PAHVANT INTERAGENCY
FUELS REDUCTION PROJECT

Wildlife Report

Fillmore Ranger District, Fishlake National Forest
Fillmore Field Office, BLM
Millard County, Utah

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Prepared by Stan Andersen
Wildlife Biologist, Fishlake National Forest

Summary – Wildlife and Plants

Management Indicator Species (MIS)

The analysis area contains habitat for the following MIS species: elk, mule deer, cavity nesters (hairy woodpecker, western bluebird, and mountain bluebird), northern goshawk, riparian guild (Lincoln's sparrow, yellow warbler, and song sparrow), sage nesters (Brewer's sparrow, and vesper sparrow), resident trout, and macroinvertebrates. The no action alternative would have no adverse direct effects on MIS species, there may be some future indirect effects as natural succession occurs on the landscape. The action alternative may affect individuals and their habitat, but would not adversely affect population numbers or viability of these MIS species. An unwanted wildfire would have some positive and some negative effects on the different wildlife species depending on where, when, and how a wildfire occurred. See General Wildlife and MIS Report pages 38-56.

Sensitive Plant and Animal Species

The analysis area contains suitable habitat for: spotted bat, peregrine falcon, Townsend's big-eared bat, northern goshawk, three-toed woodpecker, and flammulated owl. The no action alternative would have no adverse direct effects on sensitive wildlife species, there may be some future indirect effects as natural succession occurs on the landscape. The action alternative may impact individuals or habitat, but will not likely contribute to a trend towards federal listing or loss of viability to the population or species for the sensitive wildlife species considered above. An unwanted wildfire would have some positive and some negative effects on the different wildlife species depending on where, when, and how a wildfire occurred. See the Biological Evaluation in the project file.

Endangered, Threatened and Candidate Plant and Animal Species

The analysis area contains suitable habitat for: western yellow-billed cuckoo (a candidate species), and bald eagle (a threatened species). The no action alternative would have no adverse direct effects on the western yellow-billed cuckoo or bald eagle, there may be some future indirect effects as natural succession occurs on the landscape. The action alternative is not likely to adversely affect either of these species considered above. An unwanted wildfire would have some positive and some negative effects on the different wildlife species depending on where, when, and how a wildfire occurred. See Biological Assessment in the project file.

Migratory Birds

The no action alternative would have no adverse direct effects on migratory birds, there may be some future indirect effects as natural succession occurs on the landscape. The action alternative may affect individual migratory bird species, but would not adversely affect population numbers or viability of these species. An unwanted wildfire would have some positive and some negative effects on the different species depending on where, when, and how a wildfire occurred. See General Wildlife and MIS Report pages 50-52.

Cumulative Effects

The cumulative effects area (CEA) consists of the Pahvant Mountain Range. This area was identified based on the species being evaluated and on their expected use. The past, present, and reasonably foreseeable future actions considered would include: vegetation treatment projects, cattle grazing, recreational activities, wildfires, various special uses, and habitat fragmentation.

The effects of the activities listed above, in combination with the proposed project, are not expected to cause measurable changes to the species discussed in this report. The action alternative would not adversely affect population numbers or viability of MIS, migratory bird, sensitive, endangered, threatened.

General Wildlife and Management Indicator Species Report – Pahvant Interagency Fuels Reduction Project

Alternative 1: No-Action Alternative

The emphasis of this alternative is to propose no treatments within the Pahvant Interagency Fuels Reduction Project area at this time. It does not preclude activities in other areas at this time, or from the Pahvant project area at some time in the future. The Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14d) requires that a "no action" alternative be analyzed in every Environmental Assessment (EA). This alternative represents the existing condition against which the other alternatives are compared.

Under the No Action alternative no fuels reduction activities would occur in the proposed treatment units at this time. The no action alternative, which describes existing conditions, is summarized in the Background discussion on page 1. The Fire and Fuels Specialist Report, located in the Project Planning Record, contains a detailed discussion of existing conditions. Under the no-action alternative, pinyon/juniper and undesired shrubs would continue to encroach on the landscape increasing the wildfire hazard and decreasing the quality of habitat for most wildlife species.

Alternative 2: Proposed Action

The Fillmore Ranger District of the Fishlake National Forest (NF), and the Fillmore Field Office of the Bureau of Land Management (BLM) are proposing to treat approximately 14,329 acres of hazardous fuel accumulations along the western slopes of the Pahvant Mountain Range (see general location, and treatment unit maps). Treatments would occur in seven treatment units ranging from approximately 490 to 4,929 acres in size. Vegetation to be treated includes sagebrush/grass/forb, pinyon-juniper, and Gambel oak.

The proposed action is to reduce hazardous fuels by reducing fuel height and fuel loads. The areas proposed for treatment have an existing fuel height of more than 8 feet, and a fuel loading of over 15 tons per acre. The desired condition is a fuel height of 0-2 feet, and a fuel loading of less than 5 tons per acre. Approximately 40-80 percent of the vegetation would be removed in each treatment unit.

Treatment methods include cutting vegetation by hand (pinyon and juniper trees); piling or scattering cut vegetation; burning cut vegetation by hand or aerial ignition device; and broadcast burning by hand or aerial ignition device.

Treatments involving broadcast burning would occur mainly during spring and fall months. Cutting could occur any time of year. Treatments would begin in 2003, and are anticipated to be completed by 2008.

The following design features would be implemented as part of the proposed action:

- Low- to moderate-intensity prescribed fire would be used in order to promote the creation of a patchwork burn pattern of burned and unburned vegetation, and to protect soil resources.
- Where necessary, hand or "black" lines would be constructed along the perimeters of treatment units in order to contain prescribed fire within the treatment units. Hand lines and black lines are created by removing vegetation along a line by hand tools or hand burning, respectively. These lines would be constructed prior to the implementation of treatments that involve the use of prescribed burning.
- No fire lines would be constructed through known significant heritage sites. A minimum 100-foot buffer of untreated vegetation would be left around significant heritage sites. Vegetation may be cleared along the perimeter of the 100-foot buffer to exclude fire or reduce fire intensity. Prior to ignition, an archeologist would assist fire personnel to identify any other appropriate protection measures.
- Grazing pastures within treatment units would be rested from livestock grazing for a minimum of two growing seasons following a prescribed burn in that unit. Pastures would be rested for an additional season(s), where necessary to allow grasses to rejuvenate.
- One to two trees per acre would be retained for wildlife habitat in pinyon-juniper targeted for cutting. Trees with cavities that are observed during cutting of pinyon or junipers will be retained for cavity nesting bird species.
- Where necessary, treated areas may be seeded to promote recovery of ground cover to protect soil resources. Seed mixes may be comprised of grass, forbs, and shrubs. Only noxious weed free seed mixes would be used.
- The Forest Service and BLM would prepare a prescribed fire burn plan for each treatment unit prior to prescribe burning. The prescribed burn plan would describe methods and conditions under which prescribed burning would occur in order to accomplish project objectives.

Table 1. Treatment Unit Name, Acreage, Vegetation, and Treatment Method.

Unit Name	Legal Location	Unit Size (acres)	FS Acreage	BLM Acreage	Vegetation Types	Primary Treatment Methods
Grabalt	Sec 31-32, T.18 S., R.2 W.; Sec 25-26, 35-36, T.18 S., R.3 W.; Sec 1-4, T.19 S., R.3 W.	2,352	914	1,438	78% pinyon-juniper 20% Gambel oak 2% sagebrush/grass/forb	Cutting & burning by hand
Wild Goose	Sec 22-27, 35-36, T.19 S., R.3 W.	1,578	1,578	N/A	58 % pinyon-juniper 42% Gambel oak	Burning by hand or aerial ignition device
Holden Springs	Sec 6-9, 17-18, T.20 S., R.3 W.; Sec 12, T.20 S., R.4 W.	1,943	N/A	1,943	68% pinyon-juniper 32% sagebrush/grass/forb	Cutting* & burning by hand
Pioneer	Sec 31-33, T.20 S., R.3 W.; Sec 4-6, 8-9, T.21 S., R.3W.	1,603	1,149	454	38% pinyon-juniper 33% Gambel oak 29% sagebrush/grass/forb	Cutting* by hand, burning by hand or aerial ignition device
Frampton Heights	Sec 1, 12, T.21 S., R.4 W.,	490	N/A	490	65% pinyon-juniper 35% sagebrush/grass/forb	Cutting and piling*, pile burning by hand
Horse Hollow	Sec 35-36, T.21 S., R.4 W.; Sec 1-2, T.22 S., R.4 W.	1,434	1,434	N/A	51% pinyon-juniper 49% Gambel oak	Burning by hand or aerial ignition device
Meadow	Sec 7-8, 18-20, 29-32, T.22 S., R.4 W.; Sec 3-4, T.23 S., R.4.5 W.; Sec 13, 24-26, T.22 S., R.5 W.	4,929	2,195	2,734	43% Gambel oak 35% sagebrush/grass/forb 22% pinyon-juniper	Cutting* by hand, burning by hand or aerial ignition device

* Cutting on BLM portions of these units was analyzed in 1999 by the BLM in the Holden, Frampton, and Meadow Environment Assessments.

Affected Environment

This section discusses the environment that would be affected, specifically as it relates to the terrestrial wildlife and sensitive plant species.

The Forest Service Manual (USDA Forest Service, 1995) states that wildlife habitat should be maintained to provide for viable populations of existing and approved introduced wildlife species. This document covers a portion the Pahvant Range Subsection, which is approximately 287,475 acres in size. It lies east of I-15 between Fillmore and Richfield and extends from near Cove Fort to Scipio. This is a narrow mountain and ridge system that forms the transition between the Great Basin and Colorado Plateau. Elevations range from 5,500 to 10,200 feet with all aspects, but most tend east and west. Slopes are 10-20% on the base and main ridge crest, and 50% to vertical on scarp and canyon slopes. Annual precipitation is 8-34 inches with March and April the wettest months, and July the driest. Mean annual temperatures range from 30-40°F.

There are different vegetative communities within the project subsection that provides habitat for a variety of wildlife species. The project area supports a large variety of terrestrial wildlife species such as: mule deer, elk, coyote, red fox, bobcat, cougar, rabbits, squirrel, wild turkey, various raptor species, small rodents, and numerous snakes and lizards.

Generally the Utah Division of Wildlife Resources manages the wildlife populations on National Forest System lands and BLM lands. The Federal land management agencies responsibilities are focused on management of habitat to maintain viability of species that are within its jurisdiction. Close cooperation among the various agencies, governments, and other jurisdictions is necessary to provide proper management of wildlife resources.

All of the treatment units on National Forest System lands occur on Management Area 6B as outlined in the Fishlake Forest Plan. Management Areas 6B are managed for intensive grazing management systems are favored over extensive systems. Conflicts between livestock and wildlife are resolved in favor of livestock. There are no general directions given for this Management Area as it relates to fuels reduction projects. There are general management requirements given in the Forest Plan for vegetation treated by burning (FP IV-48 thru 49) that apply to wildlife, it states:

1. Use prescribed fire from planned and unplanned ignitions to accomplish resource management objectives, such as reducing fuel load buildup, wildlife habitat improvement, ETC.
2. Limit use of prescribed fires on areas adjacent to riparian areas to protect riparian and aquatic values.

Table 2. Vegetation types and numbers of acres to be treated.

Vegetation Types	Number of Acres in Treatment Units	40-80% of Acres Treated	Total Number of Acres in Analysis Area
Aspen	0	0	10,948
Communities	0	0	1768
Cropland	0	0	23,400
Gambel Oak	4547	1819-3638	72,413
Mountain Mahogany	0	0	19,102
Mountain Shrub	0	0	555
Pinyon/Juniper	6604	2642-5283	56,733
Riparian	32	*0	2066
Sagebrush/Grass/Forb	3144	1258-2515	70,573
Semi-desert Shrubs	0	0	14
Spruce/Fir	0	0	29,903
Total	**14,329**	**5719-11,436**	**287,475**

*No acres in the riparian type would be treated

WILDLIFE MANAGEMENT INDICATOR SPECIES

Planning regulations in the first round of forest planning directed Forests to identify management indicator species (MIS). These species are selected and monitored to indicate change in wildlife habitat resulting from activities on the Forest.

MIS that were selected for the Fishlake NF include: elk, mule deer, cavity nesters, northern goshawk (also discussed as a sensitive species in the Biological Evaluation), riparian guild, sage nesters, Bonneville cutthroat trout, resident trout, macroinvertebrates and Rydberg's milkvetch.

Information regarding MIS can be found in *Life History and Analysis of Endangered Threatened, Candidate, Sensitive, and Management Indicator Species of the Fishlake National Forest* (Rodriguez 2002). This document contains summarized population trend and monitoring information for the Fishlake NF. Some basic habitat requirements and trend for these species is included in this wildlife report, however much more information can be found in the Life Histories document.

In order to monitor for sage nesters, cavity nesters, and riparian dependent guild species, the Forest identified specific species to meet the objectives of the monitoring plan located in the Fishlake LRMP Chapter V-6. Biologists working on the Fishlake and Dixie

National Forests collaborated to develop a list of species to monitor based on vegetation types or habitat needs as identified in the Fishlake LRMP Chapter II, Table II-8A. The selection of these representative species for riparian, sage, and cavity habitats were based on direction found in the Forest Service Manual (FSM 2621.1) "to assure the maintenance of viable populations of native and non-native plants and animals". The following species were selected:

Sage nesters: Brewer's sparrow, and vesper sparrow
Cavity nesters: hairy woodpecker, western bluebird, and mountain bluebird
Riparian guild: Lincoln's sparrow, yellow warbler, and song sparrow

The reason these species were selected as MIS is described in the Fishlake LRMP Chapter II pages 27-31. The objective was to select species that through monitoring populations and habitat relationships we could measure the effects of Forest Service management activities on all the fish and wildlife that occur on the Forest.

Populations of wildlife are extremely difficult to quantify, and in some cases can vary substantially from year to year. Environmental factors can dramatically influence the recruitment of young and survival of adults. A precise figure on the number of animals is very difficult if not impossible to determine, and would only be valid for a short period of time.

Population trend is most appropriately addressed at a scale above the project level. Many of the selected MIS occur and range far beyond a local scale such as a project analysis. Individuals, family groups, or herds such as elk, annually use areas much larger area than a typical analysis area and population trend must be examined on a much larger scale to be meaningful. For National Forest Management Act implementation, this scale is the Fishlake National Forest. At a site-specific project level, there is a great deal of fluctuation in wide ranging populations. For most species, it would be technically, and practically inappropriate to conduct population trend sampling at the scale of individual projects. Individual projects contribute to the total population trend but do not usually make up the entire population and trend, unless they are a locally endemic species. For this reason, it is not appropriate to determine population trend at a local level.

Population trend for threatened, endangered and candidate species is addressed using recovery plans or conservation assessments, strategies and agreements. These broad scale documents are used because they occur and range far beyond the scale of the forest.

Because population trend is best addressed at a much larger scale than the project level, data from organizations such as the Nature Conservancy (NatureServe Explorer), the Division of Wildlife Resources, and the United States Geological Survey, Breeding Bird Survey (BBS) were used in the discussions on trend. For far ranging species such as elk that can range across multiple forest boundaries and land ownerships, broad scale data were obtained from the Division of Wildlife Resources, Southern Region.

Wildlife surveys were conducted specific for this project in 2002, summary report from Mark Madsen in project record.

Elk (*Cervus canadensis*)

Elk habitat includes semi-open forest, mountain meadows in the summer, foothills, plains, and valleys. Rocky Mountain elk require mature stands of deciduous and conifer forest habitats. Dense brush understory is used for escape and thermal cover. These habitats are particularly important on south-facing slopes for cover in winter. Rocky Mountain elk use uneven-aged forest stands that include old growth, herbaceous openings, and water.

Elk are herbivorous, and feed in riparian areas, meadows, open parklands, and herbaceous and brush stages of forest habitats. They graze and browse, eating grasses, forbs, tender twigs, and leaves of shrubs and trees, fungi, some mast, and aquatic vegetation.

Calving occurs in areas with available water and brushy vegetation that provide dense cover near openings, and seclusion from human impacts. The rut occurs from late August to November. Gestation period is about 255 days. Usually one calf is born, but occasionally two and rarely three. Young are born in secluded areas with good cover. Cows become sexually mature at about two years. In sedentary herds, female calves usually remain with mothers to form the cow-calf herds to which they belong throughout their lives. Adult males live separately in bull herds, and join cows only during the rut.

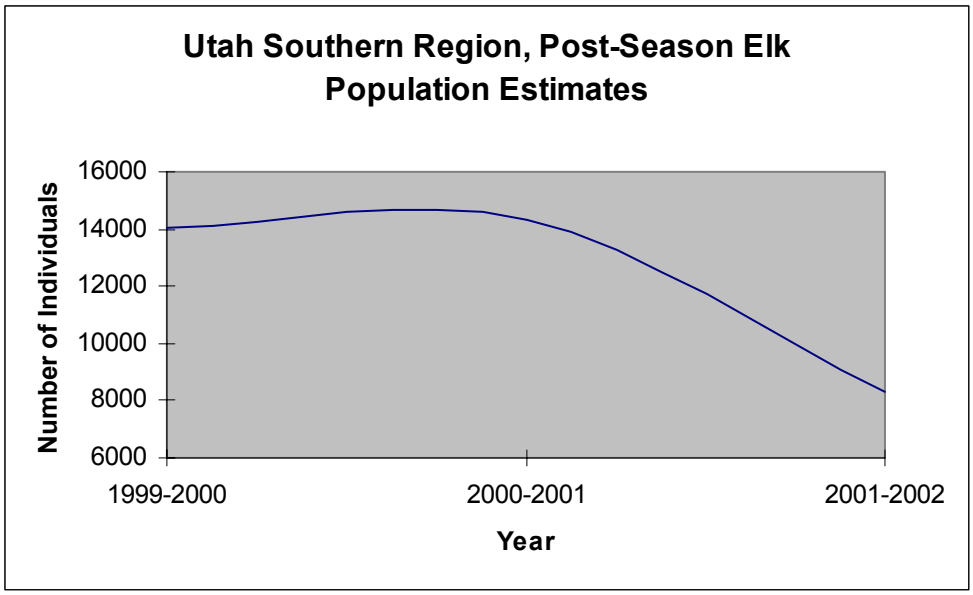
Humans, mountain lions, and coyotes are the major predators of elk, although black bears, bobcats, and feral dogs probably kill a few, mostly young. Some competition for food and cover may occur between elk and domestic livestock, wild horses, and deer. Populations require seclusion from human interference, protection from poaching, and management to prevent local overpopulation. Proper management of forest and recreational activities can provide these requirements, and the mixture of habitats essential to the health of the subspecies.

Elk habitat occurs across the entire Fishlake National Forest and the project area. There are approximately 1,458,049 acres of potentially suitable habitat on the Fishlake National Forest. Within the Fishlake LRMP II-29, table II-8B, the estimated population size of elk on the Fishlake National Forest was 2,000 head in 1986 when the LRMP was signed. Based on data collected in cooperation with the Division of Wildlife Resources, there were approximately 4000 counted elk in the winter of 2001/2002. These data were collected during the winter, by helicopter. Helicopter counts are collected on a three-year basis. As a result of habitat improvement projects across the forest these data display a 2000 head increase since 1986 when the plan was signed.

The Division of Wildlife Resources collects population data and monitors harvest levels and trends of all big game populations, such as elk.

Displayed below are population graphs that describe population trends since 1997 in the Southern Region after elk hunting season.

Figure 1. Elk populations for Southern Region.



These data indicate a population decline between the years of 1999 to 2001. This decline is apart of an overall DWR management strategy to reduce the total number of elk in elk management units that do not comply with approved elk management plans. These reductions will only occur in units where management objectives need to be manipulated to meet unit objectives. This includes cow elk management to keep total numbers in compliance to meet herd unit objectives in the future.

The Pahvant Mtn. Range (21B) is one of two sub-units of the Fillmore Elk Herd Unit (21). The herd objective for the Unit is 1400 elk. Utah Division of Wildlife Resources (UDWR) biologist Sean Kelly counted the elk in the unit in 1999 and 2002. These counts were done from helicopter in winter. The results from these surveys are:

Table 3. Comparison of 2002 and 1999 elk counts for Fillmore Elk Unit (21)

	2002	**1999**
Total elk counted	1136	738
Cows/calves	841	582
Spike Bulls	73	46
Branch-antlered Bulls	222	110
Bulls/100 antlerless	35	27
% of bull branch antlered	75	71
Average group size	12	22

The 2002 elk count is more than 50% higher than the 1999 count. The fastest growing segment of the herd is branch-antlered bulls, which doubled in size between 1999 and 2002 counts. Anterless elk increased at a much slower rate (45%), probably

due to drought conditions and antlerless hunts. The UDWR adjusts the number of animals counted by a 1.2 figure to account for the number of elk not found during the aerial survey. When 1136 is adjusted by the 1.2 figure the UDWR estimates the herd to be 1363 elk and essentially at the herd objective for the Unit. The count also showed that 75% of all elk counted were found south of Meadow Creek.

Hunting strategies and overall population control in Utah are made through the Regional Advisory Council and Wildlife Board process. This process has been designed to involve the people in public meetings, with a wide range of interests in Utah. Decisions for all hunting season bag limits, and season dates are rendered based on political as well as biological input. This process demonstrates that the Forest Service does not control hunted game species in the State of Utah. Based on the DWR data presented above, the population trend for elk across the forest, which is located in the DWR designated Southern Region, populations are stable to slightly up in trend and viable. This determination does not mean that some units may have site-specific areas that are significantly higher than approved herd unit numbers or some that may be slightly lower. It does mean that the trends of elk on the Fishlake, in the Southern Region are stable to slightly up in numbers.

Mule Deer (*Odocoileus hemionus*)

The mule deer occupies several types of habitat throughout the west. Mule deer occur in coniferous forests, desert shrubs, chaparral, and grassland with shrubs. They occur in early to intermediate successional stages of most forest, woodland, and brush habitats. Mule deer prefer a mosaic of various-aged vegetation that provides woody cover, meadow and shrubby openings, and free water. Brushy areas and tree thickets are important for escape cover. Vegetative cover is critical for thermal regulation in winter and summer.

Mule deer browse and graze and commonly frequent salt or mineral licks. They prefer tender new growth of various shrubs, many forbs, and a few grasses. They forage from the ground surface into bushes and trees as high as they can reach. Mule deer also dig out subterranean mushrooms to eat. Food preferences vary with season, forage quality, and availability. Forbs and grasses are important in spring, and they feed heavily on acorns where available, primarily in the fall.

Fawning occurs in moderately dense shrublands and forests, dense herbaceous stands, and high-elevation riparian and mountain shrub habitats, with available water and abundant forage. Mule deer are serially polygynous. The rutting season occurs in autumn. The gestation period is between 195 and 212 days. Fawns are born from early April to midsummer, varying geographically. Fawning period peaks from late April through mid-June. Both males and females become sexually mature at 1.5 years.

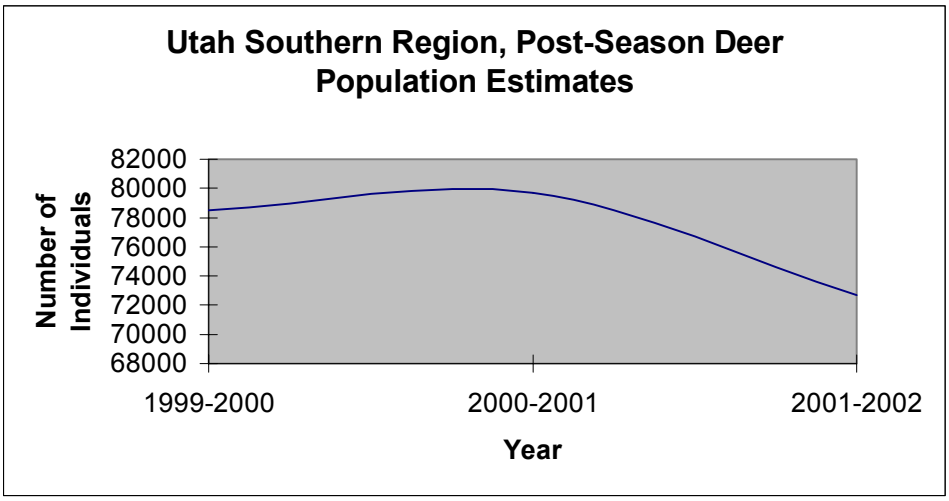
Natural predators of deer have been reduced in numbers in most areas. Overpopulation, with resultant winter die-offs and destruction of habitat, occurs

periodically in California, as in other states. Mule deer are preyed upon regularly by mountain lions and coyotes, and occasionally by bobcats, black bears, and domestic dogs. Deer populations can respond rapidly to habitat management. However, populations can decline in response to fragmentation, degradation or destruction of habitat caused by urban expansion, incompatible use of land resources (e.g. timber, water, rangeland), and disturbances by humans. Mule deer compete potentially for food with domestic cattle and sheep, wild horses, wild pigs, and black bears.

The DWR collects post-season population data and monitors harvest levels and population trends of all big game species, such as mule deer. Displayed below are population graphs that describe population trends since 1999 in the Southern Region after hunting season. These data display a decline in the total number of deer in the entire Southern Region. It should be noted that a hunting unit may be within approved herd unit objectives and as a result of management strategies population numbers may be reduced. There are units throughout this area that are at herd unit objective and active management is in the process of reducing total numbers.

Hunting strategies in Utah are made through the Regional Advisory Council and Wildlife Board process. This process has been designed to involve the people in public meetings, with a wide range of interests in Utah. Decisions for all hunting

Figure 2. Deer populations for the Southern Region



seasons bag limits, and season dates are rendered based on political as well as biological input. This process demonstrates that the Forest Service does not control hunted game species in the State of Utah. The data presented above demonstrate that deer populations fluctuate throughout the Southern Region. These fluctuations have been the result of numerous influences including drought, cold winters, and increased predation from large mammals, habitat modifications and degradation. Although the numbers of young being recruited into the population are on a decline, the data show an increase in mature bucks into the population as well as an increase in buck to doe

ratios. Based on these data, mule deer populations and trends on the Fishlake National Forest appear to be stable and viable with increases in the total number of mature bucks (3 point or larger), and an increase in buck to doe ratios.

Currently there are an estimated 12500 mule deer on the Pahvant Mtn. Range, which is the objective for the area. The mule deer herd growth trend is static for this area and the Southern Region as well.

Cavity Nesters (hairy woodpecker, western bluebird, and mountain bluebird)

Hairy Woodpecker *(Picoides villosus)*

The hairy woodpecker is a fairly common, permanent resident of mixed conifer and riparian deciduous habitats from sea level to 2700 m (0-9000 ft). It occurs the length of the state, but is very scarce in portions of coastal southern California, Central Valley, Salinas Valley, Mojave and Colorado deserts, and Great Basin.

This species uses stands of large, mature trees and snags of sparse to intermediate density. Cover is provided also by cavities. The hairy woodpecker uses relatively open or patchy stands of conifers with adjacent riparian habitats and abundant snags. Tree/shrub, tree/herbaceous, and shrub/ herbaceous ecotones are important. The hairy woodpecker excavates a nest cavity above ground in the soft interior of a snag or dead. The hairy woodpecker breeds from mid-March to late August; the peak nesting activity is late May through June. Average clutch is 4 eggs; the range is 3-6. They have one brood per year. Both the male and female dig a cavity, incubate the eggs, and care for altricial young. Incubation lasts about 12 days. A pair may remain together for several years.

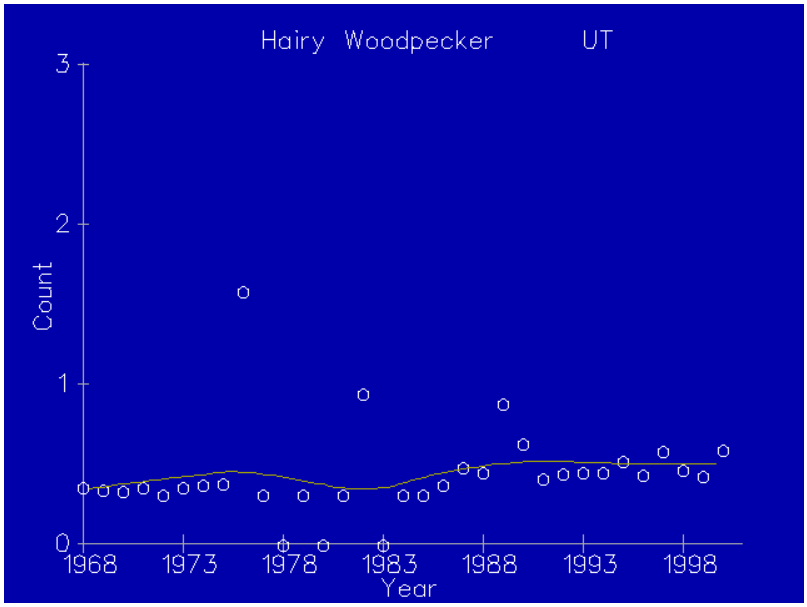
Approximately 80% of this species' annual diet is animal matter, arthropods (beetles, ants, caterpillars, spiders, millipedes, aphids, and other larvae). They also eat mast (acorns, hazelnuts, dogwood, cherry, serviceberry, pinenuts) and sap and cambium. The hairy woodpecker drills, pecks, and probes in crevices of bark of dead and live trees, logs, and stumps. It often congregates to feed in insect-infested or burned areas. The hairy woodpecker frequents riparian habitats.

In addition to these data, the BBS database (www.mbr-pwrc.usgs.gov) displays a stable trend of Hairy woodpeckers in Utah. These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest.

Surveys for avian MIS have been conducted on the FNF since the mid 1980's. Additional studies by "expert birders" were conducted in 1994, 1998, and 2002. These surveys have targeted cavity nesting species, riparian species, and sage nesting species. All other avian species were also recorded while conducting survey routes. In addition to these data, Utah State University has collected data

across the forest in aspen/conifer habitat types. Cavity nesting bird species were the focus of these efforts. These data were collected between 2001 and 2002.

Figure 3. Hairy woodpecker trend in Utah



Although the data collected on the forest is minimal, the BBS data collected; combined with the Nature Conservancy data indicates this species to be stable. On the Fishlake National Forest a large portion of forest habitats are potentially suitable, and currently supply habitat for Hairy woodpeckers.

The BBS data demonstrates a stable population in Utah, which includes transects on the Fishlake National Forest. The Nature Conservancy data describe this species as "apparently secure". Considering all the data known about this species, this population appears to be stable, and likely viable across the forest. However, due to limited information, additional data gathering is an ongoing process on the forest to continue to monitor viability and trend.

In 2002 wildlife survey specific to this project were conducted throughout the analysis area. Hairy woodpeckers were observed during these studies within the analysis area but not within treatment units, the survey data is located in the project record.

Western Bluebird (*Sialia mexicana*)

The western bluebird is a fairly common year-round resident throughout much of California, excluding the higher mountains and eastern deserts. It breeds in open woodlands of oaks, riparian deciduous trees, or conifers with herbaceous understory. In winter, it uses more open habitats as well. Sparse to open-canopied, mature, valley foothill and montane hardwood and valley foothill hardwood-conifer habitats are optimal. A variety of other coniferous habitats are

used, primarily open-canopied mature forests, especially edges. In winter, it leaves higher portions of nesting range and becomes more widespread in lowlands.

