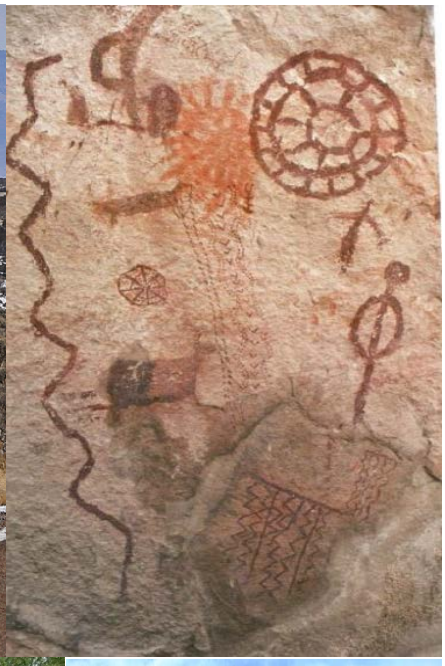
Kaibab National Forest

Forest Plan Monitoring Report



Fiscal Year 2013

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Introduction

The Monitoring Plan for the Kaibab National Forest (NF) outlined in the original 1988 Forest Plan 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 management actions under the Plan. Each year, select items from the above categories are discussed in the monitoring report in order to provide information on monitoring efforts and accomplishments by resource or concern area. This report documents activities occurring during fiscal year (FY) 2013. Monitoring reports from previous years can be accessed at http://fs.usda.gov/goto/kaibab/planning or provided upon request.

The Kaibab NF recently revised its Forest Plan (March 2014) in order to address changing management needs and areas of focus. Chapter 5 of the revised Plan includes an updated monitoring plan, which was designed to better inform progress toward desired conditions and support adaptive management. Because the revised plan was approved after the 2013 fiscal year, this report is guided by the monitoring plan set forth in the original l988 plan. This will be the last monitoring report prepared under the previous forest plan. This report contains a few optional items that are responsive to the new monitoring plan and have been noted as such.

The new forest wide monitoring plan includes concepts such as effectiveness monitoring, adaptive management, and the integration of local scale (e.g. plan-level) monitoring with broader landscape-level strategies (e.g. across multiple units, regions). Further, it is supportive of multi-party monitoring and intends to leverage existing data sets and the inventory and monitoring efforts of other partners and agencies. The initial data will be assessed to establish a “baseline” against which change can be compared. Monitoring reports will be prepared on an annual basis with a comprehensive review occurring approximately every five years. This would allow the forest to evaluate the overall monitoring program and management actions and to identify any conditions that would trigger a change in management or prompt further investigation, either internally or externally. This evaluation would allow the Kaibab NF to add, modify, or delete existing questions no longer needed in the monitoring plan. It would also assess plan components and implementation effectiveness, and whether or not the Kaibab NF is achieving and maintaining desired conditions.

Timber (1, 2, 6, 8, 9, 10[1]; NP 17 Fire Adapted Ecosystems; 18, 19 Aspen; 33, 34 Forestry and Forest Products; 16, 17 Fire Adapted Ecosystems; 10, 22 Ponderosa Pine, Mixed Conifer, Spruce Fir and Pinyon juniper communities

The timber program is an integral part of the Kaibab NF’s continued strategy to make progress toward desired conditions for fuel loading, forest health, wildlife habitat enhancement, and watershed improvement. Timber sale and stewardship vegetation management contracts are useful, cost-effective tools for manipulating live and dead vegetation in order to restore and maintain fire-adapted forest ecosystems. This vegetation management improves forest health; resistance to insect, disease and/or stand replacing wildfire; and wildlife habitat, while also increasing over- and understory plant diversity. The wood fiber cut, sold and removed from the forest helps offset high vegetation management costs while reducing carbon footprints by helping meet society’s wood fiber demands locally and in a timely fashion rather than depending on imported fiber from distant regions and countries where high transportation

[1] Numbers in parentheses in section headers correspond with specific monitoring items outlined in the 1987 Kaibab Forest Plan as amended; NP designates monitoring items under the new 2014 forest plan.

costs are incurred. Timber harvesting on the forest has been occurring either for salvaging excess wildfire-killed timber or thinning green timber stands to prevent tree mortality. Some uneven-aged regeneration harvesting has also been performed through group selection cutting of live timber to stagger age/size classes to help achieve and maintain uneven-aged forest conditions.

In FY 2013, the Kaibab NF experienced a large increase in timber volume sold, from 8,000 ccf (cubic feet) in 2012 to 43,875 ccf, in 2013. This marked increase is largely a result of several Four Forest Restoration Initiative Task Orders (approximately 34,959 ccf of the total volume) that were issued. Stewardship Contracts (5,907 ccf) and timber Sales (3,009 ccf) also contributed to the total volume. Cumulatively, this represents the highest level of timber volume sold in many years on the Kaibab National Forest. These treatments will contribute to forest restoration efforts by decreasing the threat from uncharacteristic stand replacing fire and by helping to improve ecosystem function and resiliency over time.

A total of 15,886 ccf were harvested through Timber Sale and Stewardship contracts, representing a slight decrease from 19,863 ccf in 2012. There was a slight increase, however, in timber sales, from 2,488 acres in 2012 to 3,966 in 2013.

Other timber outputs include: 1, 584 Christmas trees sold (sale-by-vendor through Big 5 Sporting Goods stores-777 trees and over-the-counter at district offices-807 trees); 10, 857 cords of personal and free-use firewood (for home heating and other purposes); and 104 cords sold as ceremonial use firewood (for Native Americans for traditional and cultural purposes).

South Zone

- Planted 645 acres of ponderosa pine trees on severely burned areas of Eagle Rock fire.
- Established tree protection cones on 171 acres of newly planted ponderosa pine seedlings in order to protect them from ungulate browse and allow them to become established and develop into larger trees.
- Installed seedling survival monitoring plots on all planted areas.
- Planted one acre of aspen in an area with heavy aspen mortality. The aspen were planted within a fenced enclosure that provides protection from ungulate browse and allows the newly planted trees to become established and develop into a new stand of aspen.

North Kaibab

- Planted 401 acres within the Warm Fire salvage units.
- Completed the Arizona Trail Reforestation effort, which included 51 acres of contract planting and 24 acres of planting by Forest Service and Coconino County crews.
- Installed 250 survival plots on the Warm IV Reforestation project. Completed 5th year stocking plots on Warm I (~1,600 acres), and 3rd year survival plots on Warm II (~900 acres).
- Completed the 30-acre Dry Park Aspen weeding project by cutting, lopping, and scattering conifer trees in aspen stands.
- Conducted field trips with the Forest Health Protection staff to develop a future proposal fora Western spruce budworm control project in Dry Park..
- Completed the Dry Park Thinning/Hand-piling project **on 104 acres** with. Thinning was precommercial, with the objective of removing infested and host trees for the Western spruce budworm. Crews focused on cutting Douglas-fir, white fir, subalpine fir, and spruce (Engelmann

and Blue) trees that were < 9" dbh. Ponderosa pine and aspen are non-host trees that were retained during the thinning project.

- Surveyed and mapped the current Pandora Moth infestation in the northwest portion of the Jacob-Ryan project. Collected adult moths at three locations around Jacob Lake and sent them to FHP staff in Flagstaff.
- Installed 7 Gypsy Moth traps in locations near Jacob-Lake and DeMotte CG, with bi-monthly reporting and checking for adult male moths.
- Installed 4 Western Spruce Budworm Moth traps in the Dry Park and East Rim areas for monitoring adult populations.
- Certified natural regeneration to aspen and ponderosa pine in the Warm Fire area for **381 acres**.

Forest products sold

- 3105 ccf of personal use dead fuelwood from permits (valued at $15,525)
- 9506 ccf of volume from timber sales and stewardship contracts (valued at $243,219)
- 1700 bushells of green seed cones (valued at $3400)
- 650 personal use Christmas trees (valued at $9750) + an 84' oversized tree (worth $126) for Garkane power that was proudly decorated and displayed in St. George, UT

- Issued 12 cords of free use ceremonial dead oak for local Native American tribal members.

Acres Treated from timber sale/stewardship contracts
1,370 acres of ponderosa pine habitat were included in FY13 awarded timber sale/stewardship contracts in 3 year increments.

Acres Salvaged in Warm Fire for Planting Preparation:

An additional 392 acres of Warm Fire were sold under contract for salvage and eventual planting. Previously-awarded West 2 Salvage. contract was also completed, making 337 more "planting acres" available for the FY14 seedling order (500 ac.s, for planting spring 2015).

Insects and Disease (Protection 1)[NP 10, 22 Ponderosa Pine, Mixed Conifer, Spruce Fir, and Pinyon juniper Communities]

According to the 2014 *Forest Insect and Disease conditions in the Southwestern Region* report (USDA Forest Service 2014), acres affected by bark beetle activity decreased in the ponderosa pine-type from 16,661 acres detected in 2012 to 5,154 acres in 2013. However, bark beetle activity in the mixed-conifer forest type increased from 18 acres detected in 2012 to 496 acres detected in 2013. Most bark beetle activity occurred on the Williams Ranger District (RD), few widely scattered trees were mapped on the Tusayan and North Kaibab Ranger Districts. Hot spots of bark beetle activity in ponderosa pine on the Williams RD include; Pitman Valley, Pine Ridge near the Eagle Rock Fire, West of Sycamore Canyon Wilderness and on Potato Hill. Hot spots are often associated with disturbance events. Douglas-fir beetle and western balsam bark beetle damage was concentrated around Sitgreaves Mountain near Spring Valley and on Bill Williams Mountain. Scattered spruce mortality was mapped on the North Kaibab RD in the Dry Park area.

Major western defoliators have been active on the Kaibab National Forest since 2008 and 2009. A pine sawfly complex of *Neodiprion spp*. has been actively defoliating ponderosa pine on Kendrick Mountain since 2009. Since the outbreak began majority of the damage has occurred on the Kaibab National Forest with some additional defoliation just east on the Coconino NF. Just over 2,000 acres were defoliated this year (Table 2 Figure 1A).

A pandora moth population has been building on the North Kaibab RD since 2008 however, visible defoliation did not result from larval feeding until 2013. In 2012, pheromone and light trapping for adult pandora moths detected a decrease in trap catch from 2010 to 2012 suggesting the population was decreasing or leveling off. However, in the spring of 2013, the District notified Forest Health Protection that visible defoliation was reported by the public. The Zone insect and disease personnel conducted a special survey to map the extent of the outbreak and detected over 1,800 acres impacted north of Highway 89-A. Damage was most severe around Orderville Canyon. The last pandora moth outbreak occurred from 1979-1985. At the peak of the last outbreak (1983) 28,525 acres were defoliated.

The number of acres with mapped aspen damage decreased from 5,240 acres in 2012 to only 245 acres in 2013. Only 25 of those acres were mapped as defoliation and 220 acres were mapped as aspen decline. The mapped aspen decline occurred on the North Kaibab RD. Drought and aspen defoliation from both the large aspen tortix and the western tent caterpillar contribute to the declining state of aspen on the North Kaibab RD.

Table 1. Bark beetle conditions report for the Kaibab National Forest in acres*

Bark Beetle	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Western pine beetle	0	7,833	3	26	410	9	94	16	27	11	7,150	2,869
Mountain pine beetle	4	79	0	0	0	3	0	0	0	0	0	0
Ponderosa pine *Ips*	6,012	64,195	29,807	23	6,850	215	343	196	489	188	9,510	2,273
Douglas-fir beetle	0	1,282	615	2,510	850	251	106	89	53	16	18	366
True fir complex†	80	365	1,065	1,211	105	252	17	57	5	0	0	130
Cedar bark beetle	0	0	0	0	0	0	0	1	0	30	0	1
Pinyon ips	1,269	158,951	6,922	6	15	0	1	0	5	1	1	2
Spruce beetle											2	3
Total:	7,365	232,705	38,412	3,776	8,230	730	561	359	579	246	16,681	5,644

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

Defoliator	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Spruce Budworm	0	0	0	0	0	0	0	0	0	0	0	0
Pine sawflies	0	0	0	0	0	0	0	1,130	1,140	260	1,847	1,885
Aspen damage*	16,370	951	17,782	22,664	28,415	76,185	65,204	4,667	2,815	6,097	5,240	245
Pandora Moth	0	0	0	0	0	0	0	0	0	0	0	1,833
Salt Damage											716	419
Total:	16,370	951	17,782	22,664	28,415	76,185	65,204	5,797	3,955	6,357	7,803	4,382

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

Fire and Fuels Management [NP 15]

Most of the vegetation types on the Kaibab NF are fire-adapted, and require frequent fire to remain healthy and resilient. Restoring fire to fire-adapted ecosystems and reducing accumulations of forest litter and debris to avoid uncharacteristic high severity wildfires are Forest priorities. In FY12 the Forest treated 9,522 acres with prescribed fire, piling of activity-generated slash, pile burning, thinning, and low to moderate severity wildfires.

Since 2000, the Kaibab National Forest has implemented an average of 7,500 acres of prescribed fire per year. In fiscal year 2013, weather conditions and other constraints limited the application of prescribed fire to **4,179 acres.** Of those acres, 2,346 acres were in the wildland urban interface with a primary purpose of protecting the people and communities living adjacent to the Forest. The remaining 1,823 acres were in more remote areas of the forest which achieved vegetation, wildlife habitat, watershed, range, soils, and heritage resource protection objectives.

Thinning activities on the Forest produce slash, which increases the load of hazardous fuels. To reduce this load the slash is often piled and subsequently burned during periods of low fire danger, such as when there is snow on the ground. Kaibab firefighters were able to burn 1,405 acres of piles during the winter and monsoon seasons this year.

Conditions in FY 2013 were right to manage 5 lighting caused fires to achieve resource benefits, which treated a total of **4,292 acres** (an increase from only 248 acres treated in 2012). These fires included:

- Wash Fire, Tusayan RD – 14 acres
- Cooper Fire, North Kaibab RD – 969 acres
- Castle Fire, North Kaibab RD – 1,538 acres
- Skinner Fire, Tusayan RD – 1,463 acres
- Mud Fire, Williams RD – 308 acres
- Brushy Fire, Tusayan RD – 0.5 acres

Fire prevention and suppression is a primary function of the Kaibab fire organization. At many times of the year, conditions are too dry, too windy, or too wet to achieve resource benefits and desirable outcomes from wildfires. By federal policy, all human caused fires are suppressed. Firefighters took full suppression action on 107 wildfires this year.

Since 1970, an average of 25% of the fires on the Kaibab has been human caused. Prevention efforts are paying off, however as the percentage has been steadily decreasing since 2008. In FY13, only 12% (14 fires) were human caused. The largest was the Halfway Fire on the Tusayan Ranger District, which burned 250 acres. The other 13 human caused fires were all successfully contained on initial attack, for a total of 3.9 acres. Firefighters were also successful in initial attack on the remaining 93 lightning caused fires, which burned a total of 24.6 acres all together.

A total of 8,471 acres (100 % of all fires) burned with desired fire effects on the forest in FY13. No fires burned with undesired fire behavior and effects.

Range (Range 2, 3, 4)[NP 46 Livestock grazing, 25 Nonnative Invasive Species]

The Forest administered grazing on 33 grazing permits (26 on the Williams/Tusayan districts and 7 on the North Kaibab) during 2013. The moisture year started slow, but the monsoon season was one of the wettest in recorded history and produced substantial grass throughout the Forest. Permitted use has stabilized and is expected to remain relatively constant for the foreseeable future. Actual use continues to follow forage production provided by seasonal climatic conditions.

Non-structural range treatments were completed on 5,000 acres. Approximately 3,000 acres of noxious weeds treatments and 2,000 of agra-axe grassland maintenance were completed.

Progress was made on the Tusayan/Navajo Nation boundary fence project. The Bureau of Indian Affairs awarded a contract to Southwest Conservation Corp for construction and five miles of the fence was completed.

Wild Burro Population (Range 1) [NP 57, Double A Wild and Free Roaming Burro Territory]

The Kaibab NF conducted a helicopter survey of burro populations in the Double A Wild Burro Territory on May 3, 2013. A total of 53 burros were seen (50 adults and 3 juveniles). The majority (20) were seen at the eastern portion of the Territory. The 29 burros are believed to represent 30-50% of the actual population (Ohmart *et al*.,1978). This results in an estimated burro population of 106-175 (Hydock 2013). This marks a increase from the 58-95 head estimated in 2012. Burro populations are currently higher than the desired range of 22-35 animals. A burro gather began in 2009 with the goal of bringing the burro population closer to desired numbers. As of June 2012 a total of 142 burros have been removed from the Forest. Since this time BLM Wild Horse and Burro Center in Ridgecrest, CA, is no longer accepting burros for adoption. For this reason we are looking into other options of controlling numbers, such as new contraceptive techniques.

Recreation (1, 3)[NP 44, Recreation and Transportation]

The Kaibab manages three Wilderness areas: Kanab Creek, Kendrick Mountain, and Saddle Mountain. The Districts continued to improve their wilderness scores for the Ten Year Challenge. Projects in 2013 included implementing wilderness education plans, campsite and spring condition monitoring, implementing biocontrols for invasive plants, trail maintenance, and implementing the new national solitude monitoring protocol. Much of this work was conducted under the Forest's partnership with Northern Arizona University and completed by wilderness students.

A key wilderness accomplishment was the completion of a Wilderness Information Needs Assessment (INA). An interdisciplinary team of specialists met for a week-long session to identify management concerns in the forest's three wilderness areas and the information needed to assess and address those concerns. The effort resulted in a six-year plan to conduct surveys, analyze the results, and implement responsive management actions. Identified concerns included: cattle trespass in Kanab Creek and its attendant damage to vegetation, soils and archaeological resources; potential soils, spring and vegetation damage in the Pumpkin Fire area of Kendrick Mountain; and, the lack of accurate knowledge of use levels in all wilderness areas.

In June 2012 the Kaibab hosted the annual Region 2 and 3 Wilderness Rendezvous. This week-long session is aimed at getting wilderness employees – from seasonal rangers to program managers – together

for training and skill sharing. Seventy participants, from four states and three agencies, gathered at the historic Big Springs Ranger station for a week of wilderness ethics, history, monitoring and primitive skills.

The North Kaibab Ranger District completed a corridor management plan for the Kaibab Plateau – North Rim Parkway, otherwise known as Arizona Highway 67. This road is a National Scenic Byway and runs from Jacob Lake south to the entrance to the North Rim of Grand Canyon National Park. An estimated 1,100 vehicles travel the Parkway every day. The management plan provides a framework for maintaining the scenic qualities of this popular highway.

The North Kaibab Ranger District completed the environmental analysis to add 8 miles to the Rainbow Rim Trail. The extension of this trail is conducted in partnership with the International Mountain Bicycling Association. This extension marks substantial progress to the ultimate goal of creating a loop option for this highly popular trail.

Heritage Resources (1, 2, 3) NP 32, 45 Cultural Resources

During FY 2013, the heritage program achieved the distinction of having more than 10,000 archaeological sites recorded on the forest, which demonstrates the richness of the Kaibab's historically and culturally significant resources. Archaeologists conducted 38 projects in support of section 106 of the National Historic Preservation Act and managed more than 1,400 hours of volunteer work through the Arizona site stewards Program, the Passport in time Project, independent research initiatives, and the Grinnell College Grinnellink Internship Program. Kaibab archaeologists hosted more than 50 outreach projects including presentations, interactive demonstrations and field trips for events such as the esmart summer camp for Girls at Dixie State University, Arizona Archaeology Month, Flagstaff Festival of Science and more.

Section 106 Compliance Project Overview

Archeologists conducted 38 projects in support of Section 106, surveying 880 acres, recording 13 new sites and monitoring and/or protecting 170 sites. They also assisted in the protection of cultural resources during several fire incidents. Archaeologists were deployed to fires when a bulldozer was requested to help contain the fire or it was believed that a heritage resource site might be at risk. Archaeologists also assisted with planning and site protection efforts associated with wildfires managed for resource benefits. Additional details of fire related protection efforts can be found in the 2013 Kaibab Heritage, Fire, and Tribal Relations Accomplishment Reports (KNF 2013).

<u>North Kaibab Ranger District</u>

Cultural resource surveys were initiated for the Burnt Corral project, and staff completed various Section 106 compliance work (surveys, reports, site avoidance flagging) for timber, fuels, recreation, special uses, engineering, and range programs, and supported fire suppression and managed fire efforts. Additionally, staff assisted with the Wilderness Rendezvous and Wilderness Needs Assessment Workshop, both held on the North Kaibab. Archaeologists worked with local BLM archaeologists on several field projects and public outreach events that crossed agency boundaries, allowing both agencies to better serve the local publics and to complete work in a more efficient manner. Archaeologists also worked with the AGFD regarding proposed efforts to manage buffalo.

Kane Ranch Allotment Management Plan (AMP)

Clearance and specialist reports were completed for the Kane Ranch AMP. Archaeologists also worked with local tribal government representatives regarding Forest Service activities and began efforts to assist the Grand Canyon Trust in the implementation of projects associated with the Kane Ranch AMP and the proposed research ranch.

Travel management
Implementation activities included a site signage strategy and the data recovery report for mitigation to archaeological sites .

South Zone: Tusayan and Williams Ranger Districts
South Zone archeologists wrote 20 cultural resource clearance reports surveying over nearly 700 acres and recorded 20 sites for those projects. They completed consultation with Arizona State Historic Preservation Office on the Juan Tank Allotment Permit Renewal. Archeologists surveyed the Ida Mastication Project and trained district silviculture, wildlife, and range staff in conducting 240 acres of survey. In their effort to reduce fuels on historic sites, they also consulted with State Historic Preservation Office to allow feller-bunchers to harvest timber on 5 miles of historic railroad grades within the KA and Pomeroy Timber Sales. Finally, archeologists painted and flagged 60 sites in support of Fire, Range, and Four Forest Restoration Projects.

Four Forest Restoration Initiative
The Coconino and the Kaibab National Forests completed the DEIS in March of 2013. Currently both forests are initiating work in 2014 on timber/fuels projects that have existing NEPA. For the Kaibab Heritage Program that has consisted of addressing road maintenance activities and insuring that the existing Section 106 inventories were still adequate and consistent with the undertaking.

Section 110 Protection and Preservation Project Overview

Snake Gulch Preservation
During the spring and fall of 2013, district archaeologists and other employees cleaned dozens of rock shelter and rock art sites in Snake Gulch Canyon, after cattle from an allotment near the national forest trespassed into the canyon.

Keyhole Sink
On the Williams District, vandals painted graffiti on the Keyhole Sink rock art panels for the second time in three years. Archaeologists and the Youth Conservation Corps removed the graffiti once again, using a biodegradable cleanser with water and sponges. A camera was installed in the hopes of recording the perpetrators of any future incidents.
Historic Railroad Grade Preservation

Archaeologists worked with the Coconino Rural Environment and the Williams Youth Conservation crews to remove fuel from 1.5 miles of fire sensitive historic logging railroad grades.

Soil NP 3,4 Soils and Watersheds

Soil conditions were evaluated on the Kane Ranch grazing allotments on the North Kaibab Ranger District and the Juan Tank Allotment on the Williams Ranger District. Soil condition evaluations include excavation of soil pits and detailed descriptions of soil profiles and the associated vegetative communities. Soil hydrologic condition, stability and nutrient cycling capability are also evaluated. These field evaluations document current soil conditions and guide future management of the soils resource to ensure that soil productivity is maintained.

Kane Ranch Allotments (North Kaibab Ranger District)

There are approximately 193,731 acres of soils in satisfactory condition in the Kane Ranch Allotments analysis area. Satisfactory soils occur where three soil functions - the ability of the soil to resist erosion, to infiltrate water, and to recycle nutrients - are properly functioning. Most satisfactory soils have high amounts of effective ground cover that protect the soil from accelerated erosion. Approximately 105,249 acres of soils within the Kane Ranch Allotments are currently in impaired condition. Impaired soils generally occur in pinyon-juniper woodlands, juniper-semidesert grassland transitional areas, semidesert grassland/shrublands, and in some areas affected by high severity wildfires. In some cases, these soils are at risk of trending toward unsatisfactory conditions due to loss of the herbaceous understory that protects soil surfaces from raindrop impact, soil particle detachment, and transport in surface runoff. As a result, some soils in the pinyon-juniper vegetation type exhibit erosion rates and bare soil that are approaching tolerance thresholds. There are approximately 39,615 acres of unsatisfactory soils within the Kane Ranch Allotments. Unsatisfactory soils are assigned potential capability to support grazing, but no grazing capacity is assigned to these TES map units. Similar to impaired soils, most unsatisfactory soils are located within recent wildfire scars (i.e., wildfires that have occurred within the last 20 years), in pinyon and juniper woodlands, in grasslands encroached by pinyon and juniper, and in grasslands dominated by non-native cheatgrass (*Bromus tectorum*). Many of these soils are trending toward an improved condition as vegetative ground cover and the associated litter has increased, thus restoring many soil ecosystem processes that are critical to healthy, stable soils. Unsatisfactory soils in pinyon and juniper woodlands and encroached grasslands are continuing to trend downward due to loss of ground cover, resulting in higher soil erosion rates.

Juan Tank Allotment (Williams Ranger District)
There are approximately 14,122 that are currently in satisfactory condition and 5,188 acres that are impaired. Reasons for impairment include encroachment of pinyon and juniper into grassland ecosystems that impairs understory productivity, resulting in increased bare ground on these TES map units. Also, areas invaded by Japanese brome are not currently supporting vegetative communities dominated by native plant species, resulting in impaired ecological function of these soils. Approximately 4,900 acres are infested with Japanese brome and 288 acres exhibit encroachment of pinyon and juniper at levels that cause impairment of soil function.

Spring Monitoring (Wildlife 23, 25) NP 52, 53 Natural and Constructed Waters

Museum of Northern Arizona

The Museum of Northern Arizona's Springs Stewardship Institute completed inventories and assessments of 14 spring ecosystems on the Kaibab National Forest during fiscal year 2013 using the Springs Ecosystem Assessment Protocol. These springs inventories and assessments are part of a larger project that was implemented under a contract with the museum for the primary purpose of informing the Forest Plan revision process. Data captured during the inventories and assessments are also a valuable tool for assessing restoration opportunities and providing a baseline from which to evaluate restoration responses and successes and for long term forest plan monitoring. Data captured during each spring survey include the following: geomorphology, soils, geology, solar radiation, flora, fauna, water quality, flow, georeferencing, and cultural resources, as well as assessment of the site's ecological integrity and risks. The focus of the most recent surveys has been springs on the Williams Ranger District that had not been previously surveyed, springs in areas affected by recent fires, springs with survey data that is more than 10 years old, and unmapped springs in the Kanab Creek drainage. Level II survey data was used to assess the ecological integrity of these sites, compiling information on condition and risk to aquifer/water quality, geomorphology, habitat, biota, and human use resources (Table 3). A wide array of conditions of springs were encountered, with low aquifer/water quality and geomorphology and high risk encountered at Twin Springs Road Unnamed Spring, and highest values at highest condition and lowest risk at the most remote sites (Box Elder and Box Elder Real in the Kanab Creek Wilderness Area). Overall, ecological integrity as measured by overall natural resources condition score was negatively related to the risks imposed by anthropogenic activities. Springs on the Williams District generally have lower condition scores and higher human risk scores than do those on North Kaibab District, as a result of more intensive human uses of springs in the Williams District (Table 3 and Fig. 1).

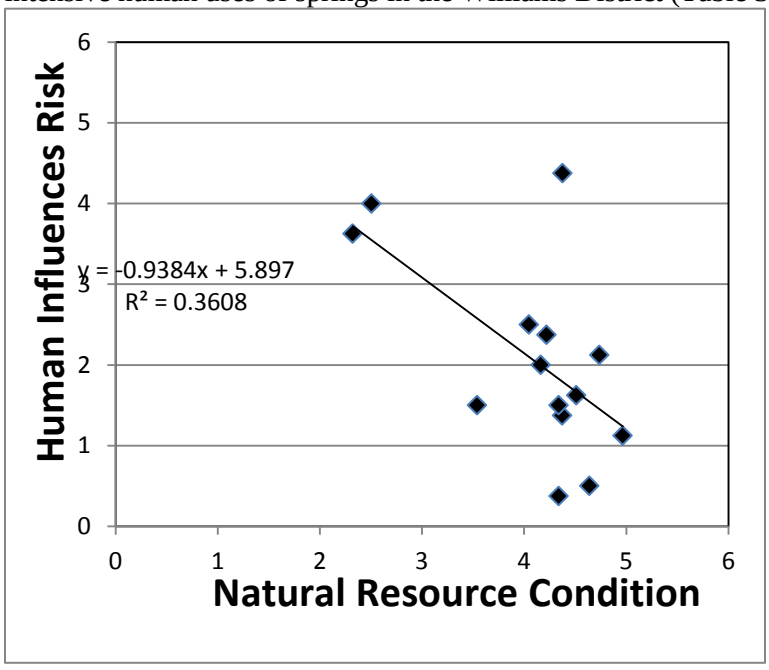

Figure 1: Human risk and natural resource score relationship for Kaibab National Forest springs on the Williams and North Kaibab Districts, for springs sampled from 1 October 2012 to 30 September 2013.

Table 3: Kaibab National Forest springs surveyed by Springs Stewardship Institute between 1 Oct 2012 and 30 Sept 2013[2]

SiteName	SurveyDate	District	AFWQScore	AFWQRiskScore	GEOScore	GEORiskScore	HABScore	HABRiskScore	BIOScore	BIORiskScore	FHIScore	FHIRiskScore	TotalScore	TotalRiskScore	NullScores	NullRiskScores
Twin Springs Rd unnamed	8/14/2013	Williams	1.3	5.0	1.6	5.0	3.6	4.4	2.8	4.0	2.7	3.6	2.3	4.6	9.0	9.0
Twin Springs	8/14/2013	Williams	2.8	4.7	1.6	4.6	2.8	4.8	2.9	3.9	2.6	4.0	2.5	4.5	11.0	9.0
Hell Canyon Spring	8/14/2013	Williams	4.7	2.5	4.4	1.0	3.8	3.4	4.6	2.1	4.9	1.4	4.4	2.3	9.0	9.0
Ben Spring	8/15/2013	Williams	5.7	2.3	5.0	1.0	4.2	2.0	5.0	1.0	5.0	1.1	5.0	1.6	12.0	9.0
Indian Spring	8/15/2013	Williams	1.3	5.0	5.0	1.0	3.2	4.0	4.7	2.0	5.3	1.5	3.5	3.0	13.0	10.0
Many Snakes Upper Spring	8/16/2013	Williams	5.0	3.7	4.6	2.4	4.0	3.2	3.8	3.0	5.1	1.5	4.3	3.1	36.0	35.0
Many Snakes Spring	8/16/2013	Williams	5.0	3.7	5.4	1.2	4.4	2.8	4.1	2.7	4.9	2.1	4.7	2.6	11.0	11.0
Stage Tank spring	8/16/2013	Williams	4.2	2.3	5.6	1.2	4.4	2.6	3.9	3.1	5.1	1.6	4.5	2.3	9.0	9.0
Cane Springs north	8/28/2013	NorthKaibab	5.0	1.0	3.4	2.8	3.6	2.2	4.9	2.3	3.8	2.4	4.2	2.1	9.0	9.0
Cane Hanging Garden	8/28/2013	NorthKaibab	4.8	1.0	3.6	2.2	3.6	2.2	4.6	2.5	4.1	2.0	4.2	2.0	9.0	9.0
Cane Two Qanat	8/28/2013	NorthKaibab	5.3	1.0	2.8	3.2	3.2	2.4	4.9	2.0	3.8	2.5	4.0	2.2	10.0	9.0
Box Elder Spring	8/29/2013	NorthKaibab	3.8	1.0	4.4	1.0	4.2	1.8	5.0	1.4	5.1	0.4	4.3	1.3	12.0	9.0
Box Elder Real	8/29/2013	NorthKaibab	4.8	1.0	4.6	1.0	4.0	2.4	5.1	1.4	5.2	0.5	4.6	1.4	9.0	9.0
Big Spring	8/30/2013	NorthKaibab	5.0	1.0	3.6	2.6	4.4	2.6	4.5	2.5	3.2	4.4	4.4	2.2	4.0	3.0
Mean	**All**	**All**	**4.2**	**2.5**	**4.0**	**2.2**	**3.8**	**2.9**	**4.3**	**2.4**	**4.3**	**2.1**	**4.1**	**2.5**	**11.6**	**10.6**
Minimum	**All**	**All**	**1.3**	**1.0**	**1.6**	**1.0**	**2.8**	**1.8**	**2.8**	**1.0**	**2.6**	**0.4**	**2.3**	**1.3**	**4.0**	**3.0**
Maximum	**All**	**All**	**5.7**	**5.0**	**5.6**	**5.0**	**4.4**	**4.8**	**5.1**	**4.0**	**5.3**	**4.4**	**5.0**	**4.6**	**36.0**	**35.0**
1 sd	**All**	**All**	**1.4**	**1.6**	**1.3**	**1.4**	**0.5**	**0.9**	**0.8**	**0.9**	**1.0**	**1.2**	**0.8**	**1.0**	**7.3**	**7.2**
N	**All**	**All**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**	**14**

[2] AFWQ = Aquifer and Water Quality;GEO=Geomorphology; HAB=Habitat;BIO=Biolota;FHI=Freedom From Human Influences

Northern Arizona University

A graduate student at Northern Arizona University (NAU) contributed to Kaibab springs assessment and investigated about 60 springs on the forest. The project, funded by The Nina Mason Pulliam Charitable Trust was completed in late 2013. The goal was to identify, assess, and prioritize forest springs in relation to potential stewardship needs and included the following tasks: determine springs for assessment; conduct field site visits; determine candidate sites for springs stewardship; prioritize sites to determine the best candidates for stewardship; and develop stewardship plans for prioritized springs. Recommendations for stewardship action were developed by the springs assessment team from NAU for the top quartile of the springs assessed through a selection process determined by land and resource managers at the Coconino and Kaibab National Forests. The recommendations were based on field observations and general ideas regarding how active stewardship could have a positive effect on the springs condition. The most common recommendations included removing or repairing spring water diversion structures (spring boxes and other man-made structures), fencing portions of the springs areas with sucker rod fencing, and decommissioning roads located in close proximity to springs habitats. A general stewardship recommendation for all springs was to install signs indicating the name of the spring and what activities are allowed in the vicinity.

Out of the 60 springs evaluated, 7 were identified as needing stewardship action to improve them to proper functioning condition. These springs, in order of restoration priority, include Spring Canyon 2 Unnamed Spring, Bear Springs, Bill Williams Loop Unnamed, Big Spring (Williams), Lower 2 Spring 1, Stewart Spring, and Bear Spring Lower. Please See Appendix A for additional details.

Wildlife

Wildlife and Fish Non-Structural Improvement (Wildlife 1) NP 16 Fire Adapted Ecosystems

Thinning and piling, prescribed burning, grassland restoration, and invasive species removal and treatment continue to improved wildlife habitat across the Forest in FY13.

South Zone
On the Williams Ranger district, work continues to improve grassland conditions. With the assistance of funding provided through the Habitat Partnership committee, 1,550 acres were clipped using an Agra-axe, and 125 acres of material were masticated to remove encroaching pinyon and juniper trees from within grasslands. In part because of the forest's proactive use of both prescribed fires and lightning-caused fires to treat the landscape, there has been recent improvement in pronghorn antelope fawn recruitment on the Williams Ranger District, according to the Arizona Game and Fish Department. The forest's focus on removing encroaching conifer trees from historic grasslands will also help in supporting the pronghorn population, by improving ground cover and decreasing soil erosion and sedimentation of ephemeral stream courses on the forest. This will also provide improved forage, hiding cover, and nesting habitat for numerous wildlife species.
Thinning to improve habitat was also accomplished by using hand crews with chainsaws to follow a silvicultural prescription; **5,360 acres** were thinned across both the Tusayan and Williams Ranger Districts. Thinning overstocked/encroaching pinyon-juniper and jack pine ponderosa pine helps to alleviate the risk of catastrophic wildfire and benefits wildlife species by returning the ecosystem to pre-settlement and pre-fire suppression conditions.

Invasive species removal

Eradication of non-native invasive species also helps to improve foraging habitat for wildlife. Spraying of herbicides usually reduces the amount of weeds present and helps to prevent the spread to other areas. Approximately **2,000 acres** were treated for invasives species across all three ranger districts, with approximately 1/2 occurring in important winter range for mule deer on the North Kaibab Ranger District. The forest has seen a steady decrease in weed infestations.

North Kaibab
With the aid of volunteers, North Kaibab Ranger district employees treated **50 acres** of meadows that were beginning to be overtaken by conifer and aspen tree species. Many meadows on the North Kaibab are gradually being filled in by trees due to less-frequent disturbance by natural wildfire. If meadows are left to convert into forests, plant and wildlife communities are altered, and both nutrient cycling and carbon storage are impacted. The effects on the soil system, vegetation structure and productivity, and native plant diversity may become irreversible. By beginning the work of meadow restoration before young trees become well-established, negative impacts can be avoided. Shortly after these treatments took place, turkeys and goshawks were detected.

The North Kaibab planted 105,700 ponderosa pine seedlings on **474 acres**, received unexpected improved habitat from **2,406 acres** of managed fire, began habitat restoration by successfully treating **1,061 acres** of invasive species and enhanced habitat by thinning from below to prevent future crown fires and opening **141 acres** for future understory growth.

Wildlife and Fish Structural Improvements (Wildlife 2) NP 18 Aspen

Wildlife structural improvements included ongoing aspen fencing to protect stands from browsing by elk and deer and fencing wetlands to exclude livestock and prevent unauthorized motor vehicle entry. **Four** aspen fence enclosures were erected over 20 acres to protect newly developing aspen sprouts from ungulate browse. The forest also decommissioned about **11 miles** of roads that had already been closed under the travel management decisions. This involved pulling culverts, ripping roadbeds, and in some cases recontouring. This should help to improve habitat connectivity and suitability for elk and deer on approximately 3, 552 acres of habitat.

Goshawk Nest Location, Occupancy and Productivity (Wildlife 4)

North Kaibab Ranger District biologists were able to monitor 39% percent Post Fledging Areas (PFAs) (52 of 133) of goshawk territories across the District with 40 percent of those territories active (21 of 52). Reproductive goshwaks were observed at most of the active territories. South zone biologists inventoried 5 project areas and 10 established PFAsusing the Forest Service Region 3 goshawk survey protocol. Total project acres surveyed was 8,210 acres and total Post Fledgling Acres surveyed was 6,000. One goshawk was detected in one of the project areas. Reproductive goshawks were detected in 2 of the Post Fledgling Family areas.

Management Indicator Species Monitoring (Wildlife 8, 15) NP 23 Wildlife MIS

Songbirds
The Kaibab NF continued its multiyear project with Rocky Mountain Bird Observatory (RMBO) 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 on the forest. It also supports the forest's efforts to comply with requirements set forth in the

National Forest Management Act and other law, regulation, and policy. Results for Kaibab National Forest were obtained by compiling and jointly analyzing data from two strata, based on elevation. Stratification by elevation allows for adjusting sampling intensity to target Management Indicator Species on the Forest.

Field technicians completed all 28 planned surveys (100%) in 2013. They conducted 359 point counts within the 28 surveyed grid cells between 9 May and 22 June. They detected 97 species, including 16 priority species (Table 3). RMBO estimated densities and population sizes for 83 species, 8 of which are priority species. The data yielded robust density estimates (CV < 50%) for 37 of these species.

RMBO estimated the proportion of 1 km2 grid cells occupied (Psi) throughout Kaibab National Forest for 82 species, 8 of which are priority species. The data yielded robust occupancy estimates (CV < 50%) for 44 of these species.

Table 4. Number of birds detected in Kaibab National Forest, by ranger district, 2010 – 2013, with priority designations as determined by US Forest Service, Partners In Flight, Arizona Game and Fish Department, and US Fish and Wildlife Service (see Appendix B for more specific information). Priority species are marked with an asterisk. Management Indicator Species (MIS) and Proposed MIS (PMIS) are bolded. Species where one or more individuals were most likely detected as migrants are italicized. **Due to differences in sample size, direct comparisons of total yearly counts should not be made.**

	North Kaibab Ranger District					Tusayan Ranger District					Williams Ranger District					
Species	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	Grand Total
Acorn Woodpecker*	1		2	4	7		5		1	6	3	1	8	20	32	45
American Crow						1				1	9	2		1	12	13
American Kestrel*											3	6		6	15	15
American Robin	31	15	3	13	62	19	13		9	41	45	56	24	17	142	245
American Three-toed Woodpecker*	1	3			4	1				1						5
Anna's Hummingbird											1	2			3	3
Ash-throated Flycatcher*	73	88	27	14	202	91	12	33	28	274	70	69	43	57	239	715
Band-tailed Pigeon*												2			2	2
Barn Swallow											1				1	1
Bewick's Wren	29	35	4	11	79	22	40	14	15	91	5	8	22	42	77	247
Black Phoebe														2	2	2
Black-chinned Hummingbird	4	15	2	2	23	6	8		1	15	4		1		5	43
Black-chinned Sparrow*	1	5	14	6	26							6	12	10	28	54
Black-headed	29	21	5	14	69	22	12	11	19	64	33	22	45	44	14	277

Species	North Kaibab Ranger District					Tusayan Ranger District					Williams Ranger District					Grand Total
	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	
Grosbeak															4	
Black-throated Gray Warbler*	127	181	47	36	391	93	83	32	35	243	31	49	16	34	130	764
Black-throated Sparrow*	30	23	48	12	113	1	5			6			1		1	120
Blue-gray Gnatcatcher	57	41	23	33	154	7	3	9	2	21	5	4	9	7	25	200
Brewer's Blackbird												3		1	4	4
*Brewer's Sparrow**	19	11			30		24	2		26	3	1		26	30	86
Broad-tailed Hummingbird*	13	14	4	6	37	8	9	1	2	20	14	24	6	18	62	119
Brown Creeper	6				6				1	1		3	1	6	10	17
Brown-headed Cowbird	6	15	7	2	30	11	36	9	9	65	30	37	19	33	119	214
Bullock's Oriole*											9	4	3	5	21	21
Bushtit*	5	3	7	12	27	3	12	4		19	1	2	8	13	24	70
Canyon Wren*				1	1	3				3		5	2		7	11
Cassin's Finch*	2	2	1	5	10	7	2			9						19
Cassin's Kingbird*			2		2	1	4	12		17	31	17	14	10	72	91
Chipping Sparrow	69	65	35	25	194	48	76	12	15	151	112	89	55	72	328	673
Chukar	12				12											12
Clark's Nutcracker*	4	37		1	42	1				1	4	1		5	10	53
Cliff Swallow												4			4	4
Common Nighthawk*	2	2		2	6			1		1	6	2	8	3	19	26
Common Poorwill*				2	2				1	1						3
Common Raven	8	10	13	17	48	17	18	4	21	60	66	103	26	55	250	358
Cooper's Hawk*							1			1		2	1		3	4
Cordilleran Flycatcher*	2	1		1	4		8			8	15	10	3	2	30	42
Dark-eyed Junco	38	46	6	28	118	22	23	2	11	58	54	46	18	38	156	332
Downy Woodpecker				3	3	1				1	3	1			4	8
Dusky Flycatcher*	3		8	4	15						3		1		4	19
Dusky Grouse*		1			1											1

Species	North Kaibab Ranger District					Tusayan Ranger District					Williams Ranger District					Grand Total
	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	
Eastern Meadowlark*											1	2			3	3
Eurasian Collared-Dove				1	1	1				1	4	3			7	9
Evening Grosbeak*	2	9		3	14											14
Gambel's Quail*						2				2	21	29	6	6	62	64
*Golden-crowned Kinglet**									1	1						1
Grace's Warbler*	124	82	12	24	242	29	31		35	95	49	50	19	9	127	464
Gray Flycatcher*	61	62	1	12	136	73	72	24	21	190	66	106	27	43	242	568
Gray Vireo*	32	25	22	12	91	2	17	10		29	12	11	5	2	30	150
Great Blue Heron											1	1	1		3	3
Great Horned Owl						1	1			2		1			1	3
Greater Pewee*									1	1						1
Greater Roadrunner		1			1		1			1	1				1	3
*Green-tailed Towhee**			6	4	10		1		1	2	4			2	6	18
Hairy Woodpecker*	28	35	6	5	74	17	30	5	7	59	45	38	16	23	122	255
Hammond's Flycatcher														1	1	1
Hepatic Tanager*	2				2	6	1	1		8	11	21	37	11	80	90
Hermit Thrush	59	70	1	22	152	1	4	1	7	13	6	1	2	8	17	182
Horned Lark*	22	15	10	8	55							12			12	67
House Finch	20	21	17	1	59	7	9	9	6	31	9	24	30	20	83	173
House Wren	10	17	8	24	59	4	3		1	8	11	11	17	35	74	141
Hutton's Vireo						1	1			2		2	1	2	5	7
Juniper Titmouse*	39	48	20	9	116	43	68	41	16	168	44	84	46	52	226	510
Killdeer												2			2	2
Ladder-backed Woodpecker*	4				4											4
Lark Sparrow	14	9	4	2	29	11	29			40	88	56	21	45	210	279
Lazuli Bunting*	7		3		10								1		1	11
Lesser	5	3		4	12	5	10	2		17	38	50	23	5	11	145

Species	North Kaibab Ranger District					Tusayan Ranger District					Williams Ranger District					Grand Total
	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	
Goldfinch															6	
Loggerhead Shrike*											1				1	1
*MacGillivray's Warbler**			1		1							1		1	2	3
Mallard											4				4	4
Mountain Bluebird*	2				2	3				3	12		3	6	21	26
Mountain Chickadee	30	51	19	48	148	57	38	3	28	126	62	40	12	29	143	417
Mourning Dove	8	4	2	32	46	12	17		25	54	24	53	31	87	195	295
Northern Flicker*	33	36	8	30	107	23	21	2	10	56	39	42	21	31	133	296
Northern Goshawk*	1				1											1
Northern Mockingbird	14	3		14	31	4	36			40	35	40	15	18	108	179
Northern Pygmy-Owl*									4	4			1		1	5
Northern Rough-winged Swallow														3	3	3
Olive Warbler*												3			3	3
Olive-sided Flycatcher*	2			1	3						2	6		3	11	14
Osprey											1			3	4	4
Painted Redstart*													1		1	1
Phainopepla*											2		6		8	8
Pine Siskin*	45	65		5	115	5	19			24	16	16		1	33	172
Pinyon Jay*	48	230	11	22	311	91	66	87	28	272	85	20	41	75	221	804
Plumbeous Vireo*	53	62	6	9	130	77	40	17	18	152	80	32	32	24	168	450
Purple Martin*						12	11			23	2	6	3	8	19	42
Pygmy Nuthatch*	44	53		11	108	68	20		23	111	98	64	7	30	199	418
Red Crossbill*	36	25		47	108	54	3		11	68	6	8		22	36	212
Red-breasted Nuthatch	7	13		10	30						1			1	2	32
Red-faced Warbler*											1		7	4	12	12
Red-naped Sapsucker*		3			3											3
Red-tailed Hawk	2	1	2	2	7	1	3			4	4		5	6	15	26

Species	North Kaibab Ranger District					Tusayan Ranger District					Williams Ranger District					Grand Total
	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	
Red-winged Blackbird											1	1		3	5	5
Rock Wren*	23	17	6	6	52	3		3		6	1		2	2	5	63
*Ruby-crowned Kinglet**	46	73		10	129						1	1			2	131
Rufous-crowned Sparrow*			1		1							1	3		4	5
Sage Sparrow*	27	10	12	9	58											58
Say's Phoebe*	1		1	1	3		1			1	1				1	5
Scott's Oriole*	1	1	4		6	2	6			8	7	13	4	2	26	40
Sharp-shinned Hawk*			1		1									1	1	2
Spotted Towhee	66	95	56	56	273	20	22	11	16	69	28	34	54	72	188	530
Squirrel, Abert's*	10	2			12		1			1	4	2	1		7	20
Squirrel, Red*	11			12	23											23
Steller's Jay	24	47	15	18	104	18	18		5	41	40	48	17	43	148	293
Swainson's Hawk*							1			1						1
Townsend's Solitaire						1				1	2	1	1	1	5	6
Turkey Vulture	15	1	2	2	20	2	2		3	7	3	5	4	4	16	43
Vesper Sparrow	23	1	3		27	16	26			42	33	38	19	15	105	174
Violet-green Swallow*	35	66	7	22	130	78	65	14	29	186	62	81	18	38	199	515
Virginia's Warbler*	29	23	7	24	83						6	9	10	5	30	113
Warbling Vireo*	64	88	9	40	201	1	8	1	1	11	3	6		1	10	222
Western Bluebird*	29	43	6	12	90	42	79	6	10	137	78	47	14	29	168	395
Western Kingbird							3			3	4			2	6	9
Western Meadowlark	5				5	8	25			33	36	34	17	19	106	144
Western Scrub-Jay*	29	48	11	4	92	33	29	12	8	82	43	59	33	35	170	344
Western Tanager	74	60	12	50	196	14	28	9	8	59	61	78	41	43	223	478
Western Wood-Pewee	16	22	2	26	66	40	20	1	19	80	65	56	39	47	207	353
White-breasted	27	34	6	21	88	46	42	15	22	125	42	37	28	31	138	351

Species	North Kaibab Ranger District					Tusayan Ranger District					Williams Ranger District					Grand Total
	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	2010	2011	2012	2013	Total	
Nuthatch*																
White-throated Swift*	5	13	1	3	22							1			1	23
Wild Turkey*	5				5						1	2	5	2	10	15
Williamson's Sapsucker*	35	21		13	69						2		1		3	72
*Wilson's Warbler**						1				1	4	1			5	6
Yellow-rumped Warbler	49	93	1	26	169	6	2		5	13	30	23	5	20	78	260

Game

The following are trends in populations for mule deer, elk, and pronghorn and in fall harvest of turkey for Game Management Units 7, 8, 9, 10 and 12A. The 3-year trends are for 2011-2013; 5-year 2009-2013; and 10-year for 2004-2013. These data were generated by the Arizona Game and Fish Department.

Population trends for mule deer, elk, and pronghorn were determined using modeling of the populations. The inputs for the models were harvest, male: female ratios, young: female ratios, estimated mean mortality rates, and estimated starting populations. The best model is estimated 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 the surveys.

Table 5a: Trends in Mule Deer Populations

Unit	3-Year	10-Year
7	Stable	Decreasing
8	Stable	Increasing
9	Increasing	Increasing
10	Decreasing	Stable
12A	Increasing	Increasing

Table 5b: Trends in Elk Populations

Unit	3-Year	10-Year
7 West[a]	Increasing	Increasing
8[a]	Increasing	Increasing
9	Increasing	Stable
10	Stable	Stable
12A[b]	Stable	Stable

[a]The Department has been increasing antlerless permits to reduce the elk populations in Units 7 West and 8 to help enhance aspen regeneration. In Unit 7 West, antlerless permits were increased an average of 47 per year from 2012 to 2014, and in Unit 8 they were increased an average 70 per year for this period. However, the calf production has increased in these Units at the same time.

[b]The Department tries to minimize the number of elk in Unit 12A, so that elk do not compete with mule deer; there is a range of 6-12 elk per year in the Unit.

Table 5c: Trends in Pronghorn Populations

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

Table 5d: Trends in Fall Turkey Harvest. Five-year trends were more appropriate for turkeys because of the wide variability of harvest between years.

Unit	5-Year
7	Stable
8/10	Stable
9	Stable
12A	Increasing

Threatened and Endangered Species Monitoring (Wildlife 27) NP 55 Threatened, Endangered and Sensitive Species

California condor (endangered)
Lead poisoning from hunting continues to be the biggest threat for the condor. The forest continues to work collaboratively with its partners on condor recovery efforts by educating the public on the negative effects of lead poisoning and providing field support to the Peregrine Fund at the release site. Recently the forest provided funding for the purchase of GPS locators which will help to track the birds' movements across the state and neighboring Utah. This will provide important information on condor foraging and dispersal movements across the Colorado Plateau. Figure 1, highlights trends in the population's movements over time from August 2001 through December 2013. The Y axis represents the percentage of birds documented in each zone, with a decrease in time spent on the Kaibab during the winter months. On the Kaibab in 2013, condor activity peaked in May (C Parish, *pers comm*). The Peregrine Fund tracks the overall condor population but does not currently have specific spatial data to quantify for the Kaibab alone. The current wild population in Arizona-Utah is 73 birds, a slight increase from 68 in 2012.

In 2013, the Arizona-Utah flock produced four chicks in the wild—a record number—in and near the Grand Canyon. Three of the chicks fledged. One chick went missing along with one of its parents; neither has been found or recovered. This breeding activity in the wild is a promising sign that California Condors can survive on their own, but lead poisoning remains a significant hurdle. Research shows that half of all condors that die are known to have died from exposure to lead. The Peregrine Fund monitors the flock closely to find and treat condors with lead poisoning and works closely with state authorities to encourage the voluntary use of non-lead ammunition by hunters to reduce condors' exposure to lead.

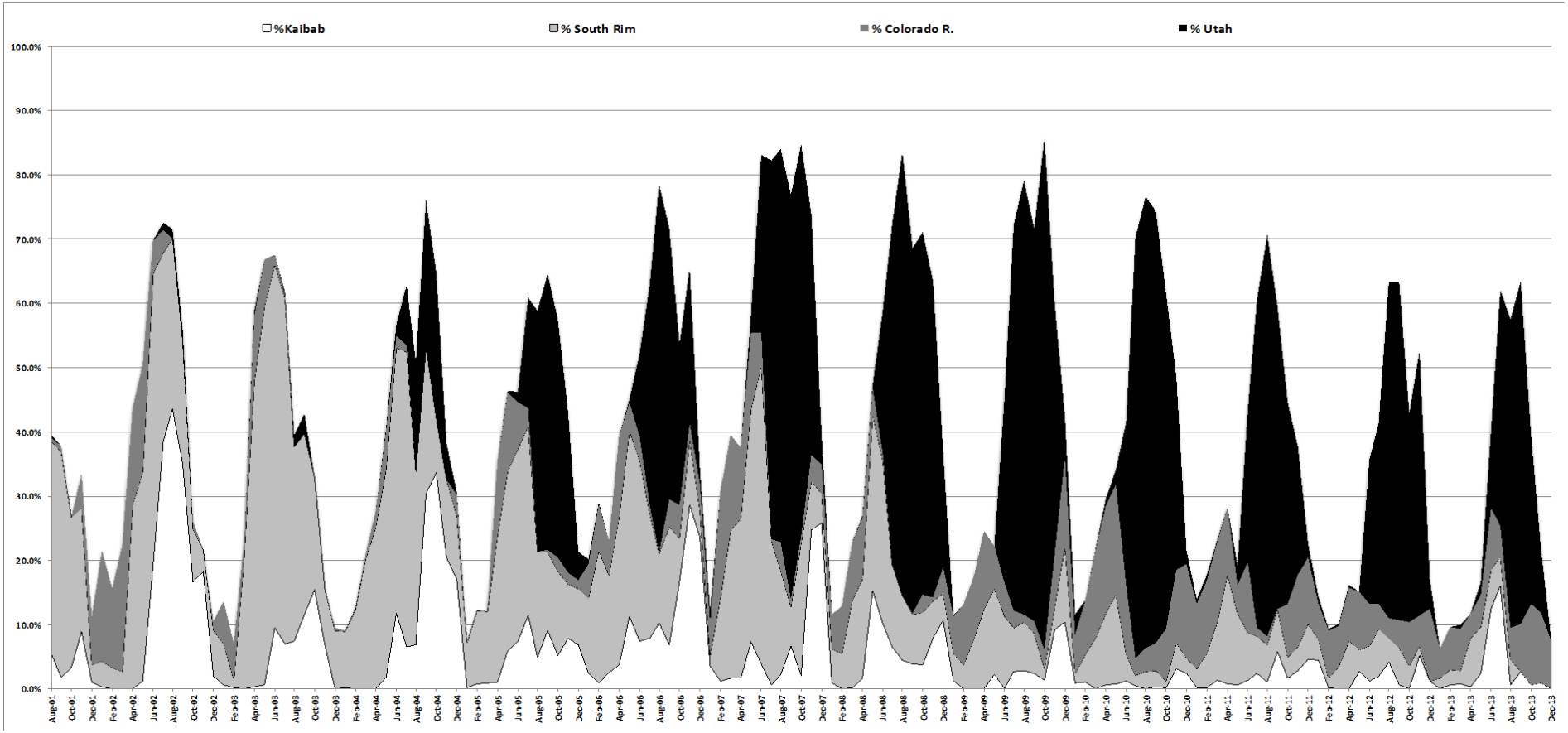

Figure 2. Trend in time spent by the California condor population in each of four zones on the Colorado Plateau from 2001 through 2013 (Peregrine Fund 2014).

Apache trout (threatened)
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 Kaibab does not currently possess the data necessary to estimate population trends.

Mexican spotted owl (threatened)
In FY13, wildlife staff on the South Zone surveyed six of six Mexican spotted owl protected activity centers (PACs) and detected owls in three of the PACs. All 3 detections (Sigreaves, Tule, and Kendrick) were of a male and female pair. In July 2013, biologists detected a new pair of owls while conducting MSO surveys for the McCracken Project (Table 2). A new PAC (Bear Tank #2) was delineated within the project area bringing the total number of PACs on the Kaibab to seven.

Table 6. 2013 McCracken Detections. *Note: M=Male, F=Female, N=Nestling, J=Juvenile. FLOW=Flammulated Owl, GHOW=Great Horned Owl, WESO=Western Screech Owl, NOPO=Northern Pygmy Owl, NSWO=Northern Saw-whet Owl.

Survey	Date	MSO	Other
1	5/28/13	-	11 FLOW, 2 GHOW
2	6/10/13	-	10 FLOW, 8 GHOW 1 WESO
3	6/19/13	-	4 FLOW, 3 GHOW 2 NOPO, 2 NSWO
4	7/02/13	1M, 1F	3 FLOW, 1 GHOW

The Revised Recovery Plan for the Mexican spotted owl was released in December 2012 (USFWS 2012) and includes a new occupancy based approach for monitoring population trends. The Fish& Wildlife Service and the Forest Service will be collaborating on this new monitoring approach with a pilot effort (conducted by Rocky Mountain Bird Obersvatory) scheduled for the region in the spring of 2014. This new approach should be more feasible than the approach detailed in the previous recovery plan (USFWS 1995) and should yield statistically robust data on trends over time.

Sensitive Species Monitoring (Wildlife 28)

Northern goshawk

South Zone biologists inventoried 5 project areas and 10 established Post Fledgling Family Areas using the Region 3 goshawk survey protocol. Total project acres surveyed was 8,210 acres and total Post Fledgling Acres was 6,000. One goshawk was detected in one of the project areas. Reproductive goshawks were detected in 2 of the Post Fledgling Family areas.

Townsends big-eared bat, Allen's lappet-browed bat, and Spotted bat

Bat Conservation International (BCI) continued to inventory potential bat roosting habitat across the forest, visiting some new sites on the North Kaibab and deploying additional data loggers and revisiting several sites on the South Zone. These data loggers are intended to collect environmental data (e.g. relative humidity and temperature) over the period of approximately one year. Data collected by these instruments is currently being summarized and will be used concurrently with other bat survey results to detrmine if bat habitat on the forest maintains the environmental conditions necessary to support the cold loving fungus *Pseudogymnoascus destructans,* which causes the highly virulent disease "White Nose Syndrome". White Nose Syndrome is not yet known to exist in the west, but surveillance efforts for the

disease are necessary to establish baseline data in support of early detection and to develop possible mitigations for the future should the disease become established here.

During the week of May 2013 BCI subterranean biologists surveyed or assessed 9 cave, mine, and sinkhole features for bat habitat or bats on the South Zone. Data loggers that had been placed over a year ago were recovered and soil samples were taken from several features for use in White-nosed Syndrome soil assay tests. The soil assay tests are part of a larger global study overseen by researchers at Northern Arizona University and UC Santa Cruz on the evolution of the *Pseudogymnoascus fungus*. Two bats were located during surveys and both were single Townsend's big-eared bats (*Corynorhinus townsendii*). In June of 2013, BCI surveyed or assessed 7 cave, mine, and sinkhole features for bat habitat or bats on the North Kaibab. Soil samples were taken in both the adits and caves for soil assay tests. No bats were located during surveys although guano was present in three of the sites as well as scattered moth wings and various other insect parts, indicating both day and night roost use. Guano and insect parts were consistent with use by Townsend's big-eared bat in two of the three sites, while the guano in one site was consistent with smaller bats, likely from the genus *Myotis*.

Forest wildlife staff worked with bat researchers from Northern Arizona University to conduct mist netting for bats. Mist nets were set up over stock tanks to capture and sample bats for disease, genetics, and general biometrics. Two stock tanks were surveyed over a two night period, one stock tank netted each night. Approximately 640 acres of potential habitat were surveyed at each tank. Allen's lappet-browed bat *(Idionycteris phyllotis*) Townsend's big-eared bat, and Spotted bat (*Euderma maculatum*) were captured. Nine other species were also captured: pallid bat, big brown bat, hoary bat, California myotis, fringed myotis, long legged myotis, mexican free-tailed bat, long eared myotis, and western small-footed bat. All bats were released immediately after species was determined and other biological information was collected.

Peregrine falcon (regionally sensitive)
South Zone biologists monitored peregrine falcon nest sites for presence/absence and reproductive activity using the Arizona Game and Fish Department peregrine falcon monitoring protocol (January 2009). Three nest sites were monitored. Reproduction was detected at one site, a pair of adults but no observed reproduction was detected at the second site and no activity occurred at the third site.

Facilities/Roads **NP 44, Recreation and Transportation**

About 309 miles of Forest Service roads were maintained for standard passenger car use. The road maintenance effort is of great benefit to many including recreational users, ranchers, and other public and private entities that operate facilities on the forest. About 75 miles of Forest Service roads suitable for high-clearance vehicles were maintained. Contracts were awarded to improve about 23.4 miles of roads suitable for standard passenger cars on the Williams Ranger District. This work involves reshaping the road surface, reestablishing/constructing drainage structures, and resurfacing the road. In addition to benefiting recreational users, this work will improve timber sale haul routes in support of the Four Forest Restoration Initiative, which will not only improve forest health but also reduce the risk of high-severity wildfire to local communities. Contracts were awarded to perform drainage structure improvement and spot resurfacing of about 9.6 miles of roads suitable for high-clearance vehicles.

Contracts were awarded to improve about 15 miles of roads suitable for standard passenger cars on the North Kaibab Ranger District. These road improvements will greatly improve access for forest visitors to recreational sites on the Kaibab Plateau and at the north rim of the Grand Canyon. About **11 miles** of roads were decommissioned, benefitting overall forest ecosystem health and contributing to watershed improvement.

Compliance of all drinking water systems on the forest was ensured in order to meet water quality regulations and protect forest visitors. Condition surveys of all forest road bridges were performed to ensure structural integrity. Forest dam condition surveys were performed to enhance overall public safety and reduce the risk of below-dam flooding. Continued work to renovate the Jacob Lake Fire Lookout tower, the Dry Park Fire Lookout tower, and the cabin near the Big Springs Fire Lookout tower.

References

Allender, C. J., K. M. Clancy, T. E. DeGomez, J. D. McMillin, S. A. Woolbright, P. Keim, and M. Wagner. 2008. Lack of genetic differentiation in aggressive and secondary bark beetles (Coleoptera : Curculionidae, Scolytinae) from Arizona. *Environmental Entomology* 37:817-824.

Arno, S.E., L. Ostlund, and R.E. Keane. 2008. Living artifacts. The ancient ponderosa pines of the West. Pages 55-62 *in* Montana the Magazine of Western History. Montana Historical Society, Helena MT.

Hydock, C. 2013. Aerial Survey: Double A Wild Burro Territory Report, Kaibab National Forest, Williams AZ 86046.

Kolb, T. E., J.K. Agee, P. Z. Fulé, N. G. McDowell, K. Pearson, A. Sala, and R. H. Waring. 2007. Perpetuating old ponderosa pine. *Forest Ecology and Management* 249:141-157.

Lynch, A.M., J.A. Anhold, J.D. McMillan, S.M Dudley, R.A. Fitzgibbon, and M. L. Fairweather. 2008. Forest and insect disease activity on the Kaibab National Forest and Grand Canyon National park 1918-2006. Report for the Kaibab NF/Regional Analysis team.

Ohmart, R.D., J.E. Walters, R.R. Johnson, and E.J. Bicknell. 1978. On estimating burro numbers: A more reliable method. *Desert Bighorn Council, 1978 Transactions*. 22: 45-46.

USDA Forest Service. 2014. Forest insect and disease conditions in the Southwestern Region, 2013. Region 3: Albuquerque, NM.

USDA Forest Service. 2008. Forest insect and disease conditions in the Southwestern Region, 2007. Albuquerque, NM.

USDI Fish and Wildlife Service (USFWS). 1995. Recovery plan for the Mexican spotted owl (*Strix occidentalis lucida*). Albuquerque, NM: Southwestern Region.

USDI Fish and Wildlife Service (USFWS). 2012. Recovery Plan for the Mexican Spotted owl (*Strix occidentalis lucida*), First Revision. USFWS, Albuquerque, New Mexico USA. 414 pp. Available at http://www.fws.gov/southwest/es/arizona/Documents/SpeciesDocs/MSO/2012MSO_Recovery_Plan_First_Revision_Final.pdf.

Appendix A: Northern Arizona University Spring Survey Results for FY 2013

Spring Name: Spring Canyon 2 Unnamed Spring
Stewardship Priority Rank: 148 (KNF Rank = 1)
Site Description: The springs discharge at the bottom of a large drainage channel. The springs source has an earthen berm placed down drainage of it to impound the spring water. There is no evidence of inflow or outflow of water from the resulting stock tank, indicating that the spring is a limnocrene type spring. There is a Forest Service road that leads to the spring source.
Site Condition: There is little wetland vegetation in the springs area. Herbivory and trampling appear to be negatively affecting the springs area. Five different mineral products have been placed within 10 meters of the springs source, presumably by hunters trying to lure Bison into the springs area.
Important Stewardship Characteristics: Ease of Restoration, Water Right, and Presence of TES.
Stewardship Recommendations: Removing the earthen berm would help return the springs source to its natural sphere of discharge. Fencing the springs source would conserve some springs habitat for native species. Decommissioning the road and installing structures at the beginning of the road would help deter motor vehicle use in the springs area.

Spring Name: Bear Springs
Stewardship Priority Rank: 161 (KNF Rank = 2)
Site Description: The spring emerges in a channel through basal-dominated forest terrain, and the channel was dry upstream at the time of visit. If this is a rheocrene springs, its waters do not appear to be perennial.
Site Condition: The springs ecosystem, if it is indeed groundwater-fed, area shows little evidence of impact by livestock; rather it appears to be geomorphically appropriately adjusted to large, summer monsoon floods. There is scant cover of perennial graminoid wetland vegetation.
Important Stewardship Characteristics: Presence of TES, Return Spring to Natural Sphere of Discharge, Eradicating or the Absence of Exotic Species, Historically Sensitive, Excluding Ungulates from Springs Source, and Increasing Accessibility for Native Animals.
Stewardship Recommendations: This springs ecosystem appears to be functioning fairly naturally. Given the rheocrenic nature of the setting, fencing the source would not prove beneficial. The site likely was heavily grazed in the past, and may still be recovering geomorphically from that disturbance. The adjacent landscape has burned in the recent past, but pine tree density still remains elevated.

Spring Name: Bill Williams Loop Unnamed
Stewardship Priority Rank: 165 (KNF Rank = 3)
Site Description: The spring resides at the bottom of a basalt cliff in a drainage channel. The bottom of the cliff contains a natural low spot where the spring discharges directly into a small spring fed pond. There is no observed spring water flowing into the pond or from the pond, indicating that it is a limnocrene type spring.
Site Condition: The springs area shows little evidence of trampling by large ungulates and there is a moderate amount of wetland vegetation.
Important Stewardship Characteristics: Presence of TES, Eradicating or the Absence of Exotic Species, and Historically Sensitive.
Stewardship Recommendations: The spring appears to be functioning naturally without substantial negative effects from human influences. The spring also resides in a large drainage channel that shows significant water discharge during storm events. Installation of fencing at the springs source would not prove beneficial due to the high discharge events that occur in the drainage channel.

Spring Name: Big Spring (Williams District)
Stewardship Priority Rank: 175 (KNF Rank = 4)

Site Description: The spring emerges from the base of a basalt flow and the flow focuses into a stream channel that converges with an upstream-dry ephemeral channel. The flow is unfocused at the base of the basalt flow, and supports a small wetlands before flowing into the ca. 3 m-wide, well-defined channel.
Site Condition: The springs area has been extensively grazed and burned, but the source area has been protected by virtue of the large boulders from which the springs emerge. There is evidence of former piping, but not much trailing.
Important Stewardship Characteristics: Water Right, Presence of TES, Return Spring to Natural Sphere of Discharge, Historically Sensitive.
Stewardship Recommendations: The spring appears to be functioning naturally, with negative effects accruing from sheep and elk grazing. The source area is protected by the coarse boulders. Fencing and revegetation of the source area and channel margins should be successful, and are recommended.

Spring Name: Lower 2 Spring 1
Stewardship Priority Rank: 178 (KNF Rank = 5)
Site Description: The springs discharge from a limestone outcrop in a steep drainage channel.
Site Condition: There is no evidence of human alteration at the spring site. There is a fair amount of trees that have fallen across the stream channel. There is also a diverse plant community within the drainage channel that is thriving.
Important Stewardship Characteristics: Water Right, Presence of TES, Return Spring to Natural Sphere of Discharge, Eradicating or the Absence of Exotic Species, Historically Sensitive, Excluding Ungulates from Springs Source, and Increasing Accessibility for Native Animals.
Stewardship Recommendations: The springs appear to be functioning naturally without any impact from human development.

Spring Name: Stewart Spring
Stewardship Priority Rank: 187 (KNF Rank = 6)
Site Description: The springs discharge from a hillslope into a rocky drainage channel. There are two discharge points that have entrenched cobble armored stream channels.
Site Condition: There appears to be very little human presence in the area and the springs appear to be functioning naturally with little to no impact from humans.
Important Stewardship Characteristics: Water Right, Presence of TES, Eradicating or the Absence of Exotic Species, Excluding Ungulates from Springs Source, and Increasing Accessibility for Native Animals. Stewardship Recommendations: Mechanically thinning the surrounding forest would help increase the
condition of the spring.

Spring Name: Bear Spring Lower
Stewardship Priority Rank: 196 (KNF Rank = 7)
Site Description: The spring discharges in the bottom of a valley floor, creating a wet meadow environment. The wet meadow drains into an earthen bermed stock tank.
Site Condition: There is some evidence of trampling from large ungulates at the spring area, as well as obvious grazing of the wetland vegetation. There are several mineral deposits placed at the stock tank, presumably by hunters to lure Bison into the springs area.
Important Stewardship Characteristics: Ease of Restoration, Water Right, Presence of TES, Return Spring to Natural Sphere of Discharge, Eradicating or the Absence of Exotic Species, Historically Sensitive, Excluding Ungulates from Springs Source, and Increasing Accessibility for Native Animals.
Stewardship Recommendations: Fencing portions of the spring area with sucker rod fencing would help in reducing trampling of the entire spring area and provide habitat for native species. The remaining spring area could then remain open for use by large ungulates. Removing the mineral deposits would have a beneficial effect on the water quality in the stock tank.