Kaibab National Forest

Forest Plan Monitoring Report

Fiscal Year 2010

All cover photos credit U.S. Forest Service, Southwestern Region, Kaibab National Forest. Clockwise from top left: Eagle Rock Fire burned area emergency rehabilitation, fall color on Bill Williams Mountain, Spring Valley Cabin rental, assembling mist netting for bat survey on the North Kaibab
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Introduction

The Monitoring Plan for the Kaibab National Forest (KNF) is outlined in the current Land and Resource Management Plan and identifies 58 items in 11 categories (timber, protection, range, recreation, heritage resources, wilderness, visual resources, soil, land management planning, wildlife, and facilities) to be tracked as measures of the effectiveness of the forest plan. Monitoring reports from previous years and the current Forest Plan (as amended), which contains the Monitoring Plan, can be accessed at http://fs.usda.gov/goto/kaibab/planning or provided upon request. This report provides information on current and recent accomplishments by resource or concern area.

The management situation on the KNF was analyzed in the 2009 Comprehensive Evaluation Report (CER) and Supplement to the CER (2010). The CER evaluated the need for change in light of how management under the current Plan (as amended) was affecting the conditions and trends related to sustainability. The Supplement to the CER contains additional analysis and information about projections of demand, benchmarks, and species considerations. Together, these documents meet the content requirements of the Analysis of the Management Situation (AMS). These documents are available for review and are located on the forest's Web site at http://fs.usda.gov/goto/kaibab/plan_rev_docs or by request. The Kaibab National Forest is currently revising its Land and Resource Management Plan in response to the needs for change identified in the AMS. Chapter 5 of the revised plan will include a revised monitoring plan, which is being designed to better inform progress toward desired conditions and support adaptive management.

Timber (1, 2, 5, 8, 9)[1]

The timber program is an integral part of the Kaibab National Forest's efforts in fuels reduction, forest health, wildlife habitat enhancement, and watershed improvement. Timber sales are an efficient way to accomplish needed thinning and other treatments by capitalizing on the value of the wood removed. The Kaibab Forest plan was amended in 1996. Since then, most harvests have been commercial thinning or group selection cuts designed to make progress toward the desired size-class distribution of ponderosa pine and reduce hazardous fuels that are the result of decades of fire suppression.

The downturn in the economy, especially the housing market, has had a severe negative impact on the timber industry. The decline in demand for wood products (everything from structural lumber to wood pallets for carrying construction materials) has driven prices down, often below the cost of harvesting, hauling, and processing of the timber. However, a few commercial timber projects continue to take place.

On the Williams and Tusayan Ranger Districts, the Moose Stewardship Agreement, located nine miles southeast of Williams, AZ, was awarded in Fiscal Year (FY) 2010. The project will treat 1,219 acres with commercial logging as well as accomplish other stewardship treatments such as non-commercial thinning and road improvements. This contract will provide 6,986 CCF (hundred cubic feet) of commercial wood fiber.

In addition to the timber sales program, the Williams and Tusayan Ranger Districts sold 477 cords of commercial fuelwood, issued 8,533 cords worth of free and paid personal use fuelwood permits to meet local home heating needs, and issued an additional 152 cords of fuelwood for ceremonial use by members of the local Native American community. Permits were also sold for Christmas trees, fence posts, pine poles, decorative wood, wilding transplants, and pine cones.

[1] Numbers in parentheses correspond with specific monitoring targets outlined in the current KNF Forest Plan.

On the North Kaibab Ranger District (NKRD), the district timber staff prepared, offered and awarded 10,076 CCF (5,496 MBF [thousand board feet]) of volume from eight Warm Fire Recovery salvage timber sales, designed to treat approximately 2,925 acres. During FY 2010 the ongoing North Kaibab Hazard Tree Removal stewardship contract was administered for the removal and slash treatment of trees killed by the 2006 Warm fire within 100 feet striking distance over an estimated 20+ miles of public-accessible forest system roads and five miles of the Arizona Trail. During FY 2010 the timber staff was also able to begin preparing an additional eight salvage sales from the Warm Fire for FY 2011 offers.

In addition to the timber sales program, the NKRD issued permits for and sold 3,765 cords of personal use dead fuelwood for local home heating needs, 150 bushels of green blue spruce seed cones, and about 45 CCF of dead post and poles plus 666 personal use Christmas trees. During FY 2010 the NKRD also issued permits for a combined total of about 20 cords of Ceremonial free use dead oak and free use green piñon/juniper. In May 2010, the NKRD planted 900 acres of the Warm Fire area with 247,000 ponderosa pine and 6,000 Douglas-fir seedlings, averaging about 280 seedlings per acre. This planting effort was funded by a $140,000 grant through the National Forest Foundation and the Salt River Project.

