

# **Wildlife Report on Manti-La Sal National Forest Management Indicator Species And Migratory Birds for the North Paradox Range Allotment**

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The Wildlife Report contains an analysis of effects to Manti-La Sal National Forest Management Indicator Species, and outlines how the proposed activity follows applicable Forest Plan standards and guidelines. A forest scale capability/suitability analysis was completed for the Manti-La Sal National Forest. This analysis covers all MIS species on the forest (Manti-La Sal National Forest MIS Suitability Process Summary, USDA Forest Service 2007). Part II of the Wildlife Report contains a review and evaluation of potential impacts to migratory bird species and habitats.

The analysis in the Wildlife Report considers the best available science. The analysis focuses on species present in the project area, which was determined through site visits, site-specific inventories/surveys and knowledge of the life history requirements of each species and occupancy of similar habitat types on the Forest. Habitat suitability was determined through site visits and review of life histories and habitat requirements. The analysis includes references to credible scientific evidence which is relevant to evaluating reasonably foreseeable impacts. When appropriate, the conclusions are based on scientific analysis that shows a thorough review of relevant scientific information, a consideration of responsible opposing views, and the acknowledgment of incomplete or unavailable information, scientific uncertainty, and risk.

The relevant science considered for this analysis consists of several key elements. For wildlife resources, the elements of science used are:

- Site specific data from inventory and monitoring, field reviews.
- Forest vegetation layers (existveg.mdb).
- Scientific literature - Refer to References section.
- The effects to wildlife resources, including migratory birds, on other allotments in the area have been considered in the analysis.

## **Allotment Description:**

The North Paradox Allotment includes 12,300 acres of National Forest System lands

on the east side of the La Sal Mountains. Within the allotment boundaries, 8,400 acres are considered capable range. Located around Carpenter Ridge and Buckeye Reservoir, the allotment is largely in Montrose County, Colorado, with a small portion in San Juan County, Utah. The area is within the Willow Basin Creek and Roc Creek subwatersheds, which are part of the Lower Dolores watershed. Elevations range from 5,800 ft. in West Paradox Creek at the Forest boundary to the highest point on Carpenter Ridge at 8,400 feet.

The allotment contains a variety of vegetative communities, but is dominated by ponderosa pine (5160 acres or 42% of the allotment), mountain brush/oakbrush (28%) and pinyon/juniper (22%). There are also small areas of aspen, sagebrush and grassland/meadow communities. Past range treatments included seeding much of the ponderosa pine habitat with the introduced forage grass smooth brome (*Bromus inermis*). Past and ongoing timber management has also had a significant influence on the structure of the forest community. Part of the Dry Point pasture was chained and seeded in the 1960's. This area burned in the 2006 Lion Creek wildfire, and will be rested from livestock grazing until it is seeded and recovered.

The allotment is currently permitted for 878 Head Months (cattle).

I. Mule deer, elk, Abert's squirrel, golden eagle, northern goshawk and macroinvertebrates are **Management Indicator Species** designated in the Manti-La Sal National Forest Land and Resource Management Plan (USDA Forest Service 1986). Monitoring these species provides indications of potential impacts to other wildlife species that occur in the same habitat types. The analysis requirements for these species are directed under the 2000 rule transition provisions and the September 29, 2004 interpretive rule on 36CFR219 and the current Forest Plan (table IV-1, as amended).

**Mule deer** (*Odocoileus hemionus*) and **Rocky Mountain elk** (*Cervus canadensis*) are management indicator species (MIS) that occur in the allotment. There is summer range in the higher elevations, and winter range on the benches and foothills of the La Sal Mountains. Summer range has been considered the limiting factor for big game animals on the La Sal Mountains due to a limited availability of high elevation range in proportion to the quantity of low elevation winter ranges available to the herds in this part of the state. However, recent declines in big sagebrush on winter range in southeastern Utah and southern Colorado, largely from drought, have led to concern for the deer herd due to the potential for increased winter mortality due to a lack of forage on traditional winter range.

The current status of the deer and elk population in southeast Utah and southwest Colorado is determined through herd composition counts (i.e. buck:doe, calf:cow ratios), winter aerial surveys and harvest records. Pellet counts are still conducted on parts of the Manti-La Sal National Forest winter ranges, but are not considered effective for population monitoring. The data provides an index to compare winter

range use in areas within and between years.

There are 1272 acres in the North Paradox allotment that have been identified as important big game summer range. While the 1986 Forest Plan identified 1332 acres of general winter range, the increasing use of the area by wintering elk has led to identification of 7559 acres as important winter habitat in the area.

Deer population trends: Deer populations in Colorado declined in the 1990's, similar to other western states (Mule Deer Working Group 2004, Gill 1999), but have taken an upward turn since the lows in 2003. The deer herd around Buckeye Reservoir is managed by the Colorado DOW as part of Game Management Unit #60, but is most closely tied to summering populations in Utah. The current population estimates for this unit are modeled from harvest success numbers and survival data obtained from monitoring on adjacent units. The 2003 post-season population estimate of 2560 deer indicates a stable population trend for deer (Banulis 2005, personal communication). The area receives moderate to heavy hunting pressure, depending on when deer move into the unit from the La Sal Mountains, and has maintained a fairly high hunter success rate. On the Utah side, the La Sal unit and other general season areas in southeast Utah have been reduced to a 5-day buck hunting season and few antlerless permits have been issued.

The post-hunting season status of the La Sal Mountain deer herd (unit 13a) is:\*

	<u>OBJECTIVE</u>	<u>CURRENT STATUS (2005)</u>
Deer Population	13,000	6,000
Buck:Doe Ratio	15:100	13:100

\* UDWR 2006a

Mule deer populations are currently below the management objective on the Utah side of the La Sal Mountains, but slightly above the provisional objectives for the Colorado management unit. Factors affecting deer populations include the quantity and quality of habitat, including a widespread change in vegetative types to later seral stages (due to fire exclusion, pinyon-juniper encroachment, loss of aspen), habitat fragmentation from roads and other development, hunting management, disease, predators, competition among other big-game species and livestock, and the spread of noxious weeds. The current capacity of many habitats to support deer may be lower than during the times of highest deer numbers (Gill 1999). The state-wide drought, with severe to extreme drought conditions in southeastern Utah since 1999 (USGS 2003) has had a negative impact on the quantity and quality of forage available to deer and elk on summer and winter ranges. The drought-related sagebrush die-off in many areas has negatively impacted critical deer winter ranges.

Fawn production is closely tied to the abundance of succulent, green forage during the spring and summer months. Fawn production was very low in the dry 2001-2002 seasons, but has increased over the last several years, indicating improved

conditions. The La Sal herd had a post-season ratio of 55 fawns:100 does in 2005, similar to the 14-year high of 56 fawns:100 does in 2003.

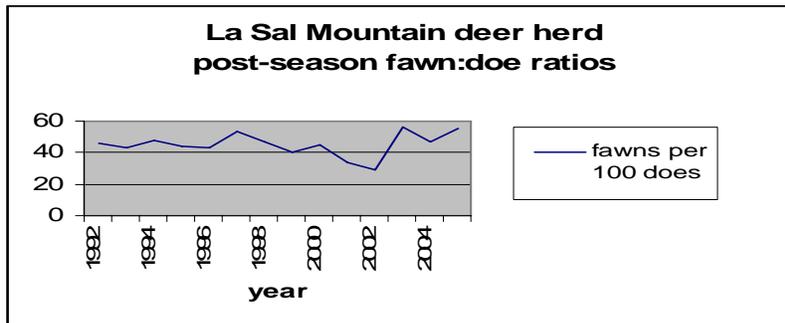


Figure 1. Fawn:doe classification data, La Sal Mountain herd unit (UDWR 2005b).

For mule deer, the Forest Plan (USDA Forest Service 1986) considered a minimum viable population for the Manti-La Sal National Forest to be 19,820. The current winter population estimate (UDWR 2006b) for herd units dominated by Manti-La Sal National Forest lands is 49,975 deer.

Elk population trends: Elk numbers on the La Sal Mountains are below the Utah DWR herd unit management objective of 1800 elk. The elk population has been reduced as a result of increased antlerless harvest during the past 5 years in response to drought conditions. There has been a decrease in elk numbers since 2000 (table 1). In 2004, 500 antlerless permits were issued for public lands in the unit. In 2005, UDWR reduced the number of antlerless permits to 200, in addition to the general and limited mature bull harvest. The 2006 and 2007 seasons have 150 antlerless elk permits issued on the La Sal unit. In Colorado, elk numbers are estimated to be 650 in Game Management Unit #60, which is above the provisional herd unit objective. The population in Colorado is apparently increasing (Banulis 2005, personnel communication). Elk numbers on Manti-La Sal NFS lands in Colorado are based mainly on winter severity and migration into the unit from Utah. Trends in the elk population are not related to any specific habitat management actions on the Manti-La Sal National Forest, but are controlled by hunting.

year	Number of elk on La Sal Mountain unit, aerial survey results - UDWR data
2000	1677
2003	1542
2005	1253

**Table 1.** Elk numbers on the La Sal Mountain unit, Utah.

The calf:cow ratio observed during the 2005 aerial survey was 37 calves:100 cows. The ratio is a slight increase over ratios observed in 2000-2003.

The Forest Plan (USDA Forest Service 1986) has a minimum viable population for

elk of 2,125. The current population estimate for elk on herd units dominated by Manti-La Sal National Forest lands is 13,000 elk (UDWR 2006b).

Range trend: There are several range vegetation trend study sites (NP-1, 2, 3) located in the allotment. The data is summarized in the Specialist Report on Vegetation and Range Resources for North Paradox. Generally, the studies show a stable soil trend and species composition dominated by the introduced grass species smooth brome.

Effects Analysis: In spring-used pastures, there is potential for competition between lactating deer and elk and livestock to occur, which could affect fawning success. Light to moderate grazing levels minimize negative impacts. In summer and fall-used pastures, livestock grazing can reduce the browse forage on which deer and elk feed in preparation for the winter months. Direction in the Forest Plan for general big game winter range calls for managing livestock grazing to complement big game habitat. Primary habitat needs will continue to be met by maintaining Forest Plan standards and guidelines for forage utilization.

Optimum cover:forage ratios are described in the forest-wide direction (C01 01). Current cover:forage ratios in allotment are difficult to calculate, as the prominent oak and mountain brush vegetation types are both good cover and provide forage for big game. Completely open forage types, such as grasslands, are uncommon in the forested allotment. As livestock grazing does not impact cover:forage ratios as measured by vegetation type, it is not used in this evaluation. Grazing may impact the availability of forage to big game through competition and avoidance. Grazing may cause impacts to hiding cover used for fawning and calving in vegetation types dominated by herbaceous species (Loft et al 1987), but no impact is indicated in the oak and mountain brush habitat types used for hiding cover in this area.

Past, present and future actions that may impact forage availability on the south and east sides of the La Sal Mountains (cumulative impact area of approximately 137,520 acres of NFS, state and private land) include:

- Permitted livestock grazing (ongoing)
- Noxious weed control (ongoing)
- Past treatments on pinyon/juniper winter range
- Timber harvest on state and private land
- 2006 Lion Creek wildfire, Dry Point Pasture, 1500 acres
- Buckeye Vegetation Management Project – ponderosa pine thinning, prescribed fire and pile burning (2002-2006) on 1000 acres
- Buckeye Reservoir proposed hazardous fuels treatment/commercial thinning (2007-2008)

As directed in D02 02 and 03 in the Forest Plan (USDA Forest Service 1986), proper use criteria have been established and range resource is managed to provide for grazing and browsing animals.

Livestock grazing occurs on most of the suitable big game habitat, but there are areas in the allotment (Roc Creek), and in spruce/fir types and mountain brush slopes in all allotments in the cumulative effects area that are not grazed by cattle. In the proposed action, the use of Forest Plan forage utilization standards and grazing management (ie deferment) lessens the potential for competition on the areas grazed in common.

Noxious weed control is beneficial to big game habitat.

The proposed Buckeye Reservoir treatments would not result in a conversion of the cover type to a forage type, as the ponderosa overstory would be retained, and there would be no measurable shift in the cover:forage ratio. In the short-term after thinning and burning, hiding cover may be reduced and the thinning and burning will stimulate growth of the oak and smooth brome. Timber harvest or thinning may cause an immediate but short-term (1-3 year) decline in forage availability, followed by a large increase in forage lasting 10 years or more (Wisdom et al. 2004a). The key is to provide a variety of seral stages across the landscape. Timber harvest on the adjacent state and private land has tended to open the ponderosa pine canopy more than the thinning treatments around Buckeye Reservoir, which results in a shift from cover to a forage type classification.

The June 2006 Lion Creek wildfire burned mostly in pinyon-juniper, in the section of the allotment identified as general winter range. It burned in the one area of old pinyon/juniper chaining/reseeding on the allotment. Within a year, the area will provide additional early-seral communities for forage production in the allotment. The wildfire area is scheduled for reseeding in the fall of 2007. The pasture was rested from livestock grazing in 2007, and the rest will continue until adequate cover is established.

Other past, present and future actions do not directly impact livestock: big game interactions, and therefore do not add cumulative impacts, but may affect habitat security for deer and elk. Habitat fragmentation and disturbance may be related to road maintenance and improvement, and outdoor recreation activities including hunting, hiking and mountain biking. Deer and elk tend not to use the area right around Buckeye Reservoir in the spring and summer due to the high levels of human activity related to the reservoir and campground. The adjacent Carpenter Ridge and Roc Creek terrace area is used by deer and elk in summer, but is especially important as key elk winter range. Livestock do not graze the allotment in winter, so there is no direct competition or disturbance/displacement during this critical time.

**Abert's squirrel** (*Sciurus aberti*) is the indicator species most directly dependent on ponderosa pine habitat on both the Moab and Monticello districts. The Abert's squirrel diet consists of the cambium, buds and seeds of ponderosa pine, with an important high-protein component of hypogeous fungi, which grows on the roots of

live ponderosa pine in areas with litter cover greater than 5 cm in depth. When available, acorns can make up a high percentage of the diet. Habitat requirements are described in Patton (1975) and Pederson et al. (1976) as mature ponderosa pine stands including groups of larger trees (>15" dbh) with interlocking crowns and an open understory or low-density of Gambel's oak. Tree characteristics largely determine the quality of squirrel habitat, with a direct relationship between the number of interlocking crowns and the quality of habitat (Brown 1984). Other stand characteristics positively correlated with squirrel habitat are mean tree diameter (DBH) and tree height (Pederson et al. 1976). Squirrel use was negatively correlated with a high percentage of shrub cover (Pederson et al. 1976). Descriptions of the understory composition in optimum squirrel habitat vary, and it appears the open understory and needle-covered forest floor often cited as characteristics of squirrel habitat are related to mature ponderosa pine forests and not necessarily a direct requirement of the squirrel.

Population trends: The Moab district Abert's squirrel population is centered on the Buckeye Reservoir area in Colorado, in the North Paradox allotment. A density of 0.09 squirrels/ha was recorded at the Buckeye Reservoir study site in May 2004. A density of 0.1 squirrels/ha was found in 2005, with an increase to 0.25 squirrels/ha in 2007 (MLNF 2007). Recent studies in Arizona using the same methodology found densities ranging from 0.05 to 1.03 squirrels/ha (Dodd et al 1998). While the reported densities of squirrels vary greatly between areas and years, and are highest in the fall and lowest in the spring, optimum habitat is reported to support a density of 0.4 squirrels/ha (Brown 1984). The MLNF Forest Plan stipulates maintenance/improvement of good (1 squirrel/10 acres or 0.25 squirrels/ha) and very good (2-4 squirrels/10 acres or 0.5-1 squirrel/ha) habitat.

The cooperative UDWR and the USFS Abert's squirrel density studies conducted on the Moab/Monticello district indicated downward trends in 2001-2003 (Pederson and Pederson 2003), and then improvements in squirrel density in 2005 and 2006 (Wright 2006).

Statewide harvest statistics for Abert's squirrel (Colorado DOW as summarized in Smith 2007) indicated a declining trend from 1999 to 2003, although hunter success remained relatively stable. There was an increase in the harvest and hunter success in 2004 and 2005, then a decline in 2006. There is no harvest data specific to the Manti-La Sal National Forest.

Squirrel numbers are known to fluctuate widely due to weather conditions and food supplies (Keith 2003, Brown 1984). The recent below normal precipitation levels impact the maturation of ponderosa pine cones and seed and the availability of hypogeous fungi- all important food sources for Abert's squirrels. Squirrel reproduction is tied to food availability in the spring, while mortality is closely related to winter severity and persistence of snow cover (Stephenson and Brown 1980).

Long-term trends in squirrel numbers are related to forest management practices that alter squirrel habitat condition, and can probably best be inferred from the

availability of quality habitat, as directed by the Forest Plan. An assessment of stands in the Buckeye Reservoir hazardous fuels project area (within the North Paradox allotment) found predominately mid-aged (VSS 4) stands, and 21% mature (VSS 5) stands. Current conditions in the ponderosa pine vegetation type are a result of historic and current timber management practices, fire suppression and drought.

Until 2004, data and observations indicated a downward trend in squirrel numbers in southeastern Utah and adjacent Colorado. The density studies across the district in 2005 - 2007 indicate an upward trend. After years of drought and limited cone production, the ponderosa pine had a much better cone crop in 2005 and 2006.

Effects analysis: Livestock grazing is not indicated as a factor affecting Abert's squirrels or their primary habitat components (USDA Forest Service 2007a).

**Golden eagles** (*Aquila chrysaetos*) breed across western North America from Alaska south to northern Mexico. Typically found in open, high desert country, golden eagles nest on cliffs or in trees. They feed mainly on small mammals, especially rabbits, prairie dogs, ground squirrels as well as insects, snakes, birds and juvenile ungulates. In Utah, they are considered a common resident, with an apparently secure population (NatureServe 2003). However, golden eagles met the criteria to be on the USFWS Birds of Conservation Concern list for the Southern Rockies/Colorado Plateau region related to a low relative abundance and threats in the breeding season due largely to their sensitivity to disturbance in the nesting area (Rocky Mountain Bird Observatory 2002, USFWS 2002).

Population Trends: The North American Breeding Bird (BBS) survey data for the period from 1966-2006 does not show a significant trend for golden eagles in the southern Rocky Mountain/Colorado Plateau region (Sauer 2007). Due to low abundance and small sample size, these estimates are not statistically reliable. A recent range-wide survey (Western Ecosystems Technology 2004) estimated a total late summer population of 4,998 golden eagles in the region, out of an interior west population of 27,392 golden eagles. The survey may be repeated in the future, and will provide important region-wide population data.

A positive correlation between breeding success (eaglets/territory and proportion of active territories) and rabbit numbers has been found in Utah (Bates and Moretti 1994) and other areas (Hoffman and Smith 2003). Current trends in the eagle population and reproductive success are likely related to the region-wide drought (USGS 2003) and subsequent reduction in prey populations.

Six of the 7 known golden eagle territories on the Moab district were monitored in 2007. There was 67% occupancy of the territories, and 4 active nests. Trend in territory occupancy on the Moab/Monticello district is shown in Figure 2.

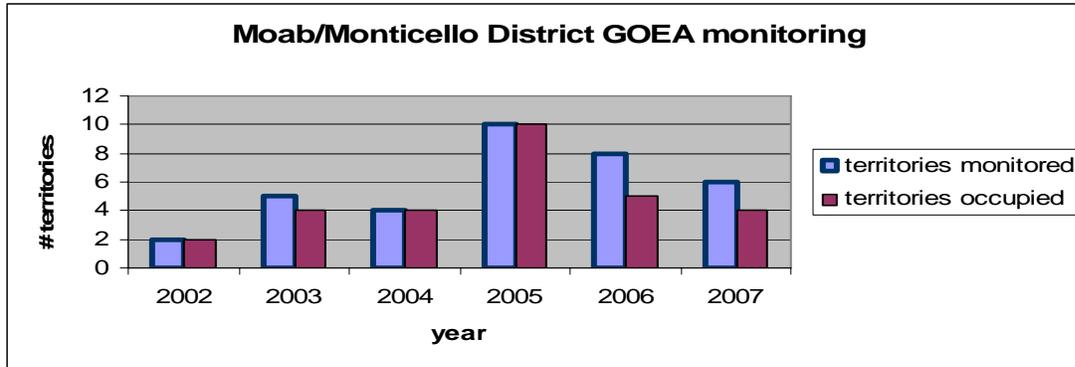


Figure 2. Golden eagle territory monitoring.

Golden eagles may use any vegetative community found on the Forest, and are not a good indicator of the impacts of management activities in specific vegetation types. They were chosen as Management Indicator Species in the Forest Plan to monitor the impacts of activities (such as oil and gas development) in nesting territories.

Effects Analysis: There are no known nesting territories on National Forest System lands in the allotment. Potential territories in Roc Creek are outside the range used by livestock. Habitat modeling, as described in the golden eagle capability/suitability analysis (MLNF 2007b), provides an estimate of 46,400 acres as suitable for nesting habitat on the Moab district. The North Paradox allotment contains 6890 acres, or 15% of the total. Of the acres classified as nesting habitat on the allotment, 2240 acres or 5% of the total nesting habitat available on the district, is capable rangeland that could be affected by the proposed action.

