

Chapter 4: Environmental Consequences

INTRODUCTION TO ENVIRONMENTAL CONSEQUENCES BY ALTERNATIVE

This Chapter summarizes the expected effects of implementing each alternative on the affected environment described in Chapter 3. It also presents the scientific and analytical basis for the comparison of alternatives presented in the alternatives chapter.

The Cumulative Effects Area for this project is the entire Santa Rosa Ranger District and all lands included within its boundary. This allows us to address the cumulative effects of all past, present and future projects and activities that have been or are authorized on the District. Because the potential cumulative effects and the area that is impacted differ by resource area, the cumulative effects area for specific resources may vary. If a specific resource specialist utilizes a different cumulative effects area than the one described above, then it would be disclosed within the sections below.

WATER QUALITY

This section describes the expected direct, indirect, and cumulative consequences or effects to water resources of implementing each alternative.

ENVIRONMENTAL EFFECTS BY ALTERNATIVE

Alternative 1: Current Management / No Action

Under the Current Management / No Action Alternative, current management plans would continue to guide management of the Project Area.

Direct and Indirect Effects of “Current Management / No Action” on Water Quality

It is a combination of the “Current Management/No Action” Alternative and historically heavy livestock grazing that has led to the existing conditions in the Project Area (see Chapter 3). Under this alternative, the water quality conditions would, at the least, remain unchanged, possibly recover at their current rate, or, more likely, degrade further. Due to the stress of the current grazing levels, riparian areas and streams that are currently in recovery would likely recover at a slower rate than with the other alternatives. Areas that are “Functional-At Risk” would remain in danger of catastrophic changes by flood events (Rosgen 1996). There is also the potential for unimpaired water resource conditions to be degraded by current management. Given the above effects, the “Current Management/No Action” alternative would likely show the least progress toward achieving desired conditions.

Livestock grazing has and continues to be one of the broadest landscape activities by humans within the Project Area, and, if not managed properly, has the potential for widespread detrimental effects to water quality. This is because livestock have been grazing in most of the Project Area for over a century, and grazing occurs over a greater area of the landscape than many other activities. In addition, livestock tend to congregate in riparian areas and streams where water quality can more easily be affected

With a few exceptions, water quality for the streams sampled was generally found to be in compliance with Nevada's numerical water quality standards (see Chapter 3, Water Quality section). However, many Project Area streams are not in compliance with narrative anti-degradation standards (rules) in the Nevada Administrative Code (NAC 445A) and the *Clean Water Act*, as amended. Of primary concern is excess sediment accumulation. It is possible that the recent drought is causing reduced stream flows and, thus, reducing the ability of Project Area streams to remove excess sediment that has naturally accumulated. While this is likely, there is evidence that livestock grazing may also be contributing to the sedimentation problem.

As discussed in Chapter 3, many of the drainages in the Project Area are non-function or functional-at risk. Many of the streambanks also have a less than optimal ungulate damage rating. This livestock-caused disturbance not only exposes soil to erosion, but reduces a riparian area's ability to catch sediment before it is washed into the channels by overland flow. Most of the drainages also have high width-to-depth ratios that can mostly be attributed to livestock-caused streambank damage. A high width-to-depth ratio impairs the ability of a stream to transport sediment once it enters the stream channel.

Drainages that are being degraded by livestock grazing are at risk of degrading to a point where their water quality does not meet State numerical standards. According to published scientific literature reviews (Belsky 1999, Branson and others 1981, Buckhouse 2000, Krueger and Sanderson 2002, Meehan 1991), improperly managed livestock grazing can potentially have the following adverse effects on water quality:

- Increased bacteria levels from livestock urine and fecal wastes;
- Increased sedimentation/turbidity due to soil disturbance and vegetation loss along stream banks;
- Higher water temperatures resulting from increased width to depth ratios and loss of shade-producing vegetation along stream banks; and
- Lower dissolved oxygen levels resulting from increased aquatic plant growth (algae) and higher water temperatures as the water solubility of oxygen decreases with the increase of temperature.

Elevated levels of bacteria can adversely affect the health of wildlife, livestock, and humans. Reduced dissolved oxygen availability and increased water temperatures and sedimentation/turbidity levels are particularly harmful to the health of aquatic life. The scientific literature reviews also identified increased nutrients (nitrate and phosphate) from urine and fecal wastes. However, a recently published research study (Amacher, 2004) in the National forest lands of central Nevada, as well as Project Area analytical data, suggest that elevated nutrient concentrations are not likely to occur in the Project Area surface waters unless livestock are heavily concentrated near a drainage.

Given these potential effects, water quality parameters for bacteria, sediment/turbidity, temperature, and dissolved oxygen were used as indicators in the analysis of direct and indirect effects for each grazing alternative. Table 3-T summarizes the likely change to each indicator by alternative. A discussion analyzing the likely direct and indirect effects by alternative is presented in the paragraphs below.

Cumulative Effects of "Current Management / No Action" on Water Quality

Continued implementation of the "Current Management/No Action" Alternative would result in the cumulative effects remaining unchanged in the cumulative effects area, with current conditions and trends remaining unchanged. The Current Management/No Action Alternative presents the greatest cumulative risk to water quality and stream/riparian conditions.

This cumulative effects analysis considers all known potential past, present, and future activities that affect water resources on National Forest System lands within the Project Area, as well as private in-holdings and lands administered by BLM immediately adjacent to the Project Area that are part of sub-watersheds originating on the National Forest.

Wildfires, recreation, water diversions, drought, and mining, as well as other events and activities, have impacted or currently impact water quality. It is reasonable to assume that water quality would continue to be affected by these things during the life of the project. There is also the possibility that their cumulative effect could increase. For example, the cumulative effect would likely increase if recreational use in riparian areas increased substantially.

FIRE

In 2001, a fire occurred in the main stem of the Willow Creek drainage and burned across the ridgeline of the Santa Rosa Range, affecting the North Fork of Cabin Creek, South Fork of Canyon Creek, Flat Creek, South Fork of Flat Creek, Three-Mile Creek, Gavica Fork of Willow Creek, and Pole Creek (Jenne 2002). Approximately 41,828 acres were burned (25,270 acres on the Forest). The fire is briefly mentioned here because of the possible cumulative effects on water quality, including increased sedimentation and turbidity, release of nutrients from burned vegetation, and increased water temperatures due to decreased shade (NWC 2001).

DISPERSED RECREATION & TRAILS

Recreation uses, such as dispersed campsites and inappropriate off-road vehicle travel, have the potential to have an adverse effect on water quality, especially when they occur in riparian areas. Both of these activities have the potential to increase stream sedimentation by disturbing soil and vegetation. Dispersed camping in the riparian areas may also lead to the introduction of human fecal material to the streams, which would add to overall impact of fecal material from livestock and wildlife. The current magnitude of recreational impacts on water quality in the cumulative effects area is not known. The effects, however, could increase in the future if recreational use increases.

WATER QUANTITY

The quantity of water in streams can also have an effect on water quality. When stream flows are low, stream temperatures tend to increase and contaminants, such as nutrients and bacteria, tend to concentrate. Also, lower stream flows may reduce the ability of a stream to transport sediments, resulting in increased sedimentation. As discussed in Chapter 3, livestock grazing has the potential to decrease precipitation infiltration through soil compaction and ground cover removal. This results in reduced base flows in streams, which can be intensified by the cumulative effects of drought and/or water diversions. The Project Area has recently been under drought conditions (Drought Monitor, 2003), and drought conditions would likely occur again during the life of this project. At least five (5) streams that originate on the Forest have water diversions; these include Andorno Creek, McConnell, Falls Canyon, Willow Creek, and Martin Creek. The Andorno Creek and McConnell Creek diversions are located on the Forest, while the Falls Canyon, Willow Creek, and Martin Creek diversions are not.

HISTORIC MINING OPERATIONS

An additional water quality concern is acid mine drainage that enters the headwaters of the North Fork of the Little Humboldt River (a Class A water) from the closed Buckskin Mine (USFS 2002). This is a concern because the river is habitat for the threatened Lahontan Cutthroat Trout. Underground gold mining operations were conducted at the Buckskin Mine from 1912 until 1947. An adit on the mine site currently discharges as much as 53 gallons per minute of very acidic water (pH 2.2-3.0) into the river. These pH levels are outside Nevada's acceptable range (pH 6.5 to 8.5) for Class A waters.

Drainage from mine tailings and waste rock are another source of very acidic water (pH 2.88). The acidic discharge from the mine also contains elevated levels of metal compounds in excess of both state (NDEP) and federal (EPA) chronic exposure criteria for aquatic life. Very acidic pH value and elevated metal concentrations were found at a downstream sampling point in August 2002 (pH 3.26, aluminum 23 mg/L, iron 2.3 mg/l, selenium 0.006 mg/L, and zinc 0.54 mg/L). No aquatic life was found within two (2) miles downstream of the mine.

Photograph 28-P:

View from adit of reclaimed tailings and waste rock along the North Fork of the Little Humboldt River at the Buckskin Mine. Arrow points to the downstream sampling location. (Brooks 2002.)



Alternative 2: Proposed Action

The “Proposed Action” Alternative would implement new management standards based on the functioning level of vegetative communities.

Direct and Indirect Effects of “Proposed Action” on Water Quality

Because the “Proposed Action” would allow for decreased grazing utilization in areas that are not functioning as desired, water quality conditions would likely improve. Decreased utilization would likely lead to:

- Reduced production of livestock urine and fecal material production, and corresponding reductions in bacteria levels in streams.
- Reduced soil disturbance and vegetation loss, resulting in corresponding increases in streambank stability, decreases in sedimentation, and lower water temperatures due to the growth of shade providing vegetation along streams. Increased vegetative cover would also help to control storm run-off, improve stream base flows, and decrease the timing and intensity of peak stream flows that have the potential to cause catastrophic flood damage.
- Increased levels of dissolved oxygen resulting from decreases in water temperatures and algae levels.

For areas that are currently moving towards a desired functioning level, the recovery rate is likely to become more rapid due to decreased stress from grazing. Furthermore, informed land management decisions that would maintain or achieve desired water quality would be made possible through monitoring of conditions in stream/riparian communities.

Cumulative Effects of “Proposed Action” on Water Quality

Because livestock grazing has the potential to have a greater impact as compared to other uses that also affect stream or riparian conditions, the changes in grazing management under the “Proposed Action” would likely result in an overall decrease in detrimental cumulative effects. In addition, better watershed conditions would result in improved water quality for downstream beneficial uses.

Livestock grazing has and continues to be one of the greatest landscape activities by humans within the Project Area, and, if improperly managed, has the potential for widespread detrimental effects to water quality. This is because livestock have been grazing in most of the Project Area for over a century, and grazing occurs over a greater area of the landscape than many other activities. In addition, livestock tend to congregate in riparian areas and streams where water quality can more easily be affected

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As discussed in Chapter 3, many of the drainages in the Project Area are non-function or functional-at risk. Many of the streambanks also have a less than optimal ungulate damage rating. This livestock-caused disturbance not only exposes soil to erosion, but reduces a riparian area’s ability to catch sediment before it is washed into the channels by overland flow. Most of the drainages also have high width-to-depth ratios that can mostly be attributed to livestock-caused streambank damage. A high width-to-depth ratio impairs the ability of a stream to transport sediment once it enters the stream channel.

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Given these potential effects, water quality parameters for bacteria, sediment/turbidity, temperature, and dissolved oxygen were used as indicators in the analysis of direct and indirect effects for each grazing alternative. Table 3-T summarizes the likely change to each indicator by alternative. A discussion analyzing the likely direct and indirect effects by alternative is presented in the paragraphs below.

This cumulative effects analysis considers all known potential past, present, and future activities that affect water resources on National Forest System lands within the Project Area, as well as private in-holdings and lands administered by BLM immediately adjacent to the Project Area that are part of sub-watersheds originating on the National Forest.

Wildfires, recreation, water diversions, drought, and mining, as well as other events and activities, have impacted or currently impact water quality. It is reasonable to assume that water quality would continue to be affected by these things during the life of the project. There is also the possibility that their cumulative effect could increase. For example, the cumulative effect would likely increase if recreational use in riparian areas increased substantially.

FIRE AND FIRE SUPPRESSION

In 2001, a fire occurred in the main stem of the Willow Creek drainage and burned across the ridgeline of the Santa Rosa Range, affecting the North Fork of Cabin Creek, South Fork of Canyon Creek, Flat Creek, South Fork of Flat Creek, Three-Mile Creek, Gavica Fork of Willow Creek, and Pole Creek (Jenne 2002). Approximately 41,828 acres were burned (25,270 acres on the Forest). The fire is briefly mentioned here because of the possible cumulative effects on water quality, including increased sedimentation and turbidity, release of nutrients from burned vegetation, and increased water temperatures due to decreased shade (NWCG 2001).

DISPERSED RECREATION & TRAILS

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WATER QUANTITY

The quantity of water in streams can also have an effect on water quality. When stream flows are low, stream temperatures tend to increase and contaminants, such as nutrients and bacteria, tend to concentrate. Also, lower stream flows may reduce the ability of a stream to transport sediments, resulting in increased sedimentation. As discussed in Chapter 3, livestock grazing has the potential to decrease precipitation

infiltration through soil compaction and ground cover removal. This results in reduced base flows in streams, which can be intensified by the cumulative effects of drought and/or water diversions. The Project Area is currently under drought conditions (Drought Monitor, 2003), and drought conditions would likely occur again during the life of this project. At least five (5) streams that originate on the Forest have water diversions; these include Andorno Creek, McConnell, Falls Canyon, Willow Creek, and Martin Creek. The Andorno Creek and McConnell Creek diversions are located on the Forest, while the Falls Canyon, Willow Creek, and Martin Creek diversions are not.

HISTORIC MINING OPERATIONS

An additional water quality concern is acid mine drainage that enters the headwaters of the North Fork of the Little Humboldt River (a Class A water) from the closed Buckskin Mine (USFS 2002). This is a concern because the river is habitat for the threatened Lahontan Cutthroat Trout. Underground gold mining operations were conducted at the Buckskin Mine from 1912 until 1947. An adit on the mine site currently discharges as much as 53 gallons per minute of very acidic water (pH 2.2-3.0) into the river. These pH levels are outside Nevada's acceptable range (pH 6.5 to 8.5) for Class A waters.

Drainage from mine tailings and waste rock are another source of very acidic water (pH 2.88). The acidic discharge from the mine also contains elevated levels of metal compounds in excess of both state (NDEP) and federal (EPA) chronic exposure criteria for aquatic life. Very acidic pH value and elevated metal concentrations were found at a downstream sampling point in August 2002 (pH 3.26, aluminum 23 mg/L, iron 2.3 mg/l, selenium 0.006 mg/L, and zinc 0.54 mg/L). No aquatic life was found within two (2) miles downstream of the mine.

Alternative 3: No Grazing

The "No Grazing" Alternative would end grazing in the Martin Basin Project Area within five (5) years.

Direct and Indirect Effects of "No Grazing" on Water Quality

"No Grazing" would likely have the most beneficial effects for water quality and provide a more rapid recovery. If there were no livestock grazing, there would be none of the adverse effects caused by grazing as described earlier. For example, there would no longer be any livestock urine and fecal material to contribute bacteria to streams, and no extra sedimentation in streams due to livestock trampling banks and grazing riparian vegetation. Dissolved oxygen levels would also improve as water temperatures decrease. With no stress from livestock grazing, it is also likely that stream and riparian areas would move towards the desired condition at a much faster rate than the other alternatives. The rate, however, at which an area moved towards desired condition, would depend on its current condition and cumulative effects.

Cumulative Effects of "No Grazing" on Water Quality

Livestock grazing is the activity in the Project Area having the most widespread effect on water resources and riparian area conditions. Without livestock grazing, the cumulative impact to water resources and riparian areas would likely decrease substantially. As with the "Proposed Action," better watershed conditions under "No Grazing" would likely result in a better water quality for downstream beneficial uses.

There may, however, be a detrimental effect to private or BLM lands under "No Grazing." If cattle do not have access to the National Forest, the grazing intensity on these other lands may increase. This would likely lead to greater damage to the water resources and riparian areas on these other lands.

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Things that have or are now acting cumulatively with grazing to negatively impact water quality include wildfires, recreation, water diversions, drought, and mining. It is reasonable to assume that water quality would continue to be affected by these things during the life of the project. There is also the possibility that their cumulative effect could increase. For example, the cumulative effect would likely increase if recreational use in riparian areas increased substantially.

FIRE AND FIRE SUPPRESSION

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WATER QUANTITY

The quantity of water in streams can also have an effect on water quality. When stream flows are low, stream temperatures tend to increase and contaminants, such as nutrients and bacteria, tend to concentrate. Also, lower stream flows may reduce the ability of a stream to transport sediments, resulting in increased sedimentation. As discussed in Chapter 3, livestock grazing has the potential to decrease precipitation infiltration through soil compaction and ground cover removal. This results in reduced base flows in streams, which can be intensified by the cumulative effects of drought and/or water diversions. The Project Area is currently under drought conditions (Drought Monitor, 2003), and drought conditions would likely occur again during the life of this project. At least four streams that originate on the Forest have water diversions; these include Andorno Creek, Falls Canyon, Willow Creek, and Martin Creek. All but the Andorno Creek diversion are located off the Forest.

HISTORIC MINING OPERATIONS

An additional water quality concern is acid mine drainage that enters the headwaters of the North Fork of the Little Humboldt River (a Class A water) from the closed Buckskin Mine (USFS 2002). This is a concern because the river is habitat for the threatened Lahontan Cutthroat Trout. Underground gold mining operations were conducted at the Buckskin Mine from 1912 until 1947. An adit on the mine site currently discharges as much as 53 gallons per minute of very acidic water (pH 2.2-3.0) into the river. These pH levels are outside Nevada's acceptable range (pH 6.5 to 8.5) for Class A waters.

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Alternative 4 – Resource Concepts, Inc. (RCI) Proposal

Direct and Indirect Effects of “RCI Proposal” on Water Quality

Given that there are no set utilization levels for livestock grazing under Alternative 4, utilization levels could potentially range from light to 100 percent. It is, therefore, unknown what the potential effects to water quality will be until the AMPs are developed. At best, water quality conditions would be the same as expected under the Proposed Action Alternative. However, because utilization could potentially exceed current levels, there is also the potential for water quality conditions to degrade further than is seen with the Current Management/No Action Alternative.

Because this alternative calls for water developments to be “expeditiously” installed, water quantity will be reduced in streams, springs, and seeps that are used as sources. As discussed in Chapter 3, a reduction in

water quantity can cause a negative effect on water quality. The magnitude of this effect depends on the quantity of water diverted to water developments. Since the quantity of water to be diverted is not specified in Alternative 4, the effect, if any, is an unknown.

Alternative 4 also calls for a number of vegetation treatments, which include prescribed burning, clearing, mowing, thinning, and seeding, to be "expeditiously" implemented. Changes in vegetation type, caused by these treatments, can potentially affect the amount and timing of precipitation runoff reaching streams. Since Alternative 4 does not define the types of vegetation removed and seeded or the extent of the area affected, the magnitude of the effect to water quantity is unknown. If the vegetation treatments occur within riparian zones, there may even be a direct effect to water quality. For example, if shade providing vegetation is removed by prescribed fire, the water temperature may increase. The treatment location is not specified in Alternative 4, however, and it is unknown if treatments will occur in riparian zones. Alternative 4 also calls for the application of fertilizers, but lacks specifics on quantities and locations of use. Fertilizers are a concern because they are commonly known to be a source of nutrient (nitrate and phosphate) pollution in runoff from agricultural fields. Without specific details on how the fertilizers will be applied, the effect, if any, is unknown.

Livestock grazing has and continues to be one of the greatest landscape activities by humans within the Project Area, and, if improperly managed, has the potential for widespread detrimental effects to water quality. This is because livestock have been grazing in most of the Project Area for over a century, and grazing occurs over a greater area of the landscape than many other activities. In addition, livestock tend to congregate in riparian areas and streams where water quality can more easily be affected

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alternative. Table 3-T summarizes the likely change to each indicator by alternative. A discussion analyzing the likely direct and indirect effects by alternative is presented in the paragraphs below.

Cumulative Effects of "RCI Proposal" on Water Quality

Under the "RCI Proposal," effects to water quality will likely not change as compared to the "Current Management." However, because the magnitude of direct and indirect effects to water quality (and quantity) is unknown, the combined effect of grazing with other activities is somewhat of an unknown. The cumulative effects could range from those that will likely occur with the Proposed Action Alternative to those equal to or greater than under the Current Management/No Action Alternative.

This cumulative effects analysis considers all known potential past, present, and future activities that affect water resources on National Forest System lands within the Project Area, as well as private in-holdings and lands administered by BLM immediately adjacent to the Project Area that are part of sub-watersheds originating on the National Forest.

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SOIL QUALITY

INTRODUCTION TO CAUSE AND EFFECT RELATIONSHIPS OF SOIL QUALITY INDICATORS

The cause and effect relationships between livestock grazing and degraded soil quality is well-documented in the scientific literature (Reid 1993, USDA 2001, Kruger and Sanderson 2002). Livestock have the potential to degrade soil quality directly by trampling soils and indirectly by consuming or trampling vegetation that protect and help form soils. Soil compaction, which is caused by trampling, reduces water infiltration and storage, physically restricts root growth, and reduces nutrient availability. These effects, coupled with trampling and consumption of vegetation, reduce the overall vegetation cover, creating bare ground, which is more susceptible to water and wind erosion, has increased precipitation runoff, and has less organic matter available for nutrient cycling.

Compaction

Improperly managed livestock grazing may cause soil compaction (Figure 1, Appendix C): Management strategies that help minimize compaction of rangeland soils include:

- Minimize grazing and vehicular traffic when the soils are wet;
- Use only designated trails or roads, and reduce the number of trips;
- Maintain or increase the content of organic matter in the soil by improving the plant cover and plant production.

Natural recovery of compacted soil is often slow, taking years to decades or more. (Cole, 1988). Cycles of wetting and drying, shrinking and swelling can break down compacted layers, especially in clays and clay loams. Weather conditions, such as drought, may slow these processes down and prolong recovery periods (Thurow, et. al., 1999). Deep compaction occurs in smaller areas than shallow compaction, but it persists longer because it is less affected by the soil expansion caused by freezing. Roots help to break up compacted layers by forcing their way between soil particles. Plants with large taproots are more effective at penetrating and loosening deep compacted layers, while shallow, fibrous root systems can break up compacted layers near the surface. Roots also reduce compaction by providing food that increases the activity of soil organisms. Soil organisms, such as earthworms, ants, and termites and small mammals reduce compaction as they move and mix soil particles when they burrow through the soil.

Trampling

Improperly managed livestock grazing may cause trampling in riparian and upland areas. (See Figure 2: Trampling Cause and Effect Flowchart in Appendix C.) Management strategies that help minimize streambank erosion caused by trampling include (Council for Agricultural Science and Technology, 2002):

- Alternative shade and watering sites;
- Improved stream fording areas;
- Abundant forage outside the immediate banks, by control of grazing duration, timing, and forage use;
- Fences around key areas, to control, or to prohibit access.

Management strategies that help minimize harmful trampling of rangeland soils include (USDA, Natural Resources Conservation Service, 2001, Rangeland Sheet 7):

- Maintain the optimum amount of live vegetation, litter, and biological crust relative to the site potential in order to maintain the content of organic matter and soil structure and control erosion;

- Improve soil structure and plant establishment by incorporating organic matter into the soil while breaking up a physical crust;
- Defer grazing use during periods when biological crusts are most susceptible to physical disturbances.

Recovery of biological soil crusts may take decades to hundreds of years. Adequate organic matter, seeds of desirable species, and a period of rest are needed for successful establishment of plants after crusts are broken (Kaltenecker et. al., 1999). Biological crusts that are in areas of low rainfall, are on coarse textured soils with low stability, and are in areas with a large amount of bare ground are most susceptible to frequent disturbances and have the longest recovery times. Biological crusts on sandy soils are less susceptible to disturbance when the soils are wet or moist, while crusts on clayey soils are less susceptible when the soils are dry (USDA, Natural Resources Conservation Service, 2001, Rangeland Sheet 8).

Soil Nutrient Cycling

Improperly managed livestock grazing may impair soil nutrient cycling. (See Figure 3: Soil Nutrient Cause and Effect Flowchart in Appendix C.) Management strategies that positively affect soil nutrient cycling in rangeland soils include (USDA, Natural Resources Conservation Service, 2001, Rangeland Sheet 6):

- Increase or maintain plant production;
- Promote the growth of species with high root production and promote a mix of species with different rooting depths and patterns;
- Promote the incorporation of above ground plant material in moist plant communities with large amounts of standing plant material (e.g., areas of tall prairie grasses);
- Protect the soil from erosion by maintaining or increasing the plant cover and reducing the amount of bare soil;
- Properly manage grazing and vehicle use and thus promote the desired plant community and protect the soil from erosion;
- Control of grazing duration, timing, and forage use to prevent continuous congregation in individual areas of grazing and individual areas of resting;
- Control the establishment and spread of invasive annual plants that can carry fire.

Plant composition and distribution control the distribution of organic matter. Changes in the composition of plant species, especially from grasses to shrubs, affect the contribution soil organic matter. Grazing animal behavior may also influence the distribution of nutrients to various landscape positions (Naeth et., al., 1991). Animals may graze in one area but move to another area to rest or to drink. Dung and urine may thus be more plentiful in the resting area and around a watering place than in a grazing area, a fact affecting the soil fertility of both areas, resulting in a net transfer of nutrients from the grazed area to the resting and watering areas. Grazing promotes nutrient cycling through rapid breakdown of organic matter into smaller particles in the system, so organic matter is available more readily for soil microorganisms. Thus grazing may increase the rate at which nutrients cycle through an ecosystem (Council for Agricultural Science and Technology, 2002). Conversely, if nutrients are not bound up in soil or plant matter, they may be more vulnerable to being lost from the ecosystem through runoff, erosion, and removal in animal products from the system.

Water Erosion

Improperly managed livestock grazing may cause accelerated water erosion. (See Figure 4: Water Erosion Cause and Effect Flowchart in Appendix C.) Management strategies that help minimize water erosion of rangeland soils include:

- Maintain or increase the cover of plants or litter on the soil through the application of good rangeland management practices;
- Reduce soil surface disturbances, especially in arid areas;
- Increase the rate of water infiltration and improve soil aggregate stability by improving or maintaining the quality of the plant community;
- Minimize grazing and traffic when the soil is wet and thus prevent the reduced infiltration caused by compaction and physical crusting;
- Maintain road surfaces and drainageways.

The ability of a plant community to recover after topsoil is lost is restricted. Erosion of nutrient-rich topsoil can cause a shift to less desirable plants, such as from grass to shrub species.



Wind Erosion

Improperly managed livestock grazing may cause accelerated wind erosion. (See Figure 5: Wind Erosion Cause and Effect Flowchart in Appendix C.) Management strategies that help minimize wind erosion of rangeland soils include:

- Maintain or increase the protective cover of plants and litter on the soil through the application of good rangeland management practices;
- Reduce disturbances of physical and biological crusts, especially in arid areas;
- Maintain soil aggregate stability by improving or maintaining the quality of the plant community.

The ability of a plant community to recover after topsoil is lost is restricted. Erosion of nutrient-rich topsoil can cause a shift to less desirable plants, such as from grass to shrub species.

ENVIRONMENTAL EFFECTS BY ALTERNATIVE

Alternative 1: "Current Management/No Action"

Direct and Indirect Effects of "Current Management / No Action" to Soil Quality

Levels of allowable use are established for both upland and riparian vegetative communities. These are from Amendment #2 of the HTNF Land Use and Resource Management Plan. These levels would remain the same. The allotments are currently managed under the direction of Allotment Management Plans. Current grazing systems, livestock numbers, season of use, and head months would remain the same. The desired/acceptable resource conditions for riparian areas are stated in Amendment #2. Components of these desired conditions include: potential key species, ground cover, soil productivity related to compaction, streambank stability, and fish production (Humboldt National Forest, 1990).

As described in the Affected Environment section, the magnitude of the effects of grazing or the degree of recovery that may have occurred throughout its long history has not been measured quantitatively. Nonetheless, direct soil impacts due to inappropriate grazing such as compaction, livestock trampling, soil nutrient cycling, water erosion, and wind erosion have been well documented in scientific literature. Many of these same types of soil impacts have been observed both quantitatively and qualitatively on the monitoring sites within the Project Area.

The monitoring data at the majority of the riparian sites suggests that there is an adequate "A" soil horizon present to sustain proper soil function. The primary parameters that may affect soil productivity over the long term are lack of plant rooting depth, high amounts of bare ground, and soil compaction. If these sites have the opportunity to regain plant rooting vigor and soil cover provided by plants, soil conditions should likely provide the capability to sustain the current level of soil productivity over the long term. If plant vigor does not recover, then soil productivity would likely decline over the long term.

Based on the Soil Survey of Humboldt County, predictions may be made for areas most sensitive to adverse soil impacts. A high potential for soil compaction is predicted to occur on 2,081 acres of riparian areas comprised mostly of the wet meadow and dry to moist meadow vegetative groups. A moderate potential for compaction caused by the effects of trampling is predicted to occur on 133,633 acres of upland area. The potential for streambank trampling is predicted to occur along 275 miles of perennial streams and 520 miles of ephemeral streams. A high potential for water erosion is predicted to occur on 84,976 acres. A high potential for wind erosion is predicted to occur on 4,352 acres. Shallow soils, where soil loss through erosion at a rate exceeding one ton per acre per year by wind or water would adversely affect crop productivity over a sustained period, are predicted to occur on 60,524 acres. Many of these acreages overlap and an area may be susceptible to more than one type of potential adverse soil impact. Many of these areas are already likely impacted due to the long history of livestock grazing, roads, trails, recreation sites, mining, and fire.

Site specific monitoring data suggest that the soil and vegetative attributes that are not currently functioning as desired would likely continue to display impaired functioning under the current grazing management system and drought conditions. While the current trend for long term soil productivity at these sites without drought factored in is not certain, the greatest degree of impairment is likely to occur in the areas predicted to be most sensitive to adverse soil impacts such as compaction, trampling, water erosion, wind erosion, and in the areas of fragile soils.

Under current grazing management practices, compaction and upland trampling disturbances are expected to remain static. This is because with current grazing systems, livestock numbers, season of use, and head months would remain the same. Under current grazing management practices, disturbances caused by riparian trampling, water erosion, and wind erosion are likely to trend downward because of additional losses of soil caused by these indicators. Soil nutrients are also likely to trend downward due to loss of organic matter caused by the effects of compaction, trampling, erosion, and conversion of vegetation into biomass.

Cumulative Effects of “Current Management / No Action” to Soil Quality

The appropriate geographic area for soil cumulative effects analysis is also the Project Area. Again, this is because soil productivity of one grazing allotment or pasture unit is not dependent on the productivity of an adjacent grazing allotment or pasture unit. Similarly, if one site receives soil impacts due to management activities and a second management that may affect soil is planned for the same site, then soil cumulative effects are possible on that site. Thus, cumulative effects to soil productivity are appropriately evaluated on a site-specific basis.

The disturbances associated with grazing that may affect soil conditions include compaction, trampling, soil nutrient cycling, water erosion, and wind erosion. Within the Project Area, soil conditions may be affected by man-caused disturbances not currently in existence or by future natural events. When grazing occurs in these areas, there is potential for cumulative effects. Other factors that may cumulatively affect soil conditions include:

COMPACTION

- **Roads**
Considerable portions of the District are Wilderness and Roadless Areas. Road Densities are low and the impacts from Roads are limited and isolated.
- **Off road travel**
Impacts from off road travel are limited due to low use and rugged terrain. Impacts are increasing with increasing use and advancements in equipment.
- **Recreation sites**
Limited to one (1), 10-acre site.
- **Trails**
There are only 25 miles of trail that occur within or adjacent to the Wilderness Area. Use on these trails is low and impacts are light.
- **Mining**
Mining activities are primarily historic and are limited to areas like Spring City, Buckskin, National and other localized sites. There are currently no active mining operations and only limited exploration activities.

TRAMPLING

- **Roads**
Considerable portions of the District are Wilderness and Roadless Areas. Road Densities are low and the impacts from Roads are limited and isolated.
- **Dispersed recreation**
Campsites are scattered throughout the area and many are near water. Use of these sites is considered light with minimal and isolated impacts.
- **Off road travel**
Impacts from off road travel are limited due to low use and rugged terrain. Impacts are increasing with increasing use and advancements in equipment.
- **Trails**
There are only 25 miles of trail that occur within or adjacent to the Wilderness Area. Use on these trails is low and impacts are light.
- **Mining**
Mining activities are primarily historic and are limited to areas like Spring City, Buckskin, National and other localized sites. There are currently no active mining operations and only limited exploration activities.
- **Terracing caused by wildlife trails**
Big game species include Mule Deer, Pronghorn, and bighorn sheep. Their numbers are limited and the impacts from trailing is light
- **Burrowing animals contributing to bare ground**
These impacts are isolated with limited impacts.

WATER EROSION

- **Fire**

Fires have impacted considerable acres on the District. Water erosion following fires is well documented on the district

- **Roads**

Considerable portions of the District are Wilderness and Roadless Areas. Road Densities are low and the impacts from Roads are limited and isolated.

- **Off road travel and trails**

Impacts from off road travel are limited due to low use and rugged terrain. Impacts are increasing with increasing use and advancements in equipment. There are only 25 miles of trail that occur within or adjacent to the Wilderness Area. Use on these trails is low and impacts are light.

- **Recreation sites**

Limited to one 10 acre site, however, this site is located within a riparian area.

- **Mining**

Mining activities are primarily historic and are limited to areas like Spring City, Buckskin, National and other localized sites. There are currently no active mining operations and only limited exploration activities.

- **Water diversions or spring developments in poor condition**

There are few water diversions on the District. Limited erosion is occurring at some spring developments that are improperly designed or in disrepair.

- **Flooding/High intensity storm events**

These occur occasionally and have considerable impacts on the steep and deeply incised watersheds that occur in parts of the Project Area. The impacts are most pronounced following wildfires such as the Upper Willow Fire of 2001.

- **Rain and snowmelt events**

These occur occasionally and have considerable impacts on the steep and deeply incised watersheds that occur in parts of the Project Area.

WIND EROSION

- **Fire**

Wind erosion has been observed on some of the larger wildfires in the Project Area.

- **Roads**

Portions of the District are Wilderness and Roadless Areas. Road Densities are low and the impacts from Roads are limited and isolated.

- **Off road travel and trails**

Impacts from off road travel are limited due to low use and rugged terrain. Impacts are increasing with increasing use and advancements in equipment. There are only 25 miles of trail that occur within or adjacent to the Wilderness Area. Use on these trails is low and impacts are light.

- **Recreation sites**

Wind erosion is not a problem in the one site on the District.

- **Mining**

Mining activities are primarily historic and are limited to areas like Spring City, Buckskin, National and other localized sites. There are currently no active mining operations and only limited exploration activities.

- **Burrowing animals contributing to bare ground**

These impacts are isolated with limited impacts.

- **Wind velocity**

- **Drought**

SOIL NUTRIENTS

- **Fire**
Wind erosion has been observed on some of the larger wildfires in the Project Area.
- **Roads**
Portions of the District are Wilderness and Roadless Areas. Road Densities are low and the impacts from Roads are limited and isolated.
- **Off road travel and trails**
Impacts from off road travel are limited due to low use and rugged terrain. Impacts are increasing with increasing use and advancements in equipment. There are only 25 miles of trail that occur within or adjacent to the Wilderness Area. Use on these trails is low and impacts are light.
- **Recreation sites**
Wind erosion is not a problem in the one site on the District.
- **Mining**
Mining activities are primarily historic and are limited to areas like Spring City, Buckskin, National and other localized sites. There are currently no active mining operations and only limited exploration activities.
- **Conversion of vegetation to annual or invasive plants**
This is a considerable problem below 6,500 feet in elevation.
- **Drought**

Aside from livestock grazing, of the various cumulative effects, fire has the potential to affect soil quality over the greatest area. The severity of affects to soil, ground cover, and organic nutrient conditions are determined by the intensity of temperatures occurring in the fire (Clark, 2001).

On low burn severity sites, the litter is partially consumed by the fire and very little heating of the soil surface layer occurs. The fire does not affect the soil hydrologic properties. Soil temperatures at 1cm are less than 50 C. Lethal temperatures for soil organisms occur down to depths of about 1 cm. Many unburned roots and seeds that are in the surface soil would aid in vegetating the burned areas. Natural re-vegetation on these sites would occur quickly.

The moderate burn severity sites have slightly altered surface soil structure, reduced numbers of fine roots and less seed viability in the soil surface. In most places, the organic layer is reduced to a layer of charred litter. Soil temperatures at the 1 cm depth can reach 100 to 200 C. Lethal temperatures for soil organisms occur down to depths of 3 to 5 cm. Natural revegetation on these sites is slower than a low burn severity site. Hydrophobic soil, or soil that as result of fire has a slightly glazed or impermeable layer right at the surface may occur under moderate burn severity sites, but are usually spotty and short-lived.

High burn severity sites have modified surface soil properties. The surface soil structure has broken down, and a strong hydrophobic layer may be present. Soil temperatures at 1 cm are greater than 250 C. Lethal temperatures for soil organisms occur down to depths of 9 to 16 cm. There are few viable roots or seeds remaining in the upper layers of the soil. Soil conditions and a lack of organic litter layer or protective vegetative cover allows for rain-impact erosion at the surface, reduced infiltration, and increase the potential for erosion and runoff. The natural revegetation on these sites is slow. Immediately after the fire, these areas would usually experience accelerated water runoff and erosion for a period of time, until a vegetative cover becomes established and the hydrophobic conditions dissipate. The potential for erosion is highest on steep slopes that burned with a high burn severity.

Fire may also affect soil quality by temporarily increasing pH and ammonium while decreasing nitrogen, sulfur, and phosphorus. One effect of low severity fires is to make water-soluble nutrients immediately available for plant uptake. This effect may enhance vegetative re-growth immediately after a fire.

Alternative 2: "Proposed Action"**Direct and Indirect Effects**

The proposed action sets new utilization standards for the eight representative vegetative groups in the Project Area. The standards include maximum allowable utilization levels for herbaceous vegetation and woody vegetation. These levels of utilization vary based on the vegetative group type, meeting a desired function, not meeting a desired function, or having crossed below threshold. Proposed utilization is for the most part, less than the current utilization levels used in "Current Management/No Action." Compared to "Current Management/No Action", there is an overall net reduction in forage utilization for grazing in the

Project Area with this alternative. Additional management requirements that apply to sage grouse nesting areas, cottonwood communities, and stream/riparian areas place some limits on season of use.

Soil impacts are likely to decrease when forage utilization is decreased compared to "Current Management/No Action." This is because a decrease in forage utilization would likely help increase plant vigor and root biomass, reduce bare ground, increase soil organic matter and nutrient cycling, break up soil compaction, and improve soil infiltration and water holding capacity. The areas where forage utilization is decreased would likely recover to a desired function from previous grazing effects, while continuing to be grazed.

A reduction in forage utilization would likely lead to changes in how the allotments are managed. Grazing utilization would be reduced. Light utilization grazing has less negative impacts on plant vigor, litter, and soil organic matter than heavy utilization grazing (Clary et. al., 2002, Naeth et. al. 1991).

Decreased forage utilization criteria have the potential to reduce direct livestock impacts to soils compared to "Current Management/No Action." Improved plant vigor and decreased adverse soil impacts would likely enhance soil recovery on existing impacted areas due to less forage utilization. Regardless of these overall changes, existing detrimental soil disturbance may be perpetuated at sites where livestock congregate.

Under "The Proposed Action" alternative, soil quality indicators for compaction, riparian trampling, and upland trampling are expected to trend upward due to less grazing pressure because of lower forage utilization. Soil nutrients are likely to remain static on sites dominated by undesirable annual or invasive plant species and trend upward elsewhere due to lower forage utilization rates. Water erosion and wind erosion trends are likely to remain static where a site has crossed below threshold due to excessive soil loss. Otherwise the erosion trends that may be attributed to Improperly managed livestock grazing should be upward because of increased ground cover due to lower forage utilization.

Cumulative Effects

Cumulative effects are expected to be similar to, but slightly less, than those described for "Current Management/No Action."

Alternative 3: "No Grazing"

Direct and Indirect Effects

The "No Grazing" Alternative would end grazing in the Martin Basin Project Area within five (5) years. Termination of grazing provides the greatest potential to restore soils to functions as desired, at the most rapid rate, in areas that have been previously impacted by grazing (Belsky, et. al., 1999). With forage utilization by livestock grazing at zero percent, improved or sustained soil and plant productivity, should occur due to improvements in plant vigor, increased ground cover, increased organic nutrients, and increased water-holding capacity.

For areas with high resiliency such as riparian sites, recovery would probably occur more rapidly, compared to other areas with impaired soil conditions. Recovery of vegetation may occur as soon as three years after livestock removal (Cole, 1988).

Less is known about soil recovery of upland rangeland areas. Recovery of upland areas may take longer than riparian areas due to a lower resiliency, less moisture, and shallower soils. On the other hand, grazing intensity of upland rangeland is likely much less than for riparian areas. While biological crusts in some upland areas may recover within 8-11 years after termination of disturbance, other areas may take many decades for complete crust restoration. (Kaltenecker et. al., 1999). Recovery rates are dependent on many factors, including disturbance type, severity, and extent; plant community structure; adjoining substrate condition; inoculation material availability; and climate during and after disturbance (Belnap et. al., 2001).

For upland rangelands that have a higher predicted sensitivity to compaction, trampling, water erosion, wind erosion, or have fragile soils, recovery may be slower compared to less sensitive upland areas. Areas where native vegetation dominates the plant community would recover more quickly compared to areas where introduced plant species are dominant. Recovery of soil quality for these areas may require several decades.

On degraded sites with severe soil disturbance, recovery may require at least several decades. These conditions may be present where concentrated livestock use occurs within the Project Area. Examples include water developments, salt placement sites, and animal trailing corridors along fence lines.

On sites where critical amounts of topsoil have been lost through water or wind erosion, sites where head cutting has significantly dropped the water table, or sites dominated by undesirable annual or invasive plant species, restoration to original condition may not be ecologically or economically feasible.

Under the "No Grazing" alternative, soil quality related to compaction, riparian trampling, and upland trampling are expected to trend upward because of the cessation of livestock grazing. Soil nutrients are also likely to trend upward due to on-site retention of all organic matter rather than losses caused by the effects of compaction, trampling, erosion, and conversion of vegetation into biomass. Water erosion and wind erosion trends are likely to remain static where a site has crossed below threshold due to excessive soil loss. Otherwise the erosion trends that may be linked to Improperly managed livestock grazing should be upward due to increased ground cover caused by zero forage utilization.

Cumulative Effects

This alternative would have the greatest potential to cumulatively improve, conserve, and maintain soil productivity and function within the Project Area due to termination of grazing. Roads, off road travel, trails, recreation sites, mining, invasive plants, fire, and naturally occurring actions and events however would continue to impact soils.

Alternative 4 – Resource Concepts, Inc. (RCI) Proposal

Direct and Indirect Effects

Given that there are no set utilization levels for livestock grazing under Alternative 4, utilization levels could potentially range from light to 100 percent. It is, therefore, unknown what the potential effects to soil quality will be until the AMPs are developed. At best, soil quality conditions would be the same as expected under the Proposed Action Alternative. However, because utilization could potentially exceed current levels, there is also the potential for soil quality to degrade further than is seen with the Current Management/No Action Alternative.

Under Alternative 4, improvements, such as water developments, portable watering points and sources, fencing, salting, and trails, would be "expeditiously" installed. If used properly, these improvements can help to limit the harmful effects of grazing. However, they also have the potential to cause soil damage by concentrating livestock. For example, livestock tend to create a ring of bare, compacted ground that expands outward as the gather around watering troughs and salting areas. Alternative 4 lacks specifics on the quantity and location of improvements, which makes it difficult to determine potential effects to soil quality, if any.

Alternative 4 also calls for a number of vegetation treatments, such as prescribed burning, clearing, mowing, thinning, and prescribed grazing, to be "expeditiously" implemented. Activities such as these will inherently cause soil disturbance, and depending on how they are implemented they could potentially cause damage to soil quality. Because this Alternative lacks specifics, such as location and size of the treatment area, the effect to soil quality, if any, is unknown.

Cumulative Effects

Things that are now acting cumulative with livestock grazing to negatively affect soil quality will likely not change under Alternative 4. However, because the direct and indirect effects to soil quality are unknown, the combined effect of grazing with other activities would likely results in a range of cumulative effects. The cumulative effects could range from those that will likely occur with the Proposed Action Alternative to those greater than under the Current Management/No Action Alternative.

FISHERIES

Potential effects to fisheries including the federally threatened Lahontan cutthroat trout (LCT) are a significant issue for this analysis. The Humboldt Land and Resource Management Plan (*Forest Plan*) recognizes LCT and other trout species as MIS and directs the Forest to improve and increase habitat for LCT. Amendment #2 of the *Forest Plan* classifies all streams into management categories and assigns utilization standards based on management category. Riparian areas along streams that contain LCT are considered to be Category 1 (Appendix A), and are defined as being associated with highest value fishery habitat. The goal of *Forest Plan* standards and guides is to improve streams and fisheries habitat to reach a desired condition.

Desired condition for Category 1 streams includes maintaining streambank stability at 90% of estimated potential and maintaining fish production near each stream's potential.

INTRODUCTION TO SEDIMENT AND SUBSTRATE EMBEDDEDNESS

Fine sediment levels in excess of 30% were found in surveys conducted by the Forest in 2002, and substrates embedded with fine sediment up to 50% are common within the Project Area.

Much of the high sediment levels found in the Project Area are due to the amount of bare, loose soils located inside and outside the riparian zone. Soils are exposed due to livestock use in the area and lack of regeneration of vegetation.

Fine sediment in streams is a normal component of salmonid habitat; however, major disruption of the system occurs when sediment levels substantially exceeds the natural levels. Deposition of fine sediment can eliminate habitat for aquatic insects; reduces density, biomass, and diversity of aquatic insects; reduces permeability of spawning gravels; and reduces emergence of fry from the redd. (Nelson et. al. in Meehan 1991). Studies have shown that an increase in 1-3mm size sand from 20% to 30% can decrease emergent survival of salmonid species from 65% down to 40% (Phillips et. al. 1975). Fine sediments are known to impact fry emergence and survival, and fine sediment (<6.5mm in size) levels above 40% can effectively eliminate a trout fishery and many macroinvertebrate species (Everest and Harr 1982).

ENVIRONMENTAL EFFECTS BY ALTERNATIVE

Alternative 1: Current Management / No Action

LCT inhabit streams throughout the Project Area, and the Project Area is considered a recovery area for LCT (USFWS 1995). Impacts to fisheries and stream habitats associated with improperly grazed livestock have been well documented in scientific literature and by state and federal agencies (Kauffman and Krueger 1984; Clary and Webster, 1989; Overton, et. al., 1994; Platts, 1991; Platts and Nelson, 1985; Platts, 1979). The Forest also has monitoring data indicating that several streams in the Project Area are not functioning at desired conditions. Grazing can affect all components of the aquatic system - riparian vegetation, channel morphology, quality and shape of water column, and structure of the soil portion of the streambank (Platts 1979). Impacts from improperly managed livestock grazing to streams and fisheries habitat include, but are not limited to:

Manipulation of channel morphology (bank shearing, increased width-to-depth ratio, channel incision, unstable streambanks due to loss of riparian vegetation and erosion, loss of undercut banks);

- Changes in riparian vegetation types and overall loss of riparian vegetation;
- Increased water temperatures;
- Increased fine sediment levels;
- Loss of riparian areas from channel degradation, channel incision, and loss of water table.

Manipulation of channel morphology results in the direct loss of habitat features that are important to trout (especially young-of-the-year), such as undercut banks, shorewater depth, and quality pool habitat (Platts 1987). The ability of the stream to transport sediment, withstand flood events, and maintain local water table is reduced by the alteration of morphology (Rosgen 1996). Changes in channel morphology caused by bank shearing and bank instability would increase the width:depth ratio of the channel, creating a wide and shallow stream and a corresponding increase in water temperature during the summer. A wide, shallow channel can also act as a barrier to fish movement. With a wide and shallow stream, fish are also impacted during the winter months from lack of thermal protection and freezing and the formation of anchor ice. Anchor ice, which forms in shallow channels, prevents fish movement between rocks on the bottom of the stream and inhibits fish from feeding on aquatic invertebrates (Montana Fish, Wildlife, and Parks 2003). Streams that are deeper and narrower, having healthy riparian vegetation and a subsequent decrease in width:depth ratio are less likely to have anchor ice than shallow, exposed streams.

During surveys in 2002, several plant species indicative of disturbance and soil compaction were seen along the streambanks within the Project Area including: hemlock, wild rose, curly dock, spikerush, and stinging nettle.

Direct and Indirect Effects of “Current Management / No Action” on Fisheries

“Current Management/No Action” would continue current management, maintaining current permitted numbers, seasons, and standards. Under this alternative, improvement in existing stream and fisheries habitat conditions would take the longest to occur. Current existing conditions and trends would continue. Under this alternative, livestock are managed according to Amendment #2 of the Forest Plan, which classifies all streams into management categories and assigns livestock utilization standards based on management category. Riparian areas along streams that contain Lahontan cutthroat trout are considered to be Category 1 (45% utilization levels). However, there are streams that are assigned a higher utilization level (up to 65%) that drain into existing or potential LCT streams (See Table 25-T in Appendix A). Many of these tributary streams could be considered potential seasonal habitat for LCT. Downstream impacts to existing LCT streams are likely to occur with these tributaries being managed at higher utilization levels. These impacts would include: increased sedimentation, vertical instability related to changes in channel morphology upstream, increased water temperature, and decreased water quality.

Direct impacts under this Alternative to fisheries, particularly to LCT, occur when mortality results from trampling of redds or early life stage embryos and alevins that have not yet left stream substrate.

The majority of impacts to fisheries and LCT occur indirectly from the alteration of stream habitat and result in reduced populations, growth, and recruitment. Indirect effects, as described in the above section, occur in a cause and effect manner when livestock trample streambanks and reduce crucial bank vegetation, and channel morphology is altered. With unstable streambanks, erosion occurs, fine sediment enters the stream channel, the channel is widened, and water temperatures rise with shallow water and decreased riparian vegetation. In some cases, the stream would form a headcut, and the channel would incise resulting in lowered water tables and loss of entire riparian areas.

In areas where impacts from livestock are measurable, stream channels contain more fine sediment, streambanks are less stable, undercut banks are lacking, and water temperatures are generally higher. Populations of salmonids and other aquatic life that are sensitive to these changes would continue to have reduced reproduction and survival rates. (Platts 1991)

Under current management, some streams within the Martin Basin Area are not functioning at desired levels. North Fork Cabin Creek, Round Corral Creek, and Siard Creek are notably below desired conditions with high sediment levels. Fisheries habitat conditions within the Granite Peak Allotment are similar with high sediment levels and increased width:depth ratios. Both the Martin Basin area and the Granite Peak Allotment are considered recovery areas for LCT within the Humboldt River Basin Distinct Population Segment (DPS) with potential for formation of metapopulations.

Similar habitat conditions are occurring within the Northwestern DPS. Of particular concern within the Westside Flat Creek Allotment is Three-Mile Creek, which currently has a population of LCT. Sediment levels and ratings for ungulate damage are high, and unstable banks are present. During surveys in 2002, Three-Mile Creek was found to be incised from vertical instability, high cut banks were contributing sediment to the stream, and plant species along the stream were indicative of disturbance and upland species were encroaching the stream.

Cumulative Effects of “Current Management / No Action” on Fisheries

Activities that have cumulatively affected stream habitats, fisheries, and particularly LCT within the Project Area and at the watershed scale outside of the Project Area include: long term grazing on public and private land, recreation, road construction and maintenance, recreational fishing, mining, water diversion and development, stocking of non-native fish, and spread of noxious weeds.

Cumulatively, livestock grazing is the most widespread activity with the longest duration in the area, starting in the late 1800's. Impacts to the landscape, as noted previously, have been extensive, and impacts to streams and riparian areas are particularly well documented.

WATER DIVERSIONS

Agricultural diversions occur on several streams in the area and are found mostly on privately-owned land or on lands administered by BLM. The diversions depend on a reliable water supply from upstream sources on the Forest. Effects to the water source such as alterations in channel morphology leading to channel incision can cause changes to water retention along the riparian zone. This can amount to less water being available

during low flow periods. In some cases, water removal would result in reduced quantity and quality of habitat for trout. Many of the streams in the area do not persist much beyond the point of diversion due to dissipation onto alluvial fans as streams flow off the mountain. Unscreened diversions can also trap fish causing direct mortality.

STOCKING OF NON-NATIVE FISH

The first known stocking of non-native fish into a LCT stream in Humboldt County was July 1896 when rainbow trout and brook trout were stocked into the Quinn River. Not all stocking activities have been documented; however, it is assumed that perennial streams with adequate access were stocked with non-native fish. (NDOW 1999) Hybridization with rainbow trout has been found throughout the Santa Rosa Range, and along with habitat degradation, a corresponding loss of LCT has been documented. Due to either direct competition or hybridization, LCT have been greatly impacted by this activity.

ROADS

Roads are found along side and/or crossing many streams on both public and private land. Roads can impact watersheds in several ways including: alteration of channel morphology, alteration of runoff regimes, increase of fine sediment levels in streams, reduced riparian vegetation and cover, and confinement of channel (particularly when roads are placed directly next to streams on adjacent floodplains). Recreation and dispersed camping alongside roads have also contributed to stream impacts. Use of All Terrain Vehicles (ATVs) has increased the number of new roads in the area and has allowed more access along streams. Where roads intersect streams, culverts or bridges can create migration barriers or completely block fish movement. Maintenance of roads continually inputs more fine sediment into the watercourse.

HISTORIC MINING OPERATIONS

Historically, the Santa Rosa Range has also been the site for mining activity. Of special concern is the acidic pH and high sulfate levels currently found in the North Fork Little Humboldt River downstream of the Buckskin Mine. No fish or aquatic invertebrates are found in the river until two (2) miles downstream of the area.

NOXIOUS WEEDS

All the above activities increase the risk and spread of noxious weeds which can invade riparian areas and ultimately impact stream habitat.

FIRE AND FIRE SUPPRESSION

Some natural processes outside the control of the Forest have contributed to cumulative effects to aquatic resources. These processes include wildfire and drought. The Santa Rosa Ranger District of the HTNF is particularly susceptible to wildfire due mainly to existing moisture regimes and conversion of native vegetation species to cheatgrass. Fires tend to spread quickly and burn hotter than in other areas. In May 2005, prescribed burning was implemented in the Buttermilk Allotment to improve sagebrush habitat.

DROUGHT

The Santa Rosa Range has also experienced persistent drought on and off since 1987.

ALTERNATIVE 2: PROPOSED ACTION

LCT inhabit streams throughout the Project Area, and the Project Area is considered a recovery area for LCT (USFWS 1995). Impacts to fisheries and stream habitats associated with improperly grazed livestock have been well documented in scientific literature and by state and federal agencies (Kauffman and Krueger 1984; Clary and Webster, 1989; Overton, et. al., 1994; Platts, 1991; Platts and Nelson, 1985; Platts, 1979). The Forest also has monitoring data indicating that several streams in the Project Area are not functioning at desired conditions. Grazing can affect all components of the aquatic system - riparian vegetation, channel morphology, quality and shape of water column, and structure of the soil portion of the streambank (Platts 1979). Impacts from improperly managed livestock grazing to streams and fisheries habitat include, but are not limited to:

- Manipulation of channel morphology (bank shearing, increased width-to-depth ratio, channel incision, unstable streambanks due to loss of riparian vegetation and erosion, loss of undercut banks);
- Changes in riparian vegetation types and overall loss of riparian vegetation;

- Increased water temperatures;
- Increased fine sediment levels;
- Loss of riparian areas from channel degradation, channel incision, and loss of water table.

Manipulation of channel morphology results in the direct loss of habitat features that are important to trout (especially young-of-the-year), such as undercut banks, shorewater depth, and quality pool habitat (Platts 1987). The ability of the stream to transport sediment, withstand flood events, and maintain local water table is reduced by the alteration of morphology (Rosgen 1996). Changes in channel morphology caused by bank shearing and bank instability would increase the width:depth ratio of the channel, creating a wide and shallow stream and a corresponding increase in water temperature during the summer. A wide, shallow channel can also act as a barrier to fish movement. With a wide and shallow stream, fish are also impacted during the winter months from lack of thermal protection and freezing and the formation of anchor ice. Anchor ice, which forms in shallow channels, prevents fish movement between rocks on the bottom of the stream and inhibits fish from feeding on aquatic invertebrates (Montana Fish, Wildlife, and Parks 2003). Streams that are deeper and narrower, having healthy riparian vegetation and a subsequent decrease in width:depth ratio are less likely to have anchor ice than shallow, exposed streams.

During surveys in 2002, several plant species indicative of disturbance and soil compaction were seen along the streambanks within the Project Area including: hemlock, wild rose, curly dock, spikerush, and stinging nettle.

Direct and Indirect Effects of “Proposed Action” on Fisheries

Improvement in stream conditions under the “Proposed Action” would occur more rapidly than under “Current Management/No Action.” The “Proposed Action” allows for streams that are not functioning at desired levels to be grazed at lower utilization levels or not at all, in order to achieve improved conditions. This alternative uses the matrix system to assign appropriate levels of grazing based on stream and riparian condition. If habitat conditions are maintained at desired levels, improvement in fisheries reproduction and population numbers is expected to occur. Also, with improved stream conditions, the amount of available habitat would increase.

General effects related to livestock grazing, as in “Current Management/No Action”, are expected to also occur with “Proposed Action”; however, the degree to which the impacts would occur would be reduced and the recovery rate to achieve desired condition would be expedited. Overall, fisheries habitat conditions under “Proposed Action” are expected to be maintained at an acceptable level. Direct and indirect effects, as discussed in “Current Management/No Action”, are still possible under “Proposed Action.” Fine sediment levels are expected to be lower under “Proposed Action” due to improved streambank condition and riparian vegetation. The riparian pasture planned for North Fork Cabin Creek and Cabin Creek area would improve management in that area and reduce direct and indirect effects to fisheries and potential LCT habitat.

“Proposed Action” would authorize livestock grazing on the two (2) currently vacant allotments. Streams (Dutch John Creek and Road Creek) within the Bradshaw Allotment that are not currently being grazed would likely see many of the impacts associated with livestock grazing that have already been described. The Rebel Creek Allotment, which is currently vacant would be authorized for livestock grazing. Impacts to fisheries habitat are expected to occur on streams in the Rebel Creek Allotment (McConnell Creek and upper Rebel Creek) that are currently not grazed. A riparian pasture is planned for the majority of Rebel Creek, and this pasture would not be used with the rest of the allotment.

Cumulative Effects of “Proposed Action” on Fisheries

Due to decreased utilization levels, the cumulative effects would be similar to, but slightly less than, those for the “Current Management / No Action” in the preceding section.

Alternative 3: No Grazing

Direct and Indirect Effects of “No Grazing” on Fisheries

“No Grazing” would likely see the most immediate improvement in stream and fisheries habitat conditions, as the direct and indirect effects of livestock would be removed from the Project Area. With the removal of livestock grazing, stream and riparian areas would be restored more quickly than with the other alternatives. Many studies have shown stream habitats that are degraded by livestock grazing would improve when

grazing is eliminated. Investigations have also shown that fish production is increased after grazing was removed (Platts 1991). The rate of recovery of any given stream would vary depending on substrate size, stream flows, condition of riparian vegetation, and upstream supply of sediment. (Rosgen 1996)

Cumulative Effects of “No Grazing” on Fisheries

Because grazing would be eliminated, this alternative would have the most reduction in cumulative effects as compared to “Current Management/No Action” and “Proposed Action.”

Alternative 4: Resource Concepts, Inc. (RCI) Proposal

The “RCI Proposal” is similar to “Current Management / No Action” in many respects. However, the implementation of this alternative would remove specifics currently permitted – utilization level, on-off dates, stocking levels, etc. – and replace them with a management strategy whereupon livestock use would be tied to desired plant community and/or desired future condition.

While adaptive management without specific “hard” standards is a laudable goal, potential exists for conflict and/or disagreement between the management agency and the user. A permittee could judge range conditions acceptable while an agency representative believes overutilization and resource damage are occurring. This alternative recognizes the possibility of conflict and suggests a collaborative arbitration procedure. However, without numerical standards, the onus is on the management agency to conclusively demonstrate negative resource effects. This validation process may require months, if not years, of monitoring, during which time natural processes may confound evidence. No provision is made in this alternative to retard use until such time conflicts are resolved, which in turn could exasperate impacts should negative effects be occurring.

In the case of fisheries resources, habitat condition and the potential to improve, maintain, or degrade is almost entirely dependent upon how a permittee manages livestock.

Direct and Indirect Effects of “RCI Proposal” on Fisheries

Under this alternative, a permittee’s riparian management actions can have a large effect upon aquatic resources.

A permittee can choose to actively graze livestock in a “fish friendly” manner. Such may involve consideration of entry/exit dates, restricting access to riparian or sensitive areas via fencing, implementing utilization levels at or below Alternative 1 permitted maximums, monitoring bank trampling and taking action when it does occur, riding livestock, scheduling rest, and so forth. If a “fish friendly” option is pursued, it is expected direct and indirect effects to fisheries would be reduced and improvement to habitat, including that currently or potentially occupied by LCT, would be realized. The amount of improvement would depend upon the aggressiveness of the individual permittee to follow this course.

Alternatively, a permittee can graze livestock in a manner similar to that currently utilized. If such occurs, effects described under the Alternative 1 analysis should apply.

For this alternative, the potential exists for a permittee to decide to increase riparian utilization above the current authorized maximums, alter livestock entry/exit dates, and graze continually through the hot season every year. Each of these decisions has potential negative fisheries management implications.

INCREASED UTILIZATION

Increased utilization can occur due to an increase in animal numbers, an increase in duration, or a combination thereof. For utilization up to the currently allowed maximum of 35% to 65%, depending upon stream categorization, the effects have already been discussed. Utilization greater than 65% within the riparian zone is discussed in the “Cumulative Effects” section.

While this proposed alternative discusses removal of utilization maximums, thus potentially allowing greater than 65% use, no specifics are provided. While the existing Forest Plan allows for utilization above the 65% maximum, however specific locations and justification for the increase are required, as is a NEPA document to analyze the effects. This alternative does not provide the necessary specificities and, thus, no decision can be made through this EIS process to increase utilization above Forest Plan maximum.

However, adoption of this alternative, in part or whole, may open the door to specific proposals of increased utilization at a later date. Analysis of cumulative effects must consider possible future actions, under which

increased utilization falls. Therefore, the discussion of utilization greater than 65% is in the following "Cumulative Effects" section.

SEASONAL TIMING

Timing, and specifically entry dates, can have a large impact on banks, and therefore the fisheries resources.

A critical period for riparian and streamside areas is late-spring to early-summer. Following snowmelt and spring rains, livestock turned out to pasture may avoid areas adjacent a stream due to overly wet soils (Platts and Nelson 1985). Later in the season, lower soil moistures and vegetative growth serve to stabilize streambanks (Mosley, et al. 1997; Marlow, et al. 1987). During the critical period, however, soil moisture levels are insufficient to deter livestock use and at the same time banks are more susceptible to trampling (Marlow, et al. 1987).

The primary effect is an aggravation of an inherent streambank instability which occurs during the critical period. In turn, fish habitat may be affected through increased sediment input, sloughing of overhanging banks, and so forth as described under previous alternatives. This is especially true in riparian areas which are already in a degraded condition and which cannot withstand grazing as well as healthy areas, in which case rest or deferment may be required (Mosley, et al. 1997).

HOT SEASON GRAZING

The hot season for the purposes of this document is defined as mid-July through August. Seasonal patterns of use for livestock are well documented. Where cattle are allowed unhindered movement, they tend to increasingly linger in the riparian zone as the season advances to summer until use is highly concentrated in areas adjacent to water (Parsons, et al. 2003; Goodman, et al. 1989).

While lower soil moisture means bank trampling is not as high a concern as compared to wetter times of the year, riparian grazing in the summer can be detrimental to woody species such as willow. Willow is increasingly utilized in the late summer and early fall months compared to earlier in the season (Myers 1989). While sedge and grasses show an ability to recover following summer grazing, willows tend to have reduced growth potential (Leonard and Karl 1995; Myers 1989).

Continued hot season use, if the permittee so chooses in this alternative, would produce an outcome similar to Alternative 1. Willow browse, especially if excessive, contributes towards lower vigor, decreased (or at least not increasing) canopy, and indirectly could increase water temperatures. If yearly hot season riparian use is combined with detrimental utilization or seasonal use, existing or developing problems could be exasperated.

The recommendation for riparian hot season use is to rest at least once every several years, as suggested in Alternative 2. An evaluation of grazing systems found successful systems reported pasture rest was important to maintain or improve willow, as well as sedges and other riparian forage (Myers 1989).

Cumulative Effects of "RCI Proposal" on Fisheries

Assuming a grazing strategy similar to Alternative 1, the cumulative effects would be similar to the "Current Management/No Action" alternative. If the permittee decides actively pursue a plan to minimize riparian impact, then cumulative effects should be less than the "Current Management/No Action" option. If permittee actions lead to greater riparian impact, then cumulative effects are expected to increase.

As aforementioned, the effects of increased utilization are considered separately.

INCREASED UTILIZATION

This subsection considers "heavy grazing" in the riparian zone. While heavy grazing has many interpretations, it is generally described as greater than 65% utilization or, alternatively, about 2.5 AUM/ha (Trimble and Mendel 1995; Kirsch 1969).

The effect livestock has upon the riparian is dependent upon factors such as soil and plant community composition, although in general, the longer or heavily stocked a pasture is, the greater the impact (Mosley, et al. 1997). In a study of successful and unsuccessful grazing systems (as defined by maintenance and condition of riparian areas), Myers (1989) found that while there was no statistical difference in stocking rate, unsuccessful systems had longer grazing duration, both overall and when only fall use was considered. A study by Schulz and Leiniger (1990) examined the effects of an enclosure installed in 1956 by the Forest

Service to limit cattle impacts. Riparian utilization outside the enclosure, while reduced over historic levels, was 65% at the time of research (Schulz and Leininger 1990). Willow showed the most improvement; and while densities inside and outside the enclosure were similar, those inside the were older and had a higher canopy closure (Schulz and Leininger 1990). While no attempt was made to characterize effects to the stream, canopy cover is an important factor in stream temperatures. At Mahogany Creek in Nevada, livestock were excluded via fencing in the mid- to late-1970's due to negative effects to the stream (Dahlem 1979). No specific AUM per unit area is provided, but the Santa Rosa Ranger District has historically sustained very high levels of grazing (Dahlem 1979). Photographic evidence demonstrates the resource damage attributable to heavy grazing, the effects of which were reversed following exclusion (Dahlem 1979). Generally, any grazing strategy which leads to heavy riparian use – high animal numbers, long duration, poor distribution – are not beneficial for aquatic resources (Platts 1991).

Consideration of number of animals stocked over an allotment-wide area is only relevant if livestock utilize all acreage equally. This is not true, especially in arid areas, as cattle demonstrate specific daily and seasonal movement in regards to forage, temperature, breed, and other factors (Bailey 2004; Goodman, *et al.* 1989). Water is especially important, and a study looking at the distance cattle will travel for forage concluded that pastures beyond 3.2 km from water should be considered ungrazable (Bailey 2004). Therefore, animals will naturally be concentrated near water; and if measures are not taken to disperse or manage streamside grazing, impacts may be higher than expected if calculations of AUM per unit area over the entire allotment is used.

WILDLIFE

ENVIRONMENTAL EFFECTS BY ALTERNATIVE

Alternative 1: Current Management / No Action

Direct and indirect effects are addressed below by species. To avoid repetition, cumulative effects are addressed at the end of each alternative by activity for all wildlife species.

Direct and Indirect Effects of “Current Management / No Action” on Wildlife

MANAGEMENT INDICATOR SPECIES (MIS)

Sage Grouse

Under “Current Management / No Action”, livestock grazing would primarily affect the quality of brood rearing habitat for sage grouse within riparian areas, wet meadows, and springs through a reduction of vegetation that serves as food sources and cover. It is not known if these effects are contributing to decreased chick survival, but the potential for effects is greater than under “Proposed Action.” Riparian meadows that are not moving toward *Forest Plan* vegetation management objectives within sage grouse habitat would continue in this trend. Past grazing practices and current utilization standards, particularly in springs and meadows, has resulted in a reduction of the quantity and quality of forbs available for attracting insects for sage grouse hens and their broods, and a reduction in the amount of cover available to successfully escape from predators.

Localized and concentrated use by livestock under this alternative may also reduce understory grass cover, which may impact the quality of nesting habitat in the following year. In general, this impact would be localized as most upland utilization standards are generally not reached; however, sites near water sources may be impacted due to heavier use. There is also the potential for nests to be damaged or destroyed by livestock trampling.

Within the Project Area the potential impacts of this proposal on wintering habitats are limited. Livestock are not present on the allotments at this time of the year. Potential impacts could occur in areas where cattle may concentrate on upland habitats. In these areas there is the potential for cattle to browse or trample sagebrush plants, which can affect the quality of winter forage for sage grouse.

Although this alternative would impact sage grouse and their habitats, it is not expected to affect the viability of the species. Under this alternative, long-term sage grouse populations should remain relatively stable or increase slightly within the Project Area.

A potential downward trend in population would be the result of numerous factors, but this trend would be due primarily to the impacts from wildfires and extensive drought rather than from livestock grazing.

Mule Deer

Under this alternative livestock grazing would continue with current standards within mule deer range, which consists mainly of sagebrush and bitterbrush communities and riparian habitats. The potential for forage competition between cattle and deer would continue, particularly during late summer when cattle are more likely to use browse species. Livestock use would remove grass growth, which may encourage or promote the growth of browse species and result in some limited benefits to mule deer, however, with allowable utilization levels of 65%, there would also be impacts to or the loss of palatable forbs, which are also important to mule deer. Congregation of cattle can also displace mule deer to other adjacent habitats.

The greatest impact to mule deer would be associated with grazing impacts to meadows and springs. These are important to mule deer for both foraging and water sources. Under this alternative the utilization standard is 65%. These areas would continue to be impacted resulting in affects to important vegetation components and in some cases these sites would begin drying up and losing the water table.

Although this alternative would impact Mule Deer and their habitats, it is not expected to affect the viability of the species. Under this alternative mule deer populations on public and private lands may remain relatively stable or show a slight downward trend within the deer management unit and the Project Area. A potential downward trend in population would be the result of numerous factors, but this trend would be due primarily to the impacts from wildfires and extensive drought rather than from livestock grazing.

FOREST SERVICE SENSITIVE SPECIES

Northern Goshawk

Livestock grazing under this alternative would affect foraging habitat of goshawk by reducing the amount food and cover for species such as snowshoe hares and mountain cottontail. Both willow riparian areas and aspen forests provide winter forage and cover for hares and rabbits. Large, mature aspen trees are used as nest trees, and several prey species such as MacGillivray's warbler, Orange-crowned warbler, Lewis's woodpecker, and red-naped sapsucker use aspen for part of their life history. Under this alternative there is potential for greater impacts to aspen regeneration, which could affect the long-term potential of these stands to provide nesting habitat.

Under this alternative, riparian areas that are not moving toward vegetation management objectives and are in low seral stages would continue in their current trend. This would result in impacts to habitats that are important to goshawk prey species.

Livestock grazing under this alternative may result in impacts to the quality of foraging and nesting habitats for northern goshawks within riparian and aspen communities. The impacts include alteration of vegetation communities, which can impact prey species and future nesting and foraging habitats. This alternative could affect up to three to four pairs of goshawks as estimated from the habitat requirements described in the Humboldt *Forest Plan*. There would be no impacts to the viability of the species within Nevada or across the species range and only a very small portion of the overall goshawk population on the Humboldt National Forest.

A potential downward trend in population would be the result of numerous factors, but this trend would be due primarily to the impacts from wildfires and extensive drought rather than from livestock grazing.

Spotted Bat & Townsend's Big-Eared Bat

Livestock grazing under this alternative may affect potential foraging habitat for these species, mainly in riparian areas, wetlands, and springs that are not moving toward vegetation management objectives. Vegetation has been reduced in many riparian areas and spring/seep areas from livestock grazing and trampling. Utilization standards on many of these sites is as high as 65% which can result in drying of the meadows and spring which may impact the quality of foraging habitats. This condition is unfavorable for food and cover of many nocturnal insect species that bats forage upon. This alternative would not affect roosting sites or hibernacula.

Flammulated Owl

Livestock grazing under this alternative has the potential to affect foraging and long-term nesting habitats for flammulated owls within the Project Area. Under this alternative the understory utilization standard, which is generally 65%, could result in greater impacts to the understory vegetation and affect the potential prey base

for the owl. Under this alternative there is no standard for aspen browsing which could allow for greater impacts to aspen regeneration. There are potential impacts to future aspen recruitment in some stands, which could affect the availability of long-term nesting habitats. This alternative would only affect individual birds and would not affect the viability of the species. The Project Area has only limited habitat for this species. Although an individual bird was documented within the Project Area, there may not be any birds nesting within the area. Flammulated owls may only use the area when passing through to more important habitats in Oregon and Idaho. If the species does use the Project Area during the spring and summer season, it is likely that only a few individuals would be present.

PEREGRINE FALCON

This alternative would have no effect on potential nesting habitats for the Peregrine falcon within the Project Area. These habitats occur high up on cliff faces where livestock do not go. This alternative could affect potential habitat for some prey species, especially those that rely upon riparian habitats on the Forest. If riparian areas in the Project Area are in less than desirable condition, then those prey species which need riparian areas in good condition would be reduced in numbers because under this alternative it would take longer to restore these habitats than under "Proposed Action." Potential prey species such as robins, starlings, brown-headed cowbirds and mountain bluebirds would maintain their populations and provide a prey source.

THREE TOED WOODPECKER

Livestock grazing under this alternative has the potential to affect long-term foraging and nesting habitats for three-toed woodpeckers within the Project Area. Under this alternative there is no standard for aspen browsing which could allow for greater impacts to aspen regeneration. There are potential impacts to future aspen recruitment in some stands, which could affect the availability of long-term foraging and nesting habitats. This alternative would only affect individual birds and would not affect the viability of the species. The Project Area has only limited habitat for this species. No three-toed woodpeckers have ever been documented within the Project Area, and they may not occur within the area. If they are present it is very likely that they may only use the area when passing through to more important habitats in Oregon and Idaho. If the species does use the Project Area during the spring and summer season, it is likely that only a few individuals would be present.

COLUMBIA SPOTTED FROG

Although no spotted frogs have been located during surveys on the Santa Rosa Ranger District, the Project Area provides potential habitat for the species. Livestock grazing within riparian areas impacts spotted frogs by reducing riparian vegetation, creating unstable streambanks and possibly trampling spotted frogs or their young. This alternative would result in the slowest recovery of riparian areas of the three alternatives due to higher utilization levels for springs, some meadows and some streams.

Other Species of Interest

SMALL MAMMAL, REPTILES, AND AMPHIBIANS

A common effect to vegetation from livestock grazing on the allotments under this alternative is a reduction of litter and residual ground vegetation, which is particularly evident in those areas that are not moving toward vegetation management objectives. Because adequate residual vegetation is important for many species of small mammals, reptiles, and amphibians, livestock grazing under this alternative would affect those species that require high levels of litter and residual vegetation, particularly in riparian areas and aspen forests. A brief discussion of species that would likely be affected due to loss of vegetation within the allotments follows.

Small mammal species such as western jumping mouse and mountain vole are particularly susceptible to the reduction of litter and residual vegetation as a result of livestock grazing. Shrews, which are insectivorous and tend to be associated with riparian areas and wet meadows, require high vegetative cover for both habitat for prey species as well as cover to escape from predators. Foraging habitat for bats would be affected, mainly in riparian areas, wetlands, and springs. Reduction in vegetation from livestock grazing is unfavorable to food and cover of many nocturnal insect species that bats forage upon.

Livestock grazing would also affect habitat for reptile species that depend on riparian areas. Garter snakes, which commonly use riparian areas to forage on fish and amphibians, require abundant residual vegetation

for both foraging and thermal cover. Amphibians, such as spotted frog and western boreal toad, require residual ground cover as well as shrub cover, particularly willows.

NEOTROPICAL MIGRATORY BIRDS

Livestock grazing under this alternative would continue to affect species requiring heavy shrub or herbaceous ground cover for nesting and foraging, mainly in riparian areas and aspen stands. Species such as yellow warbler and MacGillivray's warbler, which are considered high priority species could be most affected by this alternative. Ground-nesting birds within these habitats would continue to be vulnerable to livestock grazing through loss of nest cover and the potential for trampling of nests. A list of birds that are known to occur on the Santa Rosa Ranger District and their nest substrate has been included with the project record.

Riparian areas that are not moving toward vegetation management objectives and that are in low seral stages would continue in this current trend. Areas where willow abundance has decreased or been eliminated altogether due to livestock grazing would continue in this condition affecting species that are dependent upon riparian areas in late seral condition, such as Yellow-breasted chat and Wilson's warbler. Aspen stands that are not moving toward vegetation management objectives and show poor or no regeneration would also continue in this current trend. In the long-term, as aspen stands would continue to decline without adequate regeneration resulting in many impacts to neotropical migratory birds and their habitats. Implementation of this alternative would continue to benefit species that increase with grazing such as mountain bluebird, robin, and brown-headed cowbird.

CALIFORNIA BIGHORN SHEEP

Livestock grazing would continue within bighorn sheep habitats. Sheep diet consists mainly of grasses and grass-like species, which is very similar to livestock diet. The potential for forage competition between cattle and bighorn sheep would continue, but the amount of time that cattle would be spending in bighorn sheep habitat is minimal. Because bighorn sheep use steeper slopes and travel greater distances from water, this would decrease the amount of direct competition with cattle for use of the forage and other resources.

PYGMY RABBIT

Loss of habitat due to heavy grazing is a major concern for pygmy rabbits. Livestock may trample and open up the understory, which reduces food and shelter for the pygmy rabbit (Williams 1986). Suitable and potential habitat is present throughout the analysis area. Suitable home range includes all areas of *A. tridentata* that are in close proximity to springs, seeps, and riparian areas. Vegetation has been reduced and altered in many spring/seep areas from livestock grazing and trampling. The loss of quantity and quality of understory vegetation in many potential habitats may impact the pygmy rabbit. Under this alternative the utilization standard around springs and many meadows would be 65%. These are areas where cattle would concentrate resulting in potential habitats being impacted.

Cumulative Effects of "Current Management / No Action" on Wildlife

The Cumulative Effects Area for this project would include the entire Santa Rosa Ranger District and all private lands within its boundaries. This area was chosen because it allows us to consider the potential effects of all past, ongoing and future projects and activities on the Santa Rosa Ranger District as they relate to the potential impacts from the alternatives being considered in this document. This Cumulative Effects Area allows us to determine these effects for a wide range of species and their habitats.

FUELWOOD

Woodcutting in aspen stands has an effect on deer use of aspen habitat. Harvest of aspen trees causes direct disturbance to deer, causing the deer to move out of the area. Inappropriate or illegal woodcutting techniques and vehicle use may also damage aspen stands, which would impact mule deer habitats.

Woodcutting in aspen stands can have a direct impact on northern goshawks or three-toed woodpeckers by disturbing nesting or foraging birds, causing damage to nest trees or displacing birds from important habitats. Inappropriate or illegal woodcutting techniques and vehicle use may also damage aspen stands, which would impact goshawk habitats.

LIVESTOCK ALLOTMENT DEVELOPMENTS

Existing fences may pose a risk when placed in a location or in a manner that makes them “invisible” to sage grouse. Also, fences pose a risk when located in areas of known leks, because predators can use the fence as a perch to locate sage grouse nests. Improperly placed water developments may impact springs and meadows, and the troughs can concentrate cattle in areas that may impact grouse.

Existing fences may also pose a risk to mule deer. Mule deer can be entangled or injured by fences. Improperly placed water developments may impact springs and meadows and the troughs can concentrate cattle in areas that may impact important mule deer habitats. Water developments have, however, improved water distribution across the landscape, which has benefited mule deer and other wildlife species.