Table 1. Timber resource outputs and accomplishments for FY 10.

Resource	Monitoring Item	Unit of Measure	FY 10 Output
Precommercial thinning	Timber 1	Acres	2,416
Commercial thinning	Timber 2	Acres	1,219
Planting	Timber 5	Acres	900
Sawtimber and roundwood	Timber 8	CCF	6,956
All fuelwood	Timber 9	CCF	12,927
Christmas trees	NA	Each	2,054

Insects and Disease (Protection 1)

The KNF plan revision team identified insect/disease outbreaks as a moderate risk to ponderosa pine (Kaibab National Forest 2008). This risk is largely a function of stand density. Across the southwest increased stand densities resulting from years of fire exclusion have created prime conditions for insect epidemics and disease outbreaks, particularly among older trees (Arno 2008). In general, ponderosa pine mortality in the southwest has increased as a result of drought and more frequent bark beetle attacks (Kolb *et al*. 2007).

Historically, the western pine beetle has been the most aggressive damaging agent to ponderosa pine (Lynch *et al*. 2008). Since 2003, however, damage by western pine beetle has been surpassed by the *Ips* genus, an aggressive beetle that favors denser forests and smaller tree diameters. It is expected the high levels of ponderosa pine mortality will continue to occur throughout the region as a result of high population sizes and dispersal distances associated with *Ips* and other aggressive bark beetles (Allender *et al*. 2008). Overall, tree mortality from mountain pine beetle outbreaks has decreased on the Kaibab plateau since 1997 (USDA 2008).

In general, spruce-fir is less prone to large-scale insect outbreaks than ponderosa pine because it occurs in relatively limited amounts, in colder environments, and because fire suppression has not had an overt impact on this particular forest type. Minor outbreaks may occur every 2-4 decades (Lynch *et al*. 2008). Spruce beetle outbreaks have been minimal on the KNF. The most significant outbreak affected approximately 1,000 acres in the 1990s. Defoliator activity continues to be low due to limited host availability (USDA 2008). There is no evidence of western balsam bark beetle attacks, which primarily affect corkbark and subalpine fir (Lynch *et al*. 2008). On the NKRD, root disease has caused continued mortality since 1991 at DeMotte Campground.

Although common continentally, aspen is threatened regionally. As a result of increased fire suppression activities, unchecked forest succession, overgrazing and over browsing by elk, and insects and disease, aspen stands are currently in decline in most of the southwest. The KNF has experienced extensive aspen defoliation events caused by Western tent caterpillars, large aspen tortrix, melamspora rust, and black rust since the 1940s, although in general, mortality has been minimal until now. Recently, the effects of these causal agents have been exacerbated by weather events such as severe drought. Since the late 1990s, these abiotic agents have acted cumulatively with regard to insects and disease to cause accelerated dieback and mortality (Lynch *et al*. 2008).

Increases in tree density and canopy cover and loss of understory plant cover and diversity were identified as the primary threats to piñon-juniper (Kaibab National Forest 2008). Several studies have shown that density-dependent factors are especially impacting the piñon pine component of the piñon-juniper system. Areas with high tree density experience higher levels of competition. In the past, fire has been the primary disturbance agent affecting piñon-juniper, but insects, drought, and disease are becoming more influential. Increasing levels of mortality caused by the piñon *Ips* beetle may be attributable to increased levels of dwarf mistletoe infection, competition from higher densities of large diameter trees, and stressors inherent in drought and higher temperatures (Lynch *et al*. 2008). Changes in climate are likely to exacerbate the situation.

According to the 2010 Forest Insect and Disease Aerial Survey completed by the Arizona Zone Office Forest Health staff on August 10-11, 2010 (Table 2), bark beetle activity increased from 359 acres mapped in 2009 to 579 acres in 2010. *Ips* bark beetles in the ponderosa pine type increased from 196 acres in 2009 to 489 acres in 2010. Crown dieback was recorded on 23 acres of sapling-sized ponderosa pine. Pine sawfly (*Neodiprion fulviceps*) defoliation was recorded in 2010 on 1,143 acres in the Ponderosa pine type on the north side of Kendrick Mountain in the Williams Ranger District (Table 3). Aspen defoliation continues to decrease, with 4,667 acres recorded in 2009 and 2,815 acres recorded in 2010 (Table 3). The introduced spruce aphid, *Elatobium abietinum*, was found defoliating Engelmann spruce on the North Kaibab Ranger District in 2009 and will be surveyed during the winter of 2010 (Anhold 2010).

Table 2. Bark beetle conditions report for the Kaibab National Forest in acres[*]

Bark Beetle	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Western pine beetle	15	0	7,833	3	26	410	9	94	16	27
Mountain pine beetle	0	4	79	0	0	0	3	0	0	0
Ponderosa pine *Ips*	35	6,012	64,195	29,807	23	6,850	215	343	196	489
Douglas-fir beetle	0	0	1,282	615	2,510	850	251	106	89	53
True fir complex[†]	80	80	365	1,065	1,211	105	252	17	57	0
Fir engraver	0	0	0	0	0	0	0	0	0	5
Cedar bark beetle	0	0	0	0	0	0	0	0	1	0
Piñon *Ips*	470	1,269	158,951	6,922	6	15	0	1	0	5
Total:	**600**	**7,365**	**232,705**	**38,412**	**3,776**	**8,230**	**730**	**561**	**359**	**579**

[*]Acreages are only reported for the Kaibab National forest in this table.
[†]True fir complex includes fir engraver and/or western balsam bark beetle.

Table 3. Defoliator conditions report for the Kaibab National Forest in acres*

Defoliator	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Spruce budworm	9,515	0	0	0	0	0	0	0	0	0
Pine sawfly	0	0	0	0	0	0	0	0	1,223	1,143
Aspen defoliation	11,525	16,370	951	17,782	22,664	28,415	76,185	65,204	4,667	2,815
Cenangium canker	0	0	0	0	0	0	0	0	0	1,444
Abiotic factors	0	4,129	2,522	14,683	2,988	210	0	1,738	231	1,495
Total:	**21,040**	**20,499**	**3,473**	**32,465**	**25,652**	**28,625**	**76,185**	**66,942**	**6,121**	**6,897**

*Acreages are only reported for the Kaibab National forest in this table.

Fire and Fuels Management

Restoring fire-adapted ecosystems remains one of the Forest's highest priorities. In 2010, fire managers reduced hazardous fuel accumulations on 9,031 acres of Kaibab National Forest lands. Fuels treatments included prescribed fire, thinning, and piling.

Just over half of these acres were treated using prescribed burns under conditions that produce low to moderate intensity fires that remove accumulations of forest litter and debris. Prescribed burns greatly reduce the risk that a wildfire start during hot, dry, or windy conditions will burn with high severity. Prescribed fire remains the most cost effective and immediate fire hazard reduction treatment available to fire managers.

Moist conditions during the year decreased the number of acres that fire managers could treat with prescribed burns, but were favorable for burning a backlog of piles that had been created over the past several years. A total of 3,316 acres of piles were burned in 2010.

In addition to prescribed and pile burning, Kaibab Hazardous Fuels Reduction funding was used to thin 67 acres and to pile 782 acres of slash. While considerably more costly than burning, thinning and piling slash in dense stands of timber has a longer-term effect on reducing fire hazard. Thinning decreases the "ladder fuels" that enable a wildfire to move from the ground into tree canopies. It also creates openings between groups of trees, thereby reducing the likelihood that a single or an isolated group of torching trees will become a moving crown fire.

Over the course of the 2010 season, fire managers responded to 87 fires. Many fires were quickly extinguished due to their location, cause, time of year, weather, and fuels conditions. However, Kaibab Fire Managers continue to manage naturally caused (lightning) wildfires to accomplish hazardous fuel reduction objectives when weather and forest fuel moisture conditions are favorable. In addition to hazardous fuel reduction, naturally-caused fires have other resource benefits such as improving and protecting wildlife habitat, recycling soil nutrients, improving forage production, and maintaining or improving stand structure. These fires typically burn at low intensities, but occasionally result in isolated pockets of moderate to intense fire behavior. These fires are actively managed. Specialists from all forest resource disciplines participate in the decision process to determine where the fires will be allowed to spread, what values are at risk, and how these values will be protected. Fire Managers and firefighters implement the resulting plans, sometimes over the course of several weeks.

In fiscal year 2010, four fires (Juniper, Wash, Tank, and Saffron) on the KNF were managed to achieve resource objectives, burning a total of 1,924 acres. This is a fraction of the 44,568 acres that were treated

with 12 wildfires in 2009. This decrease was due to late snowpack in the spring, the early onset of monsoons, and an overall decrease in the number of lightning-caused fires. The Juniper Fire was 16 miles northeast of Williams on the Williams Ranger District. The Wash and Tank fires were 8 miles southeast of Tusayan on the Tusayan Ranger District. The Saffron Fire was on both the North Kaibab Ranger District and Grand Canyon National Park, and afforded the second opportunity in two years to manage fire across jurisdictional boundaries.