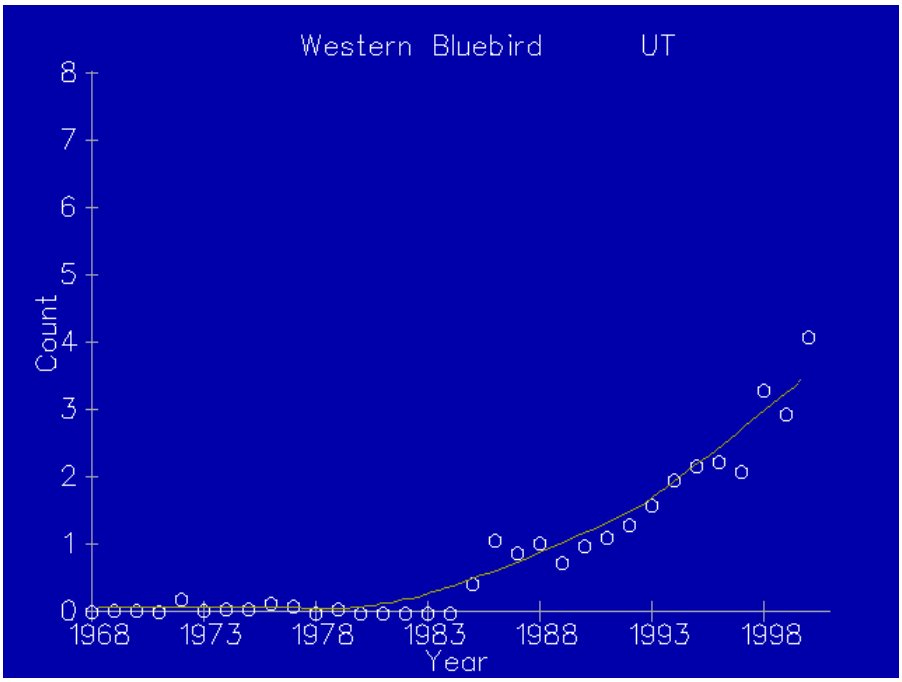
This species requires trees and shrubs for cover. Typically, it rests in a tree when it's not foraging, but it also uses fences or shrubs. The western bluebird is uncommon in habitats without at least a few trees or large shrubs, even in winter. It nests and roosts in the cavity of a tree or snag. It frequents open woodlands. The western bluebird requires suitable nesting and roosting cavity, usually in a snag or tree near open habitat for foraging; it also needs low perches to search for prey. Availability of snags frequently limits population density.

The western bluebird withdraws from higher mountains in winter, and may move into lowland areas not occupied while breeding. The western bluebird usually nests in old woodpecker excavated holes in live or dead trees, or stumps. It has been known to also use other cavity or nest boxes. It occasionally uses nests of cliff swallows or other species. Nests in Monterey Co. were 1.5 to 12 m (5-39 ft) above ground (Bent 1949). Clutch size is 3-8, with an average of 5. This species is frequently double-brooded. Incubation lasts 13-14 days. Both parents tend altricial young. The male may tend fledglings while the female renests. It probably breeds first at 1 year of age.

The western bluebird primarily eats insects, including grasshoppers, caterpillars, beetles, and ants; it also eats earthworms, snails, and other small arthropods. It flies out from a low perch to capture prey on the ground or herbage; it sometimes hovers before pouncing. The western bluebird also hawks aerial insects. It perches on a low branch of a tree or shrub, fence, or tall herb, often adjacent to a medium to large opening in a wooded or brushy habitat. In nonbreeding season, this species supplements its diet with berries of mistletoe, poison-oak, elderberry, and other species.

In addition to these data, the BBS database (www.mbr-pwrc.usgs.gov) displays an upward trend of Western bluebirds in Utah. These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest.

Figure 4. Western bluebird trend in Utah.



Surveys for avian MIS have been conducted on the FNF since the mid 1980's. Additional studies by "expert birders" were conducted in 1994, 1998, and 2002. These surveys have targeted cavity nesting species, riparian species, and sage nesting species. All other avian species were recorded while conducting survey routes. In addition to these data, collection efforts by Utah State University have collected data across the forest in aspen/conifer habitat types. Cavity nesting bird species were the focus of these efforts. These data were collected between 2001 and 2002.

Data has been collected on three different occasions between 1994-2002. In 1994, and 1998 surveys were conducted in the Burnt Flat area, and other areas of the forest. No birds were encountered in this area. In 2001, this species was detected by Utah State University along 3 transect lines while conducting specific cavity nesting surveys. In 2002 the presence of bluebirds was detected along 1 transect line.

As a result of the data presented in this document, few locations have been monitored and additional monitoring sites should be identified. While the numbers collected on the forest are somewhat static, data collected by the BBS indicate a sharp population increase in about 1985. Data presented by the Nature Conservancy demonstrate a "vulnerable" population in Utah. Considering all of the data presented in this document, as well as my professional judgment, this population is likely stable and viable across the forest. Additional monitoring is needed to continue to evaluate the viability of this species. The Western bluebird in Utah has been ranked as "vulnerable".

In 2002 wildlife survey specific to this project were conducted throughout the analysis area. Western bluebirds were observed during these studies within the analysis area but not within the treatment units, the survey data is located in the project record.

Mountain Bluebird (*Sialia currucoides*)

The Mountain bluebird is a fairly common summer resident in sparse to open forests and other open habitats from about 1200-3700 m (4000-12,000 ft) in the mountains and foothills of the state. Most individual's winter below 1500 m (5000 ft), withdrawing from higher, snowy portions of breeding range. The mountain bluebird is less numerous and the occurrence is more erratic elsewhere in interior lowlands of state. In some years this species has been known to winter throughout the Mojave Desert, on the coastal plains of southern California, and on Channel Islands.

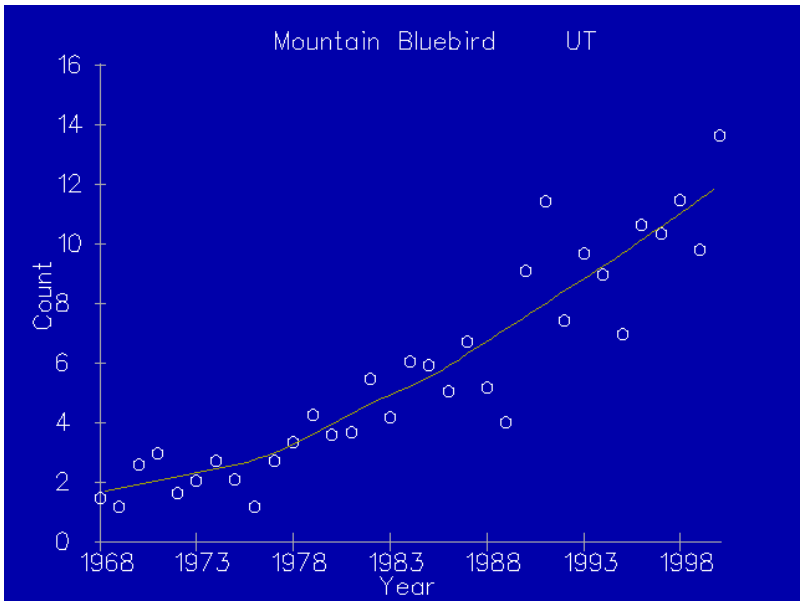
This species prefers open terrain with an occasional tree, rock, fence post, power line, or building, for foraging perch and other cover. It requires suitable cavities for roosting and nesting, usually in a snag or dead portion of tree. Breeders are most numerous where meadows, grasslands, or other open habitats edge on woodland or rock formations affording suitable nesting sites. In winter, this species occurs in virtually any open or sparsely wooded habitat, but shows a preference for agricultural fields and pastures. Breeders return to higher portions of nesting range March to June, depending on elevation and snow conditions, and depart by October or November. The mountain bluebird usually arrives on wintering areas in November and departs by March.

The mountain bluebird builds a nest of herbaceous stems, rootlets, grasses, and outer bark of shrub placed in a natural cavity or woodpecker hole in a snag or dead portion of a tree. The mountain bluebird is monogamous; it lays eggs mid-April to mid-July, depending on elevation. It may be double or triple-brooded.

From a low, exposed perch, the mountain bluebird hovers and stoops on insects on foliage or ground, and hawks flying insects. It also eats berries and other small fruits, especially in

Tree swallow, house wren, mountain chickadee, European starling, northern flicker and other woodpeckers, and rodents compete for nest sites. Predators include prairie falcon and sharp-shinned.

The BBS database (www.mbr-pwrc.usgs.gov) display an upward stable trend of the Mountain bluebirds in Utah. These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest.
Figure 5. Mountain bluebird trend in Utah.



Surveys for avian MIS have been conducted on the FNF since the mid 1980's. Additional studies by "expert birders" were conducted in 1994, 1998, and 2002. These surveys have targeted cavity nesting species, riparian species, and sage nesting species. All other avian species were also recorded while conducting survey routes. In addition to these data collection efforts Utah State University has collected data across the forest in aspen/conifer habitat types. Cavity nesting bird species were the focus of these efforts. These data were collected between 2001 and 2002.

Data has been collected on three different occasions between 1994-2002. In 1994 the number of presence/absence observations of this species along each transect line totaled 24 in the Burnt Flat area. In 1998 a total of 13 transects recorded this species being present, and in 2002 14 transects recorded this species being present. In surveys conducted in 2001 during a cavity specific survey by Utah State University, 13 transects recorded this species as being present.

As a result of these data collected over the past 8 years, as well as data collected during BBS, and the Nature Conservancy data, the trend for this species is stable, to slightly up on the forest.

In 2002 wildlife survey specific to this project were conducted throughout the analysis area. Mountain bluebirds were observed during these studies within the analysis area but not within the specific treatment units, the survey data is located in the project record.

Information in the Life History paper (Rodriguez 2002) concludes that for hairy woodpecker, western bluebird, and mountain bluebird that these species are stable and the populations are viable for the Fishlake NF and in the State of Utah.

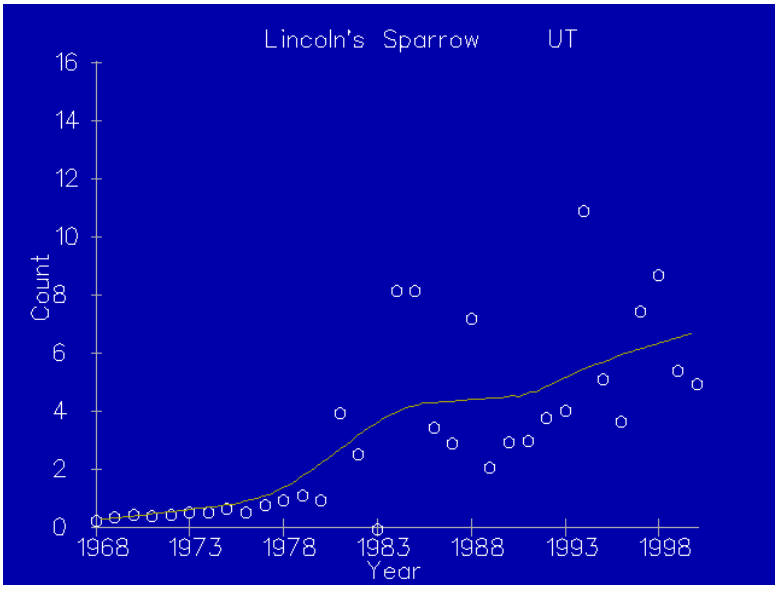
Riparian Dependent Guild (Lincoln's sparrow, yellow warbler, and song sparrow)

Lincoln's Sparrow (***Melospiza lincolnii***)

This species has a western range in the continental United States that extends from the Rocky Mountains to the Pacific Coast. The Lincoln's Sparrow is a short- to long-distance migrant. Some individuals winter in southern portions of the United States, while others over-winter in Central America.

This species is classified as a conifer dependent species. The presence of this species in poorly stocked lowland conifer may indicate that the species prefers areas that are in early stages of regeneration. This species nests and feeds (primarily on insects) on the ground.

Figure 6. Lincoln sparrow trend in Utah.



The BBS database (www.mbr-pwrc.usgs.gov) display an upward trend of Lincoln's sparrows in Utah. These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest.

Surveys for avian MIS have been conducted on the Fishlake National Forest since the mid 1980's. Additional studies by "expert birders" were conducted in 1994, 1998, and 2002. These surveys targeted cavity nesting species, riparian species, and sage nesting species. All other avian species were also recorded while conducting survey routes.

Data has been collected on three different occasions between 1998-2002. No birds were detected in the Burnt Flat area transects during 1994, 3 transects in 1998 and 8 transects in 2002. As a result of these data collected over the past 8 years, this species has increased in the number of presence/absence transects across the forest. While these numbers are increasing they are few. Therefore, further data is needed to continue to evaluate the status of the population on the Fishlake National Forest. Data presented by the Nature Conservancy indicates this species is "vulnerable". However, based on the BBS data which demonstrates a strong increase in trend beginning as far back as 1978, as well as professional judgment, the population across the forest is stable and likely viable.

In 2002 wildlife survey specific to this project were conducted throughout the analysis area. Lincoln's sparrow was observed during these studies, the survey data is located in the project record.

Song Sparrow (*Melospiza melodia*)

This species requires low, dense vegetation for protective cover, usually near water, in emergent vegetation, or in other moist areas. The male typically sings from an exposed perch at moderate height in shrub, tall herb, or low tree.

Breeders in montane habitats mostly move to lower elevations for winter, more widespread than in desert riparian habitat. The song sparrow breeds in dense riparian thickets, emergent wetlands, or dense thickets in other moist situations. An open overstory of trees may be present, but is not required. In winter, it occurs in similar habitats, often far from water.

The song sparrow builds its nest on the ground, however, it also nests in shrub, thicket, emergent vegetation, and small trees, usually within 1.3 m (4 ft) of the ground. The ground nest is hidden under low, dense vegetation, usually near water, in emergent vegetation, or in other moist sites. Nesting season usually begins in April. The song sparrow is a monogamous, solitary nester. Clutch size is 3 or 4, rarely 2, 5 or 6. Often double-brooded, sometimes treble-brooded. Incubation lasts 12-14 days. Altricial young tended by both parents, leave the nest at about 10 days and become independent about 25 days later. The song sparrow probably breeds first at 1 yr of age.

Seeds are the most important foods in the annual diet of song sparrows, but insects, spiders, and other small invertebrates, make up almost half of their diet in the nesting season. Berries and other small fruits are minor foods. The song sparrow regularly takes crustaceans and mollusks along the coast. It usually forages on the ground or in low vegetation, under cover of dense thickets or wetland vegetation. It gleans from the ground or low plants and often scratches in litter. Sometimes the song sparrow forages a short distance from cover. In more arid regions, the song sparrow nests only along edges of bodies of water.

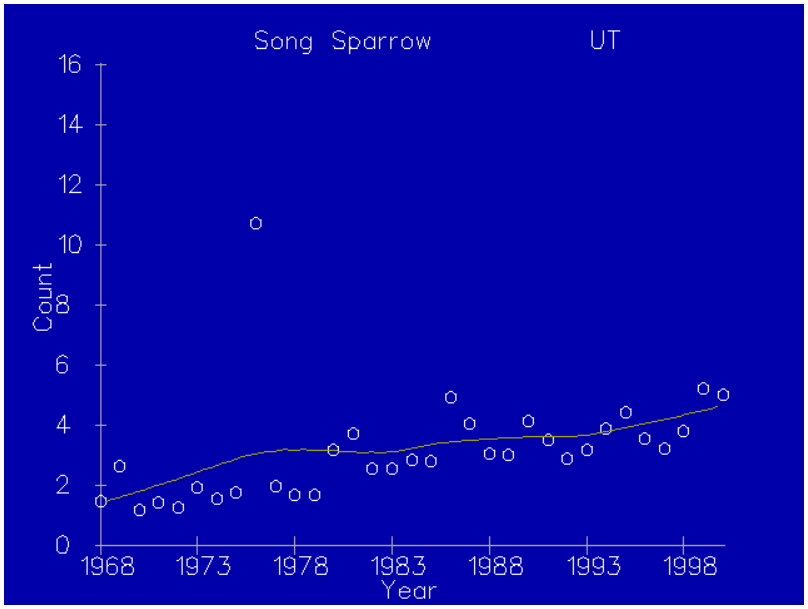
Typical nest predators include dogs, cats, and rats. The song sparrow is one of the most frequent, if not the most frequent, host of brown-headed cowbird nest parasitism. It is one of the most variable bird species- 31 races in North America.

