Annual Monitoring Report
for Implementing the
Kaibab National Forest Land Management Plan

Fiscal Year 2001

Forest Supervisor Certification

I certify that the Kaibab National Forest Plan as amended is sufficient to guide management of the Forest over the next year. Needs for change as identified in this document are necessary over time to maintain the viability of the Plan.

_____ _____

MIKE. WILLIAMS Date
Forest Supervisor

Monitoring Activities

Introduction

The Monitoring Plan for the Kaibab National Forest Plan identifies 58 items to be tracked as measures of the effectiveness of the forest plan.[1] Valuation of various forest resources by society, the Forest Service and other agencies has continued to change since the inception of this Plan in 1988. This has been expressed by public concern and action, as well as governmental action and funding of activities. This, in turn affects what can or should be monitored and how it will be done.

With monitoring, we believe the real question should often be, "Is the Forest better today than five years ago?" for particular conditions or habitats. The current monitoring criteria often do not address this issue in any meaningful way. In preparation for revision, scheduled for 2005-8, we are analysing needs for forest plan amendment(s) to bring the monitoring requirements up to date.

We reviewed all decisions made for projects in fiscal year 2001 to monitor forest plan implementation. This review is currently being documented. We attempted to compare forest site conditions from the mid-1980s to the 1990s. While we are able to draw some conclusions about trends many areas lack repeat samples to directly verify management is moving toward intended desired conditions. This will be addressed with repeat stand examinations in numerous sites over the next two years.

The following sections report what is being or has been accomplished recently by particular issue or concern areas, and what potential may exist to accomplish additional monitoring work, if necessary. For details on the last 5-year monitoring efforts, please see the Fiscal Year 1999 Monitoring Report.

[1] These items are reported every five years and will be next reported in the 2003 report.

Bridger-Knoll Fire Monitoring

A master's thesis by an NAU student who helped design and collect data on tree mortality and damage was completed in 2001 with an associated paper due out soon (*McHugh, C., and T.E. Kolb. 2002. Ponderosa pine mortality following fire in northern Arizona. International Journal of Wildland Fire: In press*.). Data collection occurred in FY1999, with re-reading of the plots described in 1997's report under "Bridger Salvage Sales." Excerpts of the master's thesis follow:

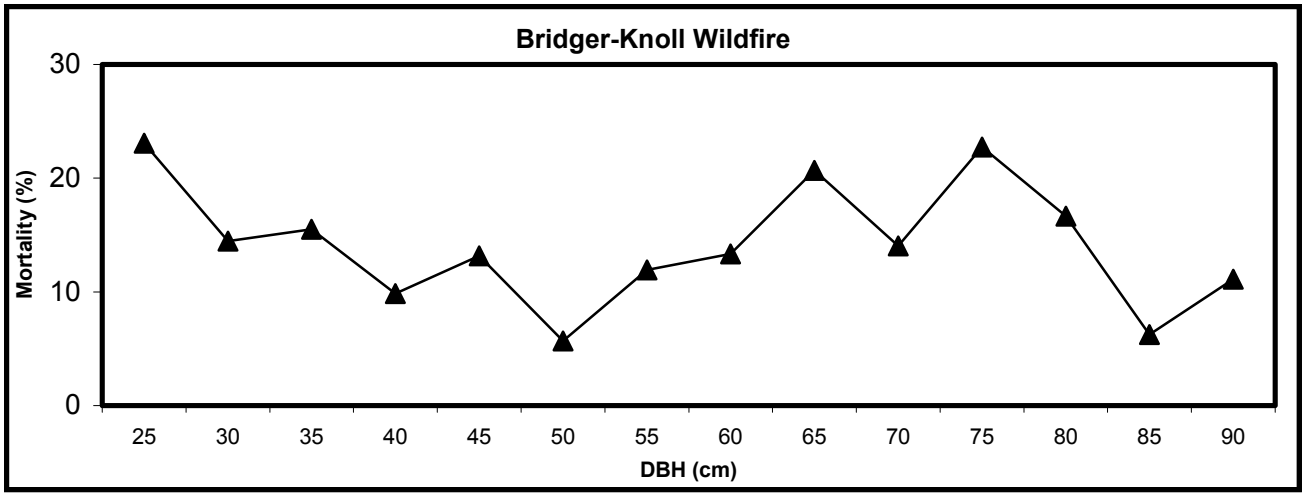
Management Recommendations

The goal of this chapter is to offer recommendations for managers to consider when assessing potential mortality of fire-affected ponderosa pine (Pinus ponderosa) in northern Arizona. These general guidelines should be applicable in areas with similar fire characteristics and tree sizes as my study sites. Tree mortality can be expected to increase when percent crown damage reaches 70%, and increase dramatically when crown damage reaches 80%. Also, tree mortality increases when the percent crown volume consumed reaches 20%. A general rule for marking fire-damaged trees for salvage operations regardless of season of fire occurrence is:

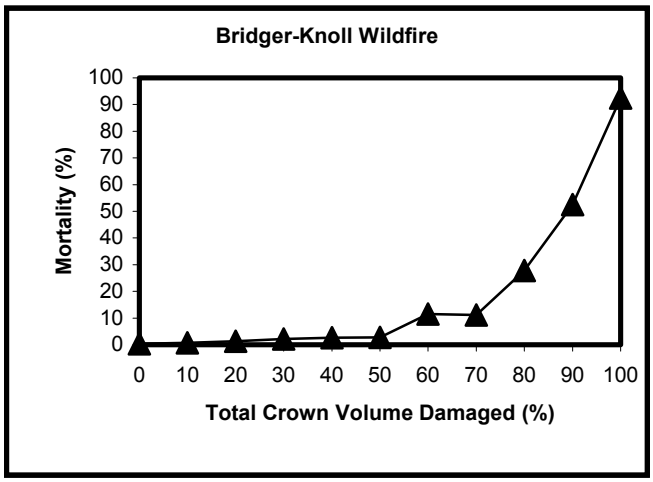
1. Crown damage (scorch + consumption) >70% with no other signs of damage or insect infestation.
2. Crown damage >60%, with >=20% crown consumption with no other signs of damage or insect infestation.
3. Any tree that has suffered >=50% crown consumption.
4. Trees with ≤ 70% total crown damage and where the bark is deeply charred into the fissures between bark plates but bark characteristics are still discernible or charred to the wood and all bark characteristics have been lost. This assessment should be made within the first 45.7 cm above ground level. Portions of bark should be removed based on the past descriptions of bark char to check for cambium vitality and to calibrate bole char severity to local conditions.
5. Trees that are infested with western pine beetle (*Dendroctonus brevicomis*), mountain pine beetle (*Dendroctonus ponderosa*), or roundheaded pine beetle (*Dendroctonus adjunctus*).
6. Evidence of girdling. Removing portions of bark and examining the cambial condition can detect evidence of girdling at the root collar. Also, evidence of woodborers at the base can give you some indication of the amount of dead cambium. If three or more quadrants are damaged consider this as additional criteria to consider for removal.

In this study damage from logging operations did not increase the likelihood of tree mortality. Fire damage and insect infestation had a larger impact on mortality than did logging operations. Trees with diameters between 30-55 cm were more likely to survive than trees smaller than 30 cm and larger than 55 cm in my study. The level of fire behavior, prefire drought, tree vigor, postfire environmental conditions, and insect infestation may affect the longevity of larger trees. If the management emphasis is to maximize revenue return, then removal of larger trees following the recommendations above could be followed. However, this may conflict with other management concerns, such as the development of snags.

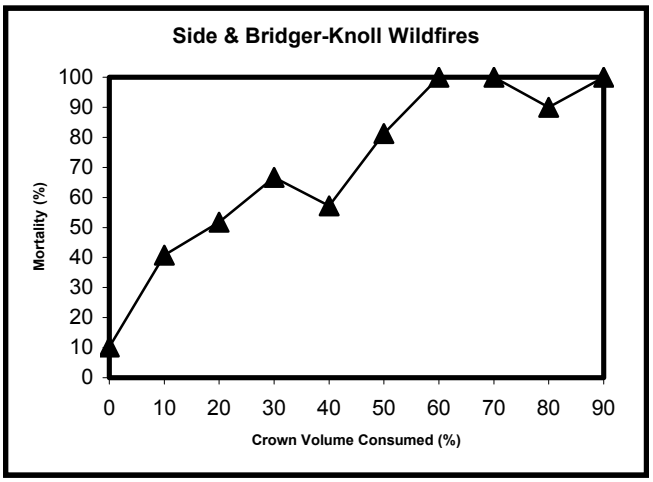
Even statistically valid models of tree mortality will be wrong at times. Given this, the above criteria should be considered as a general recommendation and a starting point for managers to consider. The final decision on criteria to use needs to be decided on a case-by-case basis taking into account fire severity, social-political realities, management objectives, and whether a conservative approach or aggressive approach for the removal of fire damaged trees is desired.



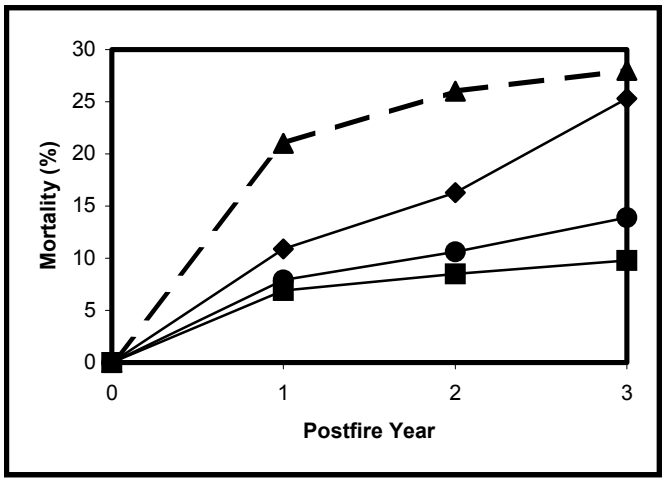
Excerpt: Percent mortality of ponderosa pine three years after fire by 5 cm dbh class. Sample size for each dbh class ranged between 9 to 109. Data is not shown for dbh classes with < 3 trees.



Excerpt: Percent mortality of ponderosa pine three years after fire by prefire live crown volume damaged.



Excerpt: Percent mortality of ponderosa pine three years after fire by prefire live crown volume consumed for the Side and Bridger-Knoll wildfires in northern Arizona..



Excerpt: Percent cumulative ponderosa pine mortality for three postfire years for the Bridger-Knoll wildfire (solid lines). Data for a summer prescribed fire from Harrington (1993) is represented by dashed lines. For the Bridger-Knoll wildfire, squares represent lightly burned areas; diamonds represent severely burned areas, and circles represent combined lightly burned and severely burned areas.

An extensive "floristic study" was contracted in FY1999 by the Zone Botanist for the Kaibab NF and was ongoing in FY 2000 but has not been completed.

Pumpkin Fire Monitoring

A project of the U.S. Geological Survey, Biological Resources Division, is studying the effects of burn severity and heterogeneity on post-fire plant and avian communities. As part of the study a spatial model of burn severity will be created using remote sensing data. This may facilitate quicker analyses and prediction of ecological response of future crown fires, helping guide management. The project samples six fires in Colorado, New Mexico and Arizona, including the Pumpkin Fire. Data entry and preliminary analysis of the first year's data is expected to be completed in 2002.

To date, no formal sampling has been done (or planned) of the erosional effects resulting from this fire and the lack of vegetative response in critical areas.

Erosion after the Pumpkin Fire: Over-dense pine forests and a resulting lack of understory plant cover have lead to serious, continuing erosion after crown fire removed the tree canopy.

Recreation

An survey of forest user preferences was completed, along with the initial analysis of the results by an NAU professor under contract with the Forest. The purpose of this research was to gather information from users of the Tusayan and Williams districts of the Kaibab National Forest regarding the values they hold toward the Forest including how they currently use the Forest and how they would like to see it managed. Three target populations were surveyed: 1) current forest recreationists, 2) local public and private sector recreations providers, and 3) local community residents. An excert of the study follows:

Visitor Survey Highlights

All Visitors: (n=458)

1. Visitor Demographics:

- Most visitors to the Kaibab National Forest (82%) were on a return visit, with nearly half indicating that they usually visit twice a year and one-quarter of the respondents generally visit once a month.

- The majority of visitors (65%) came with their families. Group sizes ranged from 1 to 50, with an average size of 5 people.

- Three-quarters of these Kaibab visitors live in urban areas. Most visitors who participated in this survey came from the Phoenix valley and other dispersed locations, primarily in Arizona – much more so than nearby northern Arizona and Colorado River communities.

- The largest number of visitors used recreation guidebooks as a source of information. Word of mouth, the Forest Service web site or a phone call to a Forest Service office were used much more than other area attractions, nearby hotels or motels, or a travel agent. When asked what other information sources they used, respondents had a number of others, the most popular of which was area maps.

2. Activities and management preferences

- Whitehorse Lake and Dogtown Lake were the most favored places of those specifically mentioned as special places on the forest. Kendrick Peak came in third. Nearly half of the respondents indicated locations south of I-40, or the area in general (other than those who mentioned Whitehorse and Dogtown specifically.)

- When asked what attributes make various locations on the forest special to them, they responded with the following most important attributes by various locations:

Developed campgrounds:	facilities and trails
Dispersed areas south of I-40:	natural beauty and views
Dispersed areas north of I-40:	natural beauty and views
Dispersed areas, Tusayan District:	wildlife
Kendrick Mountain Wilderness:	natural beauty and views
Sycamore Canyon Wilderness:	natural beauty and views
Winter recreation sites:	snow, skiing, snow play
Forest in general:	natural beauty and views
Other oft-mentioned attributes include:	not crowded; solitude
	quiet, peaceful
	wildlife and fishing
	fresh air, cool weather

- When asked the reason they chose to visit the Kaibab over another area, visitors cited its proximity to home as a strong reason. The cool weather, beauty and scenery, and hiking were also reported as important reasons.

• <u>Top three activities they did on this visit</u>	<u>Interested in for a future visit</u>
1. sightseeing	1. sightseeing
2. short hikes	2. dispersed camping
3. dispersed and campground camping	3. watching birds & wildlife

• <u>Settings visited</u>	<u>Prefer to visit</u>
no facilities (24%)	no facilities (23%)
a few primitive facilities (24%)	a few primitive facilities (24%)
moderate number of facilities (25%)	a few rustic facilities (25%)
very little contact, or little contact with others*	very little contact with others
a few visitor regulations	a few visitor regulations

accessible by all vehicles on unpaved roads	accessible by all vehicles on unpaved roads
somewhat modified; appears natural	a largely undisturbed natural area

- Acreage devoted to naturalness categories:

All visitors, when aggregated, believed the largest portion of the forest should be *an undisturbed natural area with no evidence of humans*. Only hunters as a group preferred more acres devoted to a *somewhat modified* landscape. Please note that only 18 hunters responded to this question, which is a small sample size from which to draw conclusions.

• Three most important facilities/services	Three least important
1. quiet, natural areas	1. full-service resort
2. dispersed camping	2. mountain bike rentals
3. hiking trails	3. guided tours

- Most important handicapped-accessible facilities:

1. campgrounds 2. toilets 3. picnic areas 4. hiking trails 5. showers

- Priority for spending:

Visitors believed the largest portion of the forest's budget should be spent to *protect and restore natural areas*, closely followed by *maintaining or upgrading existing facilities and trails*.

Visitors were asked to indicate the various reasons for which they would support the closing of roads. A majority of forest visitors supported road closures to *protect riparian areas, protect archeological or historic sites, improve wildlife habitat, reduce illegal activities on the forest, increase peace and quiet on the forest, lessen the amount of erosion occurring on forest roads, and lessen the risk of human-caused fires*. There was very strong support for closing roads to *improve wildlife habitat and reduce illegal activities*. Slightly less than 50% of all respondents supported road closures to *save maintenance dollars and create larger tracts of roadless land.* Unsolicited written comments associated with this question raised the issue of closing roads for any reason.

The Forest is currently participating in a multi-Forest process to decide whether and how to limit off-road access to the Forest by wheeled, motorized vehicles. The Forest is also carrying out a roads analysis process with the Coconino National Forest to identify what roads are (and should be) managed for passenger vehicle use. This analysis will be used along with project-specific analysis in the future to determine the needs for and management of all roads in specific areas.

Several recently developed databases are in use (Meaningful Measures, Infrastructure, Deferred Maintenance) to reasure and track recreation investments and use. These provide the detailed information about the cost of maintenance and operations, capital investment needs as well as meeting the financial health requirements stressed by Congress and the Washington Office. Generally, the goals for recreation are being met on this Forest within the fiscal constraints of the budget.

Vegetation

A collaborative effort to refine management for **old growth ponderosa pine forest conditions** on the National Forest portion of the Kaibab Plateau continues. An NAU student, who has participated in this process since it's inception in 1998 has completed a thesis, titled "Environmental Histories: A Foundation for Adaptive Forest Management on the Kaibab Plateau in Northern Arizona." In it, a

description and analysis of a stand-level model of old growth using four phases of succession is modeled using sample data and then compared to ground conditions. An article on this same topic by Steven Sesnie and John Bailey is due to be published in the Journal of Forestry. Implementing forms of this model will be considered in some alternatives of the Jacob-Ryan vegetation management project in FY 2002.

The Forest continues to grow **tree biomass** at rates far exceeding losses due to all causes; catastrophic fires may have taken 15 to 20 percent of timber growth in the past decade.[2] When losses of significant magnitude do occur (such as the Bridger Fire in 1996, and Outlet Fire in 2000) they tend to be in relatively concentrated areas. While these changes create heterogeneity on the landscape, the patterns are probably little like those of pre-European landscapes, especially in woodlands, ponderosa pine and lower elevation mixed forests. The Forest considers the risk of catastrophic fire in planning treatments, such as management-ignited fire (prescribed fire) and tree thinning.

Bridger Fire (1996): Fires such as Bridger include extensive areas of crown fire, destroying all or nearly all old growth forest and habitat for forest-dwelling species for decades to centuries.

Pediocactus (*P. paradinei*) monitoring has been carried out per the Conservation Agreement. Some findings to date are excerpted from meeting notes:

1. Geologic Mapping (report by Barb Phillips): George Billingsley (USGS, Flagstaff) has mapped House Rock, House Rock Spring, and Cane quads. Plants appear to be on terraces mapped as QA1: alluvial terraces 100,000 to 300,000 years old where these are found in conjunction with Kaibab limestone. Maps will be on USGS website "sometime soon." Maps suggest areas where surveys should be carried out that have never been searched. Includes written detailed reports.

2. Monitoring and ecological studies: Robert Frye. Dramatic decline in last 2 years; 56% of marked individuals were gone. Main cause was rabbits; they were using cacti as water source. This year rabbit decimation was less, but there was an overall 20% decline. No correlation with cattle except at Pasture Canyon on one occasion when cattle were present when soil was very wet. Two human caused events occurred in 2000-01: vehicle was driven over one plot, and a campfire was built in another plot. Short study on pollination 2 years ago; collected pollinators and noted good pollination. Plant is obligate outcrosser. Noticed hollowed out fruits this year; insect had eaten fruit.

3. Dripline study: Art Phillips. Surveys by TNC in the late 1980's found plants in piñon-juniper as well as in the sagebrush/grassland valleys. Found no statistical difference between 1 m and 2 m away from all trees. But when looked at juniper vs. piñon, Pedio was more correlated with juniper than with piñon.

[2] Very rough information about growth and mortality may be derived by querying the Forest Inventory and Analysis database on thwe world-wide web at: http://www.ncrs.fs.fed.us/4801/FIADB/fim_tab/wc_fim_tab.asp

4. Historical habitat investigation: Harley Shaw (B. Phillips). Found that there was not much change in vegetation. There was some infilling of juniper, but this was largely due to growth of existing trees. Had photos from 1920s, 30s, 40s, 50s. Largest increase was in size of big sagebrush. Conclusion: woodland density has not changed enough to affect Pedio populations since 1940.

A Conservation Agreement for **bugbane** (*Cimicifuga arizonica*) was signed in FY1999. A survey for Arizona bugbane in North Canyon was conducted in 2001. It was again negative as it was in 1999; several populations of the look-alike, Baneberry were located.

Wildlife and Ecosystem Functions

The following work was ongoing on the North Kaibab RD this year:

I. *Effects of Wildfire on Densities of Secondary Cavity Nesters in Ponderosa Pine Forests of Northern Arizona*. Bill Block, Snag Study/Monitoring NAU; Jill Dwyer Graduate student.

A. Summary of monitoring activities
This study was completed in 2001This study consisted of looking at snag use by secondary cavity nesters in low, medium, and high intensity wildfire burns. This study has plots on Peaks and Happy Jack Districts of the Coconino as well as the North Kaibab.

B. What we are learning
We received a copy of Jill Dwyer's completed Master's thesis for this study.

II. *Snag dynamics, use and associated bird communities in wildfire-burned ponderosa pine landscapes*. Carol Chambers, Assistant Professor, NAU; Doug Koenig Masters student.

A. Summary of monitoring activities
This is a four-year project involving two masters students. Phase I involves investigating bird community response to recent fires (<5 years old), while Phase II will investigate response of birds to older fires (>10 years previous). During both phases, they will identify bird use of snags, snag longevity, snag spatial pattern, and other characteristics of snags that are selected by wildlife for nesting or foraging. Bird community response will cover effects on Neotropical migrants which ties back to the Bridger Monitoring and collaborative questions asked concerning Neotropical migrants.

B. What we are learning
This is an ongoing study and the District has not received a report on this past season's work. District Biologist has had discussions with Dr. Chambers and there seems to be interesting results for snag longevity, however we have not yet received a report.

C. Recommendations
Continue study.

III. ***Landscape Level Competition (including habitat, prey, and predation) between Red-tail hawks and Northern Goshawks on the Kaibab Plateau.*** Teryl Grubb, RMRS.

A. Summary of monitoring activities

Final year of a 4-year study. This year they continued monitoring and surveying the Plateau for red-tailed hawks.

B. What we are learning

This season focused on video monitoring of nests, prey/diet overlap with goshawk and continued surveying for nest sites. While we have received activity and nest location data for red-tailed hawk nests, a summary of last years study. Completion of one master's thesis (adult telemetry study), and second in final stages (foraging ecology) Study expanded to include aspects of human disturbance, specifically log truck hauling and recreational ATV travel. Sound monitoring protocols were developed with the assistance of Dr, Larry Pater, US Army Engineer Research and Development Center, Construction Engineering Research Laboratory.

C. Emerging issues

As we implement the goshawk guidelines, areas of the forest may become more open. This creates concern for increased possibilities for direct competition between red-tail hawks (open forest habitats) and northern goshawk (more closed habitats). In addition, there is an opportunity for disturbance monitoring utilizing the red-tailed hawk as a surrogate for the goshawk. The red-tailed hawk is a raptor that is very common and is not Threatened, Endangered, or Sensitive, nor is it a species of concern. Yet we can learn from its behavior to such disturbances as hauling, planting with augers, road maintenance, etc. and in the future apply what is learned towards minimizing and/or eliminating disturbance to active goshawk pairs, while still meeting other management objectives.

C. Recommendations

Continue sound monitoring aspects for 2-3 years to document and better define our seasonal restrictions for goshawk and other raptor sites.

IV. ***Northern Goshawk Demographics on the Kaibab Plateau of Northern Arizona***. Richard T. Reynolds, RMRS

A. Summary of monitoring activities

This study began in 1992 and has completed its tenth year looking at territory occupancy, fecundity, site fidelity, reproduction and other demographic parameters. This study is expanding into the effects of prey densities on reproduction. This study is of extreme importance due to the Kaibab population being the largest known population of goshawks in North America. This study may have a major influence on the status of goshawks in the West.

B. What we are learning

Greater than 95% (135) of the existing territories have been located on the Kaibab Plateau and it is just in the last two years of the study that enough information has been accumulated so that researchers can begin to determine how and if management activities are impacting the goshawk population on the Plateau. During that time, researchers have observed a possible cycle in small mammal populations, and goshawk occupancy and reproduction. Goshawk fecundity (reproduction)

is highly dependent on prey populations. Prey populations appear to be dependent on cone crop and weather factors

C. Research needs identified

1. Effects of implementation of goshawk guidelines on goshawk reproduction.
2. Effects of human disturbance (e.g., logging activities, recreation activities, etc.) on goshawk reproduction.

D. Barriers to effective monitoring

Consistent, long term funding.

E. Emerging issues

1. Development of a reproductive/occupancy monitoring plan for after completion of Richard T. Reynolds study.
2. Effects of implementation of goshawk guidelines on goshawk reproduction is becoming a major issue for outside groups.
3. Effects of prescribed fire and Urban Interface treatments on goshawk reproduction.

F. Recommendations

1. Continue demographic study for minimum of 1-2 years.
2. Encourage R.T. Reynolds to expand his study to look at effects of prescribed fire and Urban Interface treatments on goshawk reproduction.
3. Develop and implement a reproductive/occupancy monitoring plan with R.T. Reynolds and other goshawk Biologists (e.g., P.L. Kennedy, Colorado State University)
4. Implement a disturbance study using the Red-tailed Hawk as a surrogate species (see T. Grubb study)
5. Develop and implement a study to evaluate the effects of implementation of goshawk guidelines on goshawk reproduction. A major commitment from the Forest, Region and Research Station is needed to undertake this huge, long term study.

V. *Development and Testing of Artificial Bat Roost Structures: Bat Bark*. M.S. Siders.

A. Summary of monitoring activities

Bat Bark has been installed on 67 trees in 11 locations on the Kaibab Plateau. These trees were monitored for bat use during the summer using both ocular estimations and limited infrared video monitoring. All (24 polyurethane, 16 fiberglass, 26 multi-chamber) bat barks were monitored this year. We were able to get some video of bats using the roosts.

B. What we are learning

1. Of the Bat Barks monitored in 2001, only 27% of Bat Barks showed signs of bat use. This was the lowest use rate seen.
2. We continue to monitor the multi-chamber bat bark design to determine if it will be used by larger colonies.

C. Barriers to effective monitoring

Funding. Need technical expertise to better monitor roosts for species, amount and type of use.

D. Emerging issues
Public interest in purchase of the Bat Bark for their home use, or other institutions.

E. Recommendations
Continue for monitoring and development for the next one to two years.

VI. Peregrine falcon monitoring.

A. Summary of monitoring activities
Monitored 16 peregrine sites this season (2 were part of the requirements of the Biological Opinion for East Rim Overlook). All observations were performed according to the 1994 Peregrine Falcon Survey Methods by Laurie Z. Ward. A document was created to describe all known peregrine falcon sites, with photos and directions.

B. What we are learning
Nine sites were occupied (56%) (adults seen on territory). These included Pigeon, Kanab Creek, Oak, Gooseneck, Jumpup, Cray Jug, East Rim, Saddle Mountain, and Valley. Nestlings were seen at three sites (Oak, Valley, Jumpup)

C. Barriers to effective monitoring
Funding and/or locating skilled volunteers.

D. Emerging issues
The peregrine falcon has been delisted, however monitoring needs to continue for five years post de-listing. A new monitoring protocol is being developed. Support/funding for monitoring in 2002 was not provided.

E. Recommendations
1. Continue for next five years to determine activity for all known eyries. Continue to monitor this and other eyries as time and funding permits. In order to stretch our resources, we work cooperatively with the Arizona Game and Fish Department and/or recruited volunteers in the past.
2. Although the species has been delisted, monitoring needs to continue for five years post de-listing.

The following work was ongoing on the Williams RD in FY 2001:

I. Forest Restoration Project NAU, Southwest Forest Alliance, Kaibab NF and others.

A. Summary of monitoring activities
This project looks at some effects of a particular approach to "restoration" in the Frenchy area. Treatments on 37 acres have been carried out. Pre- and post-treatment measurements have been carried out. Results showed that no trees were cut in 48% of the stand, with 67% of all trees cut 5" dbh or less in diameter. Average basal area went from 95.7 square feet pre- to 79.1 post. With this level of treatment, there will limited diameter growth response, and no increase in forage production.