Between the 9,031 acres that were treated using funds allocated to the Forest for hazardous fuels reduction and the 1,924 acres of wildfire managed to achieve resource objectives, a total of 10,955 acres were treated in the 2010 fiscal year.

Range (Range 2)

The Forest administered grazing on 31 allotments (24 on the Williams/Tusayan districts and 7 on the North Kaibab) during 2010. In 2010, *permitted use* on the KNF was 72,132 Animal Unit Months (AUMs) and *actual use* was 40,328 AUMs. Permitted use has stabilized and is expected to remain relatively constant for the foreseeable future. Information on permitted use and actual use by ranger district in 2010 is shown in Table 4.

Table 4. Permitted and actual use (AUMs) by Ranger District, 2010

District	**Permitted Use**			**Actual Use***		
	Horses	Sheep	Cattle	Horses	Sheep	Cattle
North Kaibab	0	0	8,277	0	0	5,746
Tusayan	0	0	12,626	0	0	2,165
Williams	252	11,770	39,207	295	11,952	20,170
Total:	**252**	**11,770**	**60,110**	**295**	**11,952**	**28,081**

*In the case of horse and sheep AUMs on the Williams district, actual use exceeded permitted use because the District Ranger has the authority to grant small increases in actual use based on forage conditions. This was the situation during 2010 due to exceptionally good moisture.

On the North Kaibab Ranger District, a new trick tank was constructed on the Ryan Allotment in a Forest Service/permittee cost share agreement, final reconstruction of a fence damaged in the 2006 Warm Fire was completed, headcut repair and/or dirt tank cleaning was completed on five different locations affected by fire flooding, and the Central Winter Allotment was monitored for long term vegetative condition and trend.

Wild Burro Population (Range 1)

The KNF conducted a helicopter survey of burro populations on July 22, 2010. A total of 51 burros were seen (46 adults and 5 juveniles). The majority (>30) were seen west of Double A Lake. The 51 burros are believed to represent 30-50% of the actual population. Ohmart *et al.* (1978) suggest that the best any aerial survey can count is approximately 30-35% of a population. The 30-50% range results in an estimated burro population at 102-153 head (Hydock 2010). Burro populations are higher than the desired range of 22-35 animals. A burro gather began in 2009, which should help bring the burro population closer to desired numbers. As a part of this effort, in 2010, 95 burros were gathered and removed from the Double A Wild Burro Territory.

Noxious Weeds (Range 4)

Noxious weeds were controlled on 4,509 acres through use of herbicide, hand pulling, and biological treatments. Species treated included dalmatian toadflax, bull thistle, leafy spurge, scotch thistle, musk thistle, diffuse knapweed, and cheatgrass. These treatments improved native plant composition and density, with increased ground cover and watershed protection benefits.

The North Kaibab Ranger District began an experimental, 3-year project to combat cheatgrass invasions that resulted from the 1996 Bridger-Knoll Fire. For the first two years of the project, 963 acres of cheatgrass will be treated with herbicide in the Buckhorn area, on the northwest side of the Kaibab Plateau. Native grasses and shrubs will be reseeded in the fall of 2011.

Recreation (4)

The Kaibab National Forest, in cooperation with Arizona State University's School of Community Resources and Development, completed the third round of National Visitor Use Monitoring (NVUM) in 2010. This monitoring involved surveying Forest visitors on all three of the Forest's districts to better understand what sites and facilities they use, how long they stay, and how satisfied they are with their experience. Survey information is currently being compiled and has not yet been released.

Developed recreation capacity on the KNF, measured in people-at-one-time (PAOT), did not change between fiscal years 2009 and 2010. Table 5 details this developed recreation capacity by site type.

On the Williams Ranger District, major improvements began at Kaibab Lake Campground in 2010. Improvements to the campground include new pavement, new parking spurs, new campsite amenities such as fire rings and picnic tables, more day-use parking for improved fishing access, additional day-use picnic sites, improved ramadas, additional small group capacity, and a new camping loop with an additional 10 to 15 campsites. Additionally, the Forest completed renovation of the Spring Valley recreational rental cabin and replaced six toilet buildings at White Horse Lake and Kaibab Lake campgrounds. This work performed, in FY 2010, will be realized in changes to PAOT in FY 2011.

Table 5. Developed recreation capacity by site type, Kaibab National Forest, 2010.

Site Type	2010 Capacity Offered (in PAOT*)
Campground	371,013
Day Use Areas	16,260
Fishing Sites	157,045
Group Campground	40,781
Interpretive Sites	150,788
Rental Cabins	4,380
Observation Sites	41,810
Snowplay Area	4,770
Picnic Areas	59,940
Trailheads	334,315

*PAOT = people-at-one-time

On the Tusayan Ranger District, the historic Hull Cabin was added to the "Rooms with a View" cabin rental program on Arizona national forests. This cabin is now available for reservation by members of the public through the National Recreation Reservation System. The KNF also replaced three toilet buildings at Ten-X Campground.

On the North Kaibab Ranger District, Jump Up cabin, a former ranger station that is now available for campers on a first-come first-served basis, received new flooring, new windows, a new stove, and exterior repairs. Funding for this work was provided through the American Recovery and Reinvestment Act (ARRA) of 2009.

Heritage Resources (1, 2, 3)

Using funding from ARRA, the Forest completed restoration projects on a number of historic cabins and facilities in fiscal year 2010. Kaibab archaeologists also conducted 49 heritage presentations and tours for more than 1,000 participants from school groups, Forest Service organizations, local tribes, archeological societies, professional archaeological organizations, and universities. Forest archaeologists received several awards for this interpretive work.

In all, in fiscal year 2010 Forest archaeologists authored 67 heritage resource clearances for forest projects. More than 51,000 acres of inventory were conducted, and archaeologists identified 426 new archaeological sites. Archaeologists also monitored and documented the condition of 197 sites on the Forest. These included 23 priority heritage assets monitored and managed to standard. Finally, 250 acres of non-project related survey were conducted, which resulted in the identification of 49 new heritage properties.

During fiscal year 2010, the Kaibab National Forest continued to work closely with tribes on a variety of issues. Forest managers attended 12 government-to-government consultation meetings and field visits. Tribal relations staff conducted an additional 13 meetings and field visits. Significant accomplishments stemming from this consultation work included implementing a firewood permit program at the Kaibab Navajo liaison's office in Cameron, through which more than 100 permits were issued for free-use, personal, and ceremonial use firewood; working with the Havasupai Tribe, Hopi Tribe, Hualapai Tribe, Navajo Nation and Pueblo of Zuni to produce a traditional cultural property determination for Red Butte, a site of cultural and religious significance to these tribes on the Tusayan Ranger District; and facilitating traditional use of the Forest by tribal members, including facilitating collection of medicinal plants and other forest products.

The Forest also continued to collaborate with tribes to incorporate tribal concepts and issues into the revised Kaibab National Forest Land Management Plan. Since 2007, the Kaibab has met 27 times with tribes to discuss the revised plan. Many issues of concern for tribes are currently addressed in the revised plan including management of important resources such as seeps, springs, and plants; management of traditional cultural places; and management of ski areas and other recreational sites.

Also in 2010, the Kaibab held a series of meetings and field visits with the Navajo Forestry Department to develop a collaborative approach to managing Forest Service lands adjacent to the Navajo Nation. The goal for this project is to develop a management approach that promotes landscape restoration while providing for traditional use of the area by Navajo tribal members. In addition, the Kaibab Navajo liaison worked with the Natural Resource Conservation Service to host a conservation day at the Cameron Chapter House. At the event, the Forest Service and other government agencies presented information on various topics including livestock management, crop preparation, and resource management.

Finally, the Kaibab Navajo liaison is working with Navajo seniors to document oral histories regarding places and resources of the Kaibab.

Soils and Watershed

Fire rehabilitation projects completed in 2010 included grass seeding 100 acres on the Wild Horse Fire; seeding 50 acres on the Twin Fire; straw mulching 660 acres on the Eagle Rock Fire; cleaning 11 stock tanks/sediment traps on 3 different fires; establishing erosion control; repairing 10 miles of road; cross falling trees on steep slopes within the Wild Horse and Eagle Rock Fire areas; water barring and rehabilitating fire lines on the Eagle Rock and Twin Fires; repairing fences; and eradicating noxious weeds.

Grassland maintenance projects were completed on 1,801 acres to improve soil and watershed conditions. This work focused on former grasslands that have been encroached by piñon and juniper trees. Monitoring has indicated a substantial improvement in ground cover conditions following treatment.

Wildlife

Wildlife and Fish Non-Structural Improvement (Wildlife 1)

Ida Grassland Maintenance Project – About 1,800 acres were treated in 2010 in order to improve habitat for pronghorn antelope, elk, and other wildlife species by thinning juniper and pine to maintain an open grassland/savanna habitat structure in historic grasslands on the north part of the Williams Ranger District. The project area serves as important habitat for pronghorn and elk, and provides habitat connectivity to state and private lands to the north where other grassland maintenance treatments have been occurring. In addition to pronghorn and elk, this project provides long-term benefits to many species of wildlife associated with grassland and savanna habitats, including Gunnison's prairie dog, badger, spotted ground squirrel, vesper sparrow, horned lark, northern harrier, western meadowlark, barn swallow, barn owl, and burrowing owl.

Wildlife Structural Improvements (Wildlife 2)

East Lake Fencing – East Lake is a natural lake on the North Kaibab that supports aquatic vegetation and likely marsh birds. Fencing the lake protects the water quality and wetland vegetation from free-range cattle. The KNF used volunteers with the Grand Canyon trust to construct an above-ground cedar post and lodgepole fence to protect unique aquatic habitat.

Southzone Fence Improvement Project – In spring 2010 the KNF received $39,900 from the Arizona Game and Fish Department's Waterfowl Conservation Fund to protect and enhance riparian habitat that supports numerous resident and migratory bird species on the Forest. Project goals were to 1) protect and enhance riparian habitat for numerous resident and migratory waterfowl and land bird species on the KNF, subsequently improving sport and recreational opportunities on KNF lands; 2) improve breeding, nesting, and foraging habitat for resident and migratory waterfowl, including dabbling ducks, grebes, herons, and osprey; 3) improve vital stopover habitat for migrating avifauna throughout the region, which will benefit migratory land bird and waterfowl species at the broader landscape scale by promoting landscape connectivity; and 4) reduce long term costs of fence maintenance by using improved material and fence techniques to reduce ungulate damage and resist damaging environmental agents such as tree fall. This project focused on three fence exclosures that have deteriorated over the years: Scholz Lake, Mineral Lake, and Perkins Tank. Collectively these exclosures protect approximately 400 acres of potential waterfowl and land bird habitat. Actual project work began in October 2010 and was completed in November 2010. A total of approximately six miles of fence were repaired and/or replaced. A reinforcing steel top cable was added to all three exclosures to minimize future maintenance. Each bottom wire was positioned 18 inches from the ground and replaced with a smooth wire. This complies

with best management practices and the KNF's commitment to maintaining wildlife (e.g. pronghorn) friendly fences. Elk jumps and goat bars were added to each fence. When necessary, gates were reinforced by adding additional wood stays. Fallen trees were removed from the fence and the existing fences were repaired as needed (Foster 2011).

North Canyon Creek habitat restoration project – This project restored 29 failing dams that create pools in the shallow creek where trout can live during the winter or during periods of low water flows.

Goshawk and Owl Nest Location Occupancy and Productivity (Wildlife 4)

Mexican spotted owl monitoring – Six Mexican spotted owl Protected Activity Centers (PACs), totaling 4,846 acres, were surveyed on the Williams Ranger District. Owl detections occurred in only one of the PACs during the 2010 breeding season. No new PACs were established in 2010.

Northern goshawk surveys – Goshawk surveys were conducted within the McCracken, Russell, and Scott project areas, as well as within four known goshawk territories on the Williams District, in an area totaling approximately 5,000 acres. Dr. Richard Reynolds continued to perform goshawk monitoring in conjunction with the KNF on the North Kaibab Ranger District.

Management Indicator Species Monitoring (Wildlife 5, 7, 8, 9, 15, 16, 17, 19, 20)

Bird Monitoring – The Kaibab National Forest continued its multiyear project with Rocky Mountain Bird Observatory to gather long-term trend data for populations of most diurnal, regularly breeding bird species in the forest. In the short term, this program provides information needed to effectively manage and conserve bird populations in Kaibab National Forest. It also supports the Forest's efforts to comply with requirements set forth in the National Forest Management Act and other statutes and regulations. Field technicians surveyed 45 of 45 planned transects throughout KNF in 2010. Technicians conducted 546 point counts within the 45 transects between 19 May and 5 July 2010. Survey efforts detected 5,282 birds of 102 species (Table 6), 14 Abert's squirrels, and 11 red squirrels.

Table 6. Estimated densities per km^2 (D), population sizes (N), percent coefficient of variation of estimates (%CV), and sample sizes (n) of breeding bird species in Kaibab National Forest, 2010. Management Indicator Species are **bolded**.

Species	Year	D	N	%CV	n
Acorn Woodpecker	2010	0.27	1,627	51	3
American Crow	2010	0.09	213	42	5
American Kestrel	2010	0.10	244	60	2
American Robin	2010	6.73	40,342	22	65
Ash-throated Flycatcher	2010	14.44	86,483	15	173
Bewick's Wren	2010	6.55	39,210	28	45
Black-chinned Sparrow	2010	0.14	812	88	1
Black-headed Grosbeak	2010	11.06	66,274	24	55
Black-throated Gray Warbler	2010	27.15	162,616	17	211
Black-throated Sparrow	2010	3.30	19,776	64	25
Blue-gray Gnatcatcher	2010	60.91	364,836	51	48
Broad-tailed Hummingbird	2010	12.13	72,678	34	23
Brown-headed Cowbird	2010	5.40	32,351	21	34
Bushtit	2010	1.28	7,690	61	2

Species	Year	D	N	%CV	n
Cassin's Kingbird	2010	1.21	7,253	42	19
Chipping Sparrow	2010	47.40	283,897	16	160
Common Raven	2010	1.17	6,979	19	33
Cordilleran Flycatcher	2010	2.22	13,270	46	14
Dark-eyed Junco	2010	14.04	84,084	19	78
Eastern Meadowlark	2010	0.09	553	84	1
Gambel's Quail	2010	0.55	3,295	53	18
Grace's Warbler	2010	25.26	151,280	22	154
Gray Flycatcher	2010	35.78	214,347	15	169
Gray Vireo	2010	2.70	16,144	39	42
Hairy Woodpecker	2010	9.71	58,144	24	58
Hepatic Tanager	2010	1.85	11,096	37	14
Hermit Thrush	2010	8.23	49,268	30	50
Horned Lark	2010	2.36	14,126	88	13
House Finch	2010	1.69	10,096	29	21
House Wren	2010	2.53	15,184	48	16
Juniper Titmouse	2010	34.80	208,425	24	99
Lark Sparrow	2010	8.05	48,248	29	72
Lesser Goldfinch	2010	4.62	27,652	28	33
Mountain Chickadee	2010	21.08	126,289	26	112
Mourning Dove	2010	1.51	9,045	19	29
Northern Flicker	2010	3.66	21,928	17	64
Northern Mockingbird	2010	1.44	8,647	30	36
Phainopepla	2010	0.13	764	90	1
Pinyon Jay	2010	1.82	10,911	30	57
Plumbeous Vireo	2010	21.80	130,589	13	181
Pygmy Nuthatch	2010	33.82	202,590	23	115
Red-breasted Nuthatch	2010	0.77	1,933	66	5
Red-tailed Hawk	2010	0.08	190	71	2
Rock Wren	2010	1.26	7,538	35	23
Scott's Oriole	2010	0.38	2,298	65	6
Spotted Towhee	2010	13.26	79,412	26	102
Steller's Jay	2010	4.54	27,215	22	56
Vesper Sparrow	2010	3.98	9,962	37	65
Violet-green Swallow	2010	32.04	191,907	18	80
Virginia's Warbler	2010	4.19	25,071	44	25
Warbling Vireo	2010	36.85	220,759	38	60
Western Bluebird	2010	16.50	98,823	18	80
Western Kingbird	2010	0.24	1,417	91	2
Western Meadowlark	2010	1.24	7,409	44	41
Western Scrub-Jay	2010	6.00	35,914	22	75
Western Tanager	2010	10.43	62,486	15	120

Species	Year	D	N	%CV	n
Western Wood-Pewee	2010	4.63	27,718	23	104
White-breasted Nuthatch	2010	9.77	58,511	18	87
Yellow-rumped Warbler	2010	16.26	97,393	31	66

This project also contributes to the Rocky Mountain Bird Observatory's broader landscape-scale breeding bird monitoring program, which includes many different states in the U.S. Additionally, the KNF continued to partner with researchers at Northern Arizona University (NAU) to model habitat use by select bird species across the Forest.

Turkey population trend – Turkey population trends were monitored by the Arizona Game and Fish Department (AZGFD). The AZGFD reported that the population seemed to be stable with the only increase noted in Unit 9 on the Tusayan Ranger District.

Pronghorn – The Nature Conservancy (TNC) contracted with the KNF to conduct a study comparing habitat connectivity for pronghorn under the current Forest Plan to connectivity that would result from treatments identified under the proposed Plan. Using the PatchMorph algorithm and the Williams Ranger District (with the exception of habitat within Game Management Unit [GMU] 10) as the analysis extent, TNC found that the Williams District currently lacks connectivity for pronghorn across all major highways and between Government Prairie and the farthest north portion of the District. With the inclusion of proposed grassland restoration in priority areas, the model indicated a dramatic increase in functionally connected habitat across the District (Hurteau and Smith 2010).

Additionally, the KNF is working to reduce impacts to pronghorn herds by removing unnecessary obstacles to migration. To that end, Williams Ranger District biologists removed 2 miles of fence in a pronghorn migration corridor during fiscal year 2010. The work, which was completed in consultation with the Arizona Game and Fish Department, should facilitate pronghorn use of these important corridors.

The Arizona Game and Fish began using a new process for determining pronghorn population trends for GMUs 7, 8, and 9 in 2010. This process is based on modeling informed by harvest, male-female ratios, young-female ratios, estimated mean mortality rates, and estimated starting populations. The model is calibrated by changing mortality rates or the starting population so that the predicted male-female ratios from the models for each year match those that are based on surveys (McCall 2011). Table 7 describes pronghorn population trends in 2010.

Table 7. 2010 Trends in pronghorn populations (McCall 2011)

Unit	3-Year	10-Year
7	Decreasing	Stable
8	Decreasing	Decreasing
9	Increasing	Increasing

In addition to GMUs 7, 8 and 9, pronghorn are found in GMUs 10 and 12A. Pronghorn numbers appear to be increasing in GMU 12A and decreasing in GMU 10. However, the southeast corner of Unit 10 contains approximately 25-35 mi^2 of good quality pronghorn habitat. Pronghorn inhabiting this area frequently exhibit the highest level of fawn survival in the unit as a whole. On the whole, the Forest-wide pronghorn population trend currently appears to be stable.

Threatened, Endangered, and Sensitive Species Monitoring (Wildlife 27)

The California condor is only known to forage on the Forest and there are no known nest sites on the Forest. The Apache trout occupies the same length of stream where it was released in the 1940s and its local population appears to be stable. The KNF does not currently possess the data necessary to estimate threatened and endangered species population trends.

Pediocactus paradinei Monitoring

A total of 236 cacti were counted on 15 plots. This is a 64% increase in the population between 2009 and 2010. The original fourteen plots had 165 plants (54% increase in numbers). Between 2009 and 2010 a relatively large increase in the number of heads, individuals, single-headed individuals and multi-headed individuals occurred. A total of 47 new recruits that were 10 mm or less in diameter were counted in 2010. This is the largest increase in new recruits noted on the plots since 1999 when 51 new recruits were counted. The declining trend noted between 2008 and 2009 was reversed in 2010. Part of this increase in cacti came from new recruits (51%) and part from previously uncounted individuals. This year represents one of the best recruitment and survival years since 1999. It is likely that the additional precipitation that occurred across the range of the species accounts for the positive recruitment and survival relative to what has been observed over the last decade.

Other

Goshawk Noise Study – North Kaibab Ranger District employees worked in collaboration with the Rocky Mountain Research Station and the U.S. Army Engineer Research and Development Center/Construction Engineering Research Laboratory to gather information on noise impacts to northern goshawks from logging trucks and recreational OHVs. The goal is to test sufficiently to establish critical thresholds for timing, distance, and noise levels.

Small Mammal Survey – Forest biologists provided support for a survey of small mammal use in areas of the forest dominated by piñon pines and juniper trees. The study will provide valuable data on how management activities might affect small mammals in this habitat type.

Facilities/Roads

Several important facilities and roads projects on the Kaibab National Forest were started or completed by the engineering team in FY 2010, including the following funded through ARRA:

- *Williams Ranger District* – renovation of the Spring Valley recreational rental cabin and replacement of six toilet buildings at White Horse Lake and Kaibab Lake Campgrounds.
- *North Kaibab Ranger District* – renovation of nine living quarters at the Big Springs Work Center and Dry Park Lookout Tower.
- *Tusayan Ranger District* – installation of new water and wastewater systems at the Hull recreational rental cabin and replacement of three toilet buildings at Ten-X Campground.

Additionally, rehabilitation and construction of two additional road loops with new campsites on the Kaibab Lake Campground was ongoing, and a new roof was installed on the Tusayan Ranger District office building.

About 14 miles of Forest Road 307 on the Tusayan Ranger District were resurfaced with gravel after monsoon flooding created ruts and holes and exposed piping and other potential hazards. Annual

maintenance and grading were completed on 799 miles of forest roads on the Williams, Tusayan and North Kaibab Ranger Districts. Route marker signs at road junctions are being checked and new ones installed where necessary. So far, 100 percent of the route marker signs on the Williams and Tusayan districts and 25 percent on the North Kaibab District have been completed.

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