Surveys for avian MIS have been conducted on the FNF since the mid 1980's. Additional studies by "expert birders" have been conducted in 1994, 1998, and 2002. These surveys have targeted cavity nesting species, riparian species, and sage nesting species. All other avian species were also recorded while conducting survey routes.

Data has been collected on three different occasions between 1998-2002. No birds were located during survey efforts in the Burnt Flat area, however in 1998, 6 transects recorded individuals, and 3 transects recorded this species in 2002. As a result of these data collected over the past 8 years, this species has demonstrated a decreased in overall presence along transects across the forest. Although these numbers have decreased the sample size is small. Therefore, further data is needed to evaluate the status of the population on the Fishlake National Forest. These data differ from that collected by the BBS, which demonstrates a steady increase in song sparrow numbers in Utah, including the Fishlake National Forest. The Nature Conservancy data indicates the population in Utah to be "apparently secure". Based on all the data presented in this discussion and professional judgment, the population across the forest is likely stable or in a slightly downward trend, however, it is still likely viable.

In addition to these data, the BBS database (www.mbr-pwrc.usgs.gov) display a slightly upward trend of Song sparrows in Utah. These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest.

Figure 7. Song sparrow bluebird trend in Utah.



In 2002 wildlife survey specific to this project were conducted throughout the analysis area. Song sparrows were observed during these studies within the analysis area but not the specific treatment units, the survey data is located in the project record.

Yellow Warbler *(Dendroica petechia)*

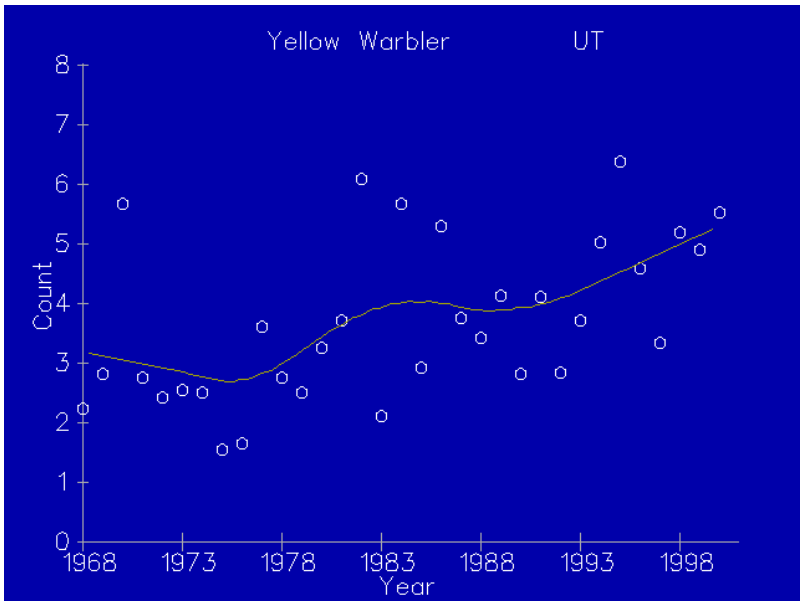
The Northern Yellow Warblers are neotropical migrants that breed within North America and winter from Mexico to northern South America. Within North America they breed throughout most of Alaska and Canada and the lower 48 States except for Texas and the extreme south and southeast.

Yellow Warblers nest in shrubby growth by swamps and watercourses, in wet scrub, tree foliage, mangroves, gardens, shrubberies and berry patches. Dense growth may be preferred in order to reduce nest predation and brood parasitism. The males are sometimes polygamous. The female builds a neat, compact cup nest in an upright twig fork 2 to 12 feet up, sometimes up to 40 or even 60 feet. The cup is made of wool, plant down, dry weed stem fibers, and fine grass stems, then lined with plant fibers, cotton, plant down, and sometimes feathers. Incubation of the 3 to 6 (usually 4 or 5) whitish spotted eggs is for 11 days. Both parents tend the nestlings until fledging occurs at 9 to 12 days.

The male Yellow warbler has golden yellow plumage with rusty streaks on the breast and flanks. Wings and tail may have a slight greenish tint. The females have plain yellow plumage and breast streaks are absent or barely noticeable. The bill is thin and pointed and the legs are yellowish. This species is known to occur within riparian areas on the Fishlake National Forest.

This BBS data (www.mbr-pwrc.usgs.gov) displays a stable, to slightly upward trend of Yellow warblers in Utah. These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest.

Figure 8. Yellow warbler trend in Utah.



Surveys for avian MIS have been conducted on the FNF since the mid 1980's. Additional studies by "expert birders" were conducted in 1994, 1998, and 2002. These surveys targeted cavity nesting species, riparian species, and sage nesting species. All other avian species were also recorded while conducting survey routes.

Data has been collected on three different occasions between 1998-2002. In 1998 the number of presence/absence observations of this species along each transect line totaled 14. In 2002 the total number of transects recording this species totaled 19. As a result of these data collected over the past 8 years, this species has demonstrated an increased in presence/absence numbers across the forest. While these numbers are increasing, the sample size is small. Therefore, further data is needed to continue to evaluate the status of the population on the Fishlake National Forest. These data differ from that collected by the BBS, which demonstrates a steady increase in the song sparrow in Utah, including the Fishlake National Forest. The Nature Conservancy data indicates the population in Utah to be "apparently secure". Based on all the data presented in this discussion and professional judgment, the population across the forest is in an upward trend and likely viable.

In 2002 wildlife survey specific to this project were conducted throughout the analysis area. Yellow warblers were observed during these studies within the analysis area but not the specific treatment units, the survey data is located in the project record.

Information in the Life History paper (Rodriguez 2002) concludes that for Lincoln's sparrow, yellow warbler, and song sparrow that these species are stable or in a slight downward trend, however these populations are viable for the Fishlake NF and in the State of Utah.

Sage Nesters (Brewer's sparrow, and vesper sparrow)

Brewer's Sparrow (*Spizella breweri*)

The Brewer's sparrow is a common summer resident and breeder in mountains and higher valley. It breeds in treeless shrub habitats with moderate canopy, especially in sagebrush. The Brewer's sparrow breeds locally above pinyon-juniper belt. It is common in winter in open desert scrub and cropland habitats of southern Mojave and Colorado deserts, usually in areas with some herbaceous understory.

This species is approximately 5-5 1/2" (13-15 cm). It is gray with black and chestnut edging on the feathers above, gray striping on the crown, and a white-eye ring. The Brewer's sparrow song is a dry, buzzy trill on different notes, descending at the end.

In summer, they often find cover in sagebrush in extensive stands with moderate copy unbroken by trees, usually 0.5-1.3 m (1.5-4.0 ft) in height. Similar shrub habitats, such as bitterbrush, are used to a lesser extent.

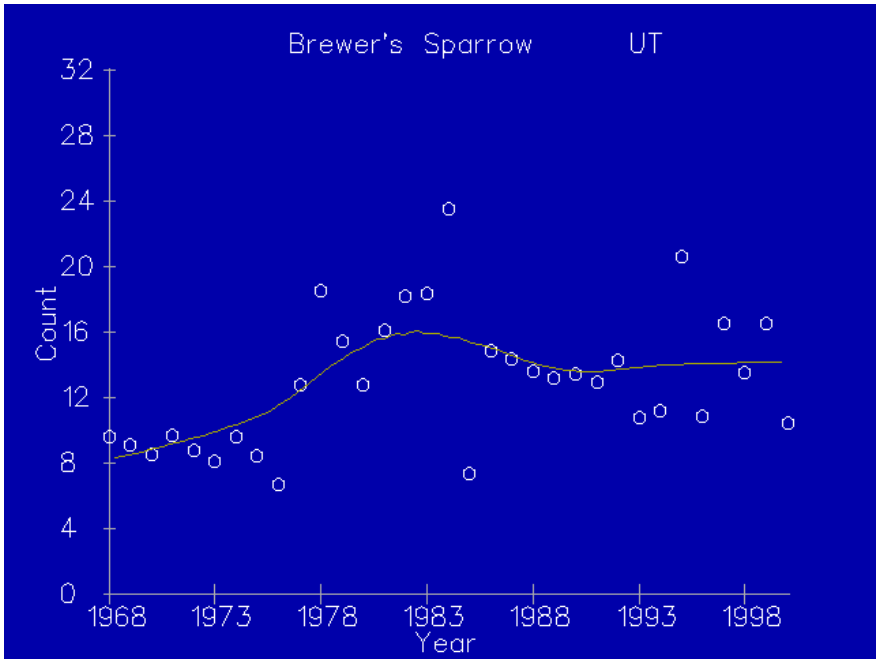
In Idaho, this species builds cup-shaped nests in sagebrush between 20 and 50 cm high or in a low tree. This species forages on the ground. It may be abundant in sagebrush habitat (Great Basin and Pacific slopes). During the nesting season many males may sing in chorus at dawn and twilight. Two Idaho studies have indicated nesting success is quite low. In the Great Basin, population density is usually 150-300/km2, but may exceed 500/km2 in some cases.

Breeding occurs in extensive shrub stands with moderate canopy cover, especially sagebrush. Winter habitat consists of open desert shrub and similar habitats, plains, and fields. Breeding occurs primarily from May through August. The nest is a cup of dry grass stems, forbs, and rootlets lined with fine grasses, rootlets, and hairs. The nest is usually located in the center of a sagebrush plant or other shrub up to 1.2 m (3.9 ft) above ground, but usually less than 0.3 m (1 ft). The Brewer's sparrow rarely nests on the ground. It breeds primarily from May through August with a peak in June. There are usually 3 or 4 eggs per clutch, occasionally 5. Incubation is between 11-13 days; altricial young fledge in 8-9 days.

The diet of this sparrow primarily consists of insects and spiders in the summer and seeds of grasses and forbs in winter. This species will pick seeds from the ground, as well as glens, and glen seeds picked from the ground. It will occasionally pursue insects on the ground; and occasionally feeds in low shrubs. This species will commonly drink and bathe, but may not require free water. They are able to meet water needs by eating insects, and can subsist on dry seeds for up to 3 weeks (Ehrlich et al. 1988).

In addition to these data, the BBS database (www.mbr-pwrc.usgs.gov) display an upward trend of Brewer's sparrows in Utah. These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest.

Figure 9. Brewer's sparrow trend in Utah.



Surveys for avian MIS have been conducted on the Fishlake National Forest since the mid 1980's. Additional studies by "expert birders" were conducted in 1994, 1998, and 2002. These surveys have targeted cavity nesting, riparian, and sage nesting species. All other avian species were also recorded while conducting these surveys.

Data has been collected on three different occasions between 1994-2002. In 1994 the number of presence/absence observations of this species along each transect line-totaled 4 observations. It is important to note that this does not mean 4 birds were observed, rather, along 4 transects brewers sparrows were observed. This data was collected in the Burnt Flat area only. In 1998 forest wide surveys

detected brewers sparrows along 6 transect lines. In 2002 the total number of transects with the brewers sparrow totaled 14. As a result of these data collected over the past 8 years, this species has increased in overall presence along transects across the forest. While these numbers are increasing they are few. Therefore, further data is needed to evaluate the status of the population on the Fishlake National Forest. However, based on the data from the BBS and the Nature Conservancy which display an upward and a "apparently secure" rating, as well as my professional judgment, the trend of this species across the Fishlake National Forest is stable to slightly up, and is viable.

In 2002 wildlife survey specific to this project were conducted throughout the analysis area. Brewers sparrows were observed during these studies within the analysis area but not the specific treatment units, the survey data is located in the project record.

Vesper Sparrow (*Pooecetes gramineus*)

The Vesper sparrow is found in shrub steppe, grasslands, savannas, weedy pastures, fields, sagebrush, arid scrub, and woodland clearings. An Idaho study found this species was more abundant in prescribed burn areas of juniper than in old growth or clearcut. The Vesper sparrow is a common summer resident occurring in sparse or open stands of sagebrush, low sagebrush, and similar habitats. In winter months, it occupies grasslands, croplands, and open brushlands. Wintering individuals often arrive in September and depart in March or April.

This species is approximately 5-6 1/2" (13-17 cm) in size. It has a rough, unkempt appearance due to the dark feathers that protrude from a light breast; also black and brown feathers that do not lay flat on back and wings. It has a streaked head with a white eye ring, "rufous shoulder patches and white outer tail feathers." Its song begins with 2-3 throating whistles followed by trilled notes and a rapid melody.

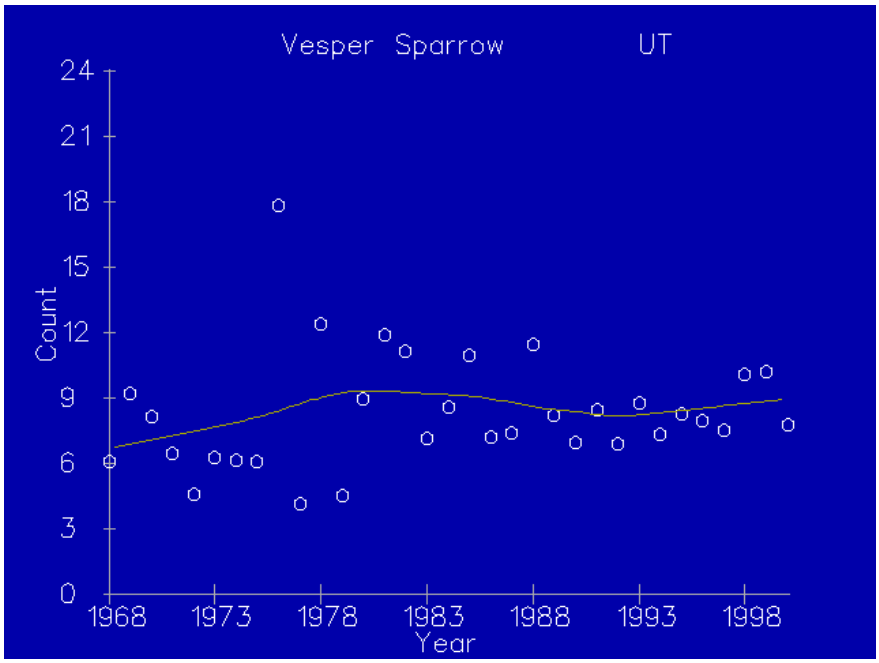
Breeding season is late April into mid-August, with a peak in May and June. The Vesper sparrow is apparently a solitary breeder. Clutch size is 3-6 eggs, usually 4 or 5. It sometimes raises 2 broods per yr. Incubation lasts 11-13 days. Altricial young are tended by both parents, and leave the nest at 9-13 days, still unable to fly. Young are dependent on parents an additional 20-22 days. This species builds a nest on the ground, often in a small depression, concealed under a shrub or at base of grasses or forbs. The Vesper sparrow breeds in sagebrush and other shrub habitats with sparse vegetation.

Annual diet is about half insects and spiders, and half grass and forb seeds. Insects and spiders are especially important in breeding season. It gleans from the ground and herbage. The Vesper sparrow can live on air-dried seeds without drinking.

In addition to these data, the BBS database (www.mbr-pwrc.usgs.gov) display a slight upward trend of Vesper sparrows in Utah. These data represent a 30-year trend between 1968 and 1998. These data were collected throughout the entire state of Utah, including points on the Fishlake National Forest.

Surveys for avian MIS have been conducted on the Fishlake National Forest since the mid 1980's. Additional studies by "expert birders" were conducted in 1994, 1998, and 2002. These surveys have targeted cavity nesting, riparian, and sage nesting species. All other avian species were also recorded while conducting these surveys.

Figure 10. Vesper sparrow trend in Utah.



Data has been collected on three different occasions between 1994-2002. In 1994 this species was not detected along transect lines in the Burnt Flat area. In 1998 the number of presence/absence observations of this species along each transect line totaled 6. In 2002 the total number of observations along transect lines forest wide totaled 9. As a result of these data collected over the past 8 years, this species has increased in occurrence across the forest. While these numbers are increasing, the data collected across the forest is minimal. The BBS data demonstrates a slight increase in the total numbers in Utah, which includes transects on the Fishlake National Forest, while the Nature Conservancy data describe this species as "imperiled". Considering all the data presented in this document, and professional judgment, this population is stable or slightly up in trend, and likely viable across the forest. However, due to limited information, additional data gathering is an ongoing process on the forest.

In 2002 wildlife survey specific to this project were conducted throughout the analysis area. Vesper sparrows were observed during these studies within the analysis area but not the specific treatment units, the survey data is located in the project record.

Information in the Life History paper (Rodriguez 2002) concludes that for Brewer's sparrow, and vesper sparrow that these species are stable or in a slight upward trend, and these populations are viable for the Fishlake NF and in the State of Utah.

Northern Goshawk (*Accipiter gentilis*)

Northern goshawks are associated with coniferous and mixed forest through much of the Northern hemisphere. Studies of nesting habitat show that goshawks nest in older-aged forests with variable tree species. The most consistent vegetative characteristic of goshawk nest sites is high percent canopy closure. Studies on habitat characteristics at goshawk nest sites have reported average canopy closure measurements ranging from 60 percent or more. Stand structure ranges from dense multi-layered stands to open park-like understories. Average tree size is just as variable with mean tree diameters ranging from 8-20 inches.

Goshawks appear to prefer north to east aspects for nest sites, as stands on these aspect are typically denser and more suitable. Slope also appears important as nests are usually placed on flat to moderately sloped land where trees are able to grow larger and at a higher density (1-39 percent). The importance of the proximity of the nest area to water is not known

Goshawks forage in a variety of habitats probably along edge as well as in deep forests, provided that there is available prey and vegetation is not too dense to prevent flight. Prey plucking sites within the nesting territory is also a habitat characteristic related to foraging. Prey plucking sites usually consist of stumps, fallen logs, snags, arched trees, rocks, or horizontal tree limbs below the canopy. Steller's jay, northern flicker, golden-mantled ground squirrel, and the least chipmunk are some of the primary prey species.

Available evidence suggests that two important resources, food and nest habitat, are the principle mechanisms limiting goshawk densities. Specifically, populations may be limited by shortage of nest sites; and where nest sites are readily available, densities may be limited by food abundance and availability.

Goshawks begin breeding activities in April. Clutches of three to five eggs are laid in mid-June with the nestling period extending through mid-July. Nests are typically large stick platform structures built in a fork near the trunk of the tree, on a large branch, or on top of a mistletoe whorl, 30-40 feet from the ground in the lower two-thirds of the crown. Young are fledged between July 15-August 15 and may be dependent on adults for food until September 30. Goshawks typically build more than one nest in adjacent trees or as far as one mile from the active nest tree. Goshawks may use one or more of these alternate nests on an annual or semi-annual basis.

The goshawk is partly migratory in the northern portion of its range, where in winters of food shortage it migrates southward. In high elevations and montane areas, some goshawks descend to lower elevations into woodlands, riparian areas, and scrublands during the winter.

According to data collected on the Fishlake National Forest over the past ten years, approximately 27 nest territories occur on the Forest as of the 2002 nesting season. This number can vary as a result of high winds and other natural events that can affect nests. Nesting activity ranges across the forest from 7-12 nests annually. Active nests are defined as; nests where adults are present and incubating or where young are present in or at the nests.

The Utah Northern Goshawk Conservation Strategy and Agreement are being implemented on the Fishlake National Forest. The Forest recognizes this document for its sound ecological base and is implementing these principals. Furthermore, the Forest recognizes this publication as the best science available on goshawk management in Utah. As stated in this document, based on the data evaluated for this strategy, and the publication The Northern Goshawk in Utah: Habitat Assessment and Management Recommendations by Graham et al. 1999, goshawk populations are stable in Utah. In addition to these programmatic sources of science, the Forest is implementing the Utah Northern Goshawk Project Environmental Assessment 1999**,** which provide standards and guidelines for individual forest plan amendments.

Goshawk populations on the Fishlake National Forest fluctuate within reproductive seasons, and from season to season. They are affected by a number of factors such as drought; cold and wet early spring conditions, low prey densities, significant wind events, fire, modified vegetation in the landscape and predators. As a result of a combination of these events across the forest over the past several years, the 27-goshawk territories across the forest have experienced a decline in nesting activity. Although number of active nests has been down, occupied territories (birds in the nest area, but not nesting) have been commonly observed.

The data used in this determination was obtained by filed reviews from District wildlife biologists. While the population of nesting goshawks on the Fishlake is experiencing a somewhat downward trend, the viability of this population is still under review. This review is based on adjacent available and suitable habitats across the forest, and the number of occupied territories and population numbers. Poor reproductive success due to severe sustained drought conditions in Southern Utah has been a primary concern. This situation is not repeated on other National Forests in Utah where higher amounts of precipitation have accrued.

Surveys for the goshawk were conducted on all suitable nesting habitat within the analysis area in 2002. As a result of these surveys one new goshawk territory was found in the Indian Spring area, no treatments are proposed near this area.

Bonneville Cutthroat Trout

Bonneville cutthroat trout are known to occur in Sam Stowe Creek and are thought to exist in the upper portion of Pole Creek on the Pahvant Mountain Range. Both of

these streams are outside of the analysis area and will not be impacted by the proposed action. Because this species is not impacted by the proposed action it will not be considered in the Environmental Consequences section.

Colorado River Cutthroat Trout

Historically, this subspecies occupied portions of the Colorado River drainage; the Pahvant Mountain Range is not part of the drainage and is outside of the range for this subspecies. Because this species is not impacted by the proposed action it will not be considered in the Environmental Consequences section.

Resident Trout

The project area provides potentially suitable habitat for rainbow trout, cutthroat trout, brown trout and brook trout in Corn Creek, Meadow Creek, Pioneer Creek, and Chalk Creek and their tributaries.

Rainbow Trout *(Salmo gairdneri Richardson)*

Because of the vast variation among rainbow trout populations, government agencies classify rainbow trout forms as Evolutionary Significant Units (ESU). This means that each ESU has an individualized genetic composition that is significant to the *Oncorhyncus mykiss* species as a whole.

There are describes four types of habitat that rainbow trout need during their life. The first is spawning habitat, which is typically small, cool-water streams. The spawning habitat must have adequate gravel beds. This means that there must be enough gravel for the redd, and the gravel must not be too fine or it will not let oxygen to the eggs. The water flow must not be too rapid. Very rapid water flow will carry the gravel of the redd, and the eggs, downstream.

The second necessary habitat type for rainbow trout is rearing habitat. This habitat must have adequate protective cover. At this stage of life, the fish is extremely susceptible to predation. The area must have water of low velocity. The fish are not yet strong enough to fight heavy currents for long periods of time. It also must have adequate food sources. A large amount of growth occurs during this time. Trout will usually stay in rearing habitat from birth to the second year of life.

The third necessary habitat type is adult habitat. Trout tend to move to these areas during the second year of life. This habitat usually has water depths of 0.3 meters or greater. It is usually an area in which rapid-flow water meets calm water. This allows the fish to rest in the calm water and search for food and cover in the faster water. The cover in these areas often includes boulders, logs, vegetation, and undercut stream banks.

The fourth necessary habitat type is over-wintering habitat. These areas are usually in deep waters. Stream fish move down to larger rivers, while lake fish

move into deeper parts of the lake. The water tends to be low velocity in these areas. There has to be a large amount of protective cover. These areas also need to have an adequate amount of food.

Regardless of the habitat they are in, rainbow trout require a high amount of dissolved oxygen in the water (at least 80% saturation). Optimal temperature is between 7 and 17 degrees Celsius. Rainbow trout will die at temperatures above 28 degrees Celsius. Optimal pH for trout survival is between 7 and 8.

The native range of rainbow trout (*Oncorhyncus mykiss*) is the drainages of the United States Pacific Coast from Alaska to Mexico, the waters of the Pacific Ocean, and the eastern coast of Asia. Except for several small cases, rainbow trout are not native east of the continental divide.

On the Fishlake National Forest rainbow trout occur on all 4 Ranger Districts. The Fishlake LRMP (II-34) identifies 66 streams and over 380 miles of habitat, and 49 lakes and reservoirs with 4,200 acres of suitable habitat across the forest. Recent GIS analysis has estimated about 1,053 miles of potentially occupied stream miles and 4,680 acres of lake habitat. This new, more accurate estimate indicates that there is more potential habitat than originally estimated in the Forest Plan.

Rainbow trout are typically diurnal, opportunistic feeders. They are carnivores, which feed in a rover-predator style. The majority of their diet consists of aquatic insects, although they will eat crayfish, grasshoppers, winged bugs, worms, salamanders, and other fish (including other trout). They will also occasionally feed on benthic invertebrates when the benthic food supply is great, and/or the competition for epipelagic food is increased.

Rainbow trout optimal feeding temperature is between 13 and 16 degrees Celsius. They will usually cease feeding between temperatures of 22 and 25 degrees Celsius. Rainbows in streams usually occupy a "station", which they have obtained through dominance and/or battle. This station usually has some sort of cover so the trout can hide from predators while it searches the water for food.

Dominance plays an important role in the feeding behavior of rainbow trout. Larger rainbows tend to have dominance over the quantity and quality of food sources in limited food environments. He also showed that larger rainbows are more likely to feed in the risk of predation than smaller rainbows. He believes that this has to do with the increased ability of escape of the larger fish, which in turn may enable the fish to feed in more productive areas (high risk-high gain feeding). Other salmonids will prey upon developing rainbow trout, including salmon, steelhead, and larger trout. There are also numerous predators on land and in the air. Bears, Martins, Fishers, Otters, Osprey, and Eagles are just a few of the non-aquatic species that consider the rainbow trout a food source.

Rainbow trout usually spawn from 2-4 years after their parents spawned. This age can vary greatly depending on size and genetics. Trout that have a territory that is very productive will usually have a large body size at an early age, and therefore will often breed sooner than a fish that lives in a less productive area. On the other hand, anadromous and lacustrine populations of rainbow trout have a genetic disposition for an older age at first breeding. Increased fecundity in these populations offsets disadvantages of later breeding. The relative fecundity ranges from 1,200 to 3,200 eggs per kilogram of body weight.

Rainbow trout spawning behavior typically begins during the spring (December - April). The actual spawning times vary greatly among regions with temperature and water flow. Temperatures of 3-6 degrees Celsius often initiate spawning behavior, although actual spawning does not usually occur until temperatures reach 6-9 degrees Celsius. When the temperature is correct, the water flow is elevated (if in moving water), and the amount of daylight in a day is adequate, the rainbow trout begin their spawning migrations. In lacustrine populations, this often means moving from the lake waters into the in-current stream in which they were hatched. If the lake is not stream-fed, the trout will usually move into shallow waters near the shore. In freshwater river populations, migration means moving from the feeding-grounds of a large river or stream into a smaller, cool-water tributary.

Mining, logging, and irrigation practices have contributed to the decline of rainbow trout in the Pacific Northwest. These practices can increase stream sedimentation, increase water temperature by removing vegetation, add harmful chemicals to the water, and deplete the volume of water moving through the streams and rivers of the area.

Hatcheries were developed as an artificial propagation tool to supplement the dwindling native populations. This idea seemed great in theory, but it had varied effects. There is a high mortality rate among hatchery strain of rainbow trout. If the hatchery strains do establish themselves in an environment, they will often displace the native trout species. Hatchery reared rainbows may also introduce disease, and/or parasites, to the native populations. And, probably the most important factor, the gene pool of the native populations may be depleted through interbreeding with hatchery stock.

Conservation projects are being conducted to preserve the landlocked rainbow trout habitat. Stream restoration is currently the main emphasis. Regulations on logging, mining, and grazing practices are ever increasing, to preserve riparian habitat and decrease sediment in the streams.

Utah's trout populations are managed by the DWR and season time frames and bag limits recommended to the RAC councils at public meetings and approved by the Utah wildlife board, a governors appointed board. Through this process all game fish regulations are established and codified.

The population trend of rainbow trout on the Fishlake National Forest is stable. As a result of a good hatchery program in the DWR Southern Region, a very successful fish-planting program for recreational use is in place. Wild self-sustaining populations of rainbow trout also occur in many of the streams on the Forest. As a result of this, fish populations are always fluctuating slightly, but remain stable, and viable across the forest.

Cutthroat Trout (*Oncorhynchus clarkii*)

Cutthroat trout are economically important over virtually all of their range. Their flesh is excellent for consumption and fishermen consider them a valuable prize. They are more difficult and expensive to raise to seven-inch size in a hatchery than rainbow trout. Cutthroat trout are often in certain high mountain lakes and streams.

The range of the cutthroat trout extends from costal streams of Alaska to northern California throughout the Intermountain Area and east to the upper Missouri, Platte, Colorado, and Rio Grande South Saskatchewan River, Alberta, Canada. The cutthroat can be found in fresh, brackish or salt water in North America mostly west of the Rocky Mountains. A central area in which the rainbow trout occurs separates the coastal and Yellowstone varieties. The inland form lives in western Alberta in the headwaters of river systems.

On the Fishlake National Forest cutthroat trout occur on all 4 Ranger Districts. Approximately 1,053 miles of potentially occupied stream habitat and 4,680 acres of lake habitat can be found across the forest.

The average length of this species is 12-15 inches and generally one-half to 17 pounds. A short, conical head with a somewhat pointed to rounded snout and a rather large mouth with well-developed teeth on both jaws characterize the fish. In breeding males the kype is slightly developed in the anadromous population and the lower jaw appears extremely long. One of the main color characteristics is two yellow or orange to red lines in the skin folds of each side of the lower jaw. The coastal form is colored dark to olive-green with numerous black spots and may appear bluer with silvery sides. The interior form (Yellowstone cutthroat) has a body of yellow-green with red on the sides of the head and front of the body and the belly.

Adult anadromous forms return to freshwater spawning streams in late autumn and early winter but spawning takes place there in February to May. In both forms of cutthroat trout spawning takes place in small, gravelly streams where the male courts the female by nudging and quivering. The female prepares the redd where she lays 1100-1700 eggs. Hatching occurs 6-7 weeks later.

The population trend of cutthroat trout on the Fishlake National Forest is stable. As a result of a good hatchery program the DWR Southern Region, has a very successful fish-planting program for recreational use. Wild self-sustaining

populations of cutthroat trout also occur in many streams on the Forest. As a result of this, fish populations are always fluctuating slightly, but remain stable to slightly increasing, and viable across the forest.

Brown Trout (*Salmo trutta Linnaeus*)

In 1883 the brown trout was introduced into the United States from Europe and soon adapted itself to trout waters throughout most of the country except some areas of the southeastern United States. The brown trout's ability to adapt itself to a wide variety of ecological conditions has helped to expand its range. Brown trout in Utah are in most streams and reservoirs at the foot of many mountain ranges. Some of the best brown trout fishing waters in the United States are the larger coldwater steams of Utah.

Brown trout are brown to gold on their back with a cream to slate-colored belly. Most fish have black, gray, yellow and occasionally red spots all surrounded by a white halo. This species has a prominent spotted adipose fin between the dorsal and caudal fin. There are no spots on the squarish tail or vermiculation--wormy marks, on the back. The average brown trout ranges from 10 to 13 inches in size. The state record brown trout weighed 14.65 pounds and measured 25.25 inches in length.

They prefer cold water with temperatures ranging up to 26 C. Preferred habitat includes areas of boulders, cobble, logs, rootwads and overhead cover. Brown trout will feed in riffles containing rock as small as gravel.

They feed actively in the morning and evening. The smaller brown trout, less than 2 pounds, live largely on such insects as mayflies, caddisflies, and stoneflies. The larger brown trout readily feed on fish, both game and non-game.

Brown trout prefer cool lakes and streams, they are present in many of the lower elevation waters, which are at times quite warm and in some cases polluted. Since they are able to withstand warmer and less clear waters than most of the other trout, the brown trout have effectively extended the good fishing waters of Utah.

On the Fishlake National Forest brown trout occur on all 4 Ranger Districts. Approximately 1,053 miles of potentially occupied stream habitat and 4,680 acres of lake habitat can be found across the forest for brown trout.

Brown trout populations are managed by the DWR in Utah, as are all fish and wildlife on the Fishlake National Forest. All regulations for the management of this species are developed through and interagency process, presented to RAC committees, and then approved by the Utah wildlife board. As a result of this process the Forest Service does not have direct control over the fate of brown trout on the forest. However, this species has stable populations across the forest. Drought conditions are serious and the effects to fish are still unknown.

The population trend of brown trout on the Fishlake National Forest is stable. As a result of a good hatchery program the DWR Southern Region, has a very successful fish-planting program for recreational use. Wild self-sustaining populations of brown trout also occur in many of the streams on the Forest. As a result of this, fish populations are always fluctuating slightly, but remain stable to slightly increasing, and viable across the forest.

Brook Trout (*Salvelinus fontinalis (Mitchill*)

The brook trout is one of the most popular game fish in the United States. Even though it has not achieved eminence in Utah, it affords fishing to many anglers. The brook trout is present in numbers in high mountain waters and beaver ponds above 6,000 feet. It is common at these altitudes in the Uinta and Wasatch mountains.

The brook trout has been studied more than almost any other trout. The small fish are readily caught on both live baits and artificial lures; the large ones are exceptionally wary. Spinning and fly-casting are the more popular methods of catching them.

The brook trout has a streamlined, somewhat compressed body, which is about five times as long as it is deep. The color of the brook trout ranges from olive, blue-gray, or black on the back to white on the belly. Red spots, with or without bluish rings around them, are evident on side though they are not numerous.

Under favorable conditions they grow to lengths or three to six inches the first year. During the second summer they grow to six to ten inches, and during the third to eight to 13 inches. Trout attains the best growth from streams with an abundance supply of spring water, which keeps the stream relatively warm in the winter. In lakes the growth rate may also be fast with lengths of 18 inches possible in 4 years.

These trout are voracious feeders. They feed on insects throughout their lives. Terrestrial insects are also taken. Occasionally brook trout eat worms, mollusks, crustaceans, or other fish.

The spawning season occurs as early as late summer in the northern part of the range and as late as early winter in the southern portion. As the spawning season approaches brook trout seek gravel riffles in spring-fed tributaries or spring seepage areas in lakes.

Brook trout attain their greatest abundance in cool, clear, headwater ponds and spring-fed streams. The species has been successfully stocked in lakes having cool, well-oxygenated lower layers of water. Stocking has occurred in lakes on the Richfield and Loa Ranger Districts with good success. However, during drought years and low water, winterkill is a problem. There are also stream populations on the Richfield and Loa Ranger Districts.

On the Fishlake National Forest brook trout occur on all 4 Ranger Districts. The population trend of brook trout on the Fishlake National Forest is stable. As a

result of a good hatchery program the DWR Southern Region, has a very successful fish-planting program for recreational use. Wild self-sustaining populations of brook trout also occur in several Forest streams. As a result of this, fish populations are always fluctuating slightly, but remain stable or slightly increasing, and viable across the forest.

There is some monitoring data available for Corn Creek that was gathered in 2000 that shows that this fishery produces approximately 125-150 lbs of fish/acre. There is also some monitoring data that was gathered on Pioneer Creek by the UDWR in 1981. Both of these streams primarily have brown and rainbow trout. The respective reports are filed in the project file.

Aquatic Macroinvertebrates

Aquatic macroinvertebrates are invertebrates that live in water and can be seen by the unaided human eye. They provide an important ecological link between microscopic food organisms and fish. Because of their strict habitat requirements they are useful indicators of aquatic habitat conditions and changes. Aquatic macroinvertebrates include insects, such as the commonly thought of mayflies, stoneflies, caddisflies, and diptera (two-winged flies), crustaceans, mollusks, and freshwater earthworms. Many of these groups are most highly developed in running water environments, as still water lakes and ponds are generally short-lived geologically. Stony fast water streams have remarkably similar major fauna groups throughout the world. The current force exerted by fast water streams is one of the most significant characteristics of their habitat, and aquatic macroinvertebrates have evolved a variety of anatomical and behavioral adaptations to it. These include a flattened body, streamlined shape, suckers, friction pads and hooks, small size, secretions, ballast (such as caddisfly houses), living in slow water among vegetation or friction layers on the stream bottom, upstream movement in the water, and upstream dispersal of winged adults. Many small insect stages utilize habitat deep in the gravel of streams (the hyporheic zone). For example, a study in southern Colorado found the nymphs of many chlorperlid stoneflies were not available in surface sediments until just before emergence; the authors surmised their use of hyporheic habitat.

Aquatic insects go through a series of life stages in a stream. Insects with incomplete metamorphosis go through three stages: egg, nymph, and adult. This group includes the mayflies and stoneflies. Insects with complete metamorphosis go through four stages: egg, larva, pupa, and adult. This group includes the caddisflies and dipteria. The eggs hatch into young nymphs and larva. The majority of their life will be spent in the nymph or larva stages. While growing these go through a variety of stages called instars. It is these nymph and larval stages that are usually collected in aquatic macroinvertebrate samples. The nymphs and larva (which go through a pupal stage first) then leave the water through emergence to become winged adults. The adults reproduce and lay eggs, completing the cycle.

The most resistant life stage of many aquatic insects is the egg. Eggs of many aquatic

insects could survive dry for many months. For example several taxa that survived a D.D.T. treatment of a tropical stream, presumably as eggs. Extended hatching periods are common in many aquatic stream insects. Aquatic insects have a variety of life cycles with a few having multiple generations per year, many having one generation per year and some taking more than a year for each generation. Even with species that have annual generations, there may be overlapping generations. These factors increase the likelihood that the more resistant egg stages are present over prolonged periods, reducing the impacts of a short-term environmental disturbance such as flooding. These cyclic and highly variable populations also mean that monitoring of individual taxon populations is unfeasible for land management monitoring purposes.

Aquatic macroinvertebrates are responsive to changes in aquatic habitat condition due to land management actions. Evaluations of aquatic invertebrates are complicated by the naturally dynamic nature of their communities.

Low streamflows are another natural factor that affects aquatic macroinvertebrates. Analysis showed clean water taxa may be eliminated by drought conditions. Fire is also a natural disturbance that affects aquatic macroinvertebrates. A study in central Idaho showed that wildfire disturbed streams had lower species richness than streams in nearby undisturbed watersheds.

The Biotic Condition Index (BCI) provides a quantitative measure of aquatic health due to overall watershed condition, land management activities, and natural disturbances. The BCI incorporates water quality (sulfate and alkalinity), stream habitat (substrate and gradient), and a database of environmental tolerances of aquatic macroinvertebrate taxa. The environmental tolerances database is a rating of each taxa's tolerance to organic enrichment and sedimentation. The BCI is calculated by dividing the predicted community tolerance quotient based on the water quality and stream habitat by the actual sampled community tolerance quotient. Advantages of the BCI is that it is sensitive to different types of stress, gives a linear assessment of conditions from unstressed through all levels of stressed, and it evaluates a streams condition against its own potential. A BCI rating above 90 is considered excellent, 80-90 good, 72-79 fair, and below 72 poor.

Since the BCI measures the average community tolerance quotient based on all of the taxa found at a site, it is robust to changes in individual taxon population levels. While one taxon may be temporarily absent due to the recent emergence of adults and reproduction, other taxa with similar tolerance quotients will still be collected. Averaging the individual tolerance quotients to obtain the community tolerance quotient then obtains a mean representative value which has minimal fluctuation despite changes in individual taxon population levels.

The intent of the Fishlake N.F. Forest Plan to use the BCI rather than population as the trend indicator is shown in the Forest Plan Standard and Guideline "Maintain a Biologic Condition Index (BCI) of 75 or greater" (page IV-19). This is also why the

"Macroinvertebrate" estimated population level in MIS Table II-8A (page II-29) is listed as N/A, or Not Applicable.

Aquatic macroinvertebrates respond to natural events, which can affect the BCI values and confound making interpretations of changes due to land management actions. This can be dealt with both through good study design (such as including a control station above a study area where management changes will occur) and detailed notes taken during sampling noting both ongoing land management activities and natural events and changes.

Sample collection has followed the standard R-4 protocol in the Forest Service Handbook (FSH) 2609.23. Three similar riffle sites within a 100-foot stream section are selected for sampling. At each site a 250 micron Surber frame is placed over the gravel/cobble substrate with the net on the downstream side. Rocks within the frame are hand scrubbed and the current carries the macroinvertebrates into the net. After the larger rocks are scrubbed the underlying gravel within the frame is stirred by hand to a depth of 3-4 inches. The net is then inverted into a pan containing a saturated saline solution to help float organisms to the top for easier collection. Larger, heavier items such as caddisfly cases are collected separately and placed in a sample bottle. The sample is gently stirred and the saline solution is poured through a sieve several times. Finally, the sample in the sieve is placed in the sample bottle and preserved in an alcohol solution. Additional data is collected at each station including alkalinity, sulfate, gradient, and substrate composition, which are used to calculate the BCI.

The Forest Plan monitoring schedule is to sample macroinvertebrates in 5 streams/year. This has been met on average. Sampling location selection has primarily been driven by interest in key watersheds on the Forest or for baseline data or monitoring for specific project activities. In other words, sampling has been more tactically oriented than strategically oriented.

Table 4. Aquatic macroinvertebrate trend on the Fillmore Ranger District.

Fillmore RD	YEAR																
STATION	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**00**	**01**	**02**
Corn FS bdr	-	-	-	-	-	-	-	-	-	-	65/68	-	-	-	-	-	-
Corn Cr 1	-	90/79	70/72	71/82	73	-	-	-	-	-	-	65	-	-	59	-	-
Corn Cr 2	-	77/75	79/78	82/86	80	-	-	-	-	-	-	74	-	-	61	-	-
Chalk Cr 1	-	-	-	80	67	-	-	-	-	-	-	-	70	-	-	-	-
Chalk Cr 2	-	-	-	78	73	-	-	-	-	-	-	-	99	-	-	-	-
Sam Stowe	-	-	-	-	78/71	-	-	85	75	-	-	-	-	64	-	-	-
Meadow 1	-	-	-	-	-	-	-	-	70	-	-	-	59	56	-	-	-
Meadow 2	-	-	-	-	-	-	-	-	68	-	-	-	70	65	66	-	-
Oak Cr 1	-	-	-	-	-	-	-	-	-	-	-	-	67	-	-	-	-
Oak Cr 2	-	-	-	-	-	-	-	-	-	-	-	-	64	-	-	-	-

Overall trend on the Fillmore Ranger District is down slightly after peaking in the late 1980s, with generally static trend since the early 1990s.

Corn Creek BCI values peaked in the late 1980s. More recent samples in the late 1990s have declined to below standards, probably showing continued after effects from the severe 1996 wildfire in the drainage. Chalk Creek showed a downward trend at one station, but an upward trend at the other station. One station was above standards and the other slightly below.

Sam Stowe Creek had relatively static trend through the early 1990s, but a drop in trend to below standards by 1999. This could be due to long-term drought effects, possibly in combination with the stream renovation treatment. One Meadow Creek station showed downward trend, but the other station was basically static. Both were below standards.

Rydberg's Milkvetch

Habitat for this plant is not found on the project area. The plant occurs on igneous gravels, volcanic gravel, or clayey soils, these substrates are not found on the Pahvant Mountain Range. No populations have ever been found on the Fillmore Ranger District. Because this species is not impacted by the proposed action it will not be considered in the Environmental Consequences section.

Migratory Birds

The Migratory Bird Treaty Act of 1918 decreed that all migratory birds and their parts are fully protected. This Act is the domestic law that affirms, or implements, the United States' commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protected selected species of birds that are common to both countries (i.e., they occur in both countries at some point during their annual life cycle).

Under the Act it is unlawful to take, import, export, possess, buy, sell, purchase, or barter any migratory bird. Feathers or other parts, nests, eggs, and products made from migratory birds are also covered by the Act. Take is defined as pursuing, hunting, capturing, trapping, or collecting.

There are many migratory bird species that utilize the analysis area for a portion of the year. A list of the birds protected by the MBTA can be found in the project file. Some of the birds that are MIS bird species are also migratory birds. These would include: mountain bluebird, western bluebird, brewers sparrow, Lincoln sparrow, song sparrow, vesper sparrow, yellow warbler, and hairy woodpecker.

ENVIRONMENTAL CONSEQUENCES

This section discusses the effects of the alternatives on the Management Indicator Species (MIS) and general wildlife resources including migratory birds.

Fuels reduction projects such as mechanical thinning and prescribed fire impact wildlife species both adversely and favorably by altering their habitat. Impacts to habitat usually come from two main areas. These are impacts to protective cover and impacts to sources of food. Protective cover can be in the form of vegetative cover or geographic features, and food sources can be vegetation or other species of wildlife. The importance of these will vary from species to species. As a result, one of the best ways to evaluate impacts to wildlife is to analyze impacts to vegetation and or prey.

The overall affect to wildlife habitat was analyzed by assessing the impacts to Management Indicator Species that are identified in the Fishlake National Forest Plan. These species represent a variety of habitat types and impacts to them can be extrapolated to other species. The key comparison elements for evaluating how the alternatives affect management indicator species are:

Elk and **deer** – amount of winter hiding and thermal cover habitat affected (# of acres of pinyon and juniper treated); amount of winter foraging habitat affected (# of acres of winter foraging communities treated); and species vulnerability.

Cavity nesters – amount of potential cavity nesting habitat affected (# of acres of aspen, pinyon and juniper, and spruce/fir vegetation types treated).

Riparian dependant guild – amount of riparian community affected (# of acres of riparian areas treated).

Sage nesters – amount of sagebrush community affected (# of acres of sagebrush/grass/forb vegetation type treated).

Northern goshawk – amount of nesting habitat affected (# of acres of aspen or spruce/fir treated); and prey base affected (# of acres of foraging habitat treated).

Resident trout and **aquatic macroinvertebrates** – increase of sediment in streams (# of tons of sediment/acre added to streams).

Table 2 (reproduced). Vegetation types and numbers of acres to be treated.

Vegetation Types	Number of Acres in Treatment Units	40-80% of Acres Treated	Total Number of Acres in Analysis Area
Aspen	0	0	10,948
Communities	0	0	1768
Cropland	0	0	23,400
Gambel Oak	4547	1819-3638	72,413
Mountain Mahogany	0	0	19,102
Mountain Shrub	0	0	555
Pinyon/Juniper	6604	2642-5283	56,733
Riparian	32	*0	2066
Sagebrush/Grass/Forb	3144	1258-2515	70,573
Semi-desert Shrubs	0	0	14
Spruce/Fir	0	0	29,903
Total	**14,329**	**5719-11,436**	**287,475**

*No acres in the riparian vegetation type would be treated

Elk and Deer

The key comparison element for evaluating how the alternatives affect elk and deer is amount of winter hiding and thermal cover habitat affected (# of acres of pinyon and juniper treated); amount of foraging habitat affected (# of acres of foraging communities treated); and species vulnerability.

Effects of Alternative 1; No Action

If the No Action Alternative were selected there would be no direct adverse effects on the population numbers or viability of these species.

Under Alternative 1, the deer and elk herds would remain essentially the same as described in the affected environment. The vegetative communities would continue to change over time. Natural succession would continue to replace sage/grass/forb areas with encroaching Pinyon-Juniper communities, understory in the sage and P-J would be crowded out as these communities become decadent, restricting water resources from reaching the understory plants. Over time the change in vegetative communities would have a negative impact on deer and elk, as foraging habitat is displaced by hiding and/or thermal cover (which isn't the limiting factor for these species). As a potential unknown effect, if a high-intensity wildfire were to occur,

wildlife habitat would be moderately altered depending on when, where, and how a wildfire occurred; revegetation time would be longer due to potential hydrophobic sterilization of the soil.

Effects of Alternative 2; Mechanical thinning treatments and/or prescribed burning

The Action Alternative may affect individual elk and deer and their habitat, but would not adversely affect population numbers or viability of these species.

The treatment units all fall within the winter or transition ranges for elk and deer, so the thermal and hiding cover and foraging areas affected are analyzed as to how they affect winter elk and deer. This alternative would directly decrease the amount of hiding and thermal cover and increase the amount of forage over time. Hiding and thermal cover would be decreased as the mechanical thinning and/or prescribed burning projects remove Pinyon-Juniper trees and Gambel oak vegetation type within the treatment units. Forest Plan requirements for hiding and thermal cover would continue to be met after the implementation of the proposed action.

Forage would eventually be increased through the creation of openings and the regeneration of grass, forb, and browse species. A short term decrease in forage quality may occur as sagebrush, cliffrose, and bitterbrush plants would be removed by burning, some resprouting of bitterbrush may occur if the soil has adequate moisture in it when the burn takes place. The indirect effects described above in the no action alternative for a wildfire are also applicable to this alternative since only 5% of the analysis area is within treatment units.

These fuels reduction projects would increase animal visibility by hunters within treated areas because of reduced hiding cover for these big game species. Short-term (5-20 years) loss of hiding cover combined with existing hunter and recreation access to the area would increase deer and elk vulnerability and possibly lead to increase hunter success during the hunting seasons.

The action alternative would not result in a loss of habitat, only a shift in the kind of habitat and short-term reduction in habitat effectiveness (quality). Deer and elk would remain an important hunting and viewing resource value for many recreation visitors. As the area becomes revegetated and access is managed, any negative impacts would gradually be reduced and the long-term affects would be beneficial to these species. Herds would continue to be managed according to respective herd management plans by the Utah State Division of Wildlife Resources.

A possible deer migration route exists north of Scipio Summit, west of the Grabalt Unit. An underpass was built under I-15 when the freeway was constructed to allow access to the Canyon Mountain Range. The impacts from the Interstate have already occurred. Recent observations do not indicate that this area is being used as a migration route. The fuel treatments would not have a direct or indirect effect on elk and deer and their ability to possibly use this route. Steep north facing slopes in the

Grabalt Unit would not be treated; this area also contains a lot (>500 acres) of Gambel oak that will not be mechanically treated. These areas would provide hiding cover for elk and deer.

Table 5. Affected acres from the proposed action on elk and mule deer.

Hiding and Thermal Cover	
Number of Acres of Winter Hiding and Thermal Cover in Analysis Area	* 56,733
Number of Acres of Winter Hiding and Thermal Cover Treated	2642-5283
Percentage of Winter Hiding and Thermal Cover Treated in Analysis Area	4.6-9.3%
Foraging Habitat	
Number of Acres of Winter Foraging Habitat in Analysis Area	**75,249
Number of Acres of Winter Foraging Habitat Treated	3077-6153
Percentage of Winter Foraging Habitat Treated in Analysis Area	4.1-8.2%

* Winter hiding and thermal cover primarily consists of the pinyon-juniper vegetation type.
** Winter foraging habitat consists of a portion or all of cropland, gamble oak, mountain mahogany, mountain shrub, riparian, sagebrush/grass/forb, and semi-desert shrub vegetation types. For analysis purpose it is estimated that 40% of these vegetation types are available for winter forage habitat.

No loss of viability to mule deer and elk is anticipated for the following reasons:

1) The prescribed burns would be implemented in a mosaic burn pattern where 40-80% of approximately 14,329 acres would be treated (5719 to 11436 acres) within a 287,475-acre analysis area. This would leave more than 275,000 acres untreated within the analysis area to be utilized by these species.
2) An estimated 4.6-9.3% of the winter hiding and thermal cover would be treated, and an estimated 4.1-8.2% of the winter foraging habitat would be affected when compared to the respective acres within the analysis area. Forest Plan guidance on hiding and thermal cover will be met (Forest Plan IV-19).
3) The treatment units are widely scattered within the 287,475-acre analysis area, leaving many areas untreated and available for habitat needs. Additionally, there are many more thousands of acres available to these species outside of the analysis area.
4) No habitat is eliminated; rather it is moved from hiding and thermal cover to foraging areas. Hiding and thermal cover is not a limiting factor for these species in the analysis area. Many of the areas may be reseeded with plants that would improve the forage quality available to these big game species.

5) The elk herd and respective habitat is in good condition. The elk herd has increased by more than 50% within a 3-year period to reach the herd objective for the Fillmore Unit (see page 9).
6) Approximately 75% of the elk herd winters south of Meadow Creek, only the Meadow Unit is within this area, the other treatment units are north of Meadow Creek. The proposed action will only affect approximately 25% of the elk herd.
7) The deer herd is at the herd objective with a static growth rate similar to other deer units within Utah and the Southern Region.
8) The proposed projects are anticipated to have long-term beneficial affects for these big game species by increasing foraging areas and quality of forage.
9) Mule deer and elk have been utilizing the areas extensively that were burned by wildfires or prescribed burns, similar results are expected from these projects.
10) The proposed treatments should reduce the risk of a wildfire in the drainages treated (approximately 2-4% of the analysis area).
11) There are no adverse cumulative effects from this project to mule deer or elk (see cumulative effects section).

Cavity Nesters (hairy woodpecker, western bluebird, and mountain bluebird)

The key comparison element for evaluating how the alternatives affect tree cavity dependent species is amount of potential cavity nesting habitat affected (# of acres of aspen, pinyon and juniper, and spruce/fir vegetation types treated).

Effects of Alternative 1; No Action

If the No Action Alternative were selected there would be no direct adverse effects on the population numbers or viability of these species.

Alternative 1 would have no direct effects on tree cavity nesters as no snags or live trees would be thinned or burned. As a potential unknown effect the area would remain susceptible to a large wildfire where the lighting sequence and area burned could not be chosen, a wildfire would however create snags that would improve habitat for cavity nesters. Insect populations generally increase in the burned snags and would provide a foraging source to cavity nesters in the short term (5-10 years) following a wildfire.

Effects of Alternative 2; Mechanical thinning treatments and/or prescribed burning

The Action Alternative may affect individual cavity nesters, but would not adversely affect population numbers or viability of these species and would increase habitat for cavity nesters. As a direct effect some pinyon and juniper trees will be removed by the mechanical thinning projects.

Table 6. Affect of proposed action on cavity nesting habitat.

Cavity Nesting Habitat	
Number of Acres of Potential Cavity Nesting Habitat in Analysis Area	* 97,584
Number of Acres of Potential Cavity Nesting Habitat Treated	2642-5283
Percentage of Potential Cavity Nesting Habitat Treated in Analysis Area	2.7-5.4%

* Potential cavity nesting habitat consists of the aspen, pinyon-juniper, and spruce/fir vegetation types.

No loss of viability to cavity nesters is anticipated for the following reasons:

1) A prescribed burn would create numerous snags throughout the treatment units.
2) An estimated 2.7-5.4% of potential cavity nesting habitat, within the pinyon-juniper vegetation type, will be treated when compared to the analysis area.
3) The burned trees would attract a number of insects that would utilize the area following a burn. A burn would increase the number of insects and cavity nesting birds in the short term (approximately 5-10 years) and then would stabilize to a pre-burn type condition.
4) The trees not burned in the surrounding areas such as, rocky outcrops, unburned islands, etc. within the treatment units would provide for snag maintenance and recruitment of tree cavity habitat into the future.
5) A design feature for the proposed action would require the people who implement the thinning project to avoid cutting the pinyon or juniper trees when they observe a cavity in the tree.
6) The prescribed burns would be implemented in a mosaic burn pattern where 40-80% of approximately 14,329 acres would be treated (5719 to 11436 acres) within a 287,475-acre analysis area. This would leave more than 275,000 acres untreated within the analysis area to be utilized by these species.
7) The treatment units are widely scattered within the 287,475-acre analysis area, leaving many areas untreated and available for habitat needs. Additionally, there are many more thousands of acres available to these species outside of the analysis area.
8) The proposed treatments should reduce the risk of a wildfire in the drainages treated (approximately 2-4% of the analysis area).
9) There are no adverse cumulative effects of this project on cavity nesters (see cumulative effects section).

Riparian Dependent Guild (Lincoln's sparrow, yellow warbler, and song sparrow)

The key comparison element for evaluating how the alternatives affect the riparian dependent guild is the amount of riparian community affected (# of acres of riparian areas treated).

Effects Common to All Alternatives

The effects for all alternatives would be the same on the riparian dependent guild; there would be no adverse effects on riparian guild species or viability since there are no riparian areas that will be treated. The analysis area contains 2066 acres of riparian vegetation type, 32 acres are within treatment units, but none are proposed to be treated.

A design feature for the proposed action is that there will be no vegetation treatments within 100 feet of a perennial stream; most treatment unit boundaries are 500 feet or more from perennial streams. Because of this design feature the effects of the proposed action and the no action alternative are the same. This design feature is consistent with guidance found in the Fishlake Forest Plan for vegetation treated by burning (FP IV-49) that apply to wildlife, it states: "Limit use of prescribed fires on areas adjacent to riparian areas to protect riparian and aquatic values".

Sage Nesters (Brewer's sparrow, and vesper sparrow)

The key comparison element for evaluating how the alternatives affect sage nesters is the amount of sagebrush community affected (# of acres of sagebrush/grass/forb vegetation type treated).

Effects of Alternative 1; No Action

If the No Action Alternative is selected there would be no direct adverse effects on the population numbers or viability of these species.

Alternative 1 would have no direct effects on the sagebrush communities and the sage dependent species as there would be no prescribed burning in these areas. As a potential unknown effect, if a high-intensity wildfire were to occur, wildlife habitat would be moderately altered depending on when, where, and how a wildfire occurred; revegetation time would be longer due to potential hydrophobic sterilization of the soil.

Effects of Alternative 2; Mechanical thinning treatments and/or prescribed burning

Although individual sage nesters species and their habitat may be affected, the action alternative would not adversely affect population numbers or viability of these species. Over time the sagebrush will continue to increase and the amount of grass and forbs will be reduced, eventually sagebrush will be replaced with Pinyon-Juniper communities, the quality of foraging and nesting areas for these birds will decrease.

Table 7. Affects of the proposed action on sage nesters habitat.

Sage Nesters Habitat	
Number of Acres of Potential Sage Nesters Habitat in Analysis Area	* 70,573
Number of Acres of Potential Sage Nesters Habitat Treated	1258-2515
Percentage of Potential Sage Nesters Habitat Treated in Analysis Area	1.8-3.6%

* Potential sage nesters habitat consists of the sagebrush/grass/forb vegetation type.

No loss of viability to sage nesters is anticipated for the following reasons:

1) The prescribed burns would be implemented in a mosaic burn pattern where 40-80% of approximately 14,329 acres would be treated (5719 to 11436 acres) within a 287,475-acre analysis area. This would leave more than 275,000 acres untreated within the analysis area to be utilized by these species. There would be no impact from the mechanical thinning treatments because this treatment only targets pinyon and juniper trees being cut out of the treatment units (approximately 5000 acres of the project area).
2) An estimated 1.8-3.6% of potential sage nesters habitat, within the sagebrush/grass/forb vegetation type, will be treated when compared to the analysis area.
3) The treatment units are widely scattered within the 287,475-acre analysis area, leaving many sagebrush areas untreated and available for sage nesting species.
4) The proposed treatments should reduce the risk of a wildfire in the drainages treated (approximately 2-4% of the analysis area).
5) There are no adverse cumulative effects of this project on sage nesters (see cumulative effects section).

Northern Goshawk

The key comparison element for evaluating how the alternatives affect northern goshawk is the amount of nesting habitat affected (# of acres of aspen or spruce/fir treated); and prey base affected (# of acres of foraging communities treated).

Effects of Alternative 1; No Action

If the No Action Alternative is selected there will be no direct adverse effects on population numbers or viability of this species.

Since there would be no vegetation treatments under Alternative 1, no adverse direct effects would be expected to the northern goshawk. Potential indirect effects would come from natural succession events as the areas move from early/mid seral species to late seral communities. This would have a negative affect on the quality of wintering goshawk habitat and on a variety of prey species that depend on understory plants for foraging and cover. As a potential unknown effect, if a high-intensity wildfire were to occur, wildlife habitat would be moderately altered depending on when, where, and how a wildfire occurred. The revegetation time would be longer due to potential hydrophobic sterilization of the soil. A wildfire may kill or displace prey species for the goshawk

Effects of Alternative 2; Mechanical thinning treatments and/or prescribed burning

Although wintering habitat for goshawks may be affected, the action alternative would not adversely affect population numbers or viability of this species.

Goshawks are known to winter in a variety of habitats including pinyon-juniper communities; removal of vegetation from a prescribed burn or mechanical thinning could have an indirect effect of decreasing prey populations. Goshawks are known to prey largely on rabbits, squirrels, chipmunks, flickers and jays. Burning would decrease populations of some prey species (especially small mammals) as woody debris is burned, and increase populations of others (such as jays or woodpeckers) as snags are created. Therefore it is likely that impacts to prey species would not make much difference in the overall availability of prey. This would be a short-term impact (<5 years) until vegetation is reestablished.

Table 8. Affects of the proposed action on goshawk habitat.

Goshawk Nesting Habitat	
Number of Acres of Aspen or Spruce/Fir in Analysis Area	* 40,851
Number of Acres of Aspen or Spruce/Fir Treated	0
Percentage of Aspen or Spruce/Fir Treated in Analysis Area	0.0%
Goshawk Foraging Habitat	
Number of Acres of Foraging Habitat in Analysis Area	**285,707
Number of Acres of Foraging Habitat Treated	5719-11,436
Percentage of Foraging Habitat Treated in Analysis Area	2.0-4.0%

* Goshawk nesting habitat consists of the aspen and spruce/fir vegetation types.
** Goshawk foraging habitat consists of all vegetation types except for the human community areas (i.e. Fillmore, Holden, etc.) within the analysis area.

No loss of viability to the northern goshawk population or species is anticipated for the following reasons:

1) There is 40,851 acres of potential nesting habitat within the analysis area. Goshawks utilize aspen or mixed conifer for nesting sites, these communities do not exist within the treatment units; therefore there would be no direct effects on this species to nesting/breeding habitats.
2) Northern goshawks are not known to occur within the treatment units (site specific surveys were done within the analysis area, see project record - wildlife), no direct effects are expected.
3) The prescribed burns would be implemented in a mosaic burn pattern where 40-80% of approximately 14,329 acres would be treated (5719 to 11436 acres) within a 287,475-acre analysis area. This would leave more than 275,000 acres untreated within the analysis area to be utilized by this species for foraging.
4) An estimated 2.0-4.0% of foraging habitat, within many vegetation types, will be treated when compared to the analysis area.
5) A prescribed burn will improve the foraging habitat for many of the goshawks prey species. Fire would create patches or a mosaic of early seral plant species, which will benefit many goshawk prey species. The creation of early seral plant species would help create size, age, and species diversity important in maintaining functioning ecosystems.
6) The treatment units are widely scattered within the 287,475-acre analysis area, leaving many areas untreated and available for habitat needs. Additionally, there are many more thousands of acres available to these species outside of the

analysis area. Local radio telemetry studies indicate that goshawks have been known to migrate more than 400 miles in the winter season.

7) Riparian areas, which are important foraging areas for goshawks, will not be treated. Most treatment units are more than 500 feet from perennial streams; a 100-foot no-treatment buffer is mandated as a design feature for the project.
8) The proposed treatments should reduce the risk of a wildfire in the drainages treated (approximately 2-4% of the analysis area).
9) There are no adverse cumulative effects of this project on northern goshawk (see cumulative effects section).

Resident Trout and Aquatic Macroinvertebrates

The effects on aquatic macroinvertebrates and trout species are similar. All trout species (rainbow trout, cutthroat trout, brown trout, and brook trout) that occur in streams are considered as resident trout. The effects are summarized together for aquatic macroinvertebrates and resident trout.

The key comparison element for evaluating how the alternatives affect aquatic macroinvertebrates and resident trout is the increase of sediment in streams (# of tons of sediment/acre added to streams).