FIRE

The Santa Rosa Ranger District is struggling with large areas containing cheat grass, which leads to large and uncharacteristic wildfires. Three (3) large (10,000 acres +) fires in the past 7 years provide evidence of this potential. The conditions for large fires are expected to remain well into the future. These fires burn very continuously and have significant impacts upon mule deer, sage grouse, and other sage dependent species. The greatest concern has been the loss of large acreages of mule deer winter ranges, which has had a direct impact on mule deer populations. Livestock grazing under this alternative would reduce some of the fine fuels that carry these large fires and may minimize some of the impacts associated with wildfires. Implementation of the 2005 Buttermilk Prescribed Burn has begun and may have limited impacts on sagebrush dependent species.

MINING AND EXPLORATION

Mining activities, road construction, exploration activities, and pit development would cause a negative effect on mule deer, sage grouse and other wildlife using the area. Although mining activities have occurred on the Santa Rosa Ranger District, it has been limited in scope and scale. Mining activities have been concentrated near Buckskin Mountain, National, and Spring City. There are currently no active mines within the Project Area and no active exploration is occurring. There has been some interest in exploration activities in the future, particularly in the Buckskin Mountain Area.

RECREATION

Recreation use on the Santa Rosa Ranger District is considered light by most standards. There is one (1), 13-unit developed campground and approximately 30 miles of developed non-motorized trails on the District. Other activities, which are popular, include hunting, dispersed camping, fishing, ATV use and sightseeing. Dispersed campsites are often placed in riparian areas, which can impact important mule deer habitats. Illegal or inappropriate use of trails and roads and cross-country travel by off-road vehicles poses a significant impact to mule deer, sage grouse and their habitats. This use not only destroys habitat, but also displaces animals from preferred habitats. Surprise encounters cause mule deer, sage grouse, neotropical migratory birds and other wildlife to flee secure types of areas, thereby increasing their vulnerability.

ALTERNATIVE 2: “PROPOSED ACTION”

Management Indicator Species (MIS)

SAGE GROUSE

Under this Proposed Action, livestock grazing may affected the quality of brood rearing habitat for sage-grouse within riparian areas, wet meadows, and springs through a reduction of vegetation that serves as food sources and cover. Under this alternative the utilization standard applied to most springs and meadows would be reduced from 65% to a maximum of 45%. The utilization would be even lower if these habitats are not in desired condition, which would result in a faster recovery of these habitats. Livestock use under this alternative still has the potential to affect the quantity and quality of forbs available for attracting insects for sage grouse hens and their broods. This alternative would also result in a reduction in the amount of cover available to successfully escape from predators. This alternative will, however, allow livestock use within these habitats while maintaining sufficient vegetation resources to provide forage and cover for the sage grouse and ensure recovery of the species.

Localized and concentrated livestock use under this alternative may also reduce understory grass cover, which may impact the quality of nesting habitat in the following year. In general this impact would be localized as most upland utilization standards are generally not reached, however, sites such as near water sources may be impacted due to heavier use. There is also the potential for nests to be damaged or destroyed by livestock trampling.

Within the Project Area the potential impacts of this proposal on wintering habitats are limited. Livestock are not present on the allotments at this time of the year. Potential impacts could occur in areas where cattle may concentrate on upland habitats. In these areas there is the potential for cattle to browse or trample sagebrush plants, which can affect the quality of winter forage for sage grouse.

Although this alternative would impact sage grouse and their habitats, it is not expected to affect the viability of the species. Under this alternative sage grouse populations should remain relatively stable or increase within the Project Area.

MULE DEER

Under this alternative livestock grazing would continue with updated standards within mule deer range, which consists mainly of sagebrush and bitterbrush communities and riparian habitats. The potential for forage competition between cattle and deer would continue, particularly during late summer when cattle are more likely to use browse species. Livestock would utilize grass, which may encourage or promote the growth of browse species, resulting in some limited benefits to mule deer. However, there may also be impacts to or the loss of palatable forbs, which are also important to mule deer. Congregations of cattle can also displace mule deer to other adjacent habitats.

The greatest impact to mule deer would be associated with grazing impacts to meadows and springs. These are important to mule deer for both foraging and water sources. Under this alternative the utilization standard would be a maximum of 45%. In those areas that do not meet desired conditions, the utilization would even be lower, which would allow for a more rapid recovery of these habitats. Although this alternative would impact Mule Deer and their habitats, it is not expected to affect the viability of the species.

A potential downward trend in population would be the result of numerous factors, but this trend would be due primarily to the impacts from wildfires and extensive drought rather than from livestock grazing.

Forest Service Sensitive Species

NORTHERN GOSHAWK

Livestock grazing under this alternative would affect foraging habitat for goshawks by reducing the amount food and cover for species such as snowshoe hares and mountain cottontail. Both willow riparian areas and aspen forests provide winter forage and cover for hares and rabbits. Large, mature aspen trees are used as nest trees, and several prey species such as MacGillivray's warbler, Orange-crowned warbler, Lewis's woodpecker, and red-naped sapsucker use aspen for part of their life history. Under this alternative there would be an aspen browse utilization standard which would ensure long-term protection of aspen stands that are important to northern goshawks for both foraging and nesting habitats.

Livestock grazing under this alternative may result in impacts to the quality of foraging and nesting habitats for northern goshawks within riparian and aspen communities. The impacts include alteration of vegetation communities, which can impact prey species and future nesting and foraging habitats. Since there are no known active territories and the local population is likely only a few individual birds, this proposal may have impacts to those individual birds, however, there would be no impacts to the viability of the species within Nevada or across the species range. This alternative would not result in a decline in the overall population of the northern goshawk.

SPOTTED BAT & TOWNSEND'S BIG-EARED BAT

Livestock grazing under this alternative may affect potential foraging habitat for these species, mainly in riparian areas, wetlands, and springs. Vegetation has been reduced in many riparian areas and spring/seep areas from livestock grazing and trampling. Utilization standards under this alternative would be a maximum of 45%, which would maintain or improve the condition of these habitats. This alternative would not affect roosting sites or hibernacula, which occur in areas that are not impacted by livestock.

FLAMMULATED OWL

Livestock grazing under this alternative has the potential to affect foraging habitats for flammulated owls within the Project Area. Under this alternative the understory utilization standard would be a maximum of 45% (50% in upland sites). This level of use may affect prey species for the flammulated owl, however, it would not affect the viability of the flammulated owl or its prey species. Under this alternative there would be a utilization standard for aspen browsing which would ensure long-term aspen regeneration and prevent impacts to potential nesting habitats for the flammulated owl. This alternative would only affect individual birds and would not affect the viability of the species. The Project Area has only limited habitat for this species. Although an individual bird was documented within the Project Area, there may not be any birds nesting within the area. Flammulated owls may only use the area when passing through to more important habitats in Oregon and Idaho. If the species does use the Project Area during the spring and summer season, it is likely that only a few individuals would be present due to the limited amount of habitat.

PEREGRINE FALCON

This alternative would have no potential affect upon potential nesting habitats for the Peregrine falcon within the Project Area. These habitats occur high up on cliff faces where livestock do not go.

This alternative could affect potential habitat for some prey species, especially those that rely upon riparian habitats on the Forest. These impacts would be limited, however, because under this alternative the maximum utilization level within riparian areas would be 45%. In degraded habitats that standard could even be lower to ensure faster recovery of those habitats. Although this alternative does have the potential to affect potential prey species, those impacts are considered to be less than "Current Management/No Action."

THREE TOED WOODPECKER

Livestock grazing under this alternative would not affect foraging or nesting habitats for three-toed woodpeckers within the Project Area. Under this alternative there is a utilization standard for aspen browsing which would likely ensure regeneration of those aspen stands into the future. Mature aspen stands provide potentially suitable foraging and nesting habitats for this species. The Project Area has only limited habitat for the three-toed woodpecker. No three-toed woodpeckers have ever been documented within the Project Area, and they may not occur within the area. If they are present it is very likely that they may only use the area when passing through to more important habitats in Oregon and Idaho. If the species does use the Project Area during the spring and summer season, it is likely that only a few individuals would be present.

COLUMBIA SPOTTED FROG

Although no spotted frogs have been located during surveys on the Santa Rosa Ranger District, the Project Area provides potential habitat for the species. Livestock grazing within riparian areas impacts spotted frogs by reducing riparian vegetation, creating unstable streambanks and possibly trampling spotted frogs or their young. This alternative would reduce utilization levels on springs, meadows, some streams and any vegetation community that is not functioning at desired condition due to impacts from grazing. These actions would allow a faster recovery of riparian areas that "Current Management/No Action" and improve conditions for spotted frogs in the Project Area.

Other Species of Interest**Small Mammals, Reptiles, and Amphibians**

A common effect to vegetation from livestock grazing on the allotments under this alternative is a reduction of litter and residual ground vegetation. A brief discussion of species that would likely be affected due to loss of vegetation within the allotments follows.

Small mammal species such as western jumping mouse and mountain vole are particularly susceptible to the reduction of litter and residual vegetation as a result of livestock grazing. Shrews, which are insectivorous and tend to be associated with riparian areas and wet meadows, require high vegetative cover for habitat for prey species as well as cover to escape from predators. Foraging habitat for bats would be affected, mainly in riparian areas, wetlands, and springs. Reduction in vegetation from livestock grazing is unfavorable to food and cover of many nocturnal insect species that bats forage upon. Under this alternative, utilization standards would be reduced in many areas to a maximum of 45% (50% in Uplands). Although there may still be impacts to some of these species, those impacts would be reduced from "Current Management/No Action."

Livestock grazing under this alternative would also affect habitat for amphibian and reptile species that depend on riparian areas. Garter snakes, which commonly use riparian areas to forage on fish and amphibians, require abundant residual vegetation for both foraging and thermal cover. Amphibians, such as spotted frog and western boreal toad, require residual ground cover as well as shrub cover, particularly willows. Although there may still be impacts to some of these species, those impacts would be reduced from "Current Management/No Action."

NEOTROPICAL MIGRATORY BIRDS

Livestock grazing under this alternative would continue to affect species requiring heavy shrub or herbaceous ground cover for nesting and foraging, however, the potential effects would be less than under "Current Management/No Action." Species such as yellow warbler and MacGillivray's warbler, which are considered high priority species, could be most affected. Ground-nesting birds within these habitats would continue to be vulnerable to livestock grazing through loss of nest cover and the potential for trampling of nests. A list of birds that are known to occur on the Santa Rosa Ranger District and their nest substrate has been included with the project record.

Under this alternative the maximum riparian utilization allowed would be 45% and may be reduced depending upon the condition of the resources. This alternative would allow for a faster recovery of these habitats than "Current Management/No Action." This alternative also includes utilization standards for aspen and willow browsing which would ensure long-term recovery of these habitats and reduced impacts when compared to "Current Management/No Action."

CALIFORNIA BIGHORN SHEEP

Livestock grazing would continue within bighorn sheep habitats. Sheep diet consists mainly of grasses and grass-like species, which is very similar to livestock. The potential for forage competition between cattle and bighorn sheep would continue, but the amount of time that cattle would be spending in bighorn sheep habitat is minimal. Because bighorn sheep use steeper slopes and travel greater distances from water, this would decrease the amount of direct competition with cattle for use of the forage and other resources. The potential impacts of this alternative are minimal.

PYGMY RABBIT

Loss of habitat due to heavy grazing is a major concern for pygmy rabbits. Livestock may trample and open up the understory, which reduces food and shelter for the pygmy rabbit (Williams 1986). Potentially suitable habitat is present throughout the analysis area. Suitable home range includes all areas of *A. tridentata* that are in close proximity to springs, seeps, and riparian areas. Vegetation has been reduced and altered in many spring/seep areas from livestock grazing and trampling. The loss of quantity and quality of understory vegetation in many potential habitats may impact the pygmy rabbit. Under this alternative the maximum utilization standard around springs and meadows would be 45%. In those areas where the habitat is not in desired condition, the utilization would be reduced to allow for faster recovery. This alternative may still have effects upon pygmy rabbits, however, those impacts would be lower than under "Current Management/No Action."

Cumulative Effects

Cumulative effects to wildlife are expected to be similar to "Current Management/No Action."

ALTERNATIVE 3: "NO GRAZING"

The "No Grazing" Alternative would end grazing in the Martin Basin Project Area within five (5) years. Existing water troughs and fences that would no longer be needed would be removed after livestock grazing was eliminated from the area, however buried pipelines would likely remain.

Management Indicator Species (MIS)

SAGE GROUSE

Under this alternative springs, seeps and meadows would recover at the fastest pace of the three alternatives. Ground cover to conceal chicks, nests and birds from predators would be the greatest of the three alternatives. The abundance of grass and forbs species would increase for the most part and provide

more forage for this species during the spring and summer. Some forb species such as dandelions, which are important to sage grouse chicks would be reduced as meadows recover.

Under this alternative, cattle grazing would terminate within the Project Area. This would result in an increase in fine fuels and could result in a higher risk of wildfires that could impact sage grouse habitats. This increase in fine fuels may result in more continuous burns that could eliminate large areas of sage grouse habitats.

This alternative would also result in increased use of private lands by operators trying to stay in business. This may result in degraded habitats on private lands, which could also affect sage grouse populations. If operators were to go out of business it may also result in them attempting to subdivide their private lands to make money, which in turn could affect sage grouse habitats. Although the small towns like Paradise Valley and Orovada are not fast growing, future subdivisions could result in ranchette style developments that could impact habitats.

This alternative is not expected to affect the viability of the species. Under this alternative sage grouse populations should remain relatively stable or increase within the Project Area. Sage grouse populations on adjacent private lands may decrease as increased pressure is placed on those private lands to maintain grazing operations.

MULE DEER

Under this alternative, riparian areas, aspen stands and meadows would recover at the fastest pace of the three alternatives. The abundance of grass and forb species would increase for the most part and provide more forage for this species during the spring and summer. Livestock would no longer displace deer to other habitats within the Project Area.

Under this alternative cattle grazing would terminate within the Project Area. This would result in an increase in fine fuels and could result in a higher risk of wildfires that could impact mule deer habitats. This increase in fine fuels may result in more continuous burns that could eliminate large areas of sagebrush, which provides important mule deer habitats.

This alternative would also result in increased use of private lands by operators trying to stay in business. This may result in degraded habitats on private lands, which could also affect mule deer populations. If operators were to go out of business it may also result in them attempting to subdivide their private lands to make money, which in turn could affect mule deer habitats. Although the small towns like Paradise Valley and Orovada are not fast growing, future subdivisions could result in ranchette style developments that could impact habitats.

This alternative is not expected to affect the viability of the species. A potential downward trend in population would be the result of numerous factors, but this trend would be due primarily to the impacts from wildfires and extensive drought rather than from livestock grazing. Mule Deer populations on adjacent private lands would likely decrease as increased pressure is placed on those private lands to maintain grazing operations.

Forest Service Sensitive Species

NORTHERN GOSHAWK

No grazing within the analysis area would improve aspen stands and ensure regeneration, which in turn would benefit goshawk nesting habitats. Also exclusion of livestock would allow maximum forb and flower production that would attract insects, which would attract more small mammals within the aspen and riparian areas increasing the prey base for the goshawk. This situation would allow riparian and wet meadows to recover more quickly and, therefore the small rodents and mammals that the goshawk feeds on would likely increase in numbers.

SPOTTED BAT & WESTERN BIG-EARED BAT

No grazing within the analysis area would benefit foraging habitats for the bats. Exclusion of livestock would allow maximum forb and flower production that would attract insects. Additionally, springs, riparian areas and wet meadows that have been affected by water developments and grazing impacts would recover at the fastest pace.

FLAMMULATED OWL

No grazing within the analysis area would improve aspen stands and ensure regeneration, which in turn would benefit potential flammulated owl nesting habitats. Also exclusion of livestock would allow maximum forb and flower production that would attract insects and provide a forage base for the species.

PEREGRINE FALCON

This alternative would have no affect upon potential nesting habitats within the Project Area. This alternative would improve foraging habitats within the Project Area by improving habitat conditions for many prey species at the fastest rate of the three alternatives.

Under this alternative cattle grazing would terminate within the Project Area. This would result in an increase in fine fuels and could result in a higher risk of wildfires that could impact habitats for some prey species for the peregrine falcon. This increase in fine fuels may result in more continuous burns that could eliminate large areas of sagebrush, which provides important habitats for some prey species.

This alternative would also result in increased use of private lands by operators trying to stay in business. This may result in degraded habitats on private lands in the valleys, which could provide important foraging habitats for peregrine falcons. If operators were to go out of business it may also result in them attempting to subdivide their private lands to make money, which in turn could affect these habitats. Although the small towns like Paradise Valley and Orovida are not fast growing, future subdivisions could result in ranchette style developments that could impact habitats.

THREE TOED WOODPECKER

No grazing within the analysis area would improve aspen stands and ensure regeneration, which in turn would benefit potential three-toed woodpecker nesting and foraging habitats.

COLUMBIA SPOTTED FROGDirect and Indirect Effects

Under this alternative there would be no impacts to potential habitats for the spotted frog within the Project Area. Riparian habitats would recover at the fastest pace of the three alternatives. There would also be no potential impacts resulting from possible trampling of frogs by livestock in the Project Area.

This alternative would result in an increased use of private lands by operators trying to stay in business. This may result in degraded habitats on private lands in the valleys. If operators were to go out of business it may also result in them attempting to subdivide their private lands to make money, which in turn could affect these habitats. Although the small towns like Paradise Valley and Orovida are not fast growing, future subdivisions could result in ranchette style developments that could impact potential habitats.

Other Species**Small Mammals, Reptiles, and Amphibians**

Under this alternative grazing would be eliminated. This action would result in the fastest recovery of many habitats such as riparian areas, meadows and aspen stands, which are important to many small mammals, reptiles and amphibians. Water troughs located throughout the allotments would be removed and mortality of small mammals from drowning in these troughs would be eliminated under this alternative.

Neotropical Migratory Birds

Under this alternative grazing would be eliminated. This action would result in the fastest recovery of many habitats such as riparian areas, meadows and aspen stands, which are important to many neotropical migratory birds. There would no longer be a risk that livestock may trample nests or chicks of birds within the Project Area. Water troughs located throughout the allotments would be removed. The potential mortality of birds from drowning in these troughs would be eliminated under this alternative.

This alternative would result in an increase in fine fuels and could result in a higher risk of wildfires that could impact habitats for some prey species for the peregrine falcon. This increase in fine fuels may result in more continuous burns that could eliminate large areas of sagebrush, which provides important habitats for many bird species.

This alternative would also result in increased use of private lands by operators trying to stay in business. This would degrade habitats on private lands in the valleys, which, provide important habitats for numerous bird species. If operators were to go out of business it may also result in them attempting to subdivide their private lands to make money, which in turn could affect these habitats. Although the small towns like Paradise Valley and Orovada are not fast growing, future subdivisions could result in ranchette style developments that could impact habitats.

California Bighorn Sheep

Competition between bighorn sheep and cattle for forage would be eliminated. Bighorn sheep winter range, which is cattle summer range, would also be improved due to no cattle grazing during the summer.

Under this alternative, cattle grazing would terminate within the Project Area. This would result in an increase in fine fuels and could result in a higher risk of wildfires that could impact bighorn sheep habitats. This increase in fine fuels may result in more continuous burns that could eliminate large areas of sagebrush, which provides important bighorn sheep habitats.

Pygmy Rabbit

“No grazing” within the analysis area would benefit pygmy rabbits. Exclusion of livestock would allow maximum forb and grass production during the spring throughout all areas. Additionally, springs and wet meadows that have been affected by water developments would improve. This situation would allow riparian and wet meadow areas to recover at a faster pace than “Current Management/No Action” and “Proposed Action.” This alternative would also eliminate the effects associated with trampling of upland areas due to livestock use.

Under this alternative, cattle grazing would terminate within the Project Area. This would result in an increase in fine fuels and could result in a higher risk of wildfires that could impact pygmy rabbit habitats. This increase in fine fuels may result in more continuous burns that could eliminate large areas of sagebrush, which provides important pygmy rabbit habitats.

This alternative would also result in increased use of private lands by operators trying to stay in business. This may result in degraded habitats on private lands, which could also affect pygmy rabbit populations. If operators were to go out of business it may also result in them attempting to subdivide their private lands to make money, which in turn could affect potential habitats. Although the small towns like Paradise Valley and Orovada are not fast growing, future subdivisions could result in ranchette style developments that could impact habitats.

Cumulative Effects

Fuelwood

Similar to “Current Management/No Action” and “Proposed Action.”

Fire

The Santa Rosa Ranger District is struggling with large areas containing cheat grass, which leads to large and uncharacteristic wildfires. Three (3) large (10,000 acres +) fires in the past seven (7) years provide evidence of this potential. The conditions for large fires are expected to remain well into the future. These fires burn very continuously and have significant impacts upon mule deer, sage grouse, and other sage dependent species. The greatest concern has been the loss of large acreages of mule deer winter ranges, which has had a direct impact on mule deer populations. Without livestock grazing, there would be an increase in fine fuels in the Project Area. This may lead to more frequent and more continuous fires, which would result in cumulative effects upon wildlife species. Implementation of the 2005 Buttermilk Prescribed Burn may have limited effects on sagebrush-dependent species.

Mining and Exploration

Similar to “Current Management/No Action” and “Proposed Action.”

Recreation

Recreation use on the Santa Rosa Ranger District is considered light by most standards. There is one 13-unit developed campground and approximately 30 miles of developed non-motorized trails on the District. Other activities, which are popular, include hunting, dispersed camping, fishing, ATV use and sightseeing. Dispersed campsites are often placed in riparian areas, which can impact important mule deer habitats. Illegal or inappropriate use of trails and roads and cross-country travel by off-road vehicles poses a significant impact to mule deer, sage grouse and their habitats. This use not only destroys habitat, but also displaces animals from preferred habitats. Surprise encounters cause mule deer, sage grouse, neotropical migratory birds and other wildlife to flee secure types of areas, thereby increasing their vulnerability.

Alternative 4: Resource Concepts, Inc. (RCI) Proposal

This alternative is very similar to Alternative 1: Current Management/No Action. This alternative outlines the general philosophies and literature that would be referenced when a collaborative allotment management plan (AMP) is written in the next three to five years.

This alternative is intended to provide a valid and scientifically supported approach to managing grazing as it relates to the health and functionality of natural resources within the Santa Rosa Ranger District including the wildlife resources.

Management Indicator Species (MIS)

SAGE GROUSE

Livestock grazing would primarily affect the quality of brood rearing habitat for sage-grouse within riparian areas, wet meadows, and springs through a reduction of vegetation that serves as food sources and cover. It is not known if these effects are contributing to decreased chick survival, but the potential for effects is greater than under "Proposed Action." Riparian meadows that are not moving toward Forest Plan vegetation management objectives within sage-grouse habitat would continue in this trend. Past grazing practices and current utilization standards, particularly in springs and meadows, has resulted in a reduction of the quantity and quality of forbs available for attracting insects for sage grouse hens and their broods, and a reduction in the amount of cover available to successfully escape from predators.

Localized and concentrated used by livestock under this alternative may also reduce understory grass cover, which may impact the quality of nesting habitat in the following year. In general, this impact would be localized as most upland utilization standards are generally not reached; however, sites near water sources may be impacted due to heavier use. There is also the potential for nests to be damaged or destroyed by livestock trampling.

Within the Project Area the potential impacts of this proposal on wintering habitats are limited. Livestock are not present on the allotments at this time of the year. Potential impacts could occur in areas where cattle may concentrate on upland habitats. In these areas there is the potential for cattle to browse or trample sagebrush plants, which can affect the quality of winter forage for sage grouse.

Although this alternative would impact sage grouse and their habitats, it is not expected to affect the viability of the species. Under this alternative, long-term sage grouse populations should remain relatively stable or increase slightly within the Project Area.

A potential downward trend in population would be the result of numerous factors, but this trend would be due primarily to the impacts from wildfires and extensive drought rather than from livestock grazing.

MULE DEER

It is assumed that under this alternative livestock grazing would continue with current standards within mule deer range, which consists mainly of sagebrush and bitterbrush communities and riparian habitats. The potential for forage competition between cattle and deer would continue, particularly during late summer when cattle are more likely to use browse species. Livestock use would remove grass growth, which may encourage or promote the growth of browse species and result in some limited benefits to mule deer, however, with allowable utilization levels of 65%, there would also be impacts to or the loss of palatable forbs, which are also important to mule deer. Congregation of cattle can also displace mule deer to other adjacent habitats.

The greatest impact to mule deer would be associated with grazing impacts to meadows and springs. These are important to mule deer for both foraging and water sources. Under this alternative the utilization standard

is 65%. These areas would continue to be impacted resulting in affects to important vegetation components and in some cases these sites would begin drying up and losing the water table.

Although this alternative would impact Mule Deer and their habitats, it is not expected to affect the viability of the species. Under this alternative mule deer populations on public and private lands may remain relatively stable or show a slight downward trend within the deer management unit and the Project Area. A potential downward trend in population would be the result of numerous factors, but this trend would be due primarily to the impacts from wildfires and extensive drought rather than from livestock grazing.

Forest Service Sensitive Species

NORTHERN GOSHAWK

Livestock grazing under this alternative would affect foraging habitat of goshawk by reducing the amount food and cover for species such as snowshoe hares and mountain cottontail. Both willow riparian areas and aspen forests provide winter forage and cover for hares and rabbits. Large, mature aspen trees are used as nest trees, and several prey species such as MacGillivray's warbler, Orange-crowned warbler, Lewis's woodpecker, and red-naped sapsucker use aspen for part of their life history. Under this alternative there is potential for greater impacts to aspen regeneration, which could affect the long-term potential of these stands to provide nesting habitat.

Under this alternative, riparian areas that are not moving toward vegetation management objectives and are in low seral stages would continue in their current trend. This would result in impacts to habitats that are important to goshawk prey species.

Livestock grazing under this alternative may result in impacts to the quality of foraging and nesting habitats for northern goshawks within riparian and aspen communities. The impacts include alteration of vegetation communities, which can impact prey species and future nesting and foraging habitats. This alternative could affect up to three to four pairs of goshawks as estimated from the habitat requirements described in the Humboldt Forest Plan. There would be no impacts to the viability of the species within Nevada or across the species range and only a very small portion of the overall goshawk population on the Humboldt National Forest.

A potential downward trend in population would be the result of numerous factors, but this trend would be due primarily to the impacts from wildfires and extensive drought rather than from livestock grazing.

SPOTTED BAT & TOWNSEND'S BIG-EARED BAT

Livestock grazing under this alternative may affect potential foraging habitat for these species, mainly in riparian areas, wetlands, and springs that are not moving toward vegetation management objectives. Vegetation has been reduced in many riparian areas and spring/seep areas from livestock grazing and trampling. Utilization standards on many of these sites is as high as 65% which can result in drying of the meadows and spring which may impact the quality of foraging habitats. This condition is unfavorable for food and cover of many nocturnal insect species that bats forage upon. This alternative would not affect roosting sites or hibernacula.

FLAMMULATED OWL

Livestock grazing under this alternative has the potential to affect foraging and long-term nesting habitats for flammulated owls within the Project Area. Under this alternative the understory utilization standard, which is generally 65%, could result in greater impacts to the understory vegetation and affect the potential prey base for the owl. Under this alternative there is no standard for aspen browsing which could allow for greater impacts to aspen regeneration. There are potential impacts to future aspen recruitment in some stands, which could affect the availability of long-term nesting habitats. This alternative would only affect individual birds and would not affect the viability of the species. The Project Area has only limited habitat for this species. Although an individual bird was documented within the Project Area, there may not be any birds nesting within the area. Flammulated owls may only use the area when passing through to more important habitats in Oregon and Idaho. If the species does use the Project Area during the spring and summer season, it is likely that only a few individuals would be present.

PEREGRINE FALCON

This alternative would have no affect on potential nesting habitats for the Peregrine falcon within the Project Area. These habitats occur high up on cliff faces where livestock do not go. This alternative could affect potential habitat for some prey species, especially those that rely upon riparian habitats on the Forest. If riparian areas in the Project Area are in less than desirable condition, then those prey species which need riparian areas in good condition would be reduced in numbers because under this alternative it would take longer to restore these habitats than under "Proposed Action." Potential prey species such as robins, starlings, brown-headed cowbirds and mountain bluebirds would maintain their populations and provide a prey source.

THREE TOED WOODPECKER

Livestock grazing under this alternative has the potential to affect long-term foraging and nesting habitats for three-toed woodpeckers within the Project Area. Under this alternative there is no standard for aspen browsing which could allow for greater impacts to aspen regeneration. There are potential impacts to future aspen recruitment in some stands, which could affect the availability of long-term foraging and nesting habitats. This alternative would only affect individual birds and would not affect the viability of the species. The Project Area has only limited habitat for this species. No three-toed woodpeckers have ever been documented within the Project Area, and they may not occur within the area. If they are present it is very likely that they may only use the area when passing through to more important habitats in Oregon and Idaho. If the species does use the Project Area during the spring and summer season, it is likely that only a few individuals would be present.

COLUMBIA SPOTTED FROG

Although no spotted frogs have been located during surveys on the Santa Rosa Ranger District, the Project Area provides potential habitat for the species. Livestock grazing within riparian areas impacts spotted frogs by reducing riparian vegetation, creating unstable streambanks and possibly trampling spotted frogs or their young. This alternative would result in the slowest recovery of riparian areas of the four (4) alternatives due to higher utilization levels for springs, some meadows and some streams.

Other Species of Interest**SMALL MAMMAL, REPTILES, AND AMPHIBIANS**

A common effect to vegetation from livestock grazing on the allotments under this alternative is a reduction of litter and residual ground vegetation, which is particularly evident in those areas that are not moving toward vegetation management objectives. Because adequate residual vegetation is important for many species of small mammals, reptiles, and amphibians, livestock grazing under this alternative would affect those species that require high levels of litter and residual vegetation, particularly in riparian areas and aspen forests. A brief discussion of species that would likely be affected due to loss of vegetation within the allotments follows.

Small mammal species such as western jumping mouse and mountain vole are particularly susceptible to the reduction of litter and residual vegetation as a result of livestock grazing. Shrews, which are insectivorous and tend to be associated with riparian areas and wet meadows, require high vegetative cover for both habitat for prey species as well as cover to escape from predators. Foraging habitat for bats would be affected, mainly in riparian areas, wetlands, and springs. Reduction in vegetation from livestock grazing is unfavorable to food and cover of many nocturnal insect species that bats forage upon.

Livestock grazing would also affect habitat for reptile species that depend on riparian areas. Garter snakes, which commonly use riparian areas to forage on fish and amphibians, require abundant residual vegetation for both foraging and thermal cover. Amphibians, such as spotted frog and western boreal toad, require residual ground cover as well as shrub cover, particularly willows.

NEOTROPICAL MIGRATORY BIRDS

Livestock grazing under this alternative would continue to affect species requiring heavy shrub or herbaceous ground cover for nesting and foraging, mainly in riparian areas and aspen stands. Species such as yellow warbler and MacGillivray's warbler, which are considered high priority species could be most affected by this alternative. Ground-nesting birds within these habitats would continue to be vulnerable to livestock grazing

through loss of nest cover and the potential for trampling of nests. A list of birds that are known to occur on the Santa Rosa Ranger District and their nest substrate has been included with the project record.

Riparian areas that are not moving toward vegetation management objectives and that are in low seral stages would continue in this current trend. Areas where willow abundance has decreased or been eliminated altogether due to livestock grazing would continue in this condition affecting species that are dependent upon riparian areas in late seral condition, such as Yellow-breasted chat and Wilson's warbler. Aspen stands that are not moving toward vegetation management objectives and show poor or no regeneration would also continue in this current trend. In the long-term, as aspen stands would continue to decline without adequate regeneration resulting in many impacts to neotropical migratory birds and their habitats. Implementation of this alternative would continue to benefit species that increase with grazing such as mountain bluebird, robin, and brown-headed cowbird.

CALIFORNIA BIGHORN SHEEP

Livestock grazing would continue within bighorn sheep habitats. Sheep diet consists mainly of grasses and grass-like species, which is very similar to livestock diet. The potential for forage competition between cattle and bighorn sheep would continue, but the amount of time that cattle would be spending in bighorn sheep habitat is minimal. Because bighorn sheep use steeper slopes and travel greater distances from water, this would decrease the amount of direct competition with cattle for use of the forage and other resources.

PYGMY RABBIT

Loss of habitat due to heavy grazing is a major concern for pygmy rabbits. Livestock may trample and open up the understory, which reduces food and shelter for the pygmy rabbit (Williams 1986). Suitable and potential habitat is present throughout the analysis area. Suitable home range includes all areas of *A. tridentata* that are in close proximity to springs, seeps, and riparian areas. Vegetation has been reduced and altered in many spring/seep areas from livestock grazing and trampling. The loss of quantity and quality of understory vegetation in many potential habitats may impact the pygmy rabbit. Under this alternative the utilization standard around springs and many meadows would be 65%. These are areas where cattle would concentrate resulting in potential habitats being impacted.

Cumulative Effects

The Cumulative Effects Area for this project would include the entire Santa Rosa Ranger District and all private lands within its boundaries. This area was chosen because it allows us to consider the potential effects of all past, ongoing and future projects and activities on the Santa Rosa Ranger District as they relate to the potential impacts from the alternatives being considered in this document. This Cumulative Effects Area allows us to determine these effects for a wide range of species and their habitats.

Fuelwood

Woodcutting in aspen stands has an effect on deer use of aspen habitat. Harvest of aspen trees causes direct disturbance to deer, causing the deer to move out of the area. Inappropriate or illegal woodcutting techniques and vehicle use may also damage aspen stands, which would impact mule deer habitats.

Woodcutting in aspen stands can have a direct impact on northern goshawks or three-toed woodpeckers by disturbing nesting or foraging birds, causing damage to nest trees or displacing birds from important habitats. Inappropriate or illegal woodcutting techniques and vehicle use may also damage aspen stands, which would impact goshawk habitats.

Livestock Allotment Developments

Fences may pose a risk when placed in a location or in a manner that makes them "invisible" to sage grouse. Also, fences pose a risk when located in areas of known leks, because predators can use the fence as a perch to locate sage grouse nests. Improperly placed water developments may impact springs and meadows, and the troughs can concentrate cattle in areas that may impact grouse.

Fences may pose a risk to mule deer. Mule deer can be entangled or injured by fences. Improperly placed water developments may impact springs and meadows and the troughs can concentrate cattle in areas that may impact important mule deer habitats. Water developments have, however, improved water distribution across the landscape, which has benefited mule deer and other wildlife species.

Fire

The Santa Rosa Ranger District is struggling with large areas containing cheat grass, which leads to large and uncharacteristic wildfires. Three large (10,000 acres +) fires in the past 7 years provide evidence of this potential. The conditions for large fires are expected to remain well into the future. These fires burn very continuously and have significant impacts upon mule deer, sage grouse, and other sage dependent species. The greatest concern has been the loss of large acreages of mule deer winter ranges, which has had a direct impact on mule deer populations. Livestock grazing under this alternative would reduce some of the fine fuels that carry these large fires and may minimize some of the impacts associated with wildfires. Implementation of the 2005 Buttermilk Prescribed Burn may have limited effects on sagebrush-dependent species.

Mining and Exploration

Mining activities, road construction, exploration activities, and pit development would cause a negative effect on mule deer, sage grouse and other wildlife using the area. Although mining activities have occurred on the Santa Rosa Ranger District, it has been limited in scope and scale. Mining activities have been concentrated near Buckskin Mountain, National, and Spring City. There are currently no active mines within the Project Area and no active exploration is occurring. There has been some interest in exploration activities in the future, particularly in the Buckskin Mountain Area.

Recreation

Recreation use on the Santa Rosa Ranger District is considered light by most standards. There is one (1), 13-unit developed campground and approximately 30 miles of developed non-motorized trails on the District. Other activities, which are popular, include hunting, dispersed camping, fishing, ATV use and sightseeing. Dispersed campsites are often placed in riparian areas, which can impact important mule deer habitats. Illegal or inappropriate use of trails and roads and cross-country travel by off-road vehicles poses a significant impact to mule deer, sage grouse and their habitats. This use not only destroys habitat, but also displaces animals from preferred habitats. Surprise encounters cause mule deer, sage grouse, neotropical migratory birds and other wildlife to flee secure types of areas, thereby increasing their vulnerability.

VEGETATION

RIPARIAN COMMUNITIES (INCLUDING STREAMS, SEEPS, SPRINGS, COTTONWOODS, AND MEADOWS)

Several riparian plant communities are found within the Project Area. Though these communities are limited in size, they are dispersed throughout the Project Area. Riparian communities provide important habitat for many wildlife species. They tend to also be favored areas for cattle. Documentation shows that cattle, given the opportunity, would spend a disproportionate amount of time in a riparian area as compared to adjacent drier (xeric) upland areas (Clary and Webster, 1989). However a recent study showed nearly equal utilization of upland and riparian vegetation that were grazed during early summer. Conversely during late summer grazing, the riparian vegetation approached 60% use, compared to 36% during the early summer (Journal of Range Management, 56: 334-341 July 2003, Parsons et. al.).

Alternative 1: Current Management/No Action

Direct and Indirect Effects:

STREAMS

The majority of allotments are managed with "rest rotation" grazing systems. These systems when coupled with light to moderate grazing should maintain current conditions of the riparian vegetation associated with streams.

Where current allowable utilization levels are between 35 and 45 percent, which is considered light to moderate, they would continue to provide for vegetative health on excellent condition riparian communities (Clary and Webster, 1989, and Ratliff, 1987). However, Clary and Webster (1989) and Ratliff (1987) suggest that utilization rates of 20 to 30% would be appropriate for poor condition meadows. Holechek, et. al. (1999) indicate that research shows 30-35% use is needed for improvement in rangeland vegetation.

The research shows 40-45% use is considered moderate grazing on most rangelands. To allow for improvement in rangeland vegetation use levels of 30 to 35% use is needed (Holechek, et. al., 1999). These levels (30-35 percent) are lower than what is currently allowed. Even though current allowable use levels of up to 45% should maintain current conditions, those areas in need of improvement may not improve and could deteriorate with current management.

SEEPS, SPRINGS, AND MEADOWS

Seeps, springs, and meadows are currently managed similar to adjacent uplands. Allowable utilization ranges up to 65% by weight of current growth. Grazing at these levels in the meadow communities can reduce herbage production significantly (Clary, 1995). Because meadows, seeps and springs are dispersed throughout the uplands, livestock tend to favor these areas, and higher utilization levels are noted in many of these communities.

Observations by Forest Rangeland Management Specialists indicate that the moist to dry meadows when grazed to the allowable 65% tend to have substantial bare spaces and provide a niche for noxious weeds to establish.

COTTONWOOD COMMUNITIES

Light-to-moderate grazing on species such as willow and cottonwood appears to have little adverse effect and in some cases may stimulate growth (UCCE Rangeland Watershed Fact Sheet No. 14). This would indicate that the current allowable browse utilization levels of 35% should allow for some reproduction and survival of the "suckers," or new shoots.

Many of the stands on the southwest portion of the Project Area are recovering from past grazing and floods. Much of this recovery can be attributed to a reduction in livestock numbers after 1994.

The cottonwood stands further north along lower gradient streams are not recovering as quickly. Many of these remnant stands are lacking regeneration, which can be attributed to some livestock and/or ungulate grazing (Manning and Padgett, 1995; Padgett et. al., 1989, Personal communication K. Wearstler). These areas have also experienced similar grazing levels from year to year over the past decade. These stands probably would not improve with "Current Management/No Action."

Cumulative effects

RECREATION

Recreation may likely increase in the future, therefore cumulative effects to the riparian areas can be expected to increase slightly over time, even with livestock grazing remaining constant. Off highway vehicle (OHV) use is expected to increase. This activity would add to the effects on the riparian areas. Many of the accessible remnant cottonwood stands contain dispersed recreation sites.

MINING AND EXPLORATION

Based on past activities it is expected that minerals exploration would continue although on a limited basis. This could result in temporary roads and depending on the location could add to impacts on the riparian areas. Even though exploration is expected to continue the probability of it leading to any working mines is low for the foreseeable future.

Since the mid 1900's the Buckskin Mine has discharged acidic water into the headwaters of North Fork Little Humboldt River. This has had some remediation which is still in process and the effects from this should be reduced in the foreseeable future.

Alternative 2: "Proposed Action"

Direct and Indirect Effects:

STREAMS

Depending on the functioning level of the stream, the proposed action could reduce the amount of utilization allowed in the riparian communities associated with streams.

Currently most streams have an allowable utilization level of 45% regardless of condition. Streams that are functioning as desired would have similar allowable utilization levels as “Current Management/No Action” and should continue to function as desired. Streams that are not functioning as desired would have lower allowable utilization levels (0-35%) and should improve.

The streams that should show the most change would be Cabin Creek, Martin Creek and Rebel Creek. These streams would be within the two riparian pastures where timing and duration of use can be effectively controlled. Photographic studies on the East Fork Quinn River, since 1990, following implementation of a riparian pasture have shown substantial improvement in herbaceous and woody vegetation. As the following photographs show the channel is becoming more stable and the willows have responded throughout the riparian pasture.

Photograph 29-P:

Lack of willow and heavy use on herbaceous vegetation. Riparian pasture was completed this year and controlled grazing was implemented in 1991. East Fork Quinn River. Fall 1990.



Photograph 30-P:

Burned willow following a wildfire. East Fork Quinn River. Fall 1996.



Photograph 31-P:

Increased willow and herbaceous vegetation as compared to 1990. East Fork Quinn River. Fall 2001.

**SEEPS, SPRINGS & MEADOWS**

The condition of these communities should improve faster than with “Current Management/No Action” but slower than “No Grazing.”

Seeps, springs, and meadows would be grazed substantially less than is currently occurring. Allowable utilization would be reduced from 65% to a maximum of 45%. This reduction in utilization should result in improvement of the functioning level of these communities. Communities that are currently functioning as desired should continue to maintain that level.

COTTONWOOD

Under this alternative cottonwood communities would receive less grazing impacts than what is currently occurring. Allowable utilization in this community would be reduced to allow a maximum of 20% on the available suckers. Some cottonwood may receive total protection from grazing if the functioning level is near or below threshold. These communities should respond and begin to regenerate relatively soon due to the lighter use and less ground disturbance.

Cumulative Effects**Alternative 3: “No Grazing”****Direct and Indirect Effects**

Under this alternative, livestock grazing would be eliminated within five (5) years. Effects of implementing this alternative would be similar to “No Change/Current Management” until grazing is eliminated, after which improvement in the condition of riparian plant communities should occur rapidly. However, permanent removal of grazing would not guarantee sustained increases in herbaceous plant production. Volland (1978) found that a protected Kentucky bluegrass meadow reached peak production in 6 years and then declined until production was similar to the adjacent area grazed season-long (Clary and Webster, 1989). The most noticeable improvements would occur in the meadows, seeps, and springs.

Cumulative Effects

RECREATION

Recreation may increase along the streams as a result of no livestock. However, the added recreation should not result in greater effects than is currently occurring from livestock.

Alternative 4: RCI Proposal

Direct and Indirect Effects:

STREAMS

This alternative is similar to the “No Action/Current Management” alternative where the forage utilization on herbaceous riparian areas is between 45%-65% use of current years growth.

There are streams within the Project Area that have sagebrush encroaching the outer perimeter of the meadow complex, head-cutting occurring within channels that may increase erosion. Many willow trees associated with streams are browsed to form a “mushroom” like appearance, also called “highlining”. A proper functioning condition assessment was conducted in 2003 of 10 streams within the Project Area. Of the 10 streams surveyed, 1 was properly functioning, 3 are functional at risk with an upward trend, 2 are functional at risk with a downward trend and 4 streams were nonfunctional. Continuing to use a 65% utilization standard on vegetation associated with stream courses, no matter the condition of the stream, may not provide for the vegetative and stream health that is desired. Having the flexibility to change utilization levels based on stream conditions would be an important management tool that could move resources to desirable future conditions.

In the west, some streams no longer have their once productive streamside vegetal cover. According to Ratliff and others (1987), suggested that for site protection the herbage remaining after grazing should equal the proportion of production that decomposes annually. To achieve site protection of riparian plant communities; 35%-45% utilization on excellent condition meadows and 20% to 30% on poor condition meadows is suggested (Clary and Webster, 1989, and Ratliff, 1987, Managing Grazing of Riparian Areas in the Intermountain Region). Also, Platts (1982) suggested that rest-rotation grazing with 65% use or higher resulted in altered riparian habitat conditions, while 25% use had no effect. Elmore (1988) suggested that in some situations, willow begin to become browsed when use on herbaceous plants reaches 45%. The majority of the allotments currently use a rest-rotation grazing system.

Under this alternative, any changes in management may be site specific. To validate a change in management, the Natural Resource Conservation Service (NRCS) range site data and an interdisciplinary team of specialists may be used.

SEEPS, SPRINGS, AND MEADOWS

Alternative 4 will continue to manage seeps, springs, and meadows adjacent to uplands at 65% allowable utilization by weight of current growth. Improper livestock use of riparian areas can increase erosion and reduce plant vigor, thus resulting in lower forage production and altered plant age structure and species composition (Knopf and Cannon 1982, Kauffman and Krueger 1984, Skovlin 1984, Differences in riparian vegetation structure between grazed areas and exclosures). Grazing at these levels in the meadow communities can reduce herbage production significantly (Clary, 1995). Rangeland Management Specialists have observed bare spaces on moist to dry meadows receiving 65% use. This may create opportunity for invasive species invasion and establishment.

Under this alternative, any changes in management may be site specific and may be validated using the Natural Resource Conservation Service (NRCS) range site and soil data and an interdisciplinary team of specialists.

COTTONWOOD COMMUNITIES

Alternative 4 will have similar effects to the “Current Management/No Action” alternative. The current utilization level of 35% use of current year’s growth is applied across the board, no matter the condition of the stand. The 35% use may allow for some reproduction and seedling survival. In some cases, it may stimulate growth (UCCE Rangeland Watershed Fact Sheet No. 14).

However, some cottonwood sites within the Project Area have experienced significant grazing use over the past few decades and may not improve with current management (Manning and Padgett, 1995; Padgett et. Al., 1989, Personal communication K. Wearstler). Some cottonwood stands lack seedling and saplings understory components, have poor reproductive potential and some stands have burned in the past decade.

Other studies indicate overgrazing of domestic livestock in riparian areas, disrupts the reproductive cycle of cottonwood trees, destabilizes streambanks, and thus increases sediment loads to streams (USDA, NRCS National Plant Data Center). Glinski (1977), showed a negative correlation between grazing levels and Fremont's cottonwood recruitment. (Crouch 1979; Reichenbacher 1984) showed fewer cottonwood seedlings in grazed than in non-grazed areas. Kaufmann et al. (1983) noted that grazing slowed succession in riparian systems dominated by willows and black cottonwood, with tree densities being consistently lower in stands grazed late in the season.

There have been many impacts from grazing, floods, insects and fire that have impacted the cottonwood stands within the Project Area.

Under this alternative, any changes in management may be site specific and may be validated using the Natural Resource Conservation Service (NRCS) range site and soil data and an interdisciplinary team of specialists.

Cumulative Effects

The effects from "Alternative 4" are similar to the "Current Management/No Action."

RECREATION

Recreation is expected to increase in the future, particularly in riparian areas and those dispersed camping sites adjacent to water sources. Off highway vehicle (OHV) is expected to increase and could add to the effects in riparian areas. Cottonwood, aspen and shaded areas could receive more use by recreation, particularly those areas accessible from main forest roads.

MINING AND EXPLORATION

Mining exploration is expected to continue. The result could increase temporary roads and add to impacts in riparian areas. The Santa Rosa Ranger District has received at least one proposal for exploration. The price of gold has been rising significantly over the past few months which could in turn create more interest in exploration.

ASPEN COMMUNITIES

Many aspen stands occur throughout the Project Area. These communities occur at higher elevations associated with streams and they also occur in the higher elevation broad basins. Aspen provide important habitat for wildlife species and have the highest biodiversity than any other upland forest in the west (Kay, 2001). Heavy livestock grazing can remove the understory vegetation and may eliminate seedling and sapling establishment.

Alternative 1: "Current Management/No Action"

Direct and Indirect Effects:

The effects of continuing with current management could impact the smaller stands by reducing or eliminating regeneration. The result may be a slow disappearance of these stands. The larger stands would be affected around the periphery and over time may show a reduction in size of the stand. Smaller stands will get smaller, while larger stands are less likely to be impacted throughout the stands because the livestock only reach the periphery and not due major understory damage throughout.

Kay (2001) suggests the main reason for aspen decline in central Nevada and across the west is ungulate herbivory. Most herbivory within the Project Area is from cattle.

Cumulative Effects

As is the case with riparian areas aspen communities receive most of their impacts from livestock, wildlife, fire and recreation.

RECREATION

Aspen stands are favored areas for dispersed camping. This results in effects to localized areas and usually occurs on the periphery of the stands. Many of these areas are also the ones most affected from livestock grazing.

FUELWOOD CUTTING

Approximately 15 to 20 cords of aspen are cut annually by private individuals for fuelwood. The cutting is limited to dead and down aspen. Even though live aspen aren't cut, some damage to aspen saplings and seedlings occurs during entry into the stand and removal of the wood. These added effects to the accessible aspen stands may cause an accelerated decline.

WILDLIFE

Mule deer browse young aspen. This effect may have been more pronounced in the past when the mule deer populations were higher. Current mule deer populations are low and are expected to remain stable or decline slightly. The effects on aspen from mule deer should be minimal and decrease during the life of this project.

MINING AND EXPLORATION

Mining and exploration has had very little effect on aspen stands within the Project Area. Future exploration and/or mining is not expected to increase; therefore, effects on aspen stands should be minimal.

Alternative 2: "Proposed Action"**Direct and Indirect Effects**

This alternative would limit the amount of browsing by livestock on young aspen to 20% of the seedlings or saplings regardless of the functioning level of the stand. This alternative also implements a maximum utilization limit on herbaceous vegetation within aspen stands. These levels range from 0 to 45%. These standards should allow for sufficient aspen regeneration to maintain stands at a desired functioning level. Those stands that are currently not functioning as desired should move towards functioning as desired.

The understory vegetation should also be maintained or improve. Implementing this alternative should result in improvement in a majority of the aspen stands.

Cumulative Effects**Alternative 3: "No Grazing"****Direct and Indirect Effects**

Removing livestock grazing would allow for the majority of the aspen stands to regenerate. Browsing by wildlife will continue but this should have a minimal impact to the aspen. This alternative should produce the most rapid improvement of the aspen resources.

Aspen regeneration should accelerate when grazing is eliminated. Livestock enclosure studies found that protected aspen stands have expanded and actually "killed out" sagebrush (Kay, 2001). As these studies indicate, aspen acreage may expand over time within the Project Area.

Cumulative Effects

No cumulative effects due to livestock grazing are anticipated because livestock grazing will not occur.

Alternative 4: Resource Concepts, Inc. (RCI) Proposal**Direct and Indirect Effects:**

This alternative would continue to manage aspen stands similar to adjacent uplands until areas are identified as needing different management to achieve improved resource management conditions. Allowable use is 65% of the herbaceous vegetation. There are no browsing or use limits on aspen occurring in the upland

communities, only on upland brush species with an allowable limit of 35% of current year's growth. Aspen located along streams have an allowable use of 35% of current year's growth.

Continuing to allow 65% utilization on understory vegetation may result in browsing on aspen saplings and seedlings. Livestock may switch from utilizing understory herbaceous vegetation to aspen seedlings and saplings. Browsing first-year shoots often results in the plants being pulled from the ground, or being killed by trampling (Kovalchik and Elmore 1992, Guidelines for Managing Cattle Grazing in Riparian Areas to Protect Water Quality: Review and Research and Best Management Practices).

Many clones may disappear and the probability is high that significant aspen acreage will continue on the path of succession to other vegetative types. The lack of successful regeneration over large areas of aspen increases the risk. Continued heavy browsing pressure on existing quaking aspen and other forage species will result in habitat degradation for all species found within this type (Nevada Natural Resources Status Report, R. Michael Turnipseed, P.E., Director, 2002). There are some aspen stands that have received substantial use, many of them are associated with streams passing through them.

Under this alternative, any changes in management may be site specific and may be validated using the Natural Resource Conservation Service (NRCS) range site and soil data and an interdisciplinary team of specialists.

Cumulative Effects

Impacts to aspen communities are mostly attributed to impacts from livestock, wildlife, recreation, and fire. The cumulative effects for "Alternative 4" are similar to the "Current Management/No Action" alternative.

RECREATION

Dispersed recreation including camping and hunting tend to occur more often in aspen stands. Usually the effects are localized and occur within or adjacent to the periphery of the aspen stand. Typically these stands are also impacted from livestock due to the accessibility to the interior of the stand which tends to decrease the number of seedlings and saplings in the understory.

FUELWOOD CUTTING

Dead and down aspen are approved for removal up to 15 to 20 cords annually. Although live aspen are not approved for cutting, accessing stands may have an effect on aspen saplings and understory vegetation. The down wood could provide some protection to young aspen. These are small additional effects that could cause accelerated decline.

WILDLIFE

Aspen saplings are browsed by mule deer and may have been more pronounced in the past when populations of mule deer were higher. Current populations are low and are either expected to stabilize or decline slightly. Minimal effects from mule deer should be expected for the life of the project.

MINING AND EXPLORATION

Aspen stands are affected very little from mining and exploration within the Project Area. If the price of gold continues to increase, more interest in exploration can be expected. However, the effects to aspen should be minimal.

UPLAND VEGETATION (INCLUDES WYOMING BIG SAGEBRUSH, MOUNTAIN BIG SAGEBRUSH AND MOUNTAIN BRUSH)

The majority of the land base within the Project Area is comprised of upland plant communities. In general these communities are not severely impacted by livestock grazing. However, because they are dryer, when they are impacted they are prone to slower recovery.

Soil disturbance can result in invasions of noxious weeds or annuals such as cheatgrass. The majority of the noxious weeds within the Project Area occur in or adjacent to Wyoming big sagebrush communities. The sagebrush communities are also of particular importance to sage grouse.

Alternative 1: "Current Management/No Action"

Direct and Indirect Effects:

Implementing this alternative would result in an overall continued maintenance of the upland communities. Even though livestock are allowed to utilize 65% of the herbaceous vegetation, this seldom occurs especially on a large scale across the landscape. Steeper slopes and increased distance to water results in less livestock use. Some areas near water do receive use approaching 65% but these are limited.

Current livestock distribution patterns would continue; therefore, the condition of most upland communities should remain stable or improve.

In the areas where utilization approaches 65% the understory vegetation may decrease and the percentage of grass to forbs would favor a higher percentage of forbs. Livestock grazing can increase woody vegetation by the preferential grazing of grasses reducing the competition between and sagebrush (Saab et. al., 1995; Stoddart et. al., 1975; Vallentine, 1980). Species composition is altered by increased grazing on palatable species (Stoddart, 1975). In particular, Laycock (1979) noted that high levels of spring grazing by cattle and domestic sheep reduce vigor and production of herbaceous species, leading to increases in sagebrush. Sagebrush canopy would increase to around the 40% range (Howell, pers. Comm. 2003).

The history is complicated because the result of grazing can depend on the season of use and the type of livestock (Stoddart et. al., 1975).

Cumulative Effects

The cumulative effects boundary for upland communities is the area between Highway 95 on the west and State Route 290 and the Greeley Crossing road on the east. This boundary was chosen to evaluate the cumulative effects from adjacent activities on private and Bureau of Land Management administered lands that affect the Wyoming big sagebrush communities.

ROADS

There are no new roads planned within the cumulative effects boundary. The majority of the existing roads travel through the upland plant communities. One of the effects from the road system is spread of noxious weeds. Aside from removing the vegetation on the actual road surface these roads have very little direct effects to surrounding upland vegetation.

Off road travel is increasing. The primary increase is from All Terrain Vehicles (ATV). This is a relatively new activity to this area. These can have an adverse effect in uprooting vegetation and creating trails that can eventually become two track roads. These two track roads can result in increased erosion. ATV use is expected to increase to the point travel management plans would be implemented.

MINING AND EXPLORATION

Some mineral exploration is occurring but is limited within the cumulative effects boundaries. There are no active mines and none are anticipated in the area.

FIRE AND FIRE SUPPRESSION

The Santa Rosa Ranger District of the HTNF is particularly susceptible to wildfire due mainly to existing moisture regimes and conversion of native vegetation species to cheatgrass. Fires tend to spread quickly and burn hotter than in other areas. In May 2005, prescribed burning was implemented in the Buttermilk Allotment to improve sagebrush habitat.

Alternative 2: "Proposed Action"

Direct and Indirect Effects

The effects of implementing this alternative should be similar or slightly less than with "Current Management/No Action." The maximum use allowed would be 50% as compared to 65% with "Current Management/No Action." However, as mentioned in "Current Management/No Action", vegetative utilization very seldom reaches 65% in the upland communities. Lowering the level to 50% should have very little effect to the upland communities.

Maximum utilization on upland brush species would be 35 percent, which is the same as "Current Management/No Action." The primary brush species affected by grazing or browsing are bitterbrush, snowberry, elderberry, and serviceberry. Allowing this level of use should have no adverse effect on the brush species.

Livestock distribution patterns should be similar to "Current Management/No Action." As with "Current Management/No Action" the condition of the upland communities should remain stable or improve.

Cumulative Effects

Cumulative effects on the upland communities should be similar to "Current Management/No Action."

Alternative 3: "No Grazing"

Direct and Indirect Effects

Removing livestock should allow for a continued progression to a later seral state for upland vegetation. With the absence of other disturbance the upland communities would tend to have an increase in the cover and density of grass species. Canopy cover of sagebrush would also increase but at a slower rate than with "Current Management/No Action" and "Proposed Action."

Cumulative Effects

The condition of the upland communities should remain stable or improve.

FIRE AND FIRE SUPPRESSION

The Santa Rosa Ranger District of the HTNF is particularly susceptible to wildfire due mainly to existing moisture regimes and conversion of native vegetation species to cheatgrass. Lack of livestock grazing may result in increased fuel loads that lead to more frequent and/or larger wildland fires. Fires tend to spread quickly and burn hotter than in other areas. In May 2005, prescribed burning was implemented in the Buttermilk Allotment to improve sagebrush habitat.

ALTERNATIVE 4: RESOURCE CONCEPTS, INC. (RCI) PROPOSAL

Direct and Indirect Effects:

The effects of implementing "Alternative 4" should be similar to the "Current Management/No Action." Although current management of 65% maximum utilization on herbaceous vegetation would be used, this level is rarely observed or reached in these types of vegetative communities. The 35% of browse on brush species would stay the same and should have no adverse affect on this vegetation type. In addition, livestock distribution patterns should be similar to the "Current Management/No Action" and the condition of upland vegetation communities should remain stable or improved.

However, if livestock distribution practices were to improve and occur on broader areas of the landscape, utilization of 65% of herbaceous understory vegetation may have an impact to upland mountain brush communities. As a result there may be a reduction in the amount of herbaceous understory vegetation, increased occurrence of bare ground and the potential for invasive species to establish on the site. Rangeland Specialist have photographed and recorded invasive species in upland plant communities areas that are relatively undisturbed. Invasive species not only readily occupy disturbed sites previously dominated by annual grasses, but also invade relatively undisturbed perennial native plant communities (DiTomaso, 2000).

Under this alternative, any changes in management may be site specific and may be validated using the Natural Resource Conservation Service (NRCS) range site and soil data and an interdisciplinary team of specialists.

Cumulative Effects

Cumulative effects for "Alternative 4" should be similar to the "Current Management/No Action" alternative. The cumulative effects boundary for upland communities is the area between Highway 95 on the west and State Route 290 and the Greeley Crossing road on the east. This boundary was chosen to evaluate the

cumulative effects from adjacent activities on private and Bureau of Land Management administered lands that affect the Wyoming big sagebrush communities.

ROADS

There are no new roads planned within the cumulative effects boundary, however the majority of existing roads are within upland plant communities. The potential for noxious weed spread from the road system is possible. Aside from removing vegetation from the actual road surface, there are very little direct effects to surrounding upland vegetation.

ATV (all terrain vehicles) are becoming more popular in the area and can have adverse effects to vegetation in uprooting plants and creating trails that may eventually become two track roads. These roads can result in increased erosion. Travel management plans may be implemented with the increase of off road vehicle use and ATV's.

MINING AND EXPLORATION

Mineral exploration increases with the increase in the price of gold. Currently, there is one mining proposal within the Project Area. Exploration could affect upland vegetation by removing the vegetation to create roads or drilling.

FIRE AND FIRE SUPPRESSION

The Santa Rosa Ranger District of the HTNF is particularly susceptible to wildfire due mainly to existing moisture regimes and conversion of native vegetation species to cheatgrass. Lack of livestock grazing may result in increased fuel loads that lead to more frequent and/or larger wildland fires. Fires tend to spread quickly and burn hotter than in other areas. In May 2005, prescribed burning was implemented in the Buttermilk Allotment to improve sagebrush habitat.

NOXIOUS WEEDS

Noxious weed infestations of varying sizes and species occur throughout the Project Area. Noxious weeds that are found within the Project Area are Scotch thistle, musk thistle, Canada thistle, Russian knapweed, leafy spurge, medusahead, and hoary cress.

Noxious weeds are highly invasive and have the potential to spread throughout the Project Area. Infestations reduce the amount of available forage for wildlife and livestock and have the ability to take over large areas of land, reducing valuable public land resources.

Many noxious weed species have a single root system allowing for the exploitation of water, nutrients and other valuable soil components, resulting in the reduction of highly desired natives.

Noxious weed infestations have a significant impact on humans, the environment and economics. Large weed infestations can affect livestock production, reduce desirable forage quality, increase expenses for livestock operations, and the potential for poisoning and death of livestock (DiTomaso, 1999).

Annually, noxious weed infestations on rangelands have a \$2 billion dollar financial impact, a larger economic loss than all other pest controls combined (DiTomaso, 1999). Noxious weed infestations reduce valuable land resources, increase operating costs for both the permittee and the Forest Service, severely alter wildlife habitat, and can have a negative impact on regional economies

Alternative 1: "Current Management/No Action"

Direct and Indirect Effects

Under current management, noxious weed infestations would continue to increase slowly in size and disperse from the originating site. Cattle trails and cattle congregation areas within the Project Area provide ideal areas for noxious weeds establishment.

Degraded or stressed plant communities can provide open habitat or sites for the establishment and increase of noxious weeds. Many of these communities are located on the benches adjacent to streams and could continue to see expansion of existing noxious weed populations and establishment of new populations.

Under current management noxious weeds should continue to increase at a rate dependant on the amount of treatment of existing populations. The noxious weed program would continue with available funding to control and map current and any new infestations.

LIVESTOCK GRAZING

Current management may increase the dispersal and occurrence of noxious weeds.

The Project Area is surrounded by private land and lands administered by the Bureau of Land Management, which have populations of several species of noxious weeds. This increases the chances of new weed infestations being introduced by livestock traveling from these lands to the Project Area.

Soil disturbance and overgrazing of annual grasses and other important forage species can assist in the dispersion and expansion of noxious weed infestations (DiTomaso, 1999).

The principal areas where livestock grazing causes soil disturbance are along trails and on some of the dryer benches above stream channels. This can result in areas of bare soil that provide an area for noxious weeds to become established.

Cumulative Effects

The cumulative effects boundary for noxious weeds is the same as for upland vegetative communities. This would allow evaluation of not only activities within area but also activities outside the Project Area that may contribute to the area.

Noxious weed species have the opportunity to establish on the forest from livestock, wildlife, wildland fire, recreation users, ATV's, hunters, outfitter guides, and any other users who have come into contact with noxious weeds.

WILDLIFE

Wildlife has the potential to spread weeds through dispersal of seeds and plant parts. Wind, water, and animals, particularly birds, are most often the dispersal agents of seeds; these dispersal agents not only move seeds away from parent plants but also may spread the seeds to similar sites, thus increasing the probability of seedling survival (Sakai, et. al., *The Population Biology of Invasive Species*, Annu. Rev. Ecol. Syst. 2001. 32:305-32). Wildlife would continue to be dispersal agents for noxious weeds.

ROADS

Highway 95 is a major route into Nevada, which is commonly used by people from Idaho and Oregon, resulting in the possible spread of new noxious species not currently in the Project Area. Perennial pepperweed commonly called tall whitetop is prevalent in Paradise Valley and the surrounding ranching communities. There is a high probability for this species to be introduced onto the Project Area from vehicles, livestock and wildlife.

Road maintenance and use has the potential to spread existing weeds further up the road.

RECREATION

The HTNF has implemented a special order requiring users who bring hay into the National Forest to insure it is certified as noxious weed free. As a result of this order the introduction of noxious weeds from recreation should decrease.

There is still the potential for recreational users to introduce weeds through vehicle use. Off road vehicles have the potential to introduce weed seeds into areas not currently infested. This would continue but continuing education efforts should result in a lower potential.

FIRE AND FIRE SUPPRESSION

The occurrence of noxious weed infestation is variable within the Project Area. However, the Upper Willow Fire of 2001 is highly infested with Scotch thistle. The Quinn/Odell that occurred in 1996 facilitated the spread of Canada thistle. Prior to this fire, Canada thistle had been found primarily on the middle portion of the East Fork Quinn River within the Quinn River Allotment. Following the fire, Canada thistle has spread through almost the entire length of this river.

Alternative 2: "Proposed Action"

Direct and Indirect Effects

"Proposed Action", the proposed action, would reduce the introduction and spread of noxious weeds. However, the proposed action may not limit or reduce the dispersal rates of noxious weeds. Where cattle are present they would continue to assist in dispersing the seeds.

Cattle would spend less time in meadows, seeps, springs, and the upland benches adjacent to streams. Because utilization may be reduced, this may also reduce the number of open habitat or sites for the establishment and increase of noxious weeds. More of the vegetation would be in stable or upward trend, which would result in decreasing open habitat or sites and increased competition from native species. The increases in native plant cover would increase the sagebrush communities resistance to invasion of non-native species (Anderson and Inouye 2001).

In general the effects from the proposed action should be slightly less than "Current Management/No Action." The noxious weed program would continue with available funding.

Cumulative Effects

LIVESTOCK GRAZING

There would be continued effects from livestock grazing however, they should be less than "Current Management/No Action." This is due primarily to the potential for less ground disturbance in the moist to dry meadows.

Other activities that would cumulatively effect the area should be the same as "Current Management/No Action." Overall cumulative effects are similar to slightly less than "Current Management/No Action."

Alternative 3: No Grazing

Direct and Indirect Effects

This alternative through removal of grazing would reduce the dispersal and occurrence of noxious weed infestations. Many carriers are responsible for noxious weed dispersal, however with the removal of cattle, new noxious weed infestations should decrease.

A total of 5,663 head of cattle and 25 horses would be removed as possible carriers and distributors of noxious weeds.

Twelve permittees would no longer enter the Project Area to manage livestock allotments. Weed infestations that occur on their private land would be less likely to be transported onto the Project Area.

Perennial pepperweed and Russian knapweed occur on many of the ranches in Paradise Valley and Orovada, Nevada which are adjacent to the Project Area. These weeds are currently not within the Project Area and there would be less of a chance for these noxious weed species to establish within the Project Area.

The noxious weed program could have a higher rate of success in the control of noxious weed infestations if new infestations or spread of infestations were reduced.

LIVESTOCK GRAZING

The effects from livestock grazing that lead to bare ground from soil disturbance and stressed plant communities would be eliminated, lessening the potential for noxious weed infestations. There would be less vehicle use by permittees who could spread seed from their private land.

Cumulative Effects

RECREATION

It may be likely that recreation may increase on the forest with the removal of livestock. ATV's and recreation should continue to increase and have the potential to spread noxious weed seed.

Other methods of transport and establishment would remain the same as “Current Management/No Action” and “Proposed Action.”

FIRE AND FIRE SUPPRESSION

The Santa Rosa Ranger District of the HTNF is particularly susceptible to wildfire due mainly to existing moisture regimes and conversion of native vegetation species to cheatgrass. Lack of livestock grazing may result in increased fuel loads that lead to more frequent and/or larger wildland fires. Fires tend to spread quickly and burn hotter than in other areas. In May 2005, prescribed burning was implemented in the Buttermilk Allotment to improve sagebrush habitat.

The occurrence of noxious weed infestation is variable within the Project Area. However, the Upper Willow Fire of 2001 is highly infested with Scotch thistle. The Quinn/Odell that occurred in 1996 facilitated the spread of Canada thistle. Prior to this fire, Canada thistle had been found primarily on the middle portion of the East Fork Quinn River within the Quinn River Allotment. Following the fire, Canada thistle has spread through almost the entire length of this river.

Increased incidence of fire and fire suppression activities can be expected with this Alternative, and increases in these activities would lead to large increases in noxious weed infestation.

Alternative 4: RCI Proposal

Direct and Indirect Effects

Invasive species or noxious weeds within the Project Area not only inhabit previously burned areas, roadsides or riparian corridors; patches of noxious weeds are beginning to inhabit sites that are relatively undisturbed. This has been recorded by rangeland specialists and treatment has been ongoing for several years. DiTomaso, 2000 states that invasive species not only readily occupy disturbed sites previously dominated by annual grasses, but also invade relatively undisturbed perennial native plant communities.

Livestock can move range weeds from one area to another by passing viable seed through their digestive system or by transporting seed attached to their hair (DiTomaso, 2000). Weed dispersal by animals can be minimized by avoiding livestock grazing in weed-infested areas during flowering and seeding stages or by holding animals for seven days before moving them to uninfested areas (Sheley et al. 1998).

Since Alternative 4 is similar to the “Current Management / No Action” alternative, noxious weed invasions are expected to increase slowly in the size of the area infested and may be capable of dispersing seeds from current infestations to other sites whether they have been disturbed or not.

Those areas within the Project Area that have been degraded or stressed by grazing, fire, and or other impacts will likely provide open habitat or niches for opportunistic invasive species. Several communities are located adjacent to streams, which could expand current populations downstream.

Infestations are expected to continue to increase under “Alternative 4.” Infestations will continue to be mapped and treated as funding is available.

LIVESTOCK GRAZING

Current management may increase the dispersal and occurrence of noxious weeds.

The Project Area is surrounded by private land and lands administered by the Bureau of Land Management, which have populations of several species of noxious weeds. This increases the chances of new weed infestations being introduced by livestock traveling from these lands to the Project Area.

Soil disturbance and overgrazing of annual grasses and other important forage species can assist in the dispersion and expansion of noxious weed infestations (DiTomaso, 1999).

The principal areas where livestock grazing causes soil disturbance are along trails and on some of the dryer benches above stream channels. This can result in areas of bare soil that provide an area for noxious weeds to become established.

Cumulative Effects

The cumulative effects boundary for "Alternative 4" is the same as the "Current Management/No Action" alternative. This allows for an evaluation of activities occurring in and outside the Project Area that may effect weed populations.

WILDLIFE

Wildlife species have the potential to spread weeds through the dispersal of seeds and plant parts. Wind, water, and animals, particularly birds, are most often the dispersal agents of seeds, not only do they move seeds away from parent plants, but also spread seeds to similar sites, thus increasing the probability of seedling survival (Sakai, et. Al., The Population Biology of Invasive Species, Annu. Rev. Ecol. Syst. 2001. 32:305-32). Wildlife would continue to be dispersal agents for noxious weeds.

ROADS

Hwy 95 is a well traveled route connecting Idaho and Oregon to Nevada and has the potential to spread new infestations that may not currently occur in the Project Area. Paradise Valley has many different weed populations, including Perennial Pepperweed, also known as Tall White Top that could easily reach the Project Area by vehicle, roads, livestock and wildlife.

RECREATION

In many cases, the introduction of noxious weeds on rangelands can be associated with human-related activities. Seeds or plant vegetative fragments can be introduced as contaminants of hay or animal feed (DiTomaso, 2000). This type of spread can be prevented by using feed that is certified as weed-free (Sheley et al. 1999b).

The HTNF implemented a special order requiring users that bring hay or alfalfa onto National Forest System lands in the Intermountain West to insure it is certified noxious weed free. As a result of this order, the introduction of noxious weeds from recreation should decrease.

There is still potential for recreational users to introduce weeds through vehicle use. Off road vehicles have the potential to introduce weed seeds into areas not currently infested. This would continue, although education efforts should result in a lower potential.

SENSITIVE & RARE PLANTS

Alternative 1: "Current Management / No Action"

Direct and Indirect Effects

EFFECTS COMMON TO ALL SPECIES

Direct and indirect effects of livestock grazing include impacts directly to individual plants and alteration of the physical environments and surrounding plant communities. Direct impacts from livestock include trampling and removal of plant materials. Under heavy grazing, plants show a loss of vigor and reduction of reproduction activity (Stoddart et. al. 1975; Vallentine, 1980). Livestock also alter the physical environment by urine deposition and other excretions (Day 1990). Additionally, indirect impacts such as soil compaction and related reduction in soil water infiltration, soil erosion, noxious weed introduction and spread, changes in the seed bank, reduction in soil litter, loss of the cryptogamic crust, and any effects to pollinators are assumed to continue (Belnap et al, 2001, Stoddart et al. 1975, Vallentine, 1980). The direct and indirect effects can cause a modification or loss of potential habitat for the rare plant species and would be greater in areas where cattle congregated (Stoddart et. al. 1975).

Changes to the larger plant community can affect the environment of a rare plant species. Livestock grazing can cause alteration of species composition of the community, cause alteration of ecosystem functions, and alterations of ecosystem structure (Fleischner, 1994; Huntly, 1991). In low-nutrient environments, such as the semi-arid Great Basin Desert, grazing can decrease plant diversity (Proulx and Mazumder, 1998; Waser and Price, 1981), but not in all cases (Rambo and Faeth, 1999). Preferential grazing can decrease palatable species and plants susceptible to grazing injury, resulting in decreased competition for less desirable and more resistant plants (Stoddart et. al. 1975). In the sagebrush steppe, grazing can increase shrub cover,

decrease palatable forbs and grasses, and increasing introduce invasive weeds resulting in a change to the structure and species composition of a plant community (Saab et. al., 1995; Stoddart et. al., 1975; Vallentine 1980; Young et. al., 1979). Similar processes are seen in all plant communities. Determining the effects to a single species can be difficult without documentation of effects to the species and responses to grazing although some general assumptions can be made. Rare plants with sparse distributions have shown similar responses to grazing and other disturbances as more common species although the rare species were more sensitive to disturbance (McIntyre and Lavorel, 1994). Predictions about responses to grazing may also be made based on growth form (McIntyre et. al., 1995).

EFFECTS FOR INDIVIDUAL SPECIES

Osgood Mountain Milkvetch

Direct and indirect effects could occur to Osgood Mountain milkvetch from grazing as described previously. The species is found in flat and gentle slopes in sagebrush steppe vegetation and loose silty soils on moderate south slopes. Approximately 6,725 acres of potential habitat are in the Santa Rosa Ranger District with 4,468 acres occurring in the Project Area. Surveys have been performed in the area on decomposed granite or granodiorite exposures from 5,000-6,500 feet in the Santa Rose Range and no additional populations were identified (Knight 1991).

Direct impacts from herbivory are not expected, and herbivory does not appear to harm individual plants (Knight 1991). Indirect effect and trampling may cause damage to the individual plants and modification of the habitat. In the upland habitats, utilization levels of a maximum of 65% may negatively impact the habitat, especially in areas near water (see "Upland Vegetation" section). In addition, livestock congregation areas can negatively impact the potential habitat. These habitats would receive limited use by livestock unless activities were concentrated (S. Williams, pers. comm.).

Osgood Mountain milkvetch is listed in the State of Nevada as a critically endangered species and threatened with extinction (NRS 527.270). "Critically endangered species of native flora means the species and subspecies of native plants declared to be threatened with extinction and placed on the list of fully protected species of native flora by the state forester pursuant to NRS 527.270. The term includes, without limitation, the seeds, roots or other parts of such plants" (NRS 527.050, 527.300). Because Osgood Mountain milkvetch is a fully protected species in Nevada, mitigations would require surveys and monitoring in potential habitat before activities concentrating use can occur such as salt blocks. If surveys find occupied habitat and monitoring indicates negative impacts from livestock, grazing would be modified to minimize negative impacts to the species populations.

Compared to the "Proposed Action" and "No Grazing," grazing would be much higher in these potential habitats and therefore, the impacts from grazing would be greater in the potential habitat. Concentrating activities would be reduced. Although this alternative would impact individuals and potential habitat, it is not expected to affect the viability of the species.

Obscure Scorpion Plant

Direct and indirect effects could occur to obscured scorpion plant from grazing as described previously. Approximately 76,767 acres of potential habitat are in the Santa Rosa Ranger District with 47,260 acres occurring in the Project Area. Observations suggest that this plant is an early to mid-seral species that is fire adapted (Holland, 1996) found in both aspen stands and upland habitats. Grazing is currently not permitted for two years after a burn. This should allow any potential population to become established before livestock grazing is re-introduced.

Obscured scorpion plant is a small annual such that direct impacts would be limited with most effects occurring as a result of modification of the habitat and surrounding plant community. The mountain big sagebrush habitats would receive limited use by livestock unless activities were concentrated (S. Williams, personal communication). However, aspen/mountain snowberry communities in the Santa District are currently utilized by livestock. Ungulate and livestock grazing in this community can affect the understory species and perpetuate the occurrence of less desirable or less palatable perennials and annuals (Kay, 2000; Mueggler, 1988). In aspen communities, livestock tend to congregate (see Aspen section) and on the Santa Rosa Ranger District, aspen is often found in seasonal moist sites and near water. Under this alternative, aspen habitat would continue to decline.

Concentrating activities can negatively impact potential habitat. Holland (1996) suggests that grazing should be limited to disperse grazing activity in and near known populations. Placement of salt blocks, watering

sources, or other range supplements likely to concentrate animals in small areas, should be prohibited within 0.25 miles of any known population. Because obscured scorpion plant is a fully protected species in Nevada (NRS 527.270), mitigations would require surveys and monitoring in potential habitat. If surveys find occupied habitat and monitoring indicates negative impacts from livestock, grazing would be modified to minimize negative impacts to the species populations.

Compared to the "Proposed Action" and "No Grazing," grazing would be much higher in these potential habitats and therefore, the impacts from grazing would be greater in the potential habitat. Concentrating activities would be reduced. Although this alternative would impact individuals and potential habitat, it is not expected to affect the viability of the species.

Cusick's Hyssop

Cusick's hyssop is found in the analysis area with one of the five known sites in Nevada. The habitat in the Santa Rosa Ranger District is described as dry, open, limestone talus slopes. Use of this habitat by cattle would be limited (M. Josephsen, personal communication). Effects to this species would be minimal and may impact unknown populations.

Solitary Milkvetch

Solitary milkvetch is found in bluffs, washes, and rolling plants and banks of shallow soils on gray volcanic tuff or diatomaceous clay soils usually entangles under little sagebrush. No known locations are found in the Project Area or on the Santa Rosa Ranger District and potential habitat would be limited on the Santa Rosa Ranger District.

LIVESTOCK GRAZING

The history of livestock grazing has impacted the vegetation of the Santa Rosa Ranger District and has modified the plant communities and physical environment. In addition, livestock developments have impacted potential habitat including fences and water developments that concentrate livestock. Introduction of invasive and noxious weeds and non-native seedlings for range improvement have altered the plant communities.

Cumulative Effects

The Cumulative Effects Area for this project would include the entire Santa Rosa Ranger District and all private lands within its boundaries. This area was chosen because it allows us to consider the potential effects of all past, ongoing and future projects and activities on the Santa Rosa Ranger District as they relate to the potential impacts from the alternatives being considered in this document. Since survey information is limited for these species, effects to the potential habitat would be discussed.

In "Current Management/No Action", cumulative effects would be increased compared to the "Proposed Action." The rate of recovery may be reduced under "Current Management/No Action" due to higher levels of increased utilization. However, some potential habitat may have crossed thresholds with increased canopy closure and type conversions (i.e. to cheatgrass) and may not be affected by the removal of grazing.

Other activities have impacted potential habitat of the rare plant species:

ROADS & DEVELOPMENT

Development such as road construction and maintenance and communication sites may result in a loss or modification of potential habitat.

FUELWOOD CUTTING

Woodcutting in aspen stands may affect potential habitat for obscured scorpion plant. Inappropriate or illegal woodcutting techniques and vehicle use may also damage aspen stands and alter the habitat.

MINING & EXPLORATION

Mining and exploration activities include mining activities, road construction, exploration activities, and pit development could impact potential habitat. Mining activities has been limited in scope and scale.

WILDERNESS

Much of the potential habitat for Osgood Mountain milkvetch occurs in the Santa Rosa-Paradise Peak Wilderness which would limit the cumulative effects to the potential habitat especially from development and mining.

RECREATION

Recreation use (including one developed campground, dispersed camping, ATV use, trail development, hiking) on the Santa Rosa Ranger District is considered light by most standards. All activities have impacted potential habitat of all rare plant species. Dispersed campsites are often placed in riparian areas, which can impact obscured scorpion plants and its habitats.

Alternative 2: Proposed Action**Direct and Indirect Effects****EFFECTS COMMON TO ALL SPECIES**

Under this alternative, the effects would be similar to "Current Management/No Action" but reduced. The vegetation, especially riparian and aspen, would be in a stable or in an upward trend. Trampling, herbivory and its effects, soil compaction and its effects, soil erosion, effects to soil litter, effects to cryptogamic crust, effects to pollinators, and noxious and invasive weed invasion and spread should be reduced but would still occur.

EFFECT FOR INDIVIDUAL SPECIES**Osgood Mountain milkvetch**

Direct and indirect effects could occur to Osgood Mountain milkvetch from grazing but would be reduced compared to "Current Management/No Change." Utilization levels of 50% in upland vegetation would allow the vegetation to improve and minimize effects to Osgood Mountain milkvetch (see "Upland Vegetation"). One of the two populations in Nevada occurs in a BLM Area of Critical Environmental Concern (ACEC) and is protected from mining and surface disturbance (R. Bryan, personal communication). Grazing still occurs but use is limited and Osgood Mountain milkvetch has persisted and appears stable (Juncosa 1997).

However, livestock congregation activities can negatively impact the potential habitat. Because Osgood Mountain milkvetch is a fully protected species in Nevada, mitigations would require surveys and monitoring in potential habitat before activities concentrating use such as salt blocks and water developments. If surveys find occupied habitat and monitoring indicates negative impacts from livestock, grazing would be modified to minimize negative impacts to the species populations.

Compared to the "Current Management/No Change," grazing would be reduced in these potential habitats and therefore, the impacts from grazing would be less in the potential habitat. Concentrating activities would be reduced. Although this alternative would impact individuals and potential habitat, it is not expected to affect the viability of the species.

Obscured scorpion plant

Direct and indirect effects could occur to obscured scorpion plant from grazing but would be reduced compared to "Current Management/No Action." Grazing is currently not permitted for two years after a burn. This should allow any potential population to become established before livestock grazing is re-introduced. Utilization levels of 50% in upland vegetation would allow the vegetation to improve and minimize effects to Osgood Mountain milkvetch (see Upland vegetation).

Utilization in the aspen communities would be reduced in the aspen community to 20% on available suckers and up to 45% on herbaceous material depending on condition. This would allow the aspen plant communities to show a stable or increasing trend. This would decrease time cattle are in the aspen habitat and decrease the direct and indirect effects as described under "Current Management/No Action."

As described under "Current Management/No Action", concentrating activities can negatively impact the potential habitat. In aspen communities, livestock tend to congregate. Because obscured scorpion plant is a fully protected species in Nevada (NRS 527.270), mitigations would require surveys and monitoring in potential habitat. If surveys find occupied habitat and monitoring indicates negative impacts from livestock,

grazing would be modified to minimize negative impacts to the species populations. Some populations of obscured scorpion plant are subjected to grazing and the species is maintaining at the sites (Mosely, 1989; R. Bryan, personal communication).

Compared to the "Proposed Action", grazing would be reduced in these potential habitats and therefore, the impacts from grazing would be less in the potential habitat. Concentrating activities would be reduced. Although this alternative would impact individuals and potential habitat, it is not expected to affect the viability of the species.

Cusick's hyssop

Cusick's hyssop is found in the analysis area with one of the five known sites in Nevada. The habitat in the Santa Rosa Ranger District is described as dry, open, limestone talus slopes. This habitat would not be utilized by cattle (M. Josephsen, personal communication). Effects to this species would be minimal and similar to "Current Management/No Action."

Solitary milkvetch

Solitary milkvetch is found in habitat adjacent to the Santa Rosa Ranger District. Reducing grazing the Project Area may increase grazing in the surrounding Federal and private land. Traditional land use may also change.

Cumulative Effects

Cumulative effects would be similar to "Current Management/No Action" but reduced due to the reduction in utilization to manage for ecological condition. However, some potential habitat may have crossed thresholds with increased canopy closure and type conversions (i.e. to cheatgrass, invasions of noxious weeds) and would not be affected by the removal of grazing.

Alternative 3: "No Grazing"

Direct and Indirect Effects

EFFECTS COMMON TO ALL SPECIES

"No Grazing" would provide the greatest protection for sensitive and rare plant habitat for the long-term viability of these rare populations. Under "No Grazing", livestock use would be phased out over a ten-year period and would provide for long-term protection for potential habitat. As the stocking levels continue to decline over the ten-year period, the promotion of long-term viability and habitat condition improvement would continue to increase. Direct impacts such as trampling, herbivory, and disruption of seed bank stability and indirect impacts associated with livestock use and associated activities would still occur but would be reduced over time. As a result, incidence of soil compaction, introduction of noxious weeds by livestock, decreased soil moisture would be reduced and/or eliminated. The long-term benefits of no grazing within the analysis area would improve the potential habitat of the rare species.

EFFECTS FOR INDIVIDUAL SPECIES

Osgood Mountain milkvetch

Direct and indirect effects could occur to Osgood Mountain milkvetch from grazing but would be eliminated within five (5) years. Upland vegetation would allow the vegetation to improve at a higher rate than "Current Management/No Action" and "Proposed Action" (see "Upland vegetation"). Livestock congregation areas would be eliminated as grazing discontinued.

Compared to "Current Management/No Action" and "Proposed Action", effects from grazing would be reduced and eliminated over time in potential habitat allowing for the continued viability of the species.

Obscured scorpion plant

Direct and indirect effects could occur to Osgood Mountain milkvetch from grazing but would be eliminated within five (5) years. Upland vegetation would allow the vegetation to improve at a higher rate than "Current Management/No Action" and 2 (see Upland vegetation). Improvement in potential habitat would be greatest in the aspen communities. Livestock congregation areas would be eliminated as grazing discontinued.

Compared to the "Current Management/No Action" and "Proposed Action," effects from grazing would be reduced and eliminated over time in potential habitat allowing for the continued viability of the species.

Cusick's hyssop

Cusick's hyssop is found in the analysis area with one (1) of the five (5) known sites in Nevada. The habitat in the Santa Rosa Ranger District is described as dry, open, limestone talus slopes and would not be utilized by cattle. Effects to this species would be minimal and similar to "Current Management/No Action" and "Proposed Action."

Solitary milkvetch

Solitary milkvetch is found in habitat adjacent to the Santa Rosa Ranger District. Reducing grazing the Project Area may further increase grazing in the surrounding Federal and private land compared to "Current Management/No Change" and "Proposed Action." Traditional land use may also change.

Cumulative Effects

Cumulative effects would be similar to, but reduced from, the "Current Management/No Action" and Alternative 2. The trend and rate of recovery may be accelerated under "No Grazing." However, some potential habitat may have crossed thresholds with increased canopy closure and type conversions (i.e. to cheatgrass) and would not be affected by the removal or grazing.

Alternative 4: Resource Concepts, Inc. (RCI) Proposal

Direct and Indirect Effects

EFFECTS COMMON TO ALL SPECIES

Under this alternative, the effects would be similar to "Current Management/No Action" for grazing. Trampling, herbivory and its effects, soil compaction and its effects, soil erosion, effects to soil litter, effects to cryptogamic crust, effects to pollinators, and noxious and invasive weed invasion and spread would still occur. Grazing impacts would depend on the season of use, intensity of use, and grazing management techniques.

EFFECTS FOR INDIVIDUAL SPECIES

Osgood Mountain milkvetch

Direct and indirect effects could occur to Osgood Mountain milkvetch from grazing and would be similar to effects under the "Current Management/No Change" alternative. In the upland habitat, utilization levels of near the maximum level of 65%, especially near water, may negatively impact habitat (see "Upland Vegetation"). Grazing occurs in the known Nevada population but use is limited and Osgood Mountain milkvetch has persisted and appears stable (Juncosa 1997).

Activities that congregate livestock can negatively impact the potential habitat and would occur under this alternative. The negative impacts to individual and the habitat would be from trampling as well as surface disturbance and modification of the habitat. Before management strategies are considered in AMPs, surveys and monitoring would need to be performed under this alternative. Degradation of sites from concentrating activities could occur especially for Osgood Mountain milkvetch which occurs on flatter slopes.

The impacts from grazing under this alternative would be greater in the potential habitat when compared to the "Proposed Action" and "No Grazing". Grazing impacts would be similar to the "Current Management/No Action" alternative. However, concentrating activities would not be reduced in potential habitat until after surveys and monitor programs have been performed. This alternative would result in the most impacts to potential habitat of the four alternatives.

Obscure scorpion plant

Direct and indirect effects could occur to obscure scorpion plant from grazing and would be similar to the "Current Management/No Action" alternative. Utilization levels near the maximum of 65% in upland vegetation may negatively impact habitat, especially near water (see "Upland Vegetation"). Some populations of obscure scorpion plant are subjected to grazing and the species is maintaining at the sites (Mosely 1989; Murphy 2002; R. Bryan, personal communication). Livestock and wildlife trailing appear to create openings in the vegetation used by this species (Murphy 2002). Heavy or excessive grazing is likely to increase trampling

of plants, but also increase the risk to invasion of invasive species such as cheatgrass (Murphy 2002). Many invasive species are annuals with life histories similar to obscure scorpion plant and may compete directly with individual plants or degrade the habitat.

Activities that congregate livestock can negatively impact the potential habitat and would occur under this alternative. Activities that congregate cattle can cause trampling of plants, soil disturbance and compaction, and increase the risk of noxious weeds (see "Noxious Weeds"). For obscure scorpion plant, the plant and habitat appear to tolerate grazing and may even benefit from grazing (Holland 1996, Moseley 1989, Murphy 2002). However, conservation recommendations often include eliminating activities that would concentrate large numbers of livestock within or adjacent to occupied habitat (Holland 1996, Murphy 2002). Under this alternative, surveys and monitoring would first need to be performed before management strategies are considered in AMPs.

Compared to the "Proposed Action" and "No Grazing," grazing use would be higher in the potential habitats and therefore, the impacts from grazing would be greater in the potential habitat. Grazing impacts would be similar to the "Current Management/No Action" alternative. However, concentrating activities would not be reduced in potential habitat until surveys and monitoring has been performed. This alternative would result in the most impacts to potential habitat of the four alternatives.

Cusick's hyssop

Cusick's hyssop is found in the analysis area with one of the five known sites in Nevada. The habitat in the Santa Rosa Ranger District is described as dry, open, limestone talus slopes. This habitat would not be utilized by cattle (M. Josephsen, personal communication). Effects to this species would be minimal and similar to "Current Management/No Action."

Solitary milkvetch

Solitary milkvetch is found in habitat adjacent to the Santa Rosa Ranger District. Effects to this species would be minimal and similar to "Current Management/No Action."

Cumulative Effects

In Alternative 4, cumulative effects would be increased compared to the other alternatives. Cumulative effects would be similar to the "Current Management/No Action" with increased impacts due to concentrating activities in potential habitat. The rate of recovery of vegetation communities would be similar to the "Current Management/No Action" alternative.

For obscure scorpion plant, the history of fire suppression may have the greatest effect on potential habitat. In known population of this species, fire suppression may increase the shrub canopy reducing the suitability of the habitat (Murphy 2002). When a fire does occur, the intensity of the fire may increase, sterilizing the seed bank. Invasive species may increase with a high intensity fire and modify suitable habitat.

SOCIO-ECONOMIC CONSEQUENCES

The estimated median household income, in 1999, in Humboldt County was \$47,147.00 dollars.

Under Alternatives 1, 2, and 4, the current permitted livestock numbers and season of use would not change. Updated Allotment Management Plans (AMPs) and Annual Operating Instructions (AOIs) would guide livestock management on each allotment. Monitoring would assist in determining any future changes associated with season of use and number of livestock permitted in the Project Area.

ALTERNATIVE 1: "CURRENT MANAGEMENT/NO ACTION"

Direct and Indirect Effects

There would be no changes to the term grazing permits under the no action alternative. Current management would remain the same. This alternative would not change the current economic status of the existing permittees. Values per AUM for the livestock operators are outlined in the "Cumulative Effects" section.

The economic value to the livestock sector in Humboldt County would be unchanged as a result of this alternative. This value is estimated \$21 per AUM for an annual value of \$611,226. Total economic value to

Humboldt County is estimated at \$42 per AUM for an annual value of \$1,222,452. This would also remain unchanged as a result of this alternative (Data from Resource Concepts, Inc., September 1997).

Cumulative Effects

Management requirements and type would remain the same. The permittees may see little change in the cost to maintain grazing on National Forest System (NFS) lands.

RECREATION

Recreation should increase, which could result in increased issues related to gate etiquette. Gates opened and/or closed inappropriately could result in added operational costs to insure that livestock are in, and stay in, permitted areas. Also, cattle distribution patterns may change in response to increased presence of recreationists. This could result in additional effort by the permittee(s) in order to maintain the desired management.

ALTERNATIVE 2: "PROPOSED ACTION"

Direct and Indirect Effects

This alternative is not proposing any changes in numbers or season of use. Any reductions or increases would be determined by monitoring to determine the functionality and health of the rangeland. The amount of time the permittees spend managing their livestock may increase under this alternative. Permittees may be required to meet stricter utilization standards in some riparian and meadow communities. Economic impacts may include the increased time riding the allotment in order to meet the allowable utilization levels, as well as costs associated with implementation of the proposed riparian pasture.

Early livestock removal from a given allotment would be required if allowable utilization levels are met and there are no other areas with that allotment to which the livestock can be moved. Because allowable utilization levels would be based on the functionality of the vegetative communities, the potential exists for longer grazing periods in order to reach allowable utilization levels. This adaptive management would reward good management practices.

Forest Service administrative costs would remain about the same with small increases in long-term monitoring of allotments and the cost of building the proposed riparian pasture.

Cumulative Effects

Cumulative effects would be similar to slightly more than with "Current Management/No Action." The stricter allowable utilization levels in the meadows and depending on functionality in other vegetative communities has the potential to result in some reductions in grazing use. If permittees reduce their livestock numbers and/or season of use there would be an overall reduction in economic activity to the livestock sector and to Humboldt County.

Permittees who could no longer sustain the livestock herd base under the proposed management changes may choose to sell portions of their private lands or subdivide parcels to sustain their operation.

In addition, livestock may remain on the private lands longer, which would increase the impacts to these areas. If the permittees chose to subdivide their ranches the amount of open space may be reduced. The population density of the surrounding Paradise Valley and Orvada communities could also increase.

ALTERNATIVE 3: "NO GRAZING"

Direct and Indirect Effects:

The permittees use public land to assist and maintain their livestock operations. Without this use, ranchers may not be able to sustain a profitable operation and may not be able to afford the costs of leasing private land or purchasing more property to feed their cattle. This alternative would have the largest economic impact on all permittees within the Project Area. All grazing would be eliminated in the Project Area. The reduction or loss of cattle grazing is 22,050 head months or 29,106 AUMs.

Cattle operators would have to lease other land to graze during the summer months at costs much higher than the 2005 grazing fee of \$1.79 per head month. Private land lease rates are approximately \$10.00 per

head month. However, operating costs associated with grazing on private land is usually less than the operating costs of grazing on National Forest System lands. These lower operating costs would slightly offset the higher lease rate.

The United States Treasury would lose approximately \$29,800.00 annually in grazing fees from the Martin Basin Rangeland Project area. Range developments related to livestock management would be removed as funding and time permitted. This cost would be determined and implemented as budget constraints allow.

Cumulative Effects

“No Grazing” would remove all livestock from the Project Area. Livestock owners would have to rely solely on the use of private and/or BLM-managed lands, reduce their herd sizes, and/or discontinue cattle ranching. The economy of small historic ranching towns such as Paradise Valley and Orovida would decrease. The western culture and multi-generational ranching would diminish as well.

Since 1980 reductions in grazing on both BLM and Forest Service-managed lands have resulted in an annual loss to the livestock sector in northwest Nevada of \$2,051,364. When multiplied across the other segments of the economy, the combined impact of this loss is estimated to be \$3,697,460 annually. Estimated combined rancher wealth has decreased by \$3,632,038. Eliminating all livestock grazing within the Project Area would result in an estimated additional loss in economic value of \$611,226 annually to the livestock sector in Humboldt County. The estimated loss in overall economic value is \$1,222,452 annually to Humboldt County (*Resource Concepts*, 1997).

The possibility of the ranch properties being sold, as well as the potential for subdividing the ranches, would increase. It is possible that subdividing ranches for housing development would increase the local population. However, the availability of employment would still be very limited in smaller communities.

There could also be added impacts to private lands from increased livestock grazing there. As livestock grazing is shifted from Forest Service to non-Forest Service lands, potential negative impacts to the environment would be shifted as well. This shift could adversely affect the health and functionality of these lands, thereby decreasing land valuations and reducing the economic viability of the associated ranches.

ALTERNATIVE 4 – RESOURCE CONCEPTS, INC. (RCI) PROPOSAL

Direct and Indirect Effects

The social and economic impacts of this alternative are similar to the “Proposed Action” alternative. Alternative 4 is not proposing any changes in numbers or season of use. Any reductions or increases would be determined by monitoring, to determine the functionality and health of the rangeland. The amount of time the permittees spend managing their livestock may increase under this alternative. Permittees may be required to meet stricter utilization standards in some riparian and meadow communities. Economic impacts may include the increased time riding the allotment in order to meet the allowable utilization levels, as well as costs associated with implementation of the proposed riparian pasture in Cabin Creek.

Forest Service administrative costs would remain about the same with increases in long-term monitoring of allotments and the cost of building the proposed riparian pasture.

Cumulative Effects

The economic value to the livestock sector in Humboldt County would be unchanged as a result of this alternative. This value is estimated \$21 per AUM for an annual value of \$611,226. Total economic value to Humboldt County is estimated at \$42 per AUM for an annual value of \$1,222,452. This would also remain unchanged as a result of this alternative (Data from Resource Concepts, Inc., September 1997).

Management requirements and type would remain the same. The permittees should see little change in the cost to maintain their operation.

Recreation should increase which could result in added costs from gates being left open and cattle getting into non-permitted areas. Also cattle distribution patterns may be changed from disturbance. This could result in added riding by the permittees to maintain the desired management.

HERITAGE RESOURCES

The remains of approximately 12,000 years of human history and prehistory are spread across the Santa Rosa Ranger District of the HTNF. Many of these archaeological and historic sites are important for the scientific, historic, cultural, and aesthetic values they possess.

DIRECT AND INDIRECT EFFECTS COMMON TO ALL GRAZING ALTERNATIVES

Prehistoric and historic properties are non-renewable resources; consequently, any adverse effects are considered to be permanent. All effects are cumulative and diminish the overall resource of historic and prehistoric properties to varying degrees. When artifacts are damaged or improperly removed from their original context, they are permanently lost. Any action that contributes to site deterioration or damage is an irreversible action. In this sense, all effects are cumulative and work to reduce the archaeological/historic record.

Past grazing activities, including the building of structures to support grazing, have directly affected cultural resources by reducing the quality and/or quantity of sites due to disturbance or obliteration. In addition to the direct effects from past actions, indirect and cumulative effects may include increased site access and exposure to the elements, resulting in a greater chance of looting, and artifact displacement from erosion. Soil compaction and artifact displacement can result from livestock congregation and trailing. Historic sites have sometimes been scavenged for building materials to be used elsewhere. The severity of the effects of past actions on cultural resources across the allotments cannot accurately be assessed until more archaeological inventory and monitoring is accomplished.

Grazing

Effects to cultural properties can be expected from grazing livestock on the landscape. These effects may impact recorded sites and sites which have not yet been discovered and recorded.

Trampling

Moving about, livestock trample on exposed surface archaeological material. Trampling results in several kinds of adverse effects to archaeological materials. Archaeological remains depend, in some degree, upon depositional context for their significance. Experiment evidence (USA, Corps of Engineers, 1990) shows that livestock trampling displaces both, horizontally across the ground surface, and vertically in certain soil conditions (e.g. wet or damp soils adjacent to springs). In the latter instance, archaeological materials may come to occupy subsurface locations deeper or shallower than originally deposited. This kind of displacement makes interpreting the formation processes of the sites more difficult and sometimes impossible. Cattle have the capability of moving the artifacts downhill as well, if on a slope, by kicking clumps of dirt, or moving the artifact away from the site altogether by carrying artifacts within the mud on their hooves. In one experiment using 589 modern-made lithic flakes and tools, and 391 fragments of unglazed modern pottery, it was found that 162 artifacts (16.5 %) were no longer visible on the surface. The number of artifacts displaced by livestock was 230 (23.5 %). (Each artifact had been plotted within the experimental plots, and each displacement was plotted after the experiment).

Artifact breakage

Other experimental evidence (ibid, 1990) indicates that one of the effects to be expected from livestock grazing is the breakage of artifacts exposed on the surface. This breakage may be in the form of edge damage to artifacts, which can make the interpretation of technological processes used in the manufacture of the artifacts difficult or impossible. Trained lithic analysts are often unable to determine if certain kinds of edge wear evident on artifacts are the result of prehistoric use, purposeful human modification during manufacture, or accidental flaking due to impact from livestock hooves. Scientific interpretation of artifacts is weakened if in analysis one cannot distinguish between purposeful human use of artifacts and accidental edge damage done by the trampling of livestock.

From the same experiment described above, it was found that 55 (5.6 %) of the 980 artifacts were broken or had damaged edges. Artifacts may also be broken in two or more pieces after being stepped on by livestock. This type of breakage separates portions of artifacts critical for age dating and morphological typing (e.g. projectile point bases) from the remainder of the artifact.

Soil Compaction

Caused by livestock trampling, soil compaction can be an adverse effect to subsurface archaeological remains, as well as contributing to exposure and accelerated erosion. In addition to the horizontal and vertical displacement of artifacts discussed above, this kind of disturbance can impair the stratigraphic interpretation of soils critical to understanding site formation, site function and scientific importance. Soil compaction seems to be a more important problem in damp or wet areas than in dry soils (USA, Army Corps of Engineers 1990).

Reduced Ground Cover

Areas that are overgrazed to the point of removing or seriously depleting vegetation may increase the potential for sheet and gully erosion. Archaeological sites present in these areas are subject to damage from these erosional processes.

Destabilization of Streambanks

The riparian areas of streams above the first or second order tend to be high probability areas for the occurrence of archaeological sites. These sites often occupy terraces adjacent to the streambed. If livestock use results in shearing and collapsing of streambanks this would adversely impact archaeological sites present on the terrace.

Since grazing of livestock has occurred in the analysis area for at least 100 years, it is very unlikely that any archaeological sites remain which grazing activity has not previously impacted. Archaeological sites with any remaining surface integrity could be expected only in remote areas and on terrain unsuitable to grazing. Therefore, archaeological sites with intact subsurface remains are important for their scientific information. These subsurface archaeological materials would not have been affected by grazing except in areas with specific types of soils or soil conditions. For example, archaeological sites located in wet or damp areas are likely to have been impacted adversely by livestock trampling (USA, Army Corps of Engineers 1990).

ENVIRONMENTAL EFFECTS ON HERITAGE RESOURCES BY ALTERNATIVE

Alternative 1: "Current Management/No Action"

Direct and Indirect Effects of "Current Management/No Action" on Heritage Resources

Implementation of the Rangeland MOU between the Forest Service and the State Historic Preservation Office would continue. Treatment plans will be developed for sites that are being adversely impacted by livestock grazing. Any ground disturbing activities proposed as a result of implementation of this alternative will be addressed according to Section 106 of the NHPA.

Sites may still be impacted in high site density/high livestock use areas, however, implementation of the MOU will identify these locations and treatments plans will be developed to mitigate the effects.

Implementation of the HTNF Rangeland MOU is intended to identify and mitigate adverse effects caused by livestock grazing. These mitigation measures may include fencing sites, reducing livestock numbers in a particular area and/or moving improvements such as stock tanks and salt blocks away from sites. The Rangeland MOU will continue to be implemented no matter which Alternative is chosen. Any ground disturbing activities implemented as a result of any chosen alternative must have cultural resource surveys prior to implementation.

Cumulative Effects of "Current Management/No Action" on Heritage Resources

Section 106 of the National Historic Preservation Act outlines procedures for dealing with potential impacts to archaeological sites through avoidance, evaluation, and/or mitigation. Any type of future ground-disturbing project will be addressed through this process.

MINERAL EXPLORATION

Currently mineral exploration activities are confined to the Buckskin Mountain area on the district. The increase in gold prices could result in an increase in requests for exploration permits on the forest. Other potential mining areas could be the National and Spring City areas. Any future mineral exploration proposals

within the analysis area would require survey for the presence of cultural resources in compliance with Section 106 regulations.

All newly proposed mineral exploration activities such as new road and drill pad construction must be assessed for their potential impacts to cultural resources through Section 106 of the *National Historic Preservation Act* (NHPA). Mineral exploration activities typically avoid impacting cultural resource sites. If a site cannot be avoided by project activities then impacts to the site are mitigated through consultation with the State Historic Preservation Officer. Currently there is one active mineral exploration project within the Santa Rosa Ranger District. That project is localized to the Buckskin Mountain area. The majority of the project is within previously disturbed areas. The National and Spring City areas are two other potential locations for mineral exploration. Currently no projects are planned in either area. Cumulative impacts to cultural resources from mineral exploration activities is considered to be minimal.

FIRE AND FIRE SUPPRESSION ACTIVITIES

The district is proposing to burn approximately 4,500 acres under supervised conditions to create pockets that would limit the extent of wildland fires. Under this alternative, impacts to cultural resources may increase if the levels of vegetation increase thereby creating more fuels and a hotter fire. However, retaining a certain level of vegetation may also help cultural resources in that soil erosion will be reduced. Fire suppression activities that include bulldozer created fire control lines can have a serious impact on cultural resource sites. Active fire suppression activities in response to wildland fires have the potential to affect archaeological sites through bulldozer activity, back burning or hand lines. Bulldozer lines can potentially be the most destructive but can also provide a firebreak that can protect sites in areas where site locations are known.

ROADS

Currently no new roads are being proposed in the Project Area. However, unplanned user-created roads have the biggest impact to cultural resources since there is no mechanism for planning where they are placed. Because OHV use is expected to increase in the future, the district will soon be working towards developing an OHV plan that should limit where people are allowed to drive and thereby reduce impacts to sites.

Many roads on the Santa Rosa Ranger District are historic. These roads were created to access mining claims, ranches and for many other reasons. Some of these roads were constructed through now known prehistoric sites. Continued maintenance on these roads that pass through sites can gradually destroy intact deposits in the roadway if they exist. No new roads have been constructed on the district recently nor are any planned. The biggest impacts to archaeological sites are unauthorized, unplanned user created roads.

DISPERSED RECREATION

Dispersed recreation is expected to continue to increase, thereby increasing the impacts to areas that are typically along water sources. Vegetation will be reduced and soil erosion will be accelerated.

Dispersed recreation, such as camping, typically along water sources, has the potential to affect archaeological sites. Currently there are three main concentration use areas; access points on the west side of the Santa Rosa Paradise Peak Wilderness, the Indian Creek-Canyon Creek corridor and along the East Fork Quinn River. Where dispersed recreation occurs on archaeological sites there is a potential for unauthorized collection of diagnostic artifacts. Soil compaction due to heavy use, coupled with reduced ground cover creates areas that are susceptible to erosion. Livestock often congregate in these same areas creating more disturbance.

Alternative 2: "Proposed Action"

There is a great potential for this alternative to improve the protection of archaeological resources. Since a strong correlation exists between cultural site locations and proximity to water, any measures that would protect waterways and riparian areas would be the greatest protection to areas where cultural sites are most likely to occur. Such protective measures include, but are not limited to, exclosures and fences.

Direct and Indirect Effects of "Proposed Action" on Heritage Resources

Implementation of the Rangeland MOU between the Forest Service and the State Historic Preservation Office would continue. Treatment plans will be developed for sites that are being adversely impacted by livestock

grazing. Any ground disturbing activities proposed as a result of implementation of this alternative will be addressed according to Section 106 of the NHPA.

This alternative may reduce adverse effects to historic sites from livestock grazing even more. Sites may still be impacted in high site density/high livestock use areas, however, implementation of the MOU will identify these locations and treatments plans will be developed to mitigate the effects. These treatment plans will also take into consideration any other effects being imposed on cultural resources, such as dispersed recreation and user created roads.

Any future developments proposed within the analysis area would require survey for the presence of cultural resources in compliance with Section 106 regulations.

Implementation of the HTNF Rangeland MOU is intended to identify and mitigate adverse effects caused by livestock grazing. These mitigation measures may include fencing sites, reducing livestock numbers in a particular area and/or moving improvements such as stock tanks and salt blocks away from sites. The Rangeland MOU will continue to be implemented no matter which Alternative is chosen. Any ground disturbing activities implemented as a result of any chosen alternative must have cultural resource surveys prior to implementation.

Cumulative Effects of "Proposed Action" on Heritage Resources

Section 106 of the National Historic Preservation Act outlines procedures for dealing with potential impacts to archaeological sites through avoidance, evaluation, and/or mitigation. Any type of future ground-disturbing project will be addressed through this process.

MINERAL EXPLORATION

Currently mineral exploration activities are confined to the Buckskin Mountain area on the district. The increase in gold prices could result in an increase in requests for exploration permits on the forest. Other potential mining areas could be the National and Spring City areas. Any future mineral exploration proposals within the analysis area would require survey for the presence of cultural resources in compliance with Section 106 regulations.

All newly proposed mineral exploration activities such as new road and drill pad construction must be assessed for their potential impacts to cultural resources through section 106 of the NHPA. Mineral exploration activities typically avoid impacting cultural resource sites. If a site cannot be avoided by project activities then impacts to the site are mitigated through consultation with the State Historic Preservation Officer. Currently there is one active mineral exploration project within the Santa Rosa Ranger District. That project is localized to the Buckskin Mountain area. The majority of the project is within previously disturbed areas. The National and Spring City areas are two other potential locations for mineral exploration. Currently no projects are planned in either area. Cumulative impacts to cultural resources from mineral exploration activities is considered to be minimal.

FIRE AND FIRE SUPPRESSION

The district is proposing to burn approximately 4,500 acres under supervised conditions to create pockets that would limit the extent of wildland fires. Under this alternative, impacts to cultural resources may increase if the levels of vegetation increase thereby creating more fuels and a hotter fire. However, retaining a certain level of vegetation may also help cultural resources in that soil erosion will be reduced. Fire suppression activities that include bulldozer created fire control lines can have a serious impact on cultural resource sites. Active fire suppression activities in response to wildland fires have the potential to affect archaeological sites through bulldozer activity, back burning or hand lines. Bulldozer lines can potentially be the most destructive but can also provide a firebreak that can protect sites in areas where site locations are known.

ROADS

Currently no new roads are being proposed in the Project Area. However, unplanned user-created roads have the biggest impact to cultural resources since there is no mechanism for planning where they are placed. Because OHV use is expected to increase in the future, the district will soon be working towards developing an OHV plan that should limit where people are allowed to drive and thereby reduce impacts to sites.

Many roads on the Santa Rosa Ranger District are historic. These roads were created to access mining claims, ranches and for many other reasons. Some of these roads were constructed through now known prehistoric sites. Continued maintenance on these roads that pass through sites can gradually destroy intact deposits in the roadway if they exist. No new roads have been constructed on the district recently nor are any planned. The biggest impacts to archaeological sites are unauthorized, unplanned user created roads.

DISPERSED RECREATION

Dispersed recreation is expected to continue to increase, thereby increasing the impacts to areas that are typically along water sources. Vegetation will be reduced and soil erosion will be accelerated.

Dispersed recreation, such as camping, typically along water sources, has the potential to affect archaeological sites. Currently there are three main concentration use areas; access points on the west side of the Santa Rosa Paradise Peak Wilderness, the Indian Creek-Canyon Creek corridor and along the East Fork Quinn River. Where dispersed recreation occurs on archaeological sites there is a potential for unauthorized collection of diagnostic artifacts. Soil compaction due to heavy use, coupled with reduced ground cover creates areas that are susceptible to erosion. Livestock often congregate in these same areas creating more disturbance.

Alternative 3: "No Grazing"

Because livestock grazing does have the potential to impact sites, the removal of livestock from the allotments would eliminate adverse impacts to heritage properties.

Direct and Indirect Effects of "No Grazing" on Heritage Resources

Under this alternative, direct effects to cultural resources, as a result of grazing activities, would end. The removal of grazing-related facilities would constitute an undertaking and would be subject to National Historic Preservation Act (NHPA) Section 106 Review. If grazing-related facilities were found to be "significant" by meeting eligibility criteria for inclusion in the National Register of Historic Places then their removal would require mitigation.

Implementation of the HTNF Rangeland MOU is intended to identify and mitigate adverse effects caused by livestock grazing. These mitigation measures may include fencing sites, reducing livestock numbers in a particular area and/or moving improvements such as stock tanks and salt blocks away from sites. The Rangeland MOU will continue to be implemented no matter which Alternative is chosen. Any ground disturbing activities implemented as a result of any chosen alternative must have cultural resource surveys prior to implementation.

Cumulative Effects of "No Grazing" on Heritage Resources

Section 106 of the National Historic Preservation Act outlines procedures for dealing with potential impacts to archaeological sites through avoidance, evaluation, and/or mitigation. Any type of future ground-disturbing project will be addressed through this process.

MINERAL EXPLORATION

Currently mineral exploration activities are confined to the Buckskin Mountain area on the district. The increase in gold prices could result in an increase in requests for exploration permits on the forest. Other potential mining areas could be the National and Spring City areas. Any future mineral exploration proposals within the analysis area would require survey for the presence of cultural resources in compliance with Section 106 regulations.

All newly proposed mineral exploration activities such as new road and drill pad construction must be assessed for their potential impacts to cultural resources through section 106 of the NHPA. Mineral exploration activities typically avoid impacting cultural resource sites. If a site cannot be avoided by project activities then impacts to the site are mitigated through consultation with the State Historic Preservation Officer. Currently there is one active mineral exploration project within the Santa Rosa Ranger District. That project is localized to the Buckskin Mountain area. The majority of the project is within previously disturbed areas. The National and Spring City areas are two other potential locations for mineral exploration. Currently no projects are planned in either area. Cumulative impacts to cultural resources from mineral exploration activities is considered to be minimal.

FIRE AND FIRE SUPPRESSION ACTIVITIES

The district is proposing to burn approximately 4,500 acres under supervised conditions to create pockets that would limit the extent of wildland fires. Under this alternative, impacts to cultural resources may increase if the levels of vegetation increase thereby creating more fuels and a hotter fire. However, retaining a certain level of vegetation may also help cultural resources in that soil erosion will be reduced. Fire suppression activities that include bulldozer created fire control lines can have a serious impact on cultural resource sites. Active fire suppression activities in response to wildland fires have the potential to affect archaeological sites through bulldozer activity, back burning or hand lines. Bulldozer lines can potentially be the most destructive but can also provide a firebreak that can protect sites in areas where site locations are known.

ROADS

Currently no new roads are being proposed in the Project Area. However, unplanned user-created roads have the biggest impact to cultural resources since there is no mechanism for planning where they are placed. Because OHV use is expected to increase in the future, the district will soon be working towards developing an OHV plan that should limit where people are allowed to drive and thereby reduce impacts to sites.

Many roads on the Santa Rosa Ranger District are historic. These roads were created to access mining claims, ranches and for many other reasons. Some of these roads were constructed through now known prehistoric sites. Continued maintenance on these roads that pass through sites can gradually destroy intact deposits in the roadway if they exist. No new roads have been constructed on the district recently nor are any planned. The biggest impacts to archaeological sites are unauthorized, unplanned user created roads.

DISPERSED RECREATION

With the removal of livestock from riparian areas, dispersed recreation will increase in those areas. Although unauthorized collection of artifacts may increase the impacts to vegetation and soils will be no greater than with livestock and recreation. These areas will maintain the level of impacts to cultural resources under this alternative.

Dispersed recreation, such as camping, typically along water sources, has the potential to affect archaeological sites. Currently there are three main concentration use areas; access points on the west side of the Santa Rosa Paradise Peak Wilderness, the Indian Creek-Canyon Creek corridor and along the East Fork Quinn River. Where dispersed recreation occurs on archaeological sites there is a potential for unauthorized collection of diagnostic artifacts. Soil compaction due to heavy use, coupled with reduced ground cover creates areas that are susceptible to erosion. Livestock often congregate in these same areas creating more disturbance.

Alternative 4: Resource Concepts, Inc. (RCI) Proposal

Direct and Indirect Effects of "RCI Proposal" on Heritage Resources

Because this alternative does not recommend utilization standards across all allotments, rather it suggests defining standards in individual areas through a system of annual monitoring, the potential for adverse impacts from livestock grazing is potentially greater than in areas where standards are defined. Until consensus is reached on what is best for the allotment, impacts to cultural resources may be significant. This alternative would require a significant amount of monitoring to determine if this is truly the case. The HTNF Rangeland MOU will continue to be implemented and any adverse impacts to heritage sites will be noted. Subsequently a treatment plan to mitigate these effects will be written and implemented.

There is no indication of whether or not cattle numbers will increase or decrease under this alternative. Until standards of use are defined sites may be impacted where sites and livestock grazing overlap. Implementation of the MOU will identify these locations and treatments plans will be developed to mitigate the effects. These treatment plans will also take into consideration any other effects being imposed on cultural resources, such as dispersed recreation and user created roads.

Any future developments or activities that have the potential for to disturb the ground's surface (i.e., Salt block placement or fertilizing to increase plant growth for food) would require survey for the presence of cultural resources in compliance with Section 106 regulations.

Implementation of the HTNF Rangeland MOU is intended to identify and mitigate adverse effects caused by livestock grazing. These mitigation measures may include fencing sites, reducing livestock numbers in a particular area and/or moving improvements such as stock tanks and salt blocks away from sites. The Rangeland MOU will continue to be implemented no matter which Alternative is chosen. Any ground disturbing activities implemented as a result of any chosen alternative must have cultural resource surveys prior to implementation.

Cumulative Effects of "RCI Proposal" on Heritage Resources

Section 106 of the National Historic Preservation Act outlines procedures for dealing with potential impacts to archaeological sites through avoidance, evaluation, and/or mitigation. Any type of future ground-disturbing project will be addressed through this process.

MINERAL EXPLORATION

Wildland fires have the potential to seriously impact archaeological sites through complete obliteration of flammable products, impacting dating capabilities of stone tools, and creating the potential for severe erosion. The district currently has large acres of cheatgrass, which result in large hot burns. The district is proposing to burn approximately 4500 acres under supervised conditions to create pockets that would limit the extent of wildland fires. Continued livestock grazing would reduce some of the fuel levels, however, if excessive vegetation is removed then the risk of soil erosion is increased. Fire suppression activities that include bulldozer created fire control lines can have a serious impact on cultural resource sites.

All newly proposed mineral exploration activities such as new road and drill pad construction must be assessed for their potential impacts to cultural resources through section 106 of the NHPA. Mineral exploration activities typically avoid impacting cultural resource sites. If a site cannot be avoided by project activities then impacts to the site are mitigated through consultation with the State Historic Preservation Officer. Currently there is one active mineral exploration project within the Santa Rosa Ranger District. That project is localized to the Buckskin Mountain area. The majority of the project is within previously disturbed areas. The National and Spring City areas are two other potential locations for mineral exploration. Currently no projects are planned in either area. Cumulative impacts to cultural resources from mineral exploration activities is considered to be minimal.

FIRE AND FIRE SUPPRESSION ACTIVITIES

The district is proposing to burn approximately 4,500 acres under supervised conditions to create pockets that would limit the extent of wildland fires. Under this alternative, impacts to cultural resources may increase if the levels of vegetation increase thereby creating more fuels and a hotter fire. However, retaining a certain level of vegetation may also help cultural resources in that soil erosion will be reduced. Fire suppression activities that include bulldozer created fire control lines can have a serious impact on cultural resource sites. Active fire suppression activities in response to wildland fires have the potential to affect archaeological sites through bulldozer activity, back burning or hand lines. Bulldozer lines can potentially be the most destructive but can also provide a firebreak that can protect sites in areas where site locations are known.

ROADS

Currently no new roads are being proposed in the Project Area. However, unplanned user-created roads have the biggest impact to cultural resources since there is no mechanism for planning where they are placed. Because OHV use is expected to increase in the future, the district will soon be working towards developing an OHV plan that should limit where people are allowed to drive and thereby reduce impacts to sites.

Many roads on the Santa Rosa Ranger District are historic. These roads were created to access mining claims, ranches and for many other reasons. Some of these roads were constructed through now known prehistoric sites. Continued maintenance on these roads that pass through sites can gradually destroy intact deposits in the roadway if they exist. No new roads have been constructed on the district recently nor are any planned. The biggest impacts to archaeological sites are unauthorized, unplanned user created roads.

DISPERSED RECREATION

Dispersed recreation is expected to continue to increase, thereby increasing the impacts to areas that are typically along water sources. Vegetation will be reduced and soil erosion will be accelerated.

Dispersed recreation, such as camping, typically along water sources, has the potential to affect archaeological sites. Currently there are three main concentration use areas; access points on the west side of the Santa Rosa Paradise Peak Wilderness, the Indian Creek-Canyon Creek corridor and along the East Fork Quinn River. Where dispersed recreation occurs on archaeological sites there is a potential for unauthorized collection of diagnostic artifacts. Soil compaction due to heavy use, coupled with reduced ground cover creates areas that are susceptible to erosion. Livestock often congregate in these same areas creating more disturbance.

DISPERSED RECREATION & TRAILS

ENVIRONMENTAL CONSEQUENCES BY ALTERNATIVE

Measurement indicators that could determine visitor satisfaction with encountering cattle or evidence of their presence in the recreation setting are more qualitative than quantitative. Visitor interviews could have to be conducted to capture levels of satisfaction with these encounters in both dispersed sites and on the trail system. Negative reaction to these encounters in wilderness can be expected to be higher than outside wilderness. Damage to trail tread can be measured in feet of trail degraded by trampling damage. Damage to dispersed camp sites in terms of trampling, vegetation removed, and cow pies deposited can be measured with traditional range monitoring techniques used to determine resource condition and trend.

Alternative 1: Current Management/No Action

Direct and Indirect Effects of “Current Management/No Action” on Dispersed Recreation & Trails

There would be no change to the current experience of recreationists using the Project Area. Complaints from recreationists who think livestock negatively affect their experience could be expected to continue or increase. Cattle would continue to be present in all Concentrated Use Areas within the Project Area for at least a portion of the recreation use season. Campsites would continue to be affected by cattle loafing and shading up in these areas. All trails within the Project Area would continue to be used by cattle. Existing trail damage would continue to occur with this alternative Areas with a Visual Quality Objective (VQO) of “Preservation” that are currently being impaired by grazing would likely continue to be affected. For visitors who think livestock enhance their experience, the opportunity to view livestock in rural and backcountry settings would be available at the current level.

The existing application of management standards that would not improve vegetative vigor and water quality to the degree needed to improve dispersed recreation experiences. The activities that recreationists participate in, such as bird watching and fishing, would be less rewarding, as habitat conditions stay static or decline for these species.

Cumulative Effects of “Current Management/No Action” on Dispersed Recreation & Trails

WILDFIRE AND PRESCRIBED FIRE

Wildfires and prescribed fires such as the Buttermilk prescribed burn may disrupt recreational activities, cause smoke that obstructs views and visual experiences, or otherwise distract from recreational experiences on the district. These actions may also alter dispersed sites and impact recreational experiences at these sites in the future.

MINING AND MINERAL EXPLORATION

These activities have occurred in the past and today contribute to many visitors experiences related to the historical aspect of the activities. There are currently no active mines and mineral exploration is limited to an area near Buckskin Mountain. Roads and pads associated with these activities may affect visual quality of visitors on the District.

RECREATIONAL ACTIVITIES

Conflicts between recreational activities may also contribute to cumulative impacts to dispersed recreation, trails and wilderness experiences. Off highway vehicles, hunting, or other activities may impact or affect the experiences of other users on the District. Roads and trails may detract from a persons "Wilderness" experience in more remote locations.

FUELWOOD GATHERING

This activity is limited in scope and intensity, however it may affect dispersed sites within aspen or result in damage to trees adjacent to these sites.

LIVESTOCK ALLOTMENT DEVELOPMENTS

Current and potential future livestock allotment developments such as fences and water developments can detract from the visual aspects of persons recreational and/or wilderness experiences. These developments may also pose as a barrier to recreational experiences. Gates along roadways and trails can at times be an annoyance or a barrier to individuals not accustomed to operating various styles of gates.

Alternative 2: Proposed Action

Direct and Indirect Effects of "Proposed Action" on Dispersed Recreation & Trails

The direct effects of grazing on recreationists would be reduced. Complaints from recreationists who believe livestock negatively affects their experience could be expected to decrease. Negative effects of cattle grazing on Concentrated Use Areas (CUAs) would be reduced due to a reduction in grazing pressure in key areas. The potential creation of riparian pastures, along with providing rest periodically from hot season grazing in riparian areas would improve the vegetative condition of dispersed recreation sites.

The application of management standards that would improve vegetative vigor and water quality would indirectly result in improved dispersed recreation experiences. Effects to trails would be similar to "Current Management/No Action."

The activities that recreationists participate in, such as bird watching and fishing, would be more rewarding as habitat conditions improve for these species.

The adaptive management concept presented in this alternative could potentially overlook conflicts with the recreation experience in the effort to accommodate cattle use under different environmental or climatic conditions in a given year without the requirement for analysis of its effect on other users of the resource. High intensity, short duration grazing early in the season, as an adaptive management tool, for example, could intensify existing conflicts on dispersed camping sites. Adjusting season of use, in favor of use in the fall, could cause increased conflict with the hunting segment of the recreating public where the two uses would overlap for a longer period of time.

Cumulative Effects of "Proposed Action" on Dispersed Recreation & Trails

The reduction of impacts from grazing would improve the recreation experience, and could lead to increased recreation use. Such an increase could lead to more impacts on trails and campsites. Additional management of recreation activities might become necessary.

The potential cumulative effects associated with this alternative would be similar to those described under Alternative 1.

Alternative 3: No Grazing

Direct and Indirect Effects of "No Grazing" on Dispersed Recreation & Trails

The direct effects of livestock grazing on recreation and scenic resources would be eliminated in the Project Area. Complaints from recreationists who think livestock negatively affect their experience could be expected to cease. Livestock effects would be removed from three Concentrated Use Areas (CUAs). that are currently open to grazing.

Livestock effects would be eliminated from 21 miles of the recreation trail system. This would eliminate any livestock caused damage to trails. However, trails that were historically kept open by livestock would tend to

become overgrown. Visitors who believe that viewing livestock enhances their recreation experience would have to seek the opportunity elsewhere.

The elimination of grazing would improve vegetative vigor and water quality. This would indirectly result in improved dispersed recreation conditions in the near term. The activities that recreationists participate in, such as bird watching and fishing, would be more rewarding as habitat conditions improve for these species.

Visitors to the Project Area would have abundant opportunities to recreate without being affected by cattle. Conditions at campsites and on trails over a large area would improve, though effects to these locations from recreationists would continue. Restoration of impacted sites would more likely meet with success if the additional effects of livestock use were removed.

Cumulative Effects of “No Grazing” on Dispersed Recreation & Trails

Under this alternative livestock grazing would be phased out, however, the remaining activities identified under Alternative 1 would remain with the exception of livestock developments which would be removed over time.

Also under this alternative, the increase in the levels of fine fuels could potentially increase the potential for wildfire starts and sizes of fires. Increased fine fuels adjacent to dispersed campsites, roads and motorized trails, and in areas where firearms may be fired could potentially lead to increased numbers of human caused fires.

Alternative 4: Resource Concepts, Inc. (RCI) Proposal

Direct and Indirect Effects of “RCI Proposal”

There could be additional changes to the current experience of recreationists using the Project Area. Complaints from recreationists who think livestock negatively affect their experience could be expected to continue or increase. Cattle would continue to be present in all Concentrated Use Areas within the Project Area for at least a portion of the recreation use season. Campsites would continue to be affected by cattle loafing and shading up in these areas. All trails within the Project Area would continue to be used by cattle. Areas with a VQO of “Preservation” that are currently being impaired by grazing will likely continue to be affected.

The adaptive management concept presented in this alternative could potentially overlook conflicts with the recreation experience in the effort to accommodate cattle use under different environmental or climatic conditions in a given year without the requirement for analysis of its effect on other users of the resource. High intensity, short duration grazing early in the season, as an adaptive management tool, for example, could intensify existing conflicts on dispersed camping sites. Adjusting season of use, in favor of use in the fall, could cause increased conflict with the hunting segment of the recreating public where the two uses would overlap for a longer period of time.

For visitors who think livestock enhance their experience, the opportunity to view livestock in rural and backcountry settings would be available at the current level, but with potentially different timing and concentration levels.

The existing application of management standards that will not improve vegetative vigor and water quality to the degree needed to improve dispersed recreation experiences would continue. The activities that recreationists participate in, such as bird watching and fishing, will be less rewarding, as habitat conditions stay static or decline for these species.

The effect of continuing grazing at its present level, or potentially a higher level, would be that visitors would not have access to recreation opportunities unaffected by cattle. Trail users would continue to be affected on all trails within the Project Area. Opportunities for changing season of use to an earlier time may place cattle on trails when they are still wet with snowmelt causing damage to the trail tread. Campsites and vegetation damaged by past livestock and recreation use will not have the opportunity to recover.

Objectives to limit grazing conflicts with recreation and scenic values within this Project Area would be difficult to achieve because cattle impacts would still affect recreationists accessing or using all Concentrated Use Areas (CUAs) and on all trails. Possible displacement of recreationists from areas affected by grazing into areas with little or no livestock damage may adversely affect recreation experiences due to crowding of sites in those ungrazed areas.

This alternative offers the potential of future construction of new fences and water developments, as well as implementation of vegetation manipulation projects. These activities could further conflict with the recreation experience and reduce the scenic values in the areas that these projects occur.

Cumulative Effects of "RCI Proposal" on Dispersed Recreation & Trails

The potential cumulative effects associated with this alternative would be similar to those described under Alternative 1.

OTHER REQUIRED DISCLOSURES

NEPA at 40 CFR 1502.25(a) directs "to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with other environmental review laws and executive orders."

SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Short-term uses are those uses that generally occur annually (i.e., grazing livestock). Long-term productivity refers to the ability of the land to produce a continuous supply of a resource. Grazing available forage under the Proposed Action is not expected to affect the long-term productivity of soils, except in isolated areas around water developments and trails along fences.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

No resources would be irreversibly committed under the proposed action. The main resource involved is forage, which is used by both wildlife and domestic livestock. Forage is renewable and when managed under FLRMP standards and guides, adequate amounts of forage would return the following growing season.

ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Grazing management requires very limited amounts of energy use for installation of improvements and the management and monitoring of livestock. Forest-wide, energy requirements are not great. For the Martin Basin allotments, expected energy requirements would be small. No conflicts with other jurisdictions are anticipated because of other proposed action or alternatives.

POSSIBLE CONFLICTS WITH PLANS AND POLICIES OF OTHER JURISDICTIONS

No conflicts with other jurisdictions are anticipated because of the proposed action or alternatives.

UNAVOIDABLE ADVERSE EFFECTS

Potential adverse impacts are identified in all the areas addressed in this analysis. However, most are minor and all could be mitigated through either the alternatives considered in the analysis or the cited mitigation requirements.

CRITICAL ELEMENTS OF THE HUMAN ENVIRONMENT

Elements that are subject to requirements specified in statute, regulation or executive order that are addressed throughout Chapter III include cultural resources, water quality, American Indian religious concerns, threatened or endangered species, and wetlands/riparian zones.

Because no wetlands or floodplains would be altered, the goal and intent of Executive Order 11988 (Floodplain Management) and 11990 (Protection of Wetlands) would be met. Effects on the human environment are documented in Chapter 4 of this DEIS. The civil rights of any American citizens, including women and minorities, would not be differentially affected by implementation of any alternative.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

"No Grazing", Grazing Phased Out is the environmentally preferred alternative. This alternative causes the least damage to the biological and physical environment and best protects, preserves and enhances historic, cultural, and natural resources.

PREFERRED ALTERNATIVE

"Proposed Action" is the Forest Service's preferred alternative. This alternative allows for continued livestock grazing under updated management direction.

ENVIRONMENTAL JUSTICE (E.O. 12898)

During the course of this analysis, none of the alternatives considered resulted in any identifiable effects or issues specific to any minority or low-income population or community. The agency considered all public input from persons or groups regardless of age, race, income status, or other social/economic characteristic.

Examination of community composition, as required under E.O. 12898, found no minority or low-income communities to be disproportionately affected under any of the alternatives. This was not raised as an issue during scoping.

NATIONAL FOREST MANAGEMENT ACT

The Proposed Action is consistent with direction in the 1987 FLRMP and the *National Forest Management Act* of 1976.