Livestock grazing may have an impact on the species and/or abundance of prey available for eagles. A review by Bock et al. (1993) postulated that golden eagles may benefit from livestock grazing, due to the association of its preferred prey (jackrabbits) with shrub-dominated habitats. The density and diversity of other small animals has often been found to be negatively impacted by the overgrazing of large herbivores (Moser and Witner 2000). Livestock grazing within proper use guidelines would provide adequate cover and forage for small animals utilizing the open benches where golden eagles hunt. Continued livestock grazing on the North Paradox allotment would have no measurable impacts on the habitat or population trends of golden eagles.

The **northern goshawk** (*Accipiter gentilis*) is the Manti-La Sal National Forest Management Indicator Species for mature conifer/mixed conifer forest habitats. The Forest Supervisor signed a Forest Plan Amendment in June 2003 removing blue grouse (*Dendragapus obscurus*) and replacing it with northern goshawk as a Management Indicator Species. Please refer to the Sensitive Species section of the Biological Evaluation for more information regarding the northern goshawk, as it is both an Intermountain Region sensitive species and a MLNF Forest Plan MIS.

**Population trends:** Large-scale assessments have been unable to conclusively determine trends in northern goshawk numbers in Utah or the western U.S. Trends are difficult to determine for this raptor due to the lack of quantitative historical data and because of biases inherent in the various methodologies (nonrandom samples in counts of migrants, low sample sizes in CBC and BBC data and effective sampling only of actively breeding/territorial individuals) usually used to track bird populations. Even complete quadrat searches for this species would have their bias (Kennedy and Andersen 2004). Although it has been postulated that logging of old-growth forests, fire suppression and catastrophic fire have reduced habitat and therefore populations, conclusive data is lacking (Kennedy 1997). Still, it is generally accepted that change in forest structure, through timber harvest or other management, is the principle threat to breeding populations (Graham et al. 1999, Hoffman and Smith 2003).

A sample survey of the status of nests over time (territory occupancy) is currently the most effective methodology available on the MLNF to monitor goshawk populations. The trend in territory occupancy on the Moab/Monticello district (La Sal Division) is shown below in Figure 3. The percent occupancy is very similar to percentages and trends on the Manti division, as well as across the western states, most likely related to drought conditions and reduced prey availability. Except for 2004, territory occupancy has been within a 10 point range of 50% occupancy over the last seven years. The data from the La Sal division of the Forest tends to fluctuate more than the Manti due to the smaller sample size of territories.

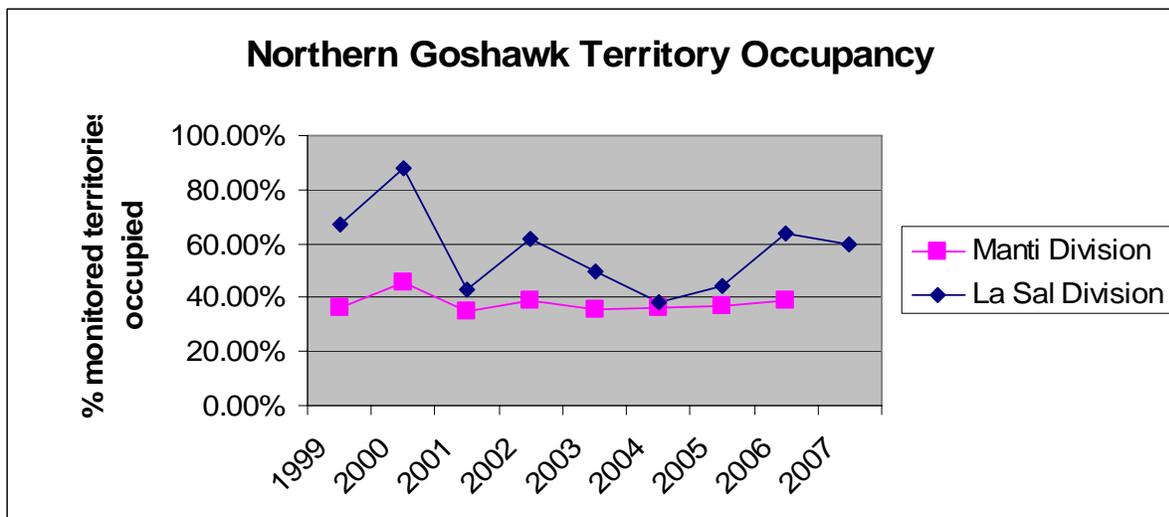


Figure 3. Northern Goshawk territory occupancy on the Manti-La Sal National Forest.

**Effects analysis:** By following the goshawk amendment guidelines as well as management standards for stubble heights and soil disturbance as listed in the Manti-La Sal National Forest Land and Resource Management Plan (1986), no measurable direct or indirect impact from livestock grazing on population trends for northern goshawk is expected. See page 18-19 of the Biological Evaluation for a

more detailed effects analysis. The area has not been identified as functioning-at-risk (guideline v.) and under the current management, the goshawk territory in the allotment has been reoccupied and has supported a successful nest for the last two years.

**Macroinvertebrates** are benthic organisms including aquatic insects (mayflies, caddis flies, daphnia, cyclops, stoneflies and others), mollusks and worms. The 1986 Forest Plan's monitoring and evaluation program includes aquatic macroinvertebrates as a management indicator species and calls for monitoring at baseline stations or as needed for select project activities (page IV-6). Most of the baseline stations are at or near the Forest boundary. The Forest Plan was amended in 2006 to update the protocols used to collect macroinvertebrate data and to change the method used to analyze the data. The 2006 amendment did not alter the language regarding macroinvertebrate monitoring as an optional technique for selected projects. Monitoring will continue at baseline stations to characterize Forest-wide conditions; data analysis will be in cooperation with the Utah Division of Water Quality.

36 CFR 219.14(f) states that site-specific monitoring [for management indicator species] or surveying of a proposed project or activity area is not required, but may be conducted at the discretion of the Responsible Official. The Forest Plan, as amended, is consistent with this direction.

No site-specific surveys of aquatic macroinvertebrates have been conducted and no site-specific monitoring is proposed for this project.

**MIS Summary** - The district has monitored Management Indicator Species and other wildlife and plant threatened, endangered and sensitive species as required (2670 files-Moab office). Monitoring data show generally stable or improving population trend indicators since the 2001-2003 drought. The capability/suitability analysis (USDA Forest Service 2007) contains additional information regarding MIS species populations and habitat conditions.

*Forest Plan Consistency* – As documented in the Biological Assessment/Biological Evaluation and the Wildlife Report, the proposed action will comply with applicable Wildlife and Fish Resource Management for Forest-wide, General Big Game Winter Range, Range and Timber Management Unit direction and standards and guidelines as listed below (USDA Forest Service 1986).

#### Forest-wide Direction

C01 01 - *Habitat needs for Management Indicator Species* – appropriate habitat is being provided for all species.

- Deer and elk – population and range trend monitoring will continue
- Abert's squirrel – population and habitat monitoring will continue, not a suitable MIS for livestock grazing

- Golden eagle – territory occupancy monitoring will continue, not a suitable MIS for livestock grazing
- Northern goshawk – territory occupancy monitoring will continue annually, range management practices as identified in monitoring requirement m-7 will be conducted when appropriate
- Macroinvertebrates – monitoring will continue on a Forest-wide basis

02 - *Manage habitat for recovery of endangered and threatened species.*

Refer to Biological Assessment

04 - *Manage habitat of sensitive species to keep them from becoming threatened or endangered.* Refer to Biological Evaluation

05 - *Maintain and/or improve habitat and habitat diversity for minimum viable populations of existing vertebrate wildlife species.*

06 - *Provide for habitat needs of cavity-nesting birds, raptor and small animals.*

08 - *Manage waters capable of supporting self-sustaining fish populations to provide for those populations.*

Management Unit Direction General Winter Range

C01 01 - *Provide big-game habitat needed to help achieve the big-game population objectives identified in interagency herd unit plans.*

D02 01 - *Manage livestock grazing to complement big-game habitat.*

Management Unit Direction Range

C01 01 - *Balance wildlife use with grazing capacities and habitat.*

*Consideration of Best Available Science* - The analysis in the Wildlife Report considers the best available science. The analysis focuses on species present in the project area, which was determined through site visits, site-specific inventories/surveys and knowledge of the life history requirements of each species and occupancy of similar habitat types on the Forest. Habitat suitability was determined through site visits and review of life histories and habitat requirements as reported in the literature. The analysis includes a summary of the credible scientific evidence which is relevant to evaluating reasonably foreseeable impacts. When appropriate, the conclusions are based on scientific analysis that shows a thorough review of relevant scientific information, a consideration of responsible opposing views, and the acknowledgment of incomplete or unavailable information, scientific uncertainty, and risk.

The relevant science considered for this analysis consists of several key elements. For wildlife, fisheries and botany resources, the elements of science used are:

- Site specific data from inventory and monitoring, field reviews.
- Forest vegetation layers (existveg.mdb).
- Scientific literature - Refer to References section.
- The effects to wildlife, fisheries and botany resources on other allotments in the area have been considered in the analysis.

## II. Migratory Birds

The Migratory Bird Treaty Act (MBTA) and Executive Order 13186 contain direction for federal agencies in the conservation of migratory birds. The intention is for agencies such as the Forest Service to support and integrate bird conservation principles into agency activities and to avoid or minimize adverse impacts on migratory birds. Under Section 3(e)(6) of EO13186, Responsibilities of Federal Agencies to Protect Migratory Birds, it states that each agency shall “ensure that environmental analyses of Federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern”. The following analysis meets agency obligations as defined in EO 13186.

High priority migratory bird species/species of concern are identified in several reports. The Colorado Partners in Flight (CoPIF) Colorado Land Bird Conservation Plan (2000) and the Utah Partners In Flight (UPIF) Avian Conservation Strategy (Parrish et al 2002) include a list of priority species and habitats in need of conservation. The Colorado Comprehensive Wildlife Conservation Strategy (CoCWCS) prepared by the Colorado Division of Wildlife (2005) and the Utah Comprehensive Wildlife Conservation Strategy (UtCWCS) prepared by the Utah Division of Wildlife Resources (2005) also include migratory bird species of management concern. The USFWS prepared the “Birds of Conservation Concern (BCC) 2002” report, which identified more than 100 bird species that deserve prompt conservation attention to stabilize or increase populations or to secure threatened habitats. Southern Rockies/Colorado Plateau region BCC species and priority species from the above lists that may occur on the La Sal Mountains are shown in the table below:

SPECIES	LIST(S)	PRIMARY HABITAT
Band-tailed pigeon	CoPIF, CoCWCS, UtCWCS	Ponderosa pine
Black rosy-finch	UPIF, UtCWCS	Alpine
Black-chinned hummingbird	CoPIF	Pinyon/juniper
Black-throated gray warbler	UPIF, BCC, CoPIF, UtCWCS	Pinyon/juniper
Brewer's sparrow	UPIF, CoPIF, CoCWCS, UtCWCS	Shrubsteppe
Broad-tailed hummingbird	UPIF, UtCWCS	Lowland riparian
Cassin's kingbird	CoPIF	Pinyon/juniper
Common poorwill	CoPIF	Mountain shrubland
Ferruginous hawk	UPIF, BCC, CoCWCS, UtCWCS	Pinyon/juniper
Flammulated owl*	BCC, CoCWCS	Ponderosa pine
Golden eagle*	BCC	Cliff, high desert shrub
Grace's warbler	BCC, CoPIF	Ponderosa pine

Gray flycatcher	CoPIF	Pinyon/juniper
Gray vireo	UPIF, BCC, CoPIF, CoCWCS, UtCWCS	Pinyon/juniper
Horned lark	CoPIF	Semidesert shrubland
Juniper titmouse	CoPIF, CoCWCS	Pinyon/juniper
Lewis's woodpecker	UPIF, BCC, CoPIF, CoCWCS, UtCWCS	Ponderosa pine, lowland riparian
Loggerhead shrike	CoPIF, CoCWCS	Semidesert shrubland
Mexican spotted owl*	CoPIF, CoCWCS	Cliff, lowland riparian, in eastern CO - Ponderosa pine
Northern goshawk*	CoCWCS, UtCWCS	Mixed conifer, aspen
Northern harrier	BCC, CoPIF	Wet meadow
Olive-sided flycatcher	CoCWCS	Sub-alpine conifer
Osprey	UtCWCS	Water-lentic
Peregrine falcon*	BCC, CoPIF, CoCWCS, UtCWCS	Cliff, lowland riparian
Pinyon jay	BCC, CoPIF, CoCWCS	Pinyon/juniper
Prairie falcon	BCC, CoCWCS	Cliff, high desert shrub
Red-naped sapsucker	CoCWCS	Mixed conifer, aspen
Sage sparrow	UPIF, BCC, CoPIF, CoCWCS, UtCWCS	Shrubsteppe
Sage thrasher	UtCWCS	Shrubsteppe
Scott's oriole	CoPIF	Pinyon/juniper
Southwestern willow flycatcher*	CoCWCS, UtCWCS	Lowland riparian
Swainson's hawk	BCC, CoCWCS	Agriculture, aspen
Three-toed woodpecker*	UPIF, UtCWCS	Sub-alpine conifer
Virginia's warbler	UPIF, BCC, CoPIF, UtCWCS	Oak, mountain shrubland, pinyon/juniper
Western bluebird	CoPIF	Ponderosa pine
Western kingbird	CoPIF	Lowland riparian
White-throated swift	CoPIF	Cliff
Williamson's sapsucker	BCC, CoCWCS, UtCWCS	Sub-alpine conifer

Highlighted habitat types are available in the North Paradox allotment. Of 38 species on the above list, 25 have suitable habitat available in the allotment and are included in the following analysis.

Several raptors on the list (**golden eagle, flammulated owl, northern goshawk, peregrine falcon, and Mexican spotted owl**) are addressed in the Biological Assessment/Evaluation and MIS sections of the analysis for the North Paradox allotment. Due to unsuitable habitat, the other raptor species on the list do not generally occur in the project area during the breeding season, although all of them may be found during migration. **Ferruginous hawks** are not known to occur in Montrose County (Richter et al 2004) where the allotment is located. The **prairie falcon** is found primarily in open habitats; alpine or desert grasslands and prairies where there are cliffs for nesting. The forest and mountain brush vegetation types

in the capable range areas of the allotment do not provide suitable foraging habitat. Livestock grazing would not impact potential cliff nesting sites of the prairie falcon. The **northern harrier** occurs primarily in open and lower elevation habitats such as desert grass and shrublands and agricultural areas. This raptor of open country may be found in unforested portions of the allotment. An occasional **osprey** has been observed foraging around Buckeye Reservoir in the fall months, but no breeding has ever been documented in the area. Grazing would not impact their fish prey. Raptor surveys have been and will continue to be conducted in the area, so that any other project activities may avoid disruption of nesting for any of these species. Limited displacement of raptor foraging activity may occur from other activities in the area, but is not likely to contribute to any population trends.

Livestock grazing may have an indirect impact on terrestrial prey availability for these raptor species. Grazing induced impacts to a variety of wildlife species, including small mammals, are well documented (Fleischner 1994). However, other factors such as fire and climate effects are often not considered, and only heavy grazing is studied (Brown and McDonald 1995). The effects of moderate, managed grazing are not as dramatic, and often changes to small animal populations in grazed areas have returned to ungrazed levels within a year (Kauffman and Krueger 1984). Livestock grazing within proper use guidelines should provide ample cover for small animals utilizing areas where these raptors forage.

The allotment is dominated by a ponderosa pine forest type. The ponderosa pine/Gambel oak habitat type has high structural diversity, and therefore has potentially high wildlife values, especially for birds (Youngblood and Mauk 1985). **Band-tailed pigeons** have not been observed in surveys of the project area, but could potentially breed or migrate through the area. They are an uncommon summer resident in southwestern Colorado. The proposed activity would not affect the mature ponderosa pines utilized for nesting and roosting. Another important habitat feature for this species, the availability of acorns, would be minimally impacted by grazing. Acorn production is mostly related to moisture conditions, but also to size of the stems, with stems under 2" in diameter producing few acorns. The larger tree forms are not impacted under proper grazing management. **Grace's warbler** uses ponderosa pine forests as a primary breeding habitat, and these treetop foliage gleaners have been observed in the project area. The canopy or overstory of mature ponderosa pine is not affected by livestock grazing, so habitat would be maintained for this species. The primary breeding habitat for **Lewis's woodpecker** is ponderosa pine, often in recently burned forests (Parrish et al. 2002). It prefers open stands with snag perches from which to hawk insects. In 2004 surveys on the La Sal Mountains, breeding Lewis's woodpeckers were found in the Hang Dog wildfire (2002) on the southeast side of the La Sal Mountains (approximately 4 miles away). They have not been observed in the allotment, but have the potential to move into the Lion Creek wildfire area. **Western bluebirds** are a fairly common summer resident that may be limited by a lack of snags and cavity nests. Much of the allotment provides appropriate habitat for this colorful bird. The historical changes to the structure and function of ponderosa pine forests from a combination of management practices (grazing, logging, fire suppression) should not

be compared to current management (Borman 2005). Potential impacts to ponderosa pine habitat and associated species can be more readily related to timber management, not current livestock grazing.

**Williamson's sapsuckers** have only been observed in ponderosa pine/aspen forests on the Moab/Monticello district, although some range-wide information indicates they are representative of montane coniferous communities (NatureServe 2003). Other sources concur that they are most common in mid-elevation mature and old-growth pine forests, and to a lesser degree in high elevation spruce/fir (Righter et al 2004, National Geographic 2002, Sousa 1983, Thomas 1979). Due to the sapsucker's primary feeding strategy, drilling holes in live trees to consume sap, cambium and insects attracted to the holes, it is not directly affected by grazing activities. The **three-toed woodpecker** is addressed in the Biological Evaluation. While most common in spruce/fir forests, they also occur in ponderosa pine where there are pockets of pine beetle activity. In general, cavity-nesting species and bark-feeding insectivores have been less influenced by grazing than other birds (Bock et al 1992).

Mountain shrubland, consisting of serviceberry and oak, and here mixed with pinyon, is represented in the allotment. **Common poorwills** have been detected during owl surveys in the area, most commonly on the east side of Carpenter Ridge and along Roc Creek. Direct impacts to this ground-nesting species may occur through trampling, but the most pressing concern is habitat loss through conversion and fire suppression (Colorado PIF 2000). The areas used by common poorwills in the allotment are mostly unsuitable range, steep slopes with dense shrubs, that is not grazed by livestock. **Virginia's warblers** are associated primarily with oak woodlands and mature pinyon/juniper. They are commonly observed on the west side of the La Sal Mountains. Permanent conversion of the habitat type is the most evident conservation issue for these species. The project does not propose any clearing or conversion of shrubland.

While pinyon/juniper habitat is extensive on the Colorado Plateau, mature pinyon/juniper communities have been altered enough to be considered a Colorado and Utah PIF priority habitat, with several associated avian species of concern. While there is pinyon-juniper habitat in portions of the project area, grazing has been light due to a lack of water in the lower unit, and the lower pasture (Dry Point) be rested from grazing after the Lion Creek wildfire and reseeded.

The **pinyon jay, gray flycatcher, gray vireo** and **black-throated gray warbler** are mature pinyon-juniper woodland species. These pinyon/juniper associated species show declining trends state or region wide (Sauer et al 2007). All are known to occur on the La Sal Mountains and in Montrose County (Righter et al 2004). These species occur on the low elevation portion of the North Paradox allotment, and may be indirectly impacted by livestock grazing. The proposed action contains no plans for treatment or conversion of existing mature pinyon-juniper communities, which originally impacted populations of these species in the mid-1900s. **Cassin's kingbird** is considered a rare summer resident in southwest Colorado (Righter et al

2004), and is usually found nesting below 6500 ft, outside the elevation range of the grazed portions of the allotment. **Juniper titmouse** is a nonmigratory species in eastern Colorado. It may inhabit a variety of pinyon/juniper community types, from open stands of juniper to dense, mature pinyon/juniper stands at higher elevations. **Scott's oriole** is not known from Montrose County, and has been found breeding in only scattered locations below 6000 ft in elevation (Righter et al 2004). Management recommendations for these species focus on maintaining large tracts of mature habitat and grazing practices that do not reduce the volume of shrub cover. Forest Plan standards and guidelines for forage utilization would continue to be met under current livestock management, minimizing adverse impacts to these species.

In eastern Colorado, **black-chinned hummingbirds** are generally found nesting in low-elevation valleys and mountain slopes up to 7000 ft. (Righter et al 2004). There is suitable habitat for this species in the lower portion of the allotment and along West Paradox Creek and Roc Creek. The Roc Creek drainage is not grazed by livestock, and neither is the lower portion of West Paradox Creek due to inaccessibility. The Lion Creek wildfire may provide new food sources for these hummingbirds, which often utilize forage in burned areas (Colorado PIF 2000).

The **broad-tailed hummingbird** uses a variety of habitats with nectar-producing plants, and is associated with both lowland and mountain riparian breeding habitat. Principal plants used for foraging include various species of larkspur (*Delphinium* sp.), scarlet gilia (*Gilia aggregata*) and indian paintbrush (*Castilleja* sp.). While these forbs may be grazed by livestock, cattle tend to eat more grasses than forbs (Ryder 1980). Other wildlife species, including big game, rodents and rabbits, consume forage from the broad-leaved forbs. Cattle grazing may impact the availability of nectar producing flowers in some areas, but following utilization standards in the Manti-La Sal National Forest Land and Resource Management Plan (1986) would limit impacts to these generally less-preferred forage species. Grazing management, such as utilized on the North Paradox allotment, allows control over the timing, frequency and intensity of grazing, and can be compatible with the maintenance of riparian areas (Mosley et al 1997). As the riparian zones in the allotment vary in structure and vegetative composition, and a significant portion of the riparian areas are not accessible to livestock grazing, grazing may affect the composition and abundance of some bird communities, but not all species in all areas. Utah PIF management recommendations (Parrish et al. 2002) are to limit grazing in hummingbird concentration areas until after August 1, and to manage grazing practices to avoid reducing the density of wildflowers in areas used by broad-tailed hummingbirds. No breeding concentration areas have been identified on the Moab district, but the species does appear to be more common in association with aspen forests, and the hummingbirds occur across the mountain in both grazed and ungrazed areas.

Although the broad-tailed hummingbird shows slightly downward regional population trends (Sauer et al 2007), it is observed regularly on the La Sal Breeding Bird survey (Figure 6) and shows a favorable trend for the small sample size. While the route is

not in the North Paradox allotment, the route samples areas under similar livestock management.

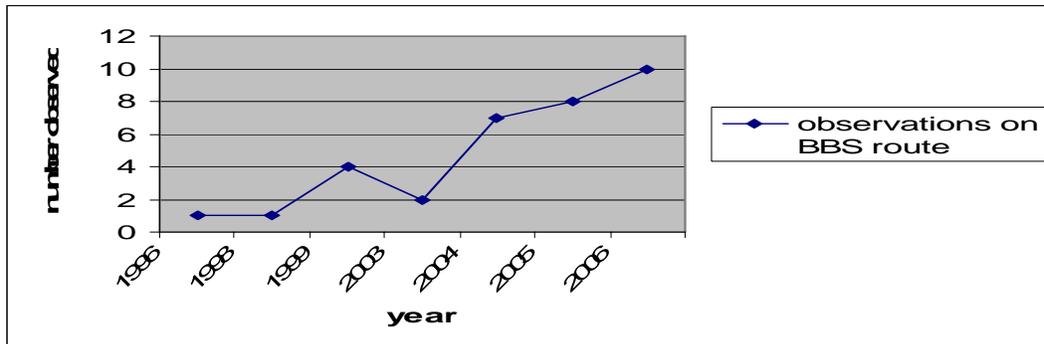


Figure 6. Broad-tailed hummingbird observations on the La Sal Breeding Bird Survey route.

The high, open, rocky cliffs preferred by **white-throated swifts** for nesting and foraging are found along Roc Creek on the northeast boundary of the allotment. The aerial insect-eaters may forage over other portions of the allotment. The causes for the observed population declines for this species in Colorado are not known, but could be related to disturbance at their colonial nest sites, degradation of winter range or pesticide exposure. The proposed action would not cause an increase in any of these factors.

Maintaining current livestock management following Forest Plan standards complies with the USFWS Directors Order No. 131 (December 21, 2000) related to the applicability of the MBTA to federal agencies and requirements for permits for 'take'. There is limited potential for unintentional take of individuals from the proposed action. The proposed action complies with the intent of the MBTA and EO 13186 and follows bird conservation recommendations in the Utah Partners in Flight Avian Conservation Strategy (Parrish et al. 2002) and the Colorado Land Bird Conservation Plan (Colorado PIF 2000) where applicable under the scope of this project. An improvement to migratory bird habitat that is occurring through existing management on the Moab/Monticello district is the installation of wildlife escape ramps in livestock watering troughs.

## REFERENCES

- Banulis, B. 2005. personnel communication 02/14/2005 with Brad Banulis, Terrestrial Biologist, Colorado Division of Wildlife, Montrose, CO.
- Bates, J.W. and M.O. Moretti. 1994. *Golden Eagle (Aquila chrysaetos) Population Ecology in Eastern Utah*. Great Basin Naturalist 54(3) pp. 248-255.
- Bock, C.E., V.A. Saab, T.D. Rich and D.S. Dobkin. 1992. *Effects of Livestock Grazing on Neotropical Migratory Landbirds in Western North America*; In Finch, D.M. and P.W. Stengel, editors. Status and Management of Neotropical Migratory Birds. General Technical Report RM-229. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station.
- Borman, M.M. 2005. *Forest Stand Dynamics and Livestock Grazing in Historical Context*. Conservation Biology 19(5):1658-1662.
- Brown, D.E. 1984. Arizona's Tree Squirrels. Arizona Game and Fish Dept. Phoenix, AZ.
- Brown, J.H. and W. McDonald. 1995. *Livestock Grazing and Conservation on Southwestern Rangelands*. Conservation Biology Vol. 9, No. 6, pg 1644-1647.
- Colorado Partners in Flight. 2000. Colorado Land Bird Conservation Plan, available at <http://www.rmbo.org/pif/bcp/intro/exsum.htm> Accessed 1/3/2005.
- Colorado Division of Wildlife. 2005. Colorado's Comprehensive Wildlife Conservation Strategy. <http://wildlife.state.co.us/WildlifeSpecies/ComprehensiveWildlifeConservationStrategy/>
- Dodd, N.L.; S.S. Rosenstock, C.R. Miller and R.E. Schweinsburg. 1998. *Tassel-Eared Squirrel Population Dynamics in Arizona: Index Technique and Relationships to Habitat Condition*. Arizona Game and Fish Department. Technical Report #27.
- Fleischner, T.L. 1994. *Ecological Costs of Livestock grazing in Western North America*. Conservation Biology Vol. 8, No. 3, pg 629-644.
- Gill, R.B. 1999. *Declining Mule Deer Populations in Colorado: Reasons and Responses*. A Report to the Colorado Legislature. Colorado Division of Wildlife.
- Graham, R.T.; R. Rodriguez; K. Paulin; R. Player; A. Heap; and R. Williams. 1999. *The Northern Goshawk in Utah: Habitat Assessment and Management Recommendations*. USDA Forest Service RMRS-GTR-22. February 1999.
- Hoffman, S.W. and J.P. Smith. 2003. *Population Trends of Migratory Raptors in Western North America, 1997-2001*. The Condor 105:397-419.
- Kauffman, J.B. and W.C. Krueger. 1984. *Livestock Impacts on Riparian Ecosystems and Streamside Management Implications...A Review*. J. Range Management 37(5).
- Keith, J.O. 2003. *Abert Squirrel (Sciurus aberti): a technical conservation assessment*. USDA Forest Service, Rocky Mountain Region. Available at <http://www.fs.fed.us/r2/projects/scp/assessments/abertsquirrel.pdf> Accessed 5/10/2004.
- Kennedy, P.L. 1997. *The Northern Goshawk (Accipiter gentilis atricapillus): Is there evidence of a population decline?* J. Raptor Research 31(2): 95-106.
- Kennedy, P.L. and D.E. Andersen. 2004. *Research and Monitoring Plan for Northern Goshawk (Accipiter gentilis atricapillus) in the Western Great Lakes Region*. Report to WGLR northern goshawk conservation stakeholders.
- Loft, E.R.; J.W. Menke, J.G. Kie and R.C. Bertram. 1987. *Influence of cattle stocking rate on the structural profile of deer hiding cover*. Journal of Wildlife Management 51(3):655-664.
- Manti-La Sal National Forest (MLNF) 2006. Abert's Squirrel Density Survey data, Buckeye study site summary.
- Moser, B.W. and G.W. Witmer. 2000. *The effects of elk and cattle foraging on the vegetation, birds, and small mammals of the Bridge Creek Wildlife Area, Oregon*. International Biodeterioration and Biodegradation 45(2000) 151-157.
- Mosley, J.C., P.S. Cook, A. J. Griffis and J. O'Laughlin. 1997. *Guidelines for Managing Cattle Grazing in Riparian Areas to Protect Water Quality: review of research and best management practices policy*. University of Idaho Report (Idaho Forest, Wildlife and Range Policy Analysis Group) No. 15. Moscow, Idaho. Mule Deer Working Group. 2004. *North American Mule Deer Conservation Plan*. Western Association of Fish and Wildlife Agencies.
- Mule Deer Working Group. 2004. *North American Mule Deer Conservation Plan*. Western Association of Fish and Wildlife Agencies.

