

**Annual Monitoring Report  
for Implementing the  
Kaibab National Forest Land Management Plan  
1998**

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.

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CONNY J. FRISCH  
Forest Supervisor

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Date

## Monitoring Activities

The Monitoring Plan for the Kaibab National Forest Plan identifies 58 items to be tracked as measures of the effectiveness of the forest plan. 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 in 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.

### Riparian Areas

No new direct monitoring activities of riparian areas are noted since last year's report. However, see *Invertebrate Monitoring of North Canyon Creek*, discussed below. Partnerships, including some with the Arizona Game and Fish Department are possibilities, but have not been proposed at this time. Work along these lines is being accomplished for key riparian areas on a project-by-project basis. This project is such an example.

### Bridger Monitoring

Data collection continued in FY 98, with re-reading of the plots described in last year's report under "Bridger Salvage Sales". Preliminary findings for some of the items are expected to be presented as part of a master's thesis of an NAU student who helped design and collect data on tree mortality and damage. Additionally, Rocky Mountain Station, which had not been previously involved, has begun inventory of understory plants in the burn area. Also, a more extensive "floristic study" is planned for FY 99 by the Zone Botanist for the Kaibab NF.

The Forest planned a "Bridger Lessons Learned" meeting with the public, but this has not yet been held due to scheduling miscommunication. For now, a draft document on this topic is being assembled by the Forest and NAU for routing and comment electronically. At some point, this may evolve into publications, depending upon outside interest and resources. One research result on goshawk nesting and log hauling has been published in a Research Note by Rocky Mountain Station by Teryl Grubb, *et al.* (RMRS-RN-3. 1998).

The Forest has received and reviewed the "Disturbed Area Rehabilitation Review" document produced by the Region and notes many similarities in conclusions reached across the Region with our experience on Bridger.

We do take exception to both the Tree Planting and Salvage Logging issues as discussed in that document. These issues are analysed and discussed in the Bridger EA with much more depth than the Regional document gave them - and resulted in different conclusions. We concluded that reestablishing ponderosa pine trees where they had been present for at least several centuries was important - not only to Merriam's turkeys whose winter roost sites were wiped out over a large area, but also because much of the area is now farther from our desired condition for other species (such as goshawk) and meeting

community needs over the long term than it was before the fire. We believe "adaptive management" as it applies to reforestation efforts does not lead one to abrupt ceasing of all efforts just because this effort was overdone in the past. Rather, it might lead one to different density and uniformity objectives.

## Vegetation

The Forest inventoried 10,299 acres of forest with quantitative stand examinations. These exams add or update the existing 447,000 acres which have exams. These exams are used to track the overall state of the Forest in various quantitative terms, yielding much greater precision and similar accuracy as the FIA plots. They may be used at multiple scales of planning and analysis. The Forest continues to grow tree biomass at rates far exceeding losses due to all causes. When losses of significant magnitude do occur (such as the Bridger fire in 1996) 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.

The Forest inventoried 3,738 acres of forest with quantitative range inventories. Additionally, past inventories, dating back to the 1950's have been entered into the RMRIS database. These past inventories allow for a long-term look at range condition and trend when compared to current inventories on the same clusters.

Stand exams to track Mexican spotted owl microhabitat were not carried out this year on the Forest although one to two plots have been identified on the North Kaibab RD. No project impacted any PAC, mixed conifer or pine-oak habitat such that this monitoring would be required. The Stewardship Branch carried the FY 98 funding over and is planning to design and implement monitoring in FY 99.

The Paradine plains cactus (*Pediocactus paradenii*) was removed from the Fish and Wildlife Service's candidate species list for listing under the Threatened and Endangered Species Act this year. Monitoring of the population and possible threats, along with specific actions taken to protect the species under a Conservation Agreement, lead to this action. Additional monitoring work is planned for the next several years.

## Wildlife

See previous discussion under "Vegetation" for Mexican spotted owl microhabitat monitoring.

### **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 is in its second year and consists 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.

    1. What did we learn from monitoring?

This is an ongoing study. We have not yet received a summary of the research for this year from Bill Block.
  - B. Recommendations

Continue for the next 2-3 years.

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 study is in its first year. This is a four year project involving 2 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.