In FY1999, 177 pre-treatment plots were also installed over about 465 acres within the adjoining Frenchy EMU project to be able to compare vegetative responses from different treatments, not just "restoration" treatments.

B. Emerging issues

This project represents an effort to collaborate with both the Southwest Forest Alliance and NAU in how to approach restoration of SW ponderosa pine forests heavily impacted by logging, grazing and fire-suppression.

C. Recommendations

No progress has been made for three years on the planning due to a lack of needed proposed treatment descriptions by the Alliance. The Forest has moved ahead immediately adjacent to the Pine-aire Estates subdivision with analysis and a planned proposal to reduce fuels. We will evaluate the Alliance's commitment to collaborate on this project soon.

II. Effects of Fire and Fire Surrogates. Carl Edminster, RMS – Flagstaff and Mark Herron, Kaibab NF, and others.

A. Summary of monitoring activities

Started in FY1999, two of ten research plots in fire-dependent ecosystems were planned to be established on the Williams RD in the Frenchy EMU to assess the ecological consequences and trade-offs of various management practices to reduce fire hazards. Work involves measurement of vegetation, wildlife, soils/hydrology, fuels, insects, economics, and social variables. Each replicate contains 4 treatment areas, each with a 10-ha interior sampling area. Each sampling area contains 36 permanent grid points. The details have been worked out between the district and NAU. The work is to be contracted in FY 2002.

B. Emerging issues

There is an opportunity to determine how "much" must be done to gain resiliency in our ponderosa pine systems and what the various costs and benefits of practices are in a comparative way. We may have the opportunity to move beyond posturing about what the relative benefits of various approaches are (from "Restoration" to "No Action").

C. Recommendations

Continue project. The potential is great for this study to bring various groups along in a collaborative way if they can be involved in the project soon with regard to its purpose and methods.

III. Grass/forage Response from Treatments in Pinyon-Juniper Type, Mark Herron, Kaibab NF

A. Summary of monitoring activities

Pre-treatment photo points were established in nine different treatment units in 1995. Treatment occurred from 1996-98. Most juniper greater than 5" dbh were removed. In FY 1998 photos were retaken at four plots to document conditions after harvest and prior to burning. In FY2000, prescribed burning was complete I the sites. Photo points need to be relocated and photos retaken in all nine units following post-commercial treatments, and at 2-5 year intervals after that. Time-

interval photo records will give us a visual record of treatment response. At this time, it is too early to fully assess results.

B. Recommendations
Continue to retake photos at established points and to assess results.

IV. Snag Production from Basal Burning. Chuck Nelson, Ed Johnson, Kaibab NF

A. Summary of monitoring efforts
Basal burned eight trees to create wildlife snags. All trees have died; two have fallen over, and half of another tree has fallen over. Some activity in one tree, but no cavities were noted. No change from last year.

B. Recommendations
Keep monitoring.

V. Snag Production from Innoculation. Chuck Nelson, Ed Johnson, Kaibab NF.

A. Summary of monitoring activities
In 1996, innoculated 60 trees with heart rot fungi to produce primary cavity-nesting habitat. After three years, two trees have died, and three trees total have cavities started, but no apparent nesting has begun. There was no activity in 56 trees.

B. Recommendations
Keep monitoring. This is a ten-year monitoring study.

VI. Grazing Utilization on 31 Allotments on the South Zone. Derek Padilla, Lauren Johnson, Paul Webber, Kaibab NF.

A. Summary of monitoring activities
Occular inspections were performed on every active allotment to determine utilization. All 31 allotments showed forage was being utilized or below allowable use levels.

B. Recommendations
Continue to monitor use on various allotments yearly to ensure use does not exceed allowable limits.

VII. Spotted Owl Monitoring/Surveying. Kara Leonard and Chuck Nelson, Kaibab NF.

A. Summary of monitoring activities
In FY2001 a total of 3600 acres were surveyed to Region 3 protocol in two areas on the district. No owls were found from the survey. Additionally 6 PACs on the district was monitored and had confirmed occupancy on 4. They confirmed reproductive success in 3. Two PAC's, Pumpkin and Newman, on Kendrick were damaged by the Pumpkin Fire in May and June. Neither produced young and one was not confirmed occupied.

B. Recommendations

Continue monitoring.

VIII. Northern Goshawk Monitoring. Jennifer Monahan and Chuck Nelson, Kaibab NF.

A. Summaryof monitoring activities
In FY2001, 45 territories were monitored on the Williams and Tusayan Districts, with 12 territories occupied; 3 of those had nesting success and in those 7 birds were fledged. In all, 11000 acres (approximately) were monitored/surveyed.

B. Recommendations
Continue project.

Monitoring Requirements of other Laws

Clean Water Act, Clean Air Act, Endangered Species Act

We comply with the Clean Water Act through the implementation of Best Management Practices (BMPs) on our projects. We include these in design of allotment management plans, timber sales and road work. We also maintain contacts with the Arizona Department of Environmental Quality on large project proposals.

The National Forests in Arizona fund a position with ADEQ to coordinate our prescribed burning programs and ensure compliance with the Clean Air Act. This position and the relationships built between agencies has been quite successful in maintaining good will while accomplishing needed work.

The Endangered Species Act is complied with through project designs which meet recovery plan requirements and maintain the viability of all TE&S species. We also consult with the USF&WS on all projects where this is required. Biological Assessment and Evaluations must be completed prior to approval of NEPA decision documents and are maintained in the Supervisor's Office.

Research Needs Update

Many needs are previously discussed by project above and in previous monitoring reports.

Emerging Issues and Trends

On this Forest, emerging issues are fairly typical of all Southwestern Forests with some exceptions. It is becoming clear that the Management Indicator Species (MIS) selected for the original Forest Plan are not good indicators of management on the Forest. Many are subject to numerous actions beyond either the boundaries of the Forest, the Forest's management authority, or both. The Forest is researching the possability of amending the Plan to select new MIS. Collaboration and partnering are increasing. Riparian issues, including T&E species associated with them, are not becoming as critical as elsewhere.

We are experiencing changes in who uses the Forest and how they (and we) view it. Up until now, increases in recreational use have been within the bounds forecast in the 1988 Plan but the type of use is changing. Mountain bikes and off-road vehicle-use are growing in popularity. We expect increased

fees and increasing limitations on visitation to Grand Canyon National Park to increase use of the Forest, including wilderness areas. The North Kaibab RD is partnering with NAU to implement a campsite monitoring and inventory sample in the Kanab Creek Wilderness which begain in FY1999.

The recently-completed Kaibab National Forest User Study by an NAU contractor will provide information to be used in the upcoming Forest Plan revision. Two spinoffs of the planning described above will be an update of the Recreation Opportunity Spectrum and progress toward conversion from the Visual Management System to the Scenery Management System.

The risk and fact of catastrophic fires are now being realized. People are increasingly supportive of action, although there are also those adamantly opposed to management to either mitigate risk or (especially) to salvage timber after large fires. Implementation of the National Fire Plan continues. It promotes aggressive fuel treatments that will minimize uncharacteristically intense fires. The Kaibab is planning and implementing urban interface treatments to help meet the Region's priorities for treatment. They will provide opportunties for monitoring to see if they create the desired result.

The Forest has shifted much of its work emphasis to the range program due to several factors including compliance with the Burns Amendment schedule, the number of permits expiring soon and public interest in grazing effects.

Antelope populations and their declining habitat began to attract more attention from both the Kaibab and Coconino National Forests after the Arizona Game and Fish Department approached the Forests with some population tracking information. Restoration of corridors, if not entire grassland/savannah areas, has become a planning issue on the Frenchy landcape and is actively being discussed at a multi-district scale across the two Forests. This issue is likely to become linked with efforts aimed at maintaining and restoring prairie dog and/or ferret populations over time.

Noxious weeds are not a severe problem on the forest yet, but there is still concern that if we do not begin progress towards containment and eradication they could become a severe problem. An integrated noxious weeds treatment EIS began last year in collaboration with the Coconino and Prescott National Forests. A decision is expected in 2002.

Current and Potential Monitoring Partnerships

Most of our current monitoring partnerships are with NAU (Bridger Salvage Sales, Kane Ranch, Kanab Creek Wilderness and Frenchy EMU), Arizona Game and Fish Department (Bridger Salvage Sales, bats and other wildlife populations, maintaining the Heritage database and water development maintenance) and Rocky Mountain Station (uneven-aged growth plots, goshawk demography).

Opportunities for partnerships probably exist for monitoring populations of rare or endangered species, including the Paradine plains cactus and noxious weeds through groups such as the Arboretum at Flagstaff and even ADOT. Others who might be interested in helping monitor economic, social and biological conditions include, Grand Canyon Trust, the Southwest Center for Biological Diversity, permit holders and local residents. These opportunities have not yet been seriously pursued.

Barriers to Effective Monitoring and Evaluation

The Forest Service has released draft forest planning regulations which would require extensive, well-designed and reviewed monitoring of various sustainability indicators. If these were adopted, much greater emphasis and expenditure on monitoring and evaluation would likely result.

The biggest barrier to effective monitoring and evaluation appears to be a lack of emphasis and resource allocation, both internally and externally; which other mandated or important activities will the Forest and/or others drop to do this work?