Table 9. Comparison of Alternatives – Estimated Soil Erosion Rates in Tons/Acre/Year (reproduced from Soil Resource Management report, page 30)

Resource / Year	Alternative #1 (No Action)	Alternative #2 (Proposed Action)	Unwanted Wildfire
Soils – Year #1	0.2-0.6	0.3-1.0	0.4-1.4 +
Soils – Year #2	0.2-0.6	0.2-0.7	0.4-1.4 +
Soils – Year #3	0.2-0.6	0.2-0.7	0.4-1.4 +
Soils – Year #4	0.2-0.6	0.2-0.6	0.4-1.4 +
Soils – Year #5	0.2-0.6	0.2-0.6	0.4-1.4 +

Note: the erosion figures can be much higher from a 10 or 25-year storm event.

Effects of Alternative 1; No Action

If the No Action Alternative is selected there would be no direct adverse effects on the population numbers or viability of aquatic macroinvertebrates and/or resident trout species.

Under Alternative 1 there would be no vegetative treatments, no direct adverse effects would be expected to the streams with aquatic macroinvertebrates and /or resident trout populations, currently there is an estimated 0.2 –0.6 tons of sediment/acre/year entering the steams across the analysis area.

Potential indirect effects would come from natural succession events as the areas move from early/mid seral species to late seral communities because these communities often have less ground cover to protect soil resources, especially in the pinyon-juniper vegetation type, this would potentially result in more erosion and sedimentation into the streams.

A wildfire may have a negative effect on stream water quality (depending when and where it burned), as it would likely occur in the summer months when control efforts are more difficult and the acreage burned would probably be greater. This would result in potentially more sediment moving into the streams (an estimated 0.4-1.4 + tons/acre/year; the figure could be much higher, approximately 29-64 tons/acre have been recorded from wildfire sites on adjacent Forests) following a precipitation event than from a planned prescribed burn.

Wildfires also have the potential for larger size than the proposed treatments, which would increase the total amount of sediment potentially delivered to the streams. These high rates of sediment could cover gravels and spawning habitat and may adversely affect localized populations or viability of aquatic macroinvertebrates and/or resident trout possibly resulting in extirpation of the species. As noted in the affected environment on aquatic macroinvertebrates, the Adelaide Fire in 1996 was a contributing factor in the downward trend in Corn Creek. Wildfire effects to fisheries on the Fishlake NF have ranged from no measurable decrease (Oldroyd Fire, 2000) to complete extirpation of the fish population (Pole Canyon, 1996).

Effects of Alternative 2; Mechanical thinning treatments and/or prescribed burning

Although individual aquatic macroinvertebrates and/or resident trout species and their habitat may be affected, the action alternative would not adversely affect population numbers or viability of these species. The riparian buffer design feature would mitigate any potential direct effects. Indirect effects are expected to be minor and within the historic range of variation.

No loss of viability to aquatic macroinvertebrates and/or resident trout population or species is anticipated for the following reasons:

1) The treatment units are all away from the riparian areas. A design feature for the proposed action is that there will be no vegetation treatments within 100 feet of a perennial stream; this will filter out the majority of sediments before they reach the creeks. This design feature is consistent with guidance found in the Fishlake Forest Plan for vegetation treated by burning (FP IV-49) that apply to wildlife, which states: "Limit use of prescribed fires on areas adjacent to riparian areas to protect riparian and aquatic values". Most actual treatment unit boundaries are 500 feet or more from perennial streams.
2) The soils and hydrology reports (see above table) suggest that the overall increase in sediment from a low to moderate intensity prescribed burn are relatively minor, and similar to pre-burn condition after 3 years.

3) The prescribed burn as proposed (low to moderate intensity) would have a much more favorable impacts when compared to a wildfire.
4) Post-fire visual monitoring would be conducted to determine potential for increased sediment into perennial creeks supporting aquatic biota, namely Pioneer Creek, Chalk Creek, and Meadow Creek. Actions such as reseeding are an option to lessen the amount of erosion and improve vegetation cover if necessary, other options have been discussed in the soils report. These options would be implemented if the monitoring determines that they are necessary.
5) The Horse Hollow Unit boundary is more than 400 feet from lower Chalk Creek, reducing the potential impacts to that stream. Treatments in the Meadow Unit are also approximately 300 feet or more from Meadow Creek.
6) The treatment areas are less than 16% of the sub-watersheds within the analysis area that contain resident trout. Most of the treatment areas will not have any impact on watersheds that contain perennial streams and aquatic species.
7) The proposed treatments would reduce the risk of a wildfire in the drainages treated (approximately 2-4% of the analysis area).
8) There are no adverse cumulative effects of this project on macroinvertebrates or resident trout (see cumulative effects section).

Migratory Birds

One of the reasons Management Indicator Species (MIS) were identified was that these species would be representative of other species (Forest Plan II-28 through 31). MIS were selected to reflect the impacts of different management activities on wildlife; this concept can be applied to migratory birds since many MIS identified species are also migratory birds.

The key comparison element for evaluating how the alternatives affect migratory bird species is the amount of habitat affected.

Effects of Alternative 1; No Action

If the No Action Alternative were selected there would be no direct adverse effects on the population numbers or viability of these species.

Alternative 1 would have no direct effects on migratory bird species, as no habitat would be treated. As a potential unknown effect, if a high-intensity wildfire were to occur, wildlife habitat would be moderately altered depending on when, where, and how a wildfire occurred; revegetation time would be longer due to potential hydrophobic sterilization of the soil. A wildfire may occur during breeding or nesting seasons and would result in isolated mortality.

Effects of Alternative 2; Mechanical thinning treatments and/or prescribed burning

The Action Alternative may affect individual migratory bird species, but would not adversely affect population numbers or viability of these species. Individuals could

be displaced or killed if a prescribed burn were done during nesting seasons (mainly May through mid-July).

Table 10. Vegetation types affected by the proposed action, percentage and acres treated compared to the analysis area.

Vegetation Types	Number of Acres in Treatment Units	40-80% of Acres Treated	Total Number of Acres in Analysis Area	Percentage of Acres Treated Compared to Analysis Area
Aspen	0	0	10,948	0.0%
Communities	0	0	1768	0.0%
Cropland	0	0	23,400	0.0%
Gambel Oak	4547	1819-3638	72,413	2.5-5.0%
Mountain Mahogany	0	0	19,102	0.0%
Mountain Shrub	0	0	555	0.0%
Pinyon/Juniper	6604	2642-5283	56,733	4.7-9.3%
Riparian	32	*0	2066	0.0%
Sagebrush/Grass/Forb	3144	1258-2515	70,573	1.8-3.6%
Semi-desert Shrubs	0	0	14	0.0%
Spruce/Fir	0	0	29,903	0.0%
Total	**14,329**	**5719-11,436**	**287,475**	

*No acres in the riparian type will be treated

No loss of viability to migratory bird species is anticipated for the following reasons:

1) The prescribed burns would be implemented in a mosaic burn pattern where 40-80% of approximately 14,329 acres would be treated (5719 to 11,436 acres) within a 287,475-acre analysis area. This would leave more than 275,000 acres untreated within the analysis area to be utilized by these species.
2) An estimated 2.5-5.0% of the Gambel oak vegetation type; 4.7-9.3% of the pinyon-juniper vegetation type; and 1.8-3.6% of the sagebrush/grass/forb vegetation type, will be treated when compared to the analysis area. All other vegetation types will be untreated.
3) The treatment units are widely scattered within the 287,475-acre analysis area, leaving many areas untreated and available for habitat needs. Additionally, there are many more thousands of acres available to these species outside of the analysis area.
4) A prescribed burn will improve the foraging habitat for many of these species. Fire would create patches or a mosaic of early seral plant species, which will benefit many bird species. The creation of early seral plant species would help

create size, age, and species diversity important in maintaining functioning ecosystems and create or maintain habitat for a number of migratory birds.

5) The proposed treatments should reduce the risk of a wildfire in the drainages treated (approximately 2-4% of the analysis area).
6) There are no adverse cumulative effects of this project on migratory birds (see cumulative effects section).

CUMULATIVE EFFECTS

This cumulative effects section considers the effects to the MIS species migratory birds discussed in this report. The cumulative effects analysis area (CEA) consists of the Pahvant Mountain Range (an area of approximately 400,000 acres, see attached map). This area was identified based on the species being evaluated in this report and also on their expected use during their presence of the analysis area. The CEA includes known or predicted spring, summer, and/or fall use by the species analyzed within this document.

The cumulative effects being described include past, present, and reasonably foreseeable future actions. These effects would include:

vegetation treatment projects
cattle grazing
recreational activities
wildfires
various special uses
habitat fragmentation

Vegetation treatment projects would include: chaining of pinyon and juniper trees, noxious weed control, pinyon and juniper thinnings, prescribed burns, and Mormon cricket control.

Chaining projects were completed on numerous acreages (approximately 7000-10,000 acres) of public lands mostly in the 1970's or before. These projects were done by dragging a heavy anchor chain between two large bulldozers to uproot mature pinyon and juniper trees. Following the chaining most of these areas were reseeded with a variety of native and non-native plant species. These projects were done primarily across the foothills of the Pahvant Mountain Range on areas with gentle slope. The projects were primarily done to increase the amount and quality of forage for livestock but also had beneficial effects for many wildlife species, especially deer and elk.

Thinning projects have been completed in recent years (<10 years), these projects are designed to remove the small pinyon and juniper trees that are re-establishing within the previously chained areas. Initially many of the chaining projects had too large of openings created than preferred by big game, these thinning projects are designed to

leave some pockets of trees to allow travel corridors and hiding/thermal cover for wildlife. These projects are beneficial to most wildlife species by keeping the areas productive and not becoming a closed canopy pinyon-juniper community with few understory plants.

Noxious weed control has been implemented and is ongoing within the analysis area, as needed to control these undesirable species. It is a requirement of the State of Utah to control these plants. Certified applicators apply the chemicals to site specific infested areas. These spot treatments have minimal effects to the MIS and migratory bird wildlife species.

Prescribed burns have been accomplished within the analysis area in recent years (<10 years). Most of these burns have been small in size (<250 acres), many of these burned areas have been seeded following the burns. These smaller burns have opened up decadent areas generally dominated by seral pinyon and juniper trees to provide foraging areas for wildlife. The effects of these projects on the MIS species would be similar to those described in the action alternative.

Mormon cricket control has been done for the past 2-3 years and is ongoing as needed on public and private lands within the analysis area. The actual amount of acreage treated within the analysis area has been very small, mainly near the mouth of Kanosh Canyon and just east of Holden. Specific environmental assessments have been prepared by the Forest Service and the BLM prior to baiting crickets. The impacts to wildlife are minimal when the bait is applied as specified in these documents. The affects to wildlife has been analyzed is the Final Environmental Impact Statement produced by Animal Plant Health Inspection Service (APHIS) entitled *Rangeland Grasshopper and Mormon Cricket Suppression Program* (see pages 29-35 of this document). Control of crickets can increase the amount of forage and cover available to wildlife that would be eaten by crickets if untreated.

Cattle grazing has occurred for over 100 years within the analysis area (see range report for a description of current grazing use). Standards and guidelines for livestock grazing have been established in specific plans and are administered by rangeland specialists. Generally these plans permit moderate grazing utilization levels and incorporate a deferred or rest rotation system to allow for improved plant vigor and residual biomass. Livestock grazing has also provided water sources across allotments from water troughs, pipelines, and stock ponds. These additional water sources have expanded wildlife habitats into areas that were limited by watering places historically. Moderate grazing pressures would probably have a negligible effect on the MIS wildlife and migratory bird species considered.

Recreational activities occur across the analysis area such as: camping, hunting, fishing, day use activities, and All-Terrain Vehicles (ATV) riding (see recreation report for a description of recreational uses within analysis area).

Camping is an ongoing activity that occurs mainly in the summer and early fall months. There are five picnic grounds and one campground on Forest Service System lands within the analysis area. These sites have removed small parcels of land from use by some wildlife species. Activities associated with campers may have short-duration disturbance impacts on wildlife causing these species to temporarily avoid areas where humans are present.

Hunting is permitted across the analysis area during specified hunting seasons, hunting is managed by the Utah Division of Wildlife Resources. Elk are hunted on a limited entry basis with approximately 20-25 mature bull permits and approximately 75-100 cows tags authorized (recent management), most of these hunters are successful (>75%). Mule deer are hunted in three separate seasons (archery, muzzleloader, and general rifle) by hunters that obtain a deer tag for the Southern Region. Hunter success is usually around 30%. Herds are managed in accordance to established herd unit objectives. Most hunting seasons are in late summer or fall seasons after important nesting/birthing periods; many of the wildlife species have migrated from the analysis area by the time hunting seasons occur.

Fishing occurs on perennial streams within the analysis area. The fishing limits are regulated by the Utah Division of Wildlife Resources. Activities associated with fishing would have a short-duration impact on wildlife species.

Many day use activities occur throughout the analysis area such as picnicking, sightseeing, antler shed hunting, horseback riding, etc. These activities are short duration by definition and the impacts of such to wildlife are minimal causing these species to temporarily avoid areas where humans are present.

ATV (All-terrain Vehicles) riding is a popular activity by many local residents and others that come from all over the United States to experience trails open to ATV's. A national ATV jamboree occurs in June each year attracting 250-400 ATV riders (a separate Environmental Assessment for this event has been prepared). The impacts to wildlife are usually short-duration from this activity causing these species to temporarily avoid areas where humans are present.

Many wildfires have occurred throughout the analysis area. The Pahvant Mountain Range is a fire-adapted ecosystem, and there have been numerous wildfires historically. In the past 10 years there have been a few large fires within the analysis area: Adelaide Fire in Kanosh Canyon burned over 16,000 acres, Dog Valley Fire east of Cove Fort burned 2,000 acres, Meadow Bench Fire east of Meadow burned 300 acres, Swains Fire east of Holden burned 10,000 acres, Shingle Mill Fire and Black Cedar Fire east of Fillmore burned about 1000 acres each. Many of these fires destroyed large tracts of important habitats for wildlife, especially critical big game winter range, because they burned in summer months when they could not be controlled. Many of these burned areas were seeded following the fires and now provide quality forage for wildlife, however, hiding and thermal cover are generally lacking in these past wildfire areas. Wildfires will likely continue to occur within the analysis area.

Special uses occur throughout the analysis area such as: firewood and post cutting, municipal water developments, small mining claims, irrigation diversions, outfitter and guide operations, roads, etc. Special uses such as these are authorized by Special Use Permits; usually these permits require a separate environmental assessment, which discloses the impacts from these activities. Also, low standard dirt roads have the potential to add sediment in to streams and affect aquatic biota.

Interstate I-15 runs west of the Pahvant Mountain Range along the west of the analysis area. This interstate with its associated deer/elk fence has caused some fragmentation of winter range for elk and deer, however, quality winter range does exist east of the freeway.

The effects of the activities listed above, in combination with the proposed project, are not expected to cause measurable changes to the species discussed in this report. The action alternative would not adversely affect population numbers or viability of MIS or migratory bird wildlife species. The activities listed above are not expected to increase as a result of this action. Some activities such as grazing, and recreational uses are likely to decrease after a burn. This decrease in use would likely be short term in duration (2-5 years) until re-vegetation occurs.

MANAGEMENT RECOMMENDATIONS

A mosaic burn pattern should be designed and implemented by the burn boss and ignitions specialists. Unburned islands should be left to allow for added edge effect providing foraging and hiding cover for wildlife species.

As a general suggestion for most wildlife species, late summer and fall burns are preferred over spring burns so that nesting and birthing periods aren't disrupted.

Trees containing cavities should be retained when observed by personnel doing the mechanical thinning project.

Give priority to reseeding projects or erosion control measures in treatment units where needed to avoid erosion into perennial streams, namely Pioneer Creek, Chalk Creek, and Meadow Creek.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

There will be no irreversible or irretrievable commitment of resources associated with selection and implementation of the proposed action that affects wildlife species.

LITERATURE CITED

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Report prepared by Stan Andersen, wildlife biologist, Fishlake National Forest.

Date: