment**

All Forest Management Indicator Species (MIS) were reviewed during the analysis to determine the appropriate MIS to be evaluated at the project level. Threatened, Endangered, Candidate and Sensitive species on the allotments or potentially affected by the alternatives were also identified and analyzed. A list of these species and associated effects of the alternatives is included in the Wildlife and Fisheries Specialist's Reports and Biological Assessment and Evaluation Reports (PR #'s 47, 49, and 55) and is summarized below.

**Burk Allotment:** The Burk allotment consists of high elevation open grassland (Management area 4) with only small islands of mixed conifer forested areas. The topography consists of rolling hills with non-forested riparian habitat existing in the drainages. No terrestrial species with Federal status exist on the allotment. A Bald eagle nest site is located on Crescent Lake Knoll, 100 meters east of Railroad pasture on the allotment. Bald Eagles were recently de-listed, however special management considerations are still required. Management Indicator Species (MIS) for grassland habitat are antelope and elk.

This allotment provides important fawning habitat for antelope and productive summer range for elk.

There are no Threatened, Endangered, Candidate or Sensitive fish, reptiles, amphibians, clams, snails, or insects documented on Burk Allotment. There is potential, suitable and occupied habitat for some fish, reptiles, insects, clams, snails and amphibians designated as threatened and sensitive on the allotment and in the analysis area. Threatened species known to occur in the analysis area include loach minnow and its critical habitat, Apache trout and Chiricahua leopard frog. Sensitive species known to occur include California floater, Three Forks springsnail, White Mountains water penny beetle, and roundtail chub. Potential or suitable habitat is present either on the allotment and/or downstream in the analysis area for several other insects, reptiles and amphibians in addition to the species listed above. Aquatic macroinvertebrates (MIS) are found in all perennial drainages in the analysis area.

Perennial aquatic habitats on the allotment include Seven Springs Draw, Chambers Draw and the Big Lake tributary to the North Fork of the East Fork Black River (NFEFBR). Additionally, downstream perennial habitats considered as part of the analysis area include portions of the NFEFBR, West Fork Black River (WFBR) and the East Fork Black River (EFBR). Based upon the 2002 survey results, the EFBR does not meet Forest Plan standards and guidelines due to streambank instability, unsatisfactory riparian condition and high sediment levels.

On the allotment, the perennial portion of Seven Springs Draw may support a similar species assemblage to what is found in the upper NFEFBR which includes: speckled dace, desert sucker, Sonora sucker and fathead minnows. Additionally, the NFEFBR supports high numbers of crayfish.

The WFBR contains desert sucker, Sonora sucker, speckled dace, brown trout, rainbow trout, and Apache trout. The upper WFBR is a designated Apache trout recovery stream.

The EFBR supports White Mountains water penny beetle, roundtail chub, Three Forks springsnail, California floater, speckled dace, desert sucker, Sonora sucker, brown trout, rainbow trout and loach minnow.

**Big Lake Allotment:** The Big Lake allotment predominantly consists of mixed conifer forest with approximately 15% of the allotment in high elevation open grassland. The topography of the grassland is flat with steep slopes on the sides of drainages and in the forested portion of the allotment. Riparian habitat exists in the majority of the drainages. The only species with Federal status on the allotment is the Mexican spotted owl (MSO). There are two small portions of two MSO Protected Activity Centers (PACs) within the allotment (approximately 115 acres of the OD PAC and 15 acres of the Three Forks PAC). Approximately 40% of the allotment is considered potential MSO foraging habitat. There is no known Northern Goshawk on the allotment, however; because the majority of the allotment is forested habitat for the sensitive species Northern Goshawk is present. MIS for this allotment includes; elk, turkey, antelope and Northern Goshawk. The allotment is within important big game summer range habitat.

There are no Threatened, Endangered, Candidate or Sensitive fish, reptiles, amphibians, clams, snails, or insects documented on the Big Lake Allotment. See the species assemblage described for Burk Allotment which also applies to Big Lake Allotment.

Perennial aquatic habitats on the allotment include unnamed tributaries to the EFBR in Blanca Cienega Pasture and the Big Lake tributary to the NFEFBR. Additionally, downstream perennial habitats considered as part of the analysis area include portions of the NFEFBR, and the EFBR. Habitat conditions and aquatic species assemblage are the same as described for the Burk Allotment for the EFBR and the NFEFBR drainages.

**Molina Springs:** Molina Springs Allotment consists of lower elevation open grassland with stands of pinyon/juniper or woodland type (Management area 2). Much of the open grassland habitat is being invaded by juniper and pinyon trees, reducing habitat value for antelope. The topography is generally flat and no riparian habitat except for one small spring that has been developed with a pipeline and drinkers for livestock watering sources. No species with Federal status is located on the allotment. MIS for this allotment includes; Plain Titmouse, deer, antelope, and elk. This allotment is within important winter range habitat for big game species.

There are no Threatened, Endangered, Candidate or Sensitive fish, reptiles, amphibians, clams, snails, or insects documented on Burk Allotment. There is potential, suitable and occupied habitat for some fish, reptiles, insects, clams, snails and amphibians designated as threatened and sensitive on the allotment and in the analysis area. Threatened species known to occur in the analysis area include Little Colorado spinedace and its critical habitat. Sensitive species known to occur include Little Colorado sucker. Potential or suitable habitat is present either on the allotment and/or downstream in the analysis area for several other insects, reptiles and amphibians in addition to the species listed above. Aquatic macroinvertebrates (MIS) are found in all perennial drainages in the analysis area.

No perennial habitats occur on the allotment. Within the analysis area, habitats include sections of Nutrioso Creek and the Little Colorado River. Based upon the 1994 survey results, lower Nutrioso Creek does not meet Forest Plan standards and guidelines due to streambank instability, unsatisfactory riparian condition and high sediment levels. Species found in Nutrioso Creek include: crayfish, speckled dace, Little Colorado spinedace, bluehead sucker, fathead minnow, green sunfish, cutthroat, brown and rainbow trout.

**Bush Creek Allotment:** Bush Creek Allotment is a small allotment within the Blue River drainage in pinyon/juniper habitat type in steep topography. The only known species with Federal status on the allotment is the MSO. There is a small portion (approximately 45 acres) of one MSO PAC on the allotment. Other species of concern that could use habitat on the allotment include: bald eagle and peregrine falcon potential foraging habitat, potential jaguar movement corridor in the Blue Drainage, and potential South Western Willow Flycatcher dispersing habitat in the Blue drainage. All these species mentioned utilize and depend on riparian habitat. The existing condition of the riparian habitat is degraded as result of many factors and not completely attributed to livestock grazing (PR # 51). MIS for this allotment includes the Plain Titmouse and deer. The allotment is within important winter range habitat for many big game species.

There are no Threatened, Endangered, Candidate or Sensitive fish, reptiles, amphibians, clams, snails, or insects documented on Burk Allotment. There is potential, suitable and occupied habitat for some fish, reptiles, insects, clams, snails and amphibians designated as threatened and sensitive on the allotment and in the analysis area. Threatened species known to occur in the analysis area include loach minnow and its critical habitat. Sensitive species known to occur include Southwestern toad, narrow-headed garter snake, and possibly roundtail chub. Potential or suitable habitat is present either on the allotment and/or downstream in the analysis area for several other insects, reptiles and amphibians in addition to the species listed above. Aquatic macroinvertebrates (MIS) are found in all perennial drainages in the analysis area.

On the allotment, the lower portion of Steeple Creek is likely perennial in most years. Within the analysis area, other perennial habitats include the Blue River. Species documented in the portions of the Blue River within the analysis area include: rainbow trout, longfin dace, speckled dace, Sonora sucker, desert sucker and loach minnow. Roundtail chub and possibly razorback sucker may also be present. Surveys of Steeple Creek have found it to be fishless to date.

## **Environmental Consequences**

### **Direct and Indirect Effects of Alternative 1-No Action (No Livestock Grazing) on Wildlife**

This alternative would not permit livestock grazing on the allotment. This would reduce utilization of herbaceous and browse plant species substantially and provide more forage and cover for wildlife. The opportunity for recruitment of individuals into populations would be higher with the implementation of this alternative compared to any of the other alternatives proposed. The implementation of this alternative would provide the greatest opportunity for habitat improvement for all plant and wildlife species.

The primary benefit of this alternative is that recovery of range, soils, watershed and riparian conditions would be quicker than with any of the other alternatives. Increases in ungrazed available herbaceous and browse forage would be expected to result in higher densities of small mammals, passerine birds, game animals and other wildlife species that depend on grasses, forbs, leaders on woody shrubs and mast for food. Increases in these species populations would have beneficial effects on endangered, threatened, proposed and sensitive species (TES), Management Indicator Species (MIS), and other wildlife species that use the allotment. More abundant food enhances the physiological condition of animals, which would provide an opportunity for higher birth or clutch rates and better survival of young. The survival rate of Northern Goshawk young, for example, has been shown to be significantly higher when prey is abundant and the time parent birds must be away from the nest to search for food is minimal (Dewey and Kennedy 1997). Voles, important in the diet of Mexican Spotted Owls, are known to be more abundant in meadows where grasses provide quality forage and cover (Ward and Block 1995).

Habitat for MIS and game species would also improve under this alternative. Turkey poult depend on grasshoppers and other insects during the spring and summer and would likely experience higher survival rates if this alternative is implemented. Whitetail and mule deer would also benefit from the reduced competition for forage and improvements in cover for fawning, thermal regulation, and escape.

Amphibians, reptiles, insects, small mammals, and birds that rely on riparian herbaceous ground cover would become more abundant as cover increases in amount and density. This could, in turn, increase predator populations as well.

With the removal of livestock, conditions in riparian areas would improve the quickest. Herbaceous riparian vegetation would have the opportunity to increase in density and vigor, although grazing by elk could still be detrimental.

Because healthy and abundant riparian vegetation slows water flow, promotes lower water temperatures, and reduces sediments in the water, habitats for amphibians, aquatic invertebrates, and fish would be improved. Dense, vigorous riparian vegetation will maximize habitat availability for the riparian dependent insects and reptiles identified as potentially occurring in the analysis area. Over time, increased riparian ground cover would reduce erosion and sediment delivered to streams, thus reducing impacts to aquatic species. Reductions in suspended sediments and bedloads to more natural levels will benefit habitats for fish, amphibians, reptiles and aquatic macroinvertebrates.

This alternative would have the greatest potential for restoration of the riparian areas to its full potential as compared to the other alternative. Threatened species found within the analysis area including Little Colorado spinedace and loach minnow, and their critical habitats, Chiricahua leopard frog and Apache trout would benefit most under this non-use alternative. Sensitive species identified as occurring in the analysis area and the management indicator species (MIS) group, aquatic macroinvertebrates, would benefit more under this alternative than alternative 2 with reduction in erosion rates to near natural levels and the removal of direct impacts such as trampling of plants by livestock. No direct impacts to species or their habitats by livestock would occur. This alternative would best meet the needs of aquatic and riparian associated species by not only expediting improvements to riparian recovery through removal of livestock grazing direct and indirect impacts to stream channels, but also through the long-term removal of all potential livestock impacts to aquatic habitats in the future. No adverse effects to any of the aquatic TEP/Sensitive/MIS species are expected with the implementation of this alternative.

### **Cumulative Effects of Alternative 1-No Action (No Livestock Grazing) on Wildlife**

Cumulative effects consideration will include all the allotments analyzed in this document and the surrounding allotments. A temporal boundary of ten years was used to try and capture the measurable changes in livestock management that have occurred across the District and Forest. The area analyzed for aquatic species of concern covered in this analysis includes Big Lake, Burk, Molina Springs and Bush Creek Allotments and all perennial habitats extending downstream from the allotments for 15 miles with a temporal timescale of 10 years.

Descriptions of other past, present and foreseeable future actions for each allotment are included in the section of this document titled Cumulative Effects for Alternative 2 -Proposed Action on Wildlife, which begins on page 67.

Cumulatively, of the two proposed alternatives, the selection and implementation of this alternative would best meet the short (one to three years) and long term (10+ years) needs of the greatest number of wildlife and plant populations in the analysis area (Allotments and adjacent allotments). There would not be any expected direct, indirect or additional cumulative adverse effects to wildlife and plant populations because livestock are not permitted. With the elimination of livestock from the allotment, livestock impacts to streamside habitats will be removed and there will be a reduction in sediment delivery to aquatic habitats. Collectively, when combined with the ongoing activities in the analysis area, there could be a net gain in habitat conditions for aquatic species in the analysis area that is greater than what is anticipated for Alternative 2.

For aquatic species, over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative sediment inputs from other ongoing activities discussed under Alternative 2 for each allotment, will occur, but sedimentation effects from implementation of this action are expected to be at near natural levels. Substantial improvements over existing conditions should occur on the allotment and are expected to benefit aquatic species and the suitability of habitats, including substrate embeddedness and water quality parameters.

Directly and/or indirectly, all TEP/Sensitive/MIS species would benefit the most by the selection and implementation of this alternative because of predicted improvements in their habitat capability, increased prey species habitat capability and result in the highest probability in an increased population trend. The adjacent allotments have either been retired from livestock grazing or have recently undergone analysis to update to more conservative grazing management which has resulted in improved habitat conditions. In general, benefits would occur as follows:

- 1) watershed, riparian, range, and soil conditions would have the greatest opportunity for achieving and maintaining ecological potential;
- 2) increased diversity, abundance and distribution of native herbaceous and woody plant species used for a) foraging, b) nesting, c) roosting, d) denning, e) brood rearing, f) travel, and g) hiding and loafing cover;
- 3) increased abundance and distribution of insect species, due to expected improvements in riparian plant species composition and distribution, that would be prey species for passerine birds, rodents, reptiles, fishes, and amphibians;
- 4) increased abundance, and distribution of reptiles, amphibians, fishes, small mammals, and passerine birds that would be prey species for raptors (Mexican Spotted Owl, American Peregrine Falcon, and Northern Goshawk), turkeys, reptiles, and carnivores (fox, coyote, jaguar, Mexican gray wolf, and bear);
- 5) improvements in overhanging streambanks that provide hiding and foraging cover for fish species, reptiles, amphibians, and rodents;
- 6) direct and indirect effects to fish species and their habitats from continued livestock activities would be eliminated, although complete recovery of the hydrologic function in the allotment from the past impact of livestock is likely to require decades (e.g.

- PFC analyses), and
- 7) reduced amounts of suspended sediments and bedloads for improved habitat for macroinvertebrates, fishes, reptiles, and amphibians.

The primary benefit of this alternative is that recovery of riparian conditions would be quicker than with any of the other alternatives. Amphibians, reptiles, and insects that rely on herbaceous ground cover in riparian areas would become more abundant as cover increases in density. Because healthy and abundant riparian vegetation slows water flow, promotes lower water temperatures, and reduces sediments in the water, the habitat for amphibians, aquatic invertebrates, and fish would be improved. This alternative would have the greatest potential for restoration of the greatest number of riparian areas as compared to the proposed action. This alternative would best meet the needs of fish and their habitats by removing impediments to riparian recovery that may be occurring because of livestock grazing and trampling.

Cumulatively, alternative 1 adds no additional adverse impacts to species of concern within the analysis area. Direct and indirect beneficial effects to TES and MIS species may be realized from the implementation of this alternative, cumulatively in the analysis areas. With the elimination of livestock from the allotments, livestock impacts to streamside habitats will be removed and there will be a reduction in sediment delivery to aquatic habitats.

Over the long term, increased vigor and density of riparian ground cover would reduce erosion and sediment delivered to streams. This would be expected to increase abundance and possibly diversity of aquatic invertebrates. In addition, this would mean less embeddedness in stream substrates thereby maintaining more of these habitats for spawning and egg laying by these and other species. Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative sediment inputs from ongoing activities will occur but sedimentation effects from implementation of this action are expected to be at near natural levels. Improvements over existing conditions should occur on the allotment and are expected to benefit aquatic species and the suitability of habitats, including substrate embeddedness and water quality parameters.

## **Direct and Indirect Effects of Alternative 2-Proposed Action on Wildlife**

### **Big Lake**

This alternative would first defer all livestock grazing until the unsatisfactory riparian conditions that occur on portions of the allotment have recovered. After recovery of riparian habitat, livestock grazing could occur in a manner that maintains the improved riparian condition. Stocking levels would be based on meeting resource protection and meeting 100% of estimated wildlife forage needs. The wild ungulate populations were estimated and all forage needs were allocated. The forage and habitat needs of small mammals important as prey base were also allocated. These forage allocations would result in reducing direct effects to the wildlife resource.

Livestock entry dates for incidental use by livestock would be based on range readiness but is estimated to be June 15. The grazing season can last through the end of October. The

estimated entry date better reflects when the range could be ready compared to the current early season entry date. The later on date will help reduce indirect wildlife/livestock forage competition in riparian habitat.

With the implementation of this alternative, riparian conditions are expected to improve in a manner exactly like what is expected under alternative 1 for at least the first five years. Five years after implementation of alternative 2, if riparian conditions are satisfactory, incidental livestock grazing could occur on the allotment on a sporadic short-term basis in order to meet defined resource objectives elsewhere. Grazing may resume on a limited basis only when riparian is ranked as satisfactory or proper functioning condition (PFC) and can be maintained as such with intermittent livestock grazing pressure.

Since the allotment will be rested a minimum of five years and also must achieve satisfactory riparian conditions before and during any livestock grazing activities, adverse effects to TEP/Sensitive/MIS species related to elevated levels of sediment delivery to streams are predicted to be discountable and will not measurably affect the species of concern or their habitats. Monitoring described in the Monitoring Plan will document improvements or declines in watershed conditions, including riparian, from which management adjustments can be made in order to achieve desired conditions.

TEP – A Biological Assessment (BA) was prepared for this alternative in 2008. The BA concluded that the implementation of this alternative: is not likely to adversely affect Mexican spotted owl, is not likely to jeopardize the continued existence of the Mexican gray wolf. The proposed action is also not likely to adversely affect Apache trout, loach minnow or its critical habitat and Chiricahua leopard frog. Informal consultation has been initiated, but concurrence has not been finalized by the U.S. Fish & Wildlife Service as of this date.

The proposed livestock management strategy will reduce direct and indirect effects to riparian habitat by providing total livestock rest until riparian habitat improves. This is intended to improve habitat conditions for prey base species. This proposed management will result in improved habitat conditions on the allotment for TEP species.

SENSITIVE – Sensitive species, not otherwise listed or proposed for federal listing are present or have suitable habitat present on the allotment. These species have been analyzed in the Biological Evaluation (BE). The BE determined that continued grazing of livestock on the Forests would impact many of these species to some degree but would not result in a trend toward federal listing or the loss of population viability for any group. Sensitive species may be locally impacted due to suitable habitat being present thereby allowing for the possibility that the species may also be present, but impacts will not be to the extent that species' viability will be affected given the limited habitat that could be affected on the allotment as compared to their total range. This applies to the Mexican and narrow-headed garter snakes, false ameleus mayfly, Arizona copper, spotted skipperling and mountain silverspot butterfly. The remaining species including the roundtail chub, White Mountains water penny, California floater and Three Forks Springsnail cannot be affected on the allotment since no suitable habitat is present, and will not be measurably affected downstream.

The proposed action would result in more riparian habitat improvements when compared to existing management, but allows for an increased potential to impact sensitive species when compared to the No Action alternative. Both alternatives would result in riparian habitat recovery in the same time frames.

MIS- Each of these species would be directly and/or indirectly, impacted by varying degrees. However, the proposed action will substantially improve habitat conditions for all MIS species because complete livestock rest, until riparian habitat conditions are restored will restore their potential the quickest. After that is achieved, improved habitat conditions will be maintained by conservative and only occasional livestock grazing. Impacts to grassland species such as antelope will be minimal under this action alternative because of the later planning on date and additional pasture rest expected. The two features will provide for reduced potential competition and disturbance during the critical fawning period.

Riparian obligate species habitat capability would improve as quickly as the no action alternative. The proposed livestock management strategies should maintain existing satisfactory conditions and improve unsatisfactory riparian conditions on the allotment. Implementation of the proposed action on the Big Lake Allotment will minimize impacts to species but impacts such as trampling of or grazing upon riparian vegetation could occur from livestock on the allotment. Proposed livestock management will prevent impacts to macroinvertebrate species on the Big Lake Allotment for at least the first 5 years and longer, if necessary, for riparian to recover. Improvements in riparian density and vigor will benefit aquatic macroinvertebrates by maintaining lower stream temperatures, providing increased quantities of detrital food sources and maintain better water quality and greater channel stability as sedimentation levels decline. Additionally improved watershed conditions will reduce sedimentation levels within the drainage basins and enhance aquatic macroinvertebrate habitat conditions. With the implementation of this alternative, habitat and population trends for aquatic macroinvertebrates will be improved at the project and Forest levels. As compared to current management, the proposed actions will improve habitats for macroinvertebrates resulting in static-upward trend for this MIS.

This alternative would improve overall habitat conditions as quickly as the no action alternative and maintain improved habitat conditions trends and population viability of MIS that occur or may occur (potential habitat) on the allotment. This alternative also has the potential to improve habitat conditions on other parts of the District because the intent is to allow livestock use when rest would improve wildlife habitat conditions on other allotments.

### **Burk Allotment**

This action alternative has features that are expected to reduce impacts to wildlife habitats over the existing grazing system. The most significant of the changes that is expected to improve resource conditions is the addition of SU pasture in the allotment and not increasing the number of livestock that will graze the allotment. Stocking levels would be based on meeting resource protection and meeting 100% of estimated wildlife forage needs. The wild

ungulate populations were estimated and all forage needs were allocated. The forage and habitat needs of small mammals important as prey base were also allocated.

Livestock entry dates will be based on range readiness but estimated to be June 15 thru the end of October. These planning dates better reflect when the range could be ready compared to the current early season entry date. The later on dates will help reduce wildlife/livestock forage competition in riparian habitat.

Monitoring described in the Monitoring Plan will document improvements or declines in watershed conditions, including riparian, from which management adjustments can be made in order to achieve desired conditions.

This alternative has less potential for restoration of the riparian areas to their full potential as compared to alternative 1. Nonetheless, riparian is expected to improve where necessary to at least satisfactory condition. Satisfactory riparian condition combined with improvements to upland watershed condition will minimize adverse effects to species of concern and their critical habitats. Good riparian condition would likely be achieved in most areas that are not heavily impacted by wild ungulates. Healthy stands of sedges and rushes would have the opportunity to increase in density and vigor, although grazing by elk could still be detrimental. Effects to species of concern will be higher than those expected under alternative 1 with livestock impacts occurring on the allotment.

Indirect effects to downstream aquatic TES species and MIS from livestock grazing can include maintenance of elevated levels of sediment within the drainages resulting from mechanical impacts to stream banks and grazing impacts to riparian and upland vegetation. Increased levels of instream sediment can degrade water quality and alter physical parameters of aquatic habitat for these species. Although levels of erosion are expected to be above those found in the absence of livestock, livestock management on the allotment is expected to produce good riparian and improved upland conditions resulting in no measurable effects to aquatic species of concern or their critical habitats. The proposed livestock management strategy should reduce indirect effects to aquatic species to a discountable level by improving riparian and overall watershed conditions from current state and limiting sediment contribution to stream habitats from both riparian and uplands. Adverse effects to aquatic TES and MIS species are not likely to occur with the implementation of this alternative.

TEP – A Biological Assessment (BA) was prepared for this alternative during 2008. The BA concluded that the implementation of this alternative: is not likely to jeopardize the continued existence of the Mexican gray wolf. The proposed action is also not likely to adversely affect Apache trout, loach minnow or its critical habitat and Chiricahua leopard frog. Informal consultation has been initiated, but concurrence has not been finalized by the U.S. Fish & Wildlife Service as of this date.

SENSITIVE – Sensitive species, not otherwise listed or proposed for federal listing are present or have suitable habitat present on the allotment. These species have been analyzed in the attached BE. The BE determined that continued grazing of livestock on the Forests

would impact many of these species to some degree but would not result in a trend toward federal listing or the loss of population viability for any group. The proposed action would result in further reducing potential impacts to habitat and improving habitat conditions. The proposed action alternative is intended to accelerate riparian habitat recovery when compared to existing grazing, but will not recover riparian habitat as quickly as the no action alternative. One sensitive species with special status occurring adjacent to the Burk allotment is the Bald Eagle. As required, the proposed action will include measures required in the National Bald Eagle Management Plan and the Conservation Assessment and Strategy for the Bald Eagle in Arizona to insure the action does not result in disturbance.

Sensitive species may be locally impacted due to suitable habitat being present thereby allowing for the possibility that the species may also be present, but impacts will not be to the extent that species' viability will be affected given the limited habitat that could be affected on the allotment as compared to their total range. This applies to the Mexican and narrow-headed garter snakes, false ameleus mayfly, Arizona copper, spotted skipperling and mountain silverspot butterfly. The remaining species including the roundtail chub, White Mountains water penny, California floater and Three Forks Springsnail cannot be affected on the allotment since no suitable habitat is present, and will not be measurably affected downstream.

MIS- Each of these species would be directly and/or indirectly, and/or cumulatively impacted, by varying degrees. Forest/grassland species could be impacted by direct forage competition with livestock when livestock grazing occurs. This conflict will be reduced compared existing management because of the lower utilization levels established and increased pasture rest. Impacts to grassland species such as antelope will be reduced compared to existing management because of the later planning on date and additional pasture rest expected. The two features will provide for reduced potential competition and disturbance during the critical fawning period.

Riparian obligate species habitat capability is also expected to improve compared to existing management because of the additional pasture rest. Riparian conditions are expected to improve, where feasible, to at least satisfactory condition. Satisfactory riparian condition combined with improvements to upland watershed condition will minimize adverse effects to aquatic species of concern and their critical habitats. Although levels of erosion are expected to be above those found in the absence of livestock, livestock management on Burk Allotment is expected to produce good riparian and improved upland conditions resulting in no measurable downstream effects to aquatic macroinvertebrates.

This alternative has less potential for restoration of the riparian areas to their full potential as compared to alternative 1. Alternative 2 would improve overall habitat conditions quicker than existing management and could result in increasing populations; however the no action alternative would improve habitat condition the quickest. This proposed alternative will improve and maintain habitat conditions trends and population viability of MIS that occur or may occur (potential habitat) on the allotment.

## **Molina Springs Allotment**

The proposed action is similar to the current management that has been in place. Stocking levels would be based on meeting resource protection and meeting 100% of estimated wildlife forage needs. The wild ungulate populations were estimated and all forage needs were allocated. The forage and habitat needs of small mammals important as prey base were also allocated.

Livestock entry dates will occur when plants are dormant which generally results in reduced impacts to forage species. Dormant use allow for undisturbed plant growth and reproduction. The allotment is scheduled for use only every other year which helps reduce wildlife/livestock forage competition during the years rested. Conflicts for winter forage could still occur during the years grazed, however; only one other small allotment is grazed during the winter.

Implementation of this alternative allows for somewhat less ground cover on the allotment as compared to alternative 1. Since this is a dormant season allotment utilized every other year, the impacts to watershed are diminished and are not expected to be at a level to adversely affect aquatic species of concern. Under this grazing scheme, good riparian condition would continue to be maintained in the lowermost section of Molina Springs Draw which drains into Nutrioso Creek. This downstream section of Nutrioso Creek is dry most of the year.

This alternative should maintain current watershed conditions through continuation of groundcover to the greatest extent possible with the current tree density and herbaceous species composition, but is slightly less effective as compared to alternative 1. Little Colorado spinedace/ critical habitat and sensitive species identified as occurring in the analysis area, as well as MIS species would not likely benefit as much as with alternative 1, but these differences are not expected to be significant. This alternative would meet the needs of aquatic and riparian associated species by maintaining or improving watershed, soils, and riparian within their capabilities. No adverse effects to any of the TEP/Sensitive/MIS species are expected with the implementation of this alternative.

TEP – A BA was prepared for this alternative during 2008. The BA concluded that the implementation of this alternative: not likely to adversely affect Southwestern willow flycatcher, is not likely to jeopardize the continued existence of the Mexican gray wolf. The proposed action is also not likely to adversely affect Little Colorado spinedace or its critical habitat and Chiricahua leopard frog. Informal consultation has been initiated, but concurrence has not been finalized by the U.S. Fish & Wildlife Service as of this date.

SENSITIVE – Sensitive species, not otherwise listed or proposed for federal listing are present or have suitable habitat present on the allotment. These species have been analyzed in the attached BE. The BE determined that continued grazing of livestock on the Forests would impact many of these species to some degree but would not result in a trend toward federal listing or the loss of population viability for any group. Dormant season grazing every other year will help reduce direct and indirect impacts to sensitive species and habitat.

The proposed action could result in more potential impacts to sensitive species than the No Action alternative.

Sensitive species may be locally impacted due to suitable habitat being present thereby allowing for the possibility that the species may also be present, but not to the extent that species viability will be affected. This applies to the spotted skipperling. The remaining species including the Little Colorado sucker, narrow-headed garter snake and Mexican garter snake cannot be affected on the allotment since no suitable habitat is present, and will not be measurably affected downstream.

MIS- Each of these species would be directly and/or indirectly impacted, by varying degrees. Forest/woodland/grassland species could be impacted by direct forage competition with livestock when livestock grazing occurs. This conflict is not expected to be significant because this is only one of two small allotments used during the winter and the allotment is only used every other year. The dormant use and every other year pasture rest will provide for reduced potential competition and disturbance during the critical fawning period.

Livestock management on Molina Springs will minimize impacts to downstream aquatic MIS species by limiting the extent and frequency of grazing impacts. More information on expected effects for Little Colorado spinedace can be found in the BA for the Molina Springs Allotment (PR # 47).

This alternative would improve overall habitat conditions, however the no action alternative would improve habitat condition the quickest. This proposed alternative will improve and maintain habitat conditions trends and population viability of MIS that occur or may occur (potential habitat) on the allotment.

### **Bush Creek Allotment**

This action alternative has features that are expected to reduce impacts to wildlife habitats over the existing grazing system. The most significant of the changes is no livestock grazing in riparian habitat until the existing dike along Bush Creek is restored. Stocking levels would be based on meeting resource protection and meeting 100% of estimated wildlife forage needs. The wild ungulate populations were estimated and all forage needs were allocated. The forage and habitat needs of small mammals important as prey base were also allocated.

Livestock entry dates will occur during the herbaceous dormant season which is generally results in fewer impacts to grazed plants. The later on dates will help reduce wildlife/livestock forage competition on herbaceous plants however competition for browse plants could still occur.

This alternative has less potential for restoration of the riparian areas to their full potential as compared to alternative 1. Nonetheless, riparian condition is expected to improve, where necessary, to at least satisfactory condition. Satisfactory riparian condition combined with improvements to upland watershed condition will minimize adverse effects to species of concern and their critical habitats. Effects to species of concern will be higher than those expected under alternative 1 with livestock impacts occurring on the allotment.

Implementation of this alternative allows for somewhat less ground cover on the allotment as compared to alternative 1. Since this is a primarily dormant season allotment historically utilized by 4 horses (23 AUMs) and currently proposed for 11 to 27 AUMs, the impacts to the watershed are diminished and are not expected to be at a level to adversely affect aquatic species of concern. Under this grazing scheme, riparian in Bush Creek will not be available to livestock until some of the floodplain function is restored by removal of a dike along the creek. Steeple Creek will continue to receive little impact from livestock grazing. Riparian improvements are expected with the implementation of this alternative and will be tracked through monitoring.

This alternative will minimize adverse impacts to the soils on the allotment. This will be accomplished through maintenance of groundcover to the greatest extent possible with the current soils, tree density and herbaceous species composition. Once implemented, alternative 2 will be slightly less effective when compared to alternative 1, at maintaining watershed conditions due to use by livestock. Loach minnow and sensitive species identified as occurring in the analysis area as well as MIS species would not likely benefit as much as with alternative 1, but these differences are not predicted to be significant. This alternative would meet the needs of aquatic and riparian associated species by maintaining or improving watershed, soils, and riparian. No adverse effects to any of the TEP/Sensitive/MIS species are expected with the implementation of this alternative.

TEP – A BA was prepared for this alternative during 2008. The BA concluded that the implementation of this alternative: may effect, not likely to adversely affect Mexican spotted owl, may effect, not likely to adversely affect Southwestern willow Flycatcher, is not likely to jeopardize the continued existence of the Mexican gray wolf. The proposed action is also not likely to adversely affect loach minnow or its critical habitat and Chiricahua leopard frog. Informal consultation has been initiated, but concurrence has not been finalized by the U.S. Fish & Wildlife Service as of this date.

SENSITIVE – Sensitive species, not otherwise listed or proposed for federal listing are present or have suitable habitat present on the allotment. These species have been analyzed in the attached BE. The BE determined that continued grazing of livestock on the Forests would impact many of these species to some degree but would not result in a trend toward federal listing or the loss of population viability for any group.

Sensitive species may be locally impacted due to suitable habitat being present thereby allowing for the possibility that the species may also be present, but not to the extent that species viability will be affected. This applies to the Mexican and narrow-headed garter snakes, Arizona Southwestern toad, Maricopa tiger beetle, Arizona copper, spotted skipperling and orange spotted skipper. Species including the roundtail chub and false ameletus mayfly, cannot be affected on the allotment since no suitable habitat is present, and will not be measurably affected downstream. The proposed action could result in more potential impacts to sensitive species than the No Action alternative. The proposed action alternative is intended to accelerate riparian habitat recovery when compared to existing grazing.

MIS- Each of these species would be directly and/or indirectly, and/or cumulatively impacted, by varying degrees through the various mechanisms discussed above. Forest/woodland species could be impacted by direct forage competition with livestock when livestock grazing occurs. This conflict is expected to be insignificant because of the use during the dormant season, the small size of the allotment, and the fact that livestock grazing will be excluded from riparian habitat. This alternative would improve overall habitat conditions quicker than existing management, however the no action alternative would improve habitat condition the quickest. This proposed alternative will improve and maintain habitat conditions trends and population viability of MIS that occur or may occur (potential habitat) on the allotment.

Although alternative 1 ranks higher for providing the quickest recovery to riparian habitats, with the implementation of Alternative 2 habitat and population trends for aquatic macroinvertebrates will be improved at the project and Forest levels. As compared to current management, the proposed actions will improve habitats for macroinvertebrates resulting in static-upward trend for this MIS. The proposed action for Bush Creek Allotment excludes Bush Creek from livestock grazing and continues low impact grazing for Steeple Creek.

### **Cumulative Effects of Alternative 2-Proposed Action on Wildlife**

Cumulative effects consideration will include all the allotments analyzed in this document and the surrounding allotments. A temporal boundary of ten years will be used to try and capture the measurable changes in livestock management that have occurred across the District and Forest. The analysis area for aquatic species of concern covered in this analysis includes Big Lake, Burk, Molina Springs and Bush Creek Allotments and all perennial habitats extending downstream from the allotments for 15 miles with a temporal timescale of 10 years.

Direct negative effects at some level will occur with livestock grazing to wildlife species (TES, MIS, and big game) and habitat as discussed on page 2-4 of Wildlife Specialist Report. Direct effects most critical to wildlife habitat are impacts to riparian habitat. Bush Creek and Big Lake riparian habitat can only be grazed after livestock rest results in riparian habitat restoration, then only grazed in a manner that maintains the improved condition. Burk Allotment will be managed with key areas in riparian habitat and conservative utilization levels to insure habitat improvement. These riparian emphasis objectives will result in reduced direct impacts to riparian habitat and improved wildlife and fisheries habitat conditions across the allotments.

Livestock grazing of uplands can result in direct effect to wildlife species. Direct competition for forage is one of the most important. This direct effect is expected to be insignificant because wildlife forage needs have been determined and reserved before forage for livestock has been allocated. The later livestock on dates proposed will also reduce forage conflicts during the critical early grazing season. Molina Springs and Bush Creek Allotments are dormant season grazing allotments. Forage availability during the winter is limited and could result in conflicts. However, because the allotments are so

small and the fact that very little livestock winter grazing occurs, this potential conflict is expected to be discountable.

Indirect and cumulative effects to wildlife species can occur as a result of livestock grazing in the surrounding areas. Over the last 10 years the District has been working to complete grazing analysis and improve standards that reduce direct and indirect impacts to the wildlife resource across the District and Forest. To date approximately 80% of the allotments across the District have improved standards that improve riparian and upland habitat conditions. Potential conflicts during the critical early season grazing have been reduced. These larger scale improvements have resulted in improved habitat condition across the District and Forest.

### **Big Lake Aquatic Species**

Cumulatively, this alternative adds no additional adverse impacts to species of concern within the analysis area. Direct and indirect beneficial cumulative effects to TES and MIS species may be realized from the implementation of this alternative. Livestock grazing will be allowed only after reaching satisfactory riparian conditions (after a minimum of 5 years) within key drainages and will then occur very infrequently, if at all, and only if good riparian conditions can be maintained.

Nonetheless, aquatic species and their habitats are affected by past and present management activities as well as natural events in the analysis area. The analysis area occurs in the NFEFBR below Mandan Pasture and in the EFBR to approximately 2 miles below Buffalo Crossing. Past disturbances include timber harvest activities, road and trail construction/maintenance, high recreational use and some areas affected by wildfire. Current Federal management activities within the analysis areas include: campground maintenance at 4 campgrounds in the vicinity of the East Fork Black River; and regular road maintenance within the Black River corridor. The analysis area encompasses three allotments: Udall, Black River and PS. The NFEFBR and EFBR river corridor in the allotments is excluded from livestock for approximately 12 miles of the total 15 miles in the analysis area.

Recent large-scale events in the analysis area include the 2004 Three Forks wildfire (accidental human ignition) which burned 7,900 acres in the Black River watershed resulting in short term effects to EFBR aquatics from ash and sediment flows. The result of the fire behavior observed during the incident is a mosaic pattern of burn severity within the fire perimeter of which most (4636 acres) was low severity. There were 3 accidental, direct aerial deliveries of fire retardant (Fire-Trol) to streams within the Three Forks Fire. One direct delivery occurred along an unnamed tributary of the Black River upstream of Three Forks in T6N-R28E-S36 (NW<sup>1</sup>/<sub>4</sub>). A second load of retardant was delivered across a tributary to Boneyard Creek below Melanie Spring in T6N-R29E-S21 (NW<sup>1</sup>/<sub>4</sub>). A third load of retardant was delivered across a tributary to Boneyard Creek one mile west of North Spring in T6N-R29E-S21 (NE<sup>1</sup>/<sub>4</sub>). The ash, sediment, and accidental retardant drops resulting from wildfire suppression efforts on the Three Forks Fire adversely affected aquatic species in the EFBR.

Non-Federal ongoing actions include use of a 43 acre private parcel of pasture land within the Udall allotment located on the NFEFBR, just above Crosby Crossing. This riparian parcel appears to be continuously well utilized for intensive livestock grazing with trampled banks and heavily utilized sedge/rush riparian.

Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative sediment inputs from other ongoing activities, described above, will occur but sedimentation effects from implementation of this action is not expected to be at a level to measurably affect aquatic species or the suitability of habitats, including substrate embeddedness and water quality parameters. Improvements over existing conditions should occur on the allotment and are expected to benefit aquatic species and the suitability of habitats, including substrate embeddedness and water quality parameters.

### **Burk Aquatic Species**

With the implementation of this alternative, no measurable cumulative effects to aquatic species will occur.

Nonetheless, aquatic species and their habitats are affected by past and present management activities as well as natural events in the analysis area. The analysis area occurs in the NFEFBR below East, West and SU Pastures and in the EFBR drainage, to approximately 5 miles above Buffalo Crossing. The 15 mile analysis area also includes lower Burro Creek and upper West Fork Black River from just west of Railroad Pasture downstream for several miles to the PS Ranch area (approx. 2 miles below the West Fork campground). Past disturbances include timber harvest activities, road and trail construction/maintenance, high recreational use and some areas affected by wildfire. Current Federal management activities within the analysis areas include: campground maintenance at 4 campgrounds in the vicinity of the East Fork Black River; 1 campground in the West Fork Black River corridor; and regular road maintenance adjacent to the Black River. The analysis area encompasses two allotments containing the EFBR drainage: Udall and Black River and 3 allotments containing the WFBR drainage: Reservation, West Fork and PS. The EFBR corridor in these allotments is excluded from livestock for all of the total 15 miles in the analysis area. The WFBR corridor in these allotments is excluded from livestock for approximately 12 miles of the total 15 miles in the analysis area.

Recent large-scale events in the analysis area include the 2004 Three Forks wildfire in the Black River watershed, described in Cumulative effects for the Big Lake Allotment.

Non-Federal ongoing actions include use of a 43 acre private parcel of pasture land within the Udall allotment located on the NFEFBR, described in Cumulative effects for the Big Lake Allotment.

Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative sediment inputs from other ongoing activities, described above, will occur but sedimentation effects from implementation of this action is not expected to be at a level to measurably affect aquatic

species or the suitability of habitats, including substrate embeddedness and water quality parameters.

### **Molina Springs Aquatic Species**

With the implementation of this alternative, no measurable cumulative effects to aquatic species are expected.

Nonetheless, aquatic species and their habitats are affected by past and present management activities in the analysis area. The analysis area occurs in Nutrioso Creek from 0.5 mile below Nelson Reservoir to and including the Little Colorado River (LCR), to approximately 7 miles above the Coyote Creek confluence with the LCR. Although Picnic Allotment is just west of Molina Springs Allotment on the Forest, the entire stream corridor section in the analysis area is excluded from livestock grazing, from Nelson Reservoir to the Forest boundary.

Ongoing disturbances include road maintenance, and a myriad of activities associated with the state and private land adjacent to most of Nutrioso Creek once it leaves the Forest boundary. A primary impact to aquatic species of concern in the analysis area is associated with water removal (diversions) for use on private land and storage of flows in reservoirs such as Nelson Reservoir (0.5 mile above the analysis area on Nutrioso Creek). Nelson Reservoir seepage provides the majority of baseflow to Nutrioso Creek, below the reservoir. Reservoir spills provide for “peak flows” in the system, along with flows from a main tributary, Rudd Creek, and lesser unnamed tributaries. Land development, livestock grazing and other agricultural uses also occur on lands adjacent to Nutrioso Creek off of the Forest.

Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative sediment inputs from other ongoing activities, described above, will occur but sedimentation effects from implementation of this action is not expected to be at a level to measurably affect aquatic species or the suitability of habitats, including substrate embeddedness and water quality parameters.

### **Bush Creek Aquatic Species**

With the implementation of this alternative, no measurable cumulative effects to aquatic species will occur.

Nonetheless, aquatic species and their habitats are affected by past and present management activities as well as landscape scale events in the analysis area. The 15 mile analysis area occurs in the Blue River, to the Sycamore Canyon confluence with Blue River. Current Federal management activities within the analysis areas include: regular road maintenance adjacent to the Blue River corridor. Non-Federal activities include: private land activities in the community of Blue including water diversion, stream channel and floodplain modification including channelization and diking, and regular road maintenance adjacent to the Blue River corridor. Blue River flooding damage to FR 281 results in regular road maintenance immediately adjacent to the Blue River resulting in streambank damage and

high erosion rates. Numerous low water crossings occur further contributing to stream destabilization in localized areas. The analysis area encompasses 4 allotments containing the Blue River drainage: Cow Flat, Fish Hook, Steeple Mesa and Raspberry. The Blue River corridor in these allotments is excluded from livestock grazing.

Recent large-scale events in the analysis area include the 2003 Blue River Complex wildfire (19,000 acres) in the Blue River watershed. The ash and sediment generated from wildfire suppression efforts adversely affected aquatic species in the Blue River.

Over the short ( $\leq 5$  years) and long term ( $\geq 6$  years), cumulative stream sediment inputs from other ongoing activities will occur, but sedimentation effects from implementation of this action is not expected to be at a level to measurably affect aquatic species or the suitability of habitats, including substrate embeddedness and water quality parameters.

## **Heritage Resources**

### **Affected Environment**

The Heritage Resources Specialist Report (PR # 50) lists heritage resource inventories completed within the allotments.

#### **Big Lake Allotment**

The Big Lake Allotment is 3,231 acres. The area is characterized by high elevation (8,100-9,200 feet), mixed conifer forest and open grasslands. Numerous springs, developed stock tanks, and cienegas occur within the allotment, elements which undoubtedly made the environment an attractive one to prehistoric and historic big-game hunters.

Thirteen heritage resource inventories have been completed within portions of the Big Lake Allotment. No heritage resource sites have been documented within the Big Lake Allotment. However, with the abundance of springs, developed stock tanks, and cienegas, undocumented heritage resources dating to both the precontact and historic times may occur within the allotment.

#### **Burk Allotment**

The Burk Allotment is the largest of the four allotments considered in this report, and contains approximately 5,625 total acres, with elevations generally ranging between 9,000 and 9,300 feet. Both portions are located in high-elevation areas characterized by mixed conifer forests and extensive grasslands. The Burk Allotment includes the northern shore of Big Lake, as well as many developed stock tanks and several springs.

Eight heritage resource inventories have been completed within portions of the allotment. No archaeological sites have been documented within the Burk Allotment. However, with the abundance of springs, developed stock tanks, and cienegas, undocumented heritage resource sites or isolated occurrences' dating to both the precontact and historic times may occur within the allotment.

### **Molina Springs Allotment**

The Molina Springs Allotment includes approximately 3,338 acres with elevations ranging from 7,400 feet at the northern portion to approximately 7,700 feet at the southern boundary. Grasslands and pinon-juniper woodland characterize the vegetation of the allotment.

Three heritage resource inventories have been conducted within portions of the Molina Springs Allotment. Four archaeological sites have been documented within the Molina Springs Allotment. All of the sites are from the precontact period. One site is an artifact scatter, one site is a pueblo village, one site is a single room, and one site is the location where a single Clovis point was found. The Clovis point dates to the Paleo-Indian era, ca 10,000-13,000 years ago. It is the first such evidence of Clovis-era hunters within the boundary of what is now the Apache-Sitgreaves National Forests and only the third complete Clovis point to be reported in Northern Arizona.

Because over 96% of the allotment remains unsurveyed, site potential for precontact heritage resource sites is very high throughout the Molina Springs Allotment. The site density in the three grazing allotments that border the Molina Springs Allotment is quite high. Given that the Molina Springs Allotment is located in the same relative elevation, and shares the same geologic, topographic, and vegetative features as the adjoining allotments, it is very likely that numerous undocumented archaeological sites occur within the allotment. Undocumented historic sites may also be encountered throughout the allotment.

### **Bush Creek Allotment**

The Bush Creek Allotment is the smallest of the three allotments at approximately 312 acres. Elevation ranges from approximately 5600 feet to 6300 feet. The Blue River intersects the allotment and the vegetation is a mixture of riparian species such as cottonwood and sycamore near the river to juniper, ponderosa pine, and a variety of oak on the slopes above.

One heritage resource inventory has been completed within portions of the Bush Creek Allotment. One heritage resource site has been documented within the allotment. The site is a precontact site originally examined in the early 1900's by noted pioneer archaeologist Walter Hough, who was working for the Smithsonian Institution. Two additional heritage resource sites have been identified on private land within the allotment. One of these sites was also originally recorded by Hough, and the other site is a historic trash scatter located in the southern portion of the allotment. Further heritage resource investigations within the Bush Creek Allotment are extremely likely to yield additional precontact and historical archaeological sites. The Blue River is very rich in prehistoric habitation sites.

### **Environmental Consequences**

Either Alternative is not expected to result in adverse effects to heritage resources. Ground cover should increase, minimizing the effects of congregating cattle, and wind and/or water erosion on heritage resources.

Management activities should promote the protection and preservation of heritage resources. Compliance with applicable laws and regulations, as well as the stipulations set forth in the *First Amended Programmatic Agreement (PA) Regarding Historic Property Protection and Responsibilities*, as agreed upon by Region 3 of the U.S. Forest Service, the Arizona State Historic Preservation Officer, and other parties in November and December, 2003, requires that appropriate inventories must be conducted in advance of the implementation of any ground-disturbing activities. Appendix H of the PA specifically addresses the subject of Rangeland Management. As is stated in the PA, Appendix H, page 3, “Achieving and maintaining allotment desired conditions is expected to benefit historical properties by providing improved vegetative cover and more stable soils, thereby reducing the potential for direct or indirect impacts to historic properties”.

The Big Lake, Burk, Molina, and Bush Creek AMP project shall be managed in such a manner that ensures that no adverse effect or “no effect to historic properties” to heritage resources, as stipulated in the aforementioned programmatic agreement. Archaeological sites must be marked for avoidance in a conspicuous fashion and avoided by project activities that are considered undertakings as stipulated in the PA. Examples of undertakings, as they pertain to Range improvement projects include, but are not limited to, Allotment Management Plans, range improvement projects, water distribution facilities, and new fence construction. Project managers must consult with the Forest Archaeologist or appropriate Forest Service cultural resource specialist prior to any treatment implementation, or the activities will be considered out of compliance with Section 106 of the NRHP. Furthermore, upon discovery of any undocumented heritage resources during project implementation, work should cease in that area immediately and the Forest Archaeologist or another appropriate cultural resources specialist should be contacted.

Past actions on the allotments have not resulted in adverse impacts to heritage resources. Protection of heritage resources as described above will be implemented on any future projects on the allotments. Because direct and indirect effects will be avoided, cumulative effects are precluded.

Cooperation and communication between project planners and heritage resources staff will ensure that this project remains in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, and with Section 101(b)(4) of the National Environmental Policy Act of 1969.

## **Social / Economics**

### **Affected Environment**

The Big Lake, Burk and Molina Springs Allotments are located within Apache County. The Bush Creek Allotment lies within Greenlee County.

Livestock grazing contributes to the livelihood of permittees as well as to the economy of local communities and counties. Although the contributions of livestock grazing to local economies and county governments is small in comparison to other businesses and funding sources, this section will discuss the effects based on economic contribution to the local economy, jobs provided and grazing receipts.

Livestock grazing contributes to the livelihood of the Burk, Molina Springs and Bush Creek permittees. Currently, livestock grazing on the Big Lake Allotment is not authorized under a term livestock grazing permit. The permit has recently been waived back to the Forest Service. Incidental use, if authorized on the Big Lake allotment, could contribute to the livelihood of other livestock grazing permittees.

**Social** - Livestock grazing has been part of the Southwest culture for 400 years. A 1998 survey of Forest permittees indicates that this group has pursued public and private land ranching for up to 40 years and that some have operated a ranch in Arizona for up to 77 years. Recent years have seen the arrival of some new permittees, a few with no previous ranching background. Apache County states in their comprehensive plan that ranching is an important way of life, and fishing and hunting opportunities on public lands are an important quality of life. In a three county survey (Apache, Navajo, Greenlee) completed by Apache County Development, respondents rated the importance of the surrounding natural environment to the quality of life as a 6 on a scale of 1 to 7.

Recent growth has resulted in diversification of values brought by newcomers. Retirement and second homes are increasingly a part of the residential makeup of the counties.

**Economics** – Throughout the Mogollon Rim region of Arizona, over the past three decades, the economy has changed significantly. Where the ranching and timber industries were once the backbone for the local economy, service and recreation based ventures are becoming more important.

Based on information available (1993), the average ranch in eastern Arizona expended approximately \$19,000 in the local community.

Historically, cattle production was a thirty five million dollar business in Apache County. In a 1995 analysis, agriculture represented the fourth largest economic sector (11%) in the county with cattle production a part of that. A 1995 Apache County resolution states “Apache County’s economy depends on activities and enterprises that occur on Federal and State lands, including but not limited to, timber harvesting, livestock grazing, mineral development and recreation”. According to the US Census Bureau in 2000, 3.1 percent of the population in Apache County was engaged in agriculture, which includes forestry, farming, ranching, fishing/hunting and mining.

Area residents are actively pursuing economic development, some related to tourism and recreation. Not all Forest permittees in Apache and Greenlee County depend on their livestock for full support. Some ranching families are diversifying their income by offering tourist related operations such as outfit and guiding, and working ranch experiences. Others supplement their income with outside employment.

## **Environmental Consequences**

An analysis of potential economic changes for each alternative is shown below. While values noted below appear very precise in measurement, they are based on certain assumptions as noted, thus they serve best as an indicator and general magnitude of change rather than a precise measurement.

The impact of the allotments on three segments of the economy are shown in Table 3 which follows. The segments include: 1) economic contributions to the local economy 2) number of jobs provided and 3) annual grazing fee receipts.

“Economic contribution to the local economy” in the Table below, is derived from estimated expenditures per animal unit as indicated by a 1998 survey of Forest grazing permittees who indicated they spend an average of \$117 per animal unit in the local economy. This amount is multiplied by 1.8 to account for an economic multiplier effect. This is consistent with the multiplier determined by the Arizona Game and Fish Department in studies regarding the economic return from hunting and fishing activities in the state and counties.

Jobs provided is the total jobs directly and indirectly supported by the livestock operation. This is assumed to be 1.14 jobs per 100 animal-years or 0.00095 jobs/AUM. This index was developed for the 1995 permit issuance project by the Forest Service’s Regional Office.

Grazing Fee Receipts: Grazing fees are paid to the federal government per head-month (HM). Current fees are set at \$1.35 per HM.

*Table. 3. Summary of Alternatives Measured by Defined Indicators.*

	<b>Alternative 1 (No Action)</b>	<b>Alternative 2 (Proposed Action)</b>
<b>Economic Contribution to the Local Economy</b>	\$0	\$74,763
<b>Jobs Provided</b>	0	1.5
<b>Grazing Fee Receipts (annual)</b>	\$0	\$2,124

### **Direct and Indirect Effects of Alternative 1-No Action (No Livestock Grazing) on Social / Economics**

#### **All Allotments**

The No Action alternative will result in the loss of fees to the U.S. Treasury and annual Federal payments to Apache and Greenlee Counties for livestock grazing. This loss, by itself, is not substantial; however, the counties would also not benefit from tax receipts from potential improvements and the state would lose tax revenues based on the permittee’s use of Federal lands. The No Action alternative could also result in reduction of revenue to the State from abandonment of State land grazing leases.

This alternative would generate no economic contribution to the local economy from a livestock operation, would not directly or indirectly provide jobs associated with a livestock operation and would generate no grazing receipts for the federal treasury.

Lifestyle changes of ranch employees in response to loss of income or increased debt could include decreasing spending, investing more time in other operations as means of alternate income opportunities, and further diversifying operations to make them less dependent upon public land ranching.

### **Cumulative Effects of Alternative 1- No Action (No Livestock Grazing) on Social / Economics**

Several allotments on the Forest (including in the vicinity of the Big Lake and Burk Allotments) have recently been waived back to the Forest Service on the Springerville Ranger District. Three permittees (Jack Brown, Pete and Sonya Hancock) no longer graze livestock on the District and several other permittees have incurred reduction in permitted livestock numbers. Much of the allotments waived back were densely forested with little available forage for livestock. Reconfiguration of allotment boundaries has occurred with retention of pastures in more open forested or grassland conditions containing forage available for wildlife. These recent allotment reconfigurations have actually served to maintain and strengthen the ranching tradition by maintaining areas logical and practical for livestock grazing in the grazing base. In addition to these reconfigurations, reductions in livestock numbers have resulted from previous analyses on adjacent allotments such as the Udall Allotment (2002) Cross Bar allotment (2004). The reconfigurations and reductions in permitted livestock numbers have resulted in reductions in jobs provided, the contribution of ranching to local communities, and payments to counties. Because ranching is such a small percentage of employment in the community, cumulative effects on economics of the No Action alternative do not result in a significant impact on local communities. Cumulatively, the number of those engaged in the ranching lifestyle has been reduced. However, livestock grazing permits are still in place on the District and are expected to continue. Allotment reconfigurations have retained acreage with forage available for livestock grazing and more intensive grazing management is occurring.

Reduction of livestock numbers has been occurring in the recent past on many allotments across the Forest in order to balance livestock use with capacity and to improve resource conditions. If these reductions continue, ranching is not expected to play as dominant a social and economic role in the communities.

### **Direct and Indirect Effects of Alternative 2- Proposed Action on Social / Economics**

The implementation of the proposed action would help to ensure the economic viability of the ranches associated with the allotment. As long as the permittees are able to function economically, the likelihood of selling their private land for developments is greatly diminished. Thus, this alternative helps to maintain “open spaces” on the ranches associated with the allotment. When livestock grazing is allowed some income would be generated from grazing use on the National Forest System Lands.

Unlike Alternative 1, this alternative would provide an economic contribution to the local economy from a livestock operation, directly or indirectly provide jobs associated with livestock operations and would generate grazing receipts for the federal treasury. Table 2 on page 76 provides a relative comparison of the amounts provided in each alternative.

### **Cumulative Effects of Alternative 2- Proposed Action on Social / Economics**

Alternative 2 provides possible methods for the culture related to the ranching lifestyle to continue to exist on this allotment. If similar alternatives are selected across the ASNFs, the traits associated with lifestyle would continue to exist.

Reduction of livestock numbers has been occurring in the recent past on many allotments across the Forest in order to balance livestock use with capacity. If these reductions continue, ranching is not expected to play as dominant a social and economic role in the communities.

Population growth and demographic changes in eastern Arizona are expected to continue to contribute to economic growth and diversification. This will likely increase the opportunity for off ranch income. As growth continues in the White Mountains, the demand for rural home sites and other ventures is likely to increase the value of the base property, regardless of the status of associated grazing permits. This may provide an alternate source of income for the permittees.

## **Air Quality**

### **Affected Environment**

The area of analysis for air quality is large. It encompasses an area including the Mt. Baldy Wilderness (a Class 1 Airshed), the allotments of concern, and an area extending downwind (northeast) that includes some of the heavy industry that affects air quality in the area. This would include the coal-fired power plants located outside of Springerville, St. Johns, and Holbrook, as well as the pulp mill located near Snowflake. Issues of concern focus on air quality related parameters that this project has potential to affect.

The ADEQ has indicated that airsheds within the Springerville Ranger District are currently in attainment (satisfactory condition). As none of the project areas are within recognized non-attainment areas, no analysis is necessary to determine conformity with the State Implementation Plan for Air Quality.

### **Environmental Consequences**

#### **Direct and Indirect Effects of Alternative 1-No Action (No Livestock Grazing) on Air Quality**

The four projects are not expected to have measurable direct or indirect effects to air quality under the No Action alternative. No livestock would be present, and no incidental dust of any amount would be generated through the implementation of this alternative.

## **Cumulative Effects of Alternative 1-No Action (No Livestock Grazing) on Air Quality**

As there are no direct or indirect effects anticipated through implementation of the Proposed Action, there are no cumulative effects either.

## **Direct and Indirect Effects of Alternative 2-Proposed Action on Air Quality**

The four projects are not expected to have measurable direct or indirect effects to air quality under the Proposed Action alternative. Livestock would be present, however the amount of incidental dust attributable to grazing animals is not measurable / insignificant and does not normally travel far before settling out.

## **Cumulative Effects of Alternative 2-Proposed Action on Air Quality**

As there are no direct or indirect effects anticipated through implementation of the Proposed Action, there are no cumulative effects either.

## **Monitoring**

Summary of effects – Monitoring effects of proposed actions (i.e. livestock grazing) is required by laws, regulations, and policies. A monitoring plan has been developed as part of this analysis and is included as Appendix A of this document.

## **National Forest Management Act Findings**

Summary of Effects – The proposed action is consistent with the Forest Plan, as amended. This project is consistent with the goals and objectives listed in the Forest Plan (pg. 13-44). This project is located in Management Areas 1-4, 11 and 15 and is consistent with the stated management emphasis for these areas. The project design specifications also adhere to the standard and guidelines listed in the Forest Plan (pp. 44-168).

The Burk & Molina Springs, Big Lake and Bush Creek allotments contain lands identified as suitable for domestic livestock grazing in the Apache-Sitgreaves National Forests Land Management Plan (ASNF LMP) (PR # 24). Implementation of Alternative 2 would provide forage from lands suitable for grazing to qualified livestock operators while meeting desired conditions on the allotments. Alternative 2 would meet the ASNF LMP (PR # 24) by continuing livestock grazing with increased emphasis on recreation, wildlife, and fishery resources, while maintaining basic soil and water values. Management as described in Alternative 2 is in accordance with the ASNF LMP, the Multiple Use and Sustained Yield Act of 1960 and the Forest and Rangeland Renewable Resources Planning Act of 1974.