- National Geographic Society. 2002. *Field Guide to the Birds of North America, Fourth Edition*.  
 NatureServe Explorer. 2003. *An Online Encyclopedia of Life*. Version 1.8. Arlington, Virginia. USA.  
 Available at <http://www.natureserve.org/explorer>
- Parrish, J.R., F.P. Howe and R.E. Norvell. 2002. *Utah Partners in Flight Avian Conservation Strategy Version 2.0*. Utah Partners in Flight Program, Utah Division of Wildlife Resources. UDWR Publication No. 02-27.
- Patton, D. 1975. *Abert Squirrel Cover Requirements in Southwestern Ponderosa Pine*. USDA Forest Service Research Paper RM-145.
- Pederson, J., R. Hasenyager, and A. Heggen. 1976. *Habitat Requirements of the Abert Squirrel on the Monticello District, Manti-La Sal National Forest of Utah*. Publication Number 76-9 Utah State Division of Wildlife Resources.
- Pederson, J.C. and A.L. Pederson. 2003. *Abert Squirrel Density Survey 2001-2003, San Juan County, Utah*. Report to the Utah Division of Wildlife Resources. Salt Lake City, UT. Contract #026218.
- Righter, R.; R. Levad, C. Dexter and K. Potter. 2004. *Birds of Western Colorado Plateau and Mesa Country*. Grand Valley Audubon Society.
- Rocky Mountain Bird Observatory. 2002. *Partners in Flight Species Assessment Database*. Available at <http://www.rmbo.org/pif/pifdb.html>. Accessed 10/5/03.
- Ryder, R.A. 1980. *Effects of Grazing on Bird Habitats*. In: Management of Western Forests and Grasslands for Nongame Birds, Workshop Proceedings. USDA Forest Service General Technical Report INT-86.
- Sauer, J. R., J. E. Hines, and J. Fallon. 2007. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2006. Version 7.23.2007*. [USGS Patuxent Wildlife Research Center](http://www.usgs.gov/patuxent), Laurel, MD.
- Smith, B. 2007. Summary of Colorado DOW Abert's squirrel harvest data, 1999-2006.
- Sousa, P.J. 1983. *Habitat Suitability Index Models: Williamson's Sapsucker*. Western Energy and Land Use Team, USDI Fish and Wildlife Service. Ft. Collins, CO.
- Stephenson, R.L. and D.E. Brown. 1980. *Snow cover as a factor influencing mortality of Abert's squirrels*. Journal of Wildlife Management 44(4):951-955.
- Thomas, J.W., technical editor. 1979. *Wildlife Habitats in Managed Forests*. USDA Forest Service, Agriculture Handbook No. 553.
- Utah Division of Wildlife Resources (UDWR). 2006a. Southeastern Region Mule Deer and Elk Population Statistics. Unpublished Data. Price, UT.
- Utah Division of Wildlife Resources (UDWR). 2006b. *Utah Big Game Annual Report*. Publication No. 06-21. Salt Lake City, UT.
- Utah Division of Wildlife Resources (UDWR). 2005. *Utah Comprehensive Wildlife Conservation Strategy*. Utah Division of Wildlife Resources Publication No. 05-19.
- USDA Forest Service. 2007. *Manti-La Sal National Forest MIS Suitability Process Summary*. Manti-La Sal National Forest. Price, UT.
- USDA Forest Service. 2007a. Capability and Suitability Analysis, Management Indicator Species – Abert's squirrel, Manti-La Sal National Forest. Price, UT
- USDA Forest Service. 2007b. Capability and Suitability Analysis, Management Indicator Species – Golden eagle, Manti-La Sal National Forest. Price, UT.
- USDA Forest Service. 1986. *Manti-La Sal National Forest Land and Resource Management Plan, as amended*. Manti-La Sal National Forest. Price, UT.
- U.S. Fish and Wildlife Service (USFWS). 2002. *Birds of conservation concern 2002*. Division of Migratory Bird Management, Arlington, VI. 99pp. [Online version available at <http://migratorybirds.fws.gov/reports/bcc2002.pdf>]
- U.S. Geological Survey (USGS). 2003. *Drought Conditions in Utah During 1999-2002: A Historical Perspective*. USGS Fact Sheet 037-03. April 2003.
- Western Ecosystems Technology, Inc. 2004. *Population Level Survey of Golden Eagles (Aquila chrysaetos) in the Western United States*. Prepared under contract for the U.S. Fish and Wildlife Service. Final Report August 30, 2004. Available at [http://mountain-prairie.fws.gov/species/birds/golden\\_eagle/](http://mountain-prairie.fws.gov/species/birds/golden_eagle/)
- Wisdom, M.J., B.J. Johnson, M. Vavre, J.M. Boyd, P.K. Coe, J.G. Kie, A.A. Ager and N.J. Cimon. 2004. Cattle and Elk Responses to Intensive Timber Harvest. The Starkey Project: A synthesis

of long-term studies of elk and mule deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resource Conference 69.

Wright, A.L. 2006. *Abert's Squirrel Monitoring in Southeastern Utah during 2006*. Utah Division of Wildlife Resources, Southeastern Region. Price, UT.

Youngblood, A.P. and R.L. Mauk. 1985. *Coniferous Forest Habitat Types of Central and Southern Utah*. Gen. Tech. Rep. INT-GTR-187. USDA Forest Service, Intermountain Research Station, Ogden, UT.