1. What did we learn from monitoring

This is an ongoing study and the District has not received a report on this past season's work.

B. Recommendations

Continue study.

III. ***Interactions of Red tail hawks and Northern Goshawks on the Landscape of the Kaibab Plateau.*** Teryl Grubb, RMRS.

A. Summary of monitoring activities

First of a 4 year study. This year they monitored and surveyed the Plateau for red-tailed hawks.

1. What did we learn from monitoring

This is the first year of the study. Still locating nests. It appears many of the Red-tailed hawks are using old goshawk nests located in the drainages.

B. Emerging issues

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 T, E or S, 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 for next two-three years. The potential is great for this study to branch out in the near future.

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

A. Summary of monitoring activities

This study began in 1991 and has completed its eighth 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.

1. What did we learn from monitoring?

Greater than 95% (134) 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.
- B. 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.
  - C. Barriers to effective monitoring
    - Consistent, long term funding.
  - D. 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. Possible petition (again) for listing by USFWS in 1999.
  - E. Recommendations
    - 1. Continue demographic study for minimum of 1-2 years.
    - 2. Develop and implement a reproductive/occupancy monitoring plan with R.T. Reynolds and other goshawk Biologists (e.g. P.L. Kennedy, Colorado State University)
    - 3. Develop and implement a disturbance study using the Red-tailed Hawk as a surrogate species (see T.Grubb study)
    - 4. 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.
    - 5. This year a related goshawk population study of Dr. Reynolds, which was funded in part by a Heritage grant, was published. This study identified the need to continue monitoring the goshawk population for some period to make the necessary statistically valid predictions about population viability.

V. ***Development and Testing of Artificial Bat Roost Structures: Bat Bark.*** M.S. Siders and D. Garcia de la Cadena.

- A. Summary of monitoring activities
  - Bat Bark was installed on 40 trees in 6 locations on the Kaibab Plateau. These trees were monitored for bat use during the summer using both ocular estimations, as well as the use of a remote ANABAT (bat detector) set-up.
  - 1. What did we learn from monitoring?
    - Of the 24 polyurethane and 16 fiberglass Bat Barks monitored in 1998, 14 (35%) showed signs of bat use. Ten (42%) polyurethane and four (24%) fiberglass Bat Barks showed signs of bat use.
  - 2. What are we doing about it?
    - Continuing to monitor use. Developing a new design to accommodate larger colonies.
    - Currently analyzing sound files to attempt to determine species using bark.
- B. Barriers to effective monitoring
  - Funding.
- C. Emerging issues
  - Public interest in purchase of the Bat Bark for their home use, or other institutions.
- D. Recommendations
  - Continue for monitoring and development for the next two-three years.

## VI. *Peregrine falcon monitoring with AGFD.*

### A. Summary of monitoring activities

Monitoring 2 peregrine eyries this season in cooperation with Game & Fish. Four visits per site.

#### 1. What did we learn from monitoring?

East Rim peregrine eyrie was not active; Oak Canyon peregrine eyrie was active.

#### 2. What are we doing about it?

Continue to monitor these and other eyries as time and funding permits. In order to stretch our resources, we work cooperatively with the Arizona Game and Fish Department.

### B. Progress moving toward desired future conditions

Overall, the population numbers required in order to consider delisting have been met.

### C. Barriers to effective monitoring

Funding.

### D. Emerging issues

The peregrine falcon is in the process of being delisted. NEPA process for grazing allotments on the District (Kane Allotment) will require that the District monitor the peregrine eyries associated with the allotments being considered. The presence of peregrine falcon within the allotment requires a "may affect, not likely to adversely affect" call under the grazing criteria issued by our Regional Office.

### E. Recommendations

Continue for next two-three years to determine activity for selected eyries.

## VII. *Invertebrate Monitoring of North Canyon Creek.*

### A. Summary of monitoring activities

To meet monitoring criteria in the Forest Plan for the habitat of the Apache Trout in North Canyon Creek.

#### 1. What did we learn from monitoring?

Quality of the stream is in good health per the invertebrate sampling. Both water and invertebrate samples were sent to Fred Mangum of the Intermountain Region Aquatic Ecosystem Analysis Lab. A report was issued on September 23, 1998. Biotic Conditions Index (BCI) of 81 for the upper reach and a BCI of 83 on the lower reach of North Canyon Creek indicate that the potential for maintaining the Apache trout fishery is good. The macroinvertebrates were lower in this year's samples compared to those taken in 1990. Part of the reason could have been that the samples were taken later in the year. In both cases, the macroinvertebrate community indicated that there may be opportunities for management to improve instream habitat quality in this aquatic ecosystem.

#### 2. What are we doing about it?

The District will continue to monitor North Canyon with assistance from AGFD. The District plans on discussing possible opportunities to improve instream habitat quality with AGFD and FS fisheries biologists.

### B. Progress moving toward desired future conditions

Overall, the population numbers required in order to consider delisting have been met.

### C. Barriers to effective monitoring

Funding has been a significant barrier.

### D. Emerging issues

There are several movement barriers for Apache trout along the 2 mile stretch of active stream. One barrier is a vertical drop which allows fish to move downstream, but will not allow them to return upstream. The barrier is located within a portion of North Canyon

Creek which is perennial. The AGFD to the opportunity to shocked and moved Apache trout from the lower stretch up above the barrier to the upper reaches.

In the past few years, there have been several transplant attempts to move Apache trout from North Canyon back to the Ord creek drainage where this population originated. Tests performed by USFWS have shown that the Apache trout in North Canyon are very pure stock and therefore extremely valuable as a gene pool for transplanting fish back to those areas where the purity has been lost over the years, through hybridization with rainbow trout.

E. Recommendations

Continue to monitor on an as needed basis. Continue to work cooperatively with the Arizona Game and Fish Department and develop a monitoring plan for Apache Trout and also Invertebrates for North Canyon with AGFD.

**VIII. MSO Habitat Monitoring Plots.**

A. Summary of monitoring activities

In cooperation with Rick Miller of the AGFD and the Tammy Randal Parker a biologist on the Coconino, at least one if not two monitoring plots were identified on the ground in mixed conifer (MSO restricted habitat). These plots are associated with the Boundary Fuels Project. An intensive monitoring plot was identified out on the ground in order to identify changes and loss of habitat characteristics in the area by management activities such as prescribed burning. The area will be prescribed burned in order to create a fuel break along the southern boundary of the District next to GCNP.

1. What did we learn from monitoring?

The plots were identified out on the ground this year. They will not be read, nor will we learn anything until after the burning has been conducted within the next few years.

B. Barriers to effective monitoring

Funding has been a significant barrier.

C. Emerging issues

Although recruitment will occur with implementation of prescribed fire, the loss of large down woody material and standing snags is a concern to the biologists. Both of these habitat characteristics are very important for wildlife and therefore the prey base of T,E&S species such as the MSO. Hopefully the plots will give us a better understanding of what is actually lost and what can be done within the prescription to better manage for and reduce the loss of these valuable habitat attributes.

D. Recommendations

Continue to monitor on an as needed basis. Continue to work cooperatively with the Arizona Game and Fish Department so the plots are read after project implementation.

**The following work was ongoing on the Williams RD this year:**

***I. Snag Longevity and Abundance.*** Joe Ganey, RMS - Flagstaff.

- A. Surveys of selected sites to establish baseline data which will be used to determine snag densities and longevity or trends. Plots will be resurveyed in 5 years.

***II. Rx Fire Monitoring.*** Rick Miller, Az Game and Fish Department and Tammy Randall Parker, Coconino NF

- A. Established two monitoring plots on the Twin Rx Fire project area.

1. Reductions in down material, large oaks and pine were noted but were within acceptable range of tolerance.

- B. Emerging issues  
See VIII C., in North Kaibab work, above.

### **III. 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 have been carried out. Pre- and post-treatment measurements have been carried out.
- 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.  
  
One major drawback of this project is that it does not have a component to compare it to current management practices on the Forest. It will be difficult to draw any meaningful conclusions about this treatment in relation to other treatment practiced programmatically on the Forest at this time.
- C. Recommendations  
Continue the project to it's conclusion. Factor in the RMS research discussed below if at all possible.

### **IV. Effects of Fire and Fire Surrogates.** Carl Edminster, RMS - Flagstaff and Mark Herron, Kaibab NF, and others.

- A. Summary of monitoring activities  
Two of ten research plots in fire-dependent ecosystems are being 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. Plots are to be 160 acres in area, with 40 acres in each of burn only, tree-cutting only, a combination of the two and no treatment.
- 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.

### **V. Rabbitbrush Control.** Paul Webber and Tom Matza, Kaibab NF.

- A The district is carrying out an *ad hoc* study seeking to control rabbitbrush through repeated burnings. Past attempts to control rabbitbrush with burning have not been effective. This attempt involves repeated burning, with the first burn occurring during a drought when the

plants are presumably stressed already. The first burn was conducted in 1997 after a severe drought and resulted in about 15% mortality. Grass was planted to carry a follow-up burn in 1998 but the seeding was essentially a failure. The District plans to try a sterile annual grass to create a fuel bed for another burn. Unfortunately, the rabbitbrush will have had at least one full growing season to recover before the next burn. The Williams District is monitoring the project with mortality plots.

***Spotted Owl Monitoring/Surveying.*** Kevin Whelan and Chuck Nelson, Kaibab NF.

This past summer a total of 4,667 acres was surveyed to Region 3 protocol in two areas on the district. No owls were found from those surveys. Additionally 5 PAC's on the district were monitored, all five PAC's had confirmed occupancy in them. We were unable to confirm reproductive success in any of them.

***Northern Goshawk Monitoring.***

In the 35 territories that were monitored this year (including historic ), 11 of them were confirmed occupied. Reproduction was confirmed in 6 of the 11 territories, with 9 fledgings produced. A total of 10,196 acres were surveyed/monitored this past year.

## **Appeals/Litigation/Large FOIAs**

Refer to the 1997 report. The status of this issue and it's effect of diverting resources from management continues. Some consistent guidance in managing programmatic, large, and unfocused Freedom of Information Act (FOIA) requests from the Washington Office, along with support from the Regional Office has allowed us to begin to focus requests to specific information requestors are entitled to. We hope this will lead to lower FOIA compliance costs while enhancing dissemination of information about our operations as the FOIA intends. The challenge for this Forest - indeed of the Forest Service - will be to spend less energy on these crises, no matter how "urgent" they seem, and move ahead with actions which give the greatest benefit to the greatest number over the long term.

## **Social, Economic and Ecological Forest Plan Objectives**

The objectives in the Kaibab Forest Plan are expressed in terms of timber sale outputs, types and amount of vegetative treatment, rights-of-way acquired, recreation investments, ORV closures, visual quality objectives and old growth allocated. Social objectives are not directly addressed in this Plan. Consideration to this will be made in a future amendment.

The latter four of the listed objective sets have been largely attained. The 6/96 amendment essentially recognized a shift which had already taken place on the Kaibab NF with respect to the first two objectives. Timber production is less than 1/3 of ASQ and is expected to remain in that range or less. Uneven-aged management, hardly even mentioned in the 1988 Plan, is now the norm on this Forest, along with substantially more thinning of small-diameter trees.

Economically, these changes contributed to the closure of several sawmills, most notably, Kaibab Industries in Fredonia. Review of 1990 Census data and subsequent Utah Job Service and local crime information indicates both the social and economic effects were profound. A follow-up has not recently been done to identify attenuation of effects, but it seems quite likely they have diminished over time.

Changes in public expectations about how the Forest is managed are generally being accommodated. The Forest has been able to keep up with increased recreational demand to this point, although a number of problems are looming, especially with respect to deteriorating infrastructure.

There is an increase in polarization of the public involved in forest management issues. The Forest is responding to this with collaborative efforts, public involvement plans and other communication. Our home page, which has contained our NEPA calendar since last year, has been nationally recognized as one of the best examples in the Service. This year the Forest has begun a dialogue about old growth management on the Forest. Some number of people representing various interests, from academia to industry and environmental groups are participating in this effort. The Tusayan Growth EIS continues toward a decision, expected this year. While this process and every proposal has been controversial, everyone involved now seems to see a long-term benefit in planning development around the South Rim.

### **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 now maintained in the Supervisor's Office. The Forest is also pursuing Conservation Agreements on two plant species to expedite recovery and thus obviate listing - Arizona bugbane and the Paradise plains pediocactus.

### **Research Needs Update**

Northern goshawk - It is essential to complete the demographics study underway by Dr. Reynolds. This issue is discussed under "Wildlife", above.

Forest restoration - This field is being actively pursued by Drs. Covington and Moore at NAU and the Southwest Center for Biological Diversity, regionally. It includes at least one proposal on this Forest. While we have heard lots of debate by various RMS scientists about the value of this work, there have been no proposals we are aware of to put the value of "restored" forests in perspective with other scenarios.

Pine-oak - We seem to have lost a large number of our larger oak stems, mostly due to fuelwood cutting, especially by theft. These large oak appear to be quite important to forest structure and function in much of our forest. We have very little information to apply in replacing these. We think thinning and

some burning will help but don't really know. Research into methods and time factors involved would be helpful.

Pinyon-juniper/grassland pre-European settlement conditions - We are beginning to get a fair amount of information on conditions in ponderosa pine. This information is quite helpful in getting some idea of the relative effects of changes proposed by management and what the costs and benefits might be to an ecosystem where life has co-evolved under relatively stable conditions for the past few thousand years. Pinyon-juniper is a very common cover type on the Kaibab and in the Southwest. It would be helpful to have similar information for these ecosystems, as well.

Smoke management near populated areas - As we move into prescribed burning in the urban interface, the issue of smoke in populated areas is likely to grow. It would be important to get good distribution of existing research, and possibly new research started.

## **Emerging Issues and Trends**

On this Forest, emerging issues are fairly typical of all Southwestern Forests with some exceptions. Budgets are declining faster on this Forest than most. Collaboration and partnering is 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 are growing 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 this year. Over time, other wilderness areas will be added to the sampling. Our tracking of visitors to developed sites is partly through the interpretative program and is discussed above.

The risk and fact of catastrophic fires are being realized now, especially in the urban interface. 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. A monitoring plan for the Bridger Salvage Sales has been established and is described above.

The Forest is shifting 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. A monitoring plan is being designed collaboratively for the Central Winter Allotment to address issues raised from a variety of interested people.

## **Current and Potential Monitoring Partnerships**

Most of our current monitoring partnerships are with NAU (Bridger Salvage Sales, Central Winter, 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 biggest barrier to effective monitoring and evaluation appears to be a lack of emphasis, both internally and externally; which other mandated or important activities will the Forest and/or others drop to do this work?

In the case of Bridger Salvage Sales, an effort was made to bring RMS into the work but both funding and timing proved insurmountable. We have also found competition between NAU and RMS to be a barrier. In this case, we simply continue to talk to people, in line with the guidelines in FS-608.

The Forest's vision emphasizes a Learning Organization. As we begin new projects with this in mind, opportunities have begun to emerge that are likely to lead to more monitoring and evaluation. The Natural Resources Group is drafting a plan to evaluate the status of project monitoring plans documented in EAs over the past several years. Besides verifying the level of implementation, effectiveness monitoring will also be carried out and evaluated for some items.

Combining the Learning Organization with a second branch in the vision - Relationships - other opportunities are beginning to emerge. In FY 1998, two demonstration projects involving other partners, monitoring and evaluation are planned. Both involve NAU researchers in restoration efforts. The Grand Canyon National Park is involved in one of these and the Southwest Center for Biological Diversity in the other.

## Monitoring Plan

Details of the Forest Plan Monitoring Items are listed at the end of this report. A summary of Monitoring Plan accomplishment for 1998 follows.

Resource Addressed	Number of Items	Number Monitored
Timber	10	9
Protection	1	1
Range	4	4
Recreation	6	0
Heritage	3	0
Wilderness	1	0
Visual	1	0
Soil	1	1
Land Management	1	1
Wildlife	29	11
Facilities	1	1
<b>TOTAL</b>	<b>57</b>	<b>28</b>

Many of the items for wildlife are monitored by the Arizona Game and Fish Department (population numbers). Others are probably no longer appropriate with the change in timber harvest practices on this Forest. These will be addressed in a future Plan amendment. For all monitoring, budget reductions have been a major impediment to effective monitoring, along with a lack of emphasis on it.

## Detailed Forest Plan Monitoring Information

All ten Timber items have been monitored. Items 1-5, 8 and 9 all deal with outputs of a particular type, either implementation of particular prescriptions or volume produced. Case law since the Plan's inception has shown that this sort of information is not part of a Plan decision and does not require evaluation on that basis. Some of the measures are useful for tracking the rate at which the Forest is dealing with currently perceived issues of forest health (especially thinning items) or contributions to local community economic health (volume produced items).

<b>Timber 1</b>	Pre-commercial Thinning	1823 acres
<b>Timber 2</b>	Commercial Thinning	2379 acres

Neither of the two thinning items are being accomplished at a rate which will keep up with growth. The reasons for this are complex and involve conflict with some Standards and Guidelines (including those for wildlife cover, goshawk and Mexican spotted owl management), economics (especially in the case of pre-commercial and pulpwood product thinning), and litigation (which has the effect of creating cascading delays in project implementation while running up costs).

<b>Timber 3</b>	Shelterwood Seed Cutting	90 acres
<b>Timber 4</b>	Shelterwood Removal Cutting	29 acres

These two items are well below the expected amounts this far into the Plan. As the Plan has been amended to emphasize old trees and uneven-aged management, these are unlikely to rise during the life of this Plan. The effects of the changes are evaluated in the Regional EIS which amended the Plan. Tracking acres of even-aged and uneven-aged regeneration generically would probably be more responsive to current issues. This will be considered for a future amendment. In 1998, the Forest accomplished the following in other types of harvest:

Uneven-aged (Group & Individual Tree Selection)	125 acres
Sanitation (Salvage and Mortality Salvage)	536 acres
Clearcut (Patch)	3 acres
Special	69 acres

<b>Timber 5</b>	Restock. of Regen. Cut	7,266 acres
<b>Timber 6</b>	Restock. of Planted Areas	of "Need"
<b>Timber 7</b>	Review of max size limits	N/A acres

The acreage of reforestation need (due to management treatments) declined from 9291 acres in 1997. The two restocking items above are reported together; planted areas typically have quite a bit of natural regeneration in them as well. First-year survival was 93% (884 acres), while third year ranged from 55% (323 acres) in ponderosa pine to only 10% (42 acres) for Englemann spruce. The number of trees per acre planted on this Forest is typically more than enough to adequately restock openings after accounting for these mortality levels. The Forest has been largely successful in regenerating harvest openings in a timely manner in the past. Opening size seems to bear little relation to success. A better predictor of regeneration success in harvest (or any other types of) openings would be the density of ungulates, especially elk during the first

several years following regeneration. With the major shift in regeneration methods incorporated in the June, 1996 amendment to the Plan, this monitoring item has little further utility in any case. The Forest will consider dropping it in a future amendment.

Only three openings (R3 Guide definition) were created in 1998 through timber harvest and they were all well below the 40 acre limit on opening size currently set. The opportunity to evaluate this measure does not exist for harvest openings created in 1998.

<b>Timber 8</b>	Net Sawtimber Sold	17,977 MBF
" "	Harvested	5,166 MBF
<b>Timber 9</b>	Net P-J Fuelwood Sold	1,680 MBF
" "	Harvested	1,429 MBF

The majority of the wood sold in 1998 occurred late in the fiscal year (10/97 through 9/98). Consequently, little harvest had occurred by October 1. The Forest designs sales to include both sawtimber (over 9" diameter) and pulpwood (5" to 9" diameter) for the past several years (multi-product sales). Our major pulpwood consumer, Stone Container, is converting to 100% recycled material and will no longer purchase raw materials. We have two multi-product sales under contract composed primarily of pulpwood which have remained unlogged due to lack of outlets. We also have three other sales with over 10,000 MBF unsold, probably due to lack of outlets.

Efforts are underway locally to attract new industry to the pulpwood and timber supply. This is important primarily meeting forest restoration objectives and the short and long-term costs of not having the "tool" of timber harvest. Timber sales, whether or no they loose money, seem to be more economic than paying someone to burn or otherwise dispose of small trees which are competing with other trees and other native vegetation. If we do not accomplish the thinning (in part, due to short-term economics), we face the increased risk of much higher costs in the future in fire suppression, fire rehabilitation (especially erosion control and rebuilding improvements) and forest restoration (including reestablishing some trees and controlling noxious weed invasions).

Meanwhile, demand for pulpwood is rising in the US and world-wide and most markets outside the U.S. are fully using their recycleable paper materials. The U.S. is also moving to this position. The current lack of interest in pulpwood seems unlikely to persist for more than a few years. The chang in industry structure may necessitate an indepth review of the Forest's timber program of the future. Adjustments may need to be made for effective management of timber resources into the future.

The Forest has not come anywhere near meeting 75% or more of the ASQ (77 MMBF/Yr) in several years. It is not expected that this will occur in the foreseeable future for reasons discussed in the 1993 Five-Year Monitoring Report. The objectives of projects within the amended Plan are fundamentally different than they were when the original Plan was crafted. Now, many trees are generally intended to be carried on uneven-aged sites for a minimum of 200 years. Additionally, more of the biomass produced is intended to provide structure (snags, down logs) and function (nutrient cycling with fire, old growth and very large trees). If a new ASQ were calculated today, it would be much lower than 77 million board feet per year.

<b>Timber 10</b>	Evaluate Unsuitable Timberland	~45,000 acres
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The trends for this item have generally resulted in fewer acres in the suitable timber base as project-level evaluations continue. The primary reason for this is because there are more lands in the suitable timber base that turn out not to be suitable than conversely. Since the inception of the Plan in May, 1988, the net effect of site-specific evaluations has been a reduction of suitable acres from 479,000 to 373,000 currently - a decrease of 22% in 1998. This ten-year monitoring item is within the bounds of the 25% tolerance. It may be appropriate to continue monitoring this item for the time being but its utility appears to be declining. Most timber harvest planned and carried out on the Forest is primarily for purposes other than timber production. Monitoring Items Timber 5 and Timber 6 adequately address the germane issue in the amended Plan.

<b>Protection 1</b>	Destructive I&D increases after tree-cutting	0 acres
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The 1998 aerial pest detection survey, as with past annual surveys have documented no unacceptable increases in tree mortality resulting from silvicultural activities. To the contrary, much of the mortality reported for the entire period appears to be associated with densely-stocked tree conditions combined with drought and/or fire.

The Jacob Lake Campground is currently being treated to reduce the incidence of dwarf-mistletoe in the ponderosa pine there. Treatments include harvest, slashing and pruning, along with complete, immediate clean-up of debris and low-cut stumps. Much of this project has been carried out with the campground open, in full view of campers. Crew members made themselves available to explain what they are doing and why. Additionally, the District has set up an interpretive trail with signs explaining the effect of dwarf-mistletoe on trees and stands. This project appears to have broad acceptance by the users of the campground.

The Bridger Complex was closely monitored last year for possible build-up of bark beetles due to the presence of large numbers of recently killed or dying trees. At this time, bark beetle mortality does not appear to be outside normal rates when fire-damaged trees are excluded.

<b>Range 1</b>	Wild Burro Populations	8 animals
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Several surveys were completed this year in the Double A Wild Burro Territory. Eight burrows were observed: 2 at MK Tank, four at the Double A headquarters area and 2 at Jim Rivers Tank.

<b>Range 2</b>	Permitted Grazing Use and Grazing Capacity	72,720 AUM
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Grazing Capacity is estimated to be 8,705 AUMs lower than permitted, or approximately 64,000 AUMs.. Actual use in 1997 was 55,100 AUMs. There are three grazing units where the data supports reduction in numbers and possible other management changes, such as modifications in season of use.

<b>Range 3</b>	Range Structural Improvements	32 structures
<b>Range 4</b>	Range Non-structural Improvements	425 acres

Planned improvements were accomplished. Structural work was mostly reconstruction of older tanks and new roadside tanks to improve distribution patterns. Non-structural work was aimed at improving forage/cover ratios, overall capacity, range condition and trend as well as watershed

values. Most of these projects were targeted to former treatment areas which have been inventoried with expansion of woodland trees.

<b>Recreation 1</b>	Public Sector Developed Rec. Use	N/A RVD
<b>Recreation 2</b>	Private Sector Developed Rec. Use	N/A RVD
<b>Recreation 3</b>	O&M of Public Sector Developed Rec. Sites	N/A MPAOT-Day
<b>Recreation 4</b>	Private Sector Developed Rec. Site Const.	N/A PAOT
<b>Recreation 5</b>	Dispersed Rec. Site Investments	N/A PAOT
<b>Recreation 6</b>	Wildlife and Fish Rec. Use	N/A WFUD

None of the Recreation Items are reported this year. Generally, the goals for recreation are being met on this Forest.

<b>Cult. Resrce 1</b>	Protection of Cultural Resource Properties	N/A Properties
<b>Cult. Resrce 2</b>	Evaluation of Cultural Resource Properties	N/A Properties
<b>Cult. Resrce 3</b>	Cultural Resource Inv. Non-Project Areas	N/A Acres

None of the Cultural Resource Items are reported this year.

<b>Wilderness 1</b>	Wilderness Use	N/A MRVD
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The Wilderness Item is not reported this year.

<b>Vis. Resrce 1</b>	Effects of Management Practices on Visual Quality	N/A Acres
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The Visual Resources Item is not reported this year.

<b>Soil 1</b>	Unsatisfactory Watershed Condition	865 Acres
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Typically, the areas treated were within older pushed areas and completed using a bobcat and agroaxe.

With almost 140,000 acres of unsatisfactory watershed condition planned for treatment in the first decade of the Plan, and only about 13,000 acres (less than ten percent) completed, it is very unlikely as much of this will be directly addressed as planned. Money for this activity has been very limited. However, indirect methods of addressing the problem have been pursued. Examples include: Addressing over-stocked allotments totalling 209,000 acres and reducing use by 9725 AUMs; changes in grazing season which have effected improvement on 20,000 acres; and, fuelwood harvest in invaded grasslands and PJ designed to improve watershed condition on 6,000 acres.

The 349,000 acres of unsatisfactory watershed condition identified in the Plan are in PJ on slopes less than 40% slope. They are probably best treated with a combination of removal of invaded or overstocked PJ, grazing reductions (possibly including wild ungulates) and re-introduction of fire. Attempts to begin with fire on the Williams/Chalender Districts proved unsuccessful; even on warm, windy, dry days, the fuel (PJ with no understory) is just too discontinuous to carry fire.

<b>LMP 1</b>	Resource Information Management Systems, Inventory and Data Collection Systems for various resources
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The Forest has converted from a GRASS GIS to ARC-Info with implementation of the IBM contract. Fifteen national standard GIS layers have been identified, including topography (2), elevation, soils, existing vegetation, perennial streams, watersheds, range allotments, transportation, recreation sites, threatened and endangered species, land ownership and rights/restrictions. The Kaibab NF expects to have these fifteen layers fully integrated by the end of 1999. Twelve of them are virtually completed at this time.

#### **Forest Vegetative Conditions** (RMRIS and GIS for Timber, Range, Wildlife and Fish Habitat and Forest Protection)

The Forest conducts two basic types of inventories of vegetative condition: Stage II stand exams, with additional information collected for snags and fuels; and, grass-forb-shrub information from range transects and permanent clusters. All inventories are added to the RMRIS database, whether they originate from post-project implementation inventories or inventories in anticipation of a future project.

At present, it is quite difficult to make detailed comparisons of forest conditions over time with Stage II data because new exams over-write the old exams, rather than supplementing them in some way. For the range transects, this is not a problem because there is room in the database to track the information with each new survey.

Recently, funding for these surveys has declined substantially at the same time their complexity has increased. The result is greatly reduced acreage inventoried quantitatively each year. Table I summarizes inventories by the indicated time period and type during the life of the Plan and the percentage of the forested (for Quantitative Stand Exams) or National Forest (for Range Forage Exams) this represents.

<b>Vegetative Inventories by Time Period and Type</b>		
Year	Quant. Stand Exam	Quant. Forage Exam
1989	82,534	0
1990	100,941	3,296
1991	77,908	1,731
1992	42,803	2,638
1993	34,187	10,259
1994	26,829	5,539
1995	18,155	12,846
1996	6,245	13,818
1997	4,712	13,950
1998	10,299	3,738
Total	447,449	76,558
% of Area	34.2	4.8

Reductions in inventories, both post-project implementation and pre-project, impact our ability to monitor conditions for a variety of resources and concerns over time. These include habitat for TE&S species, insect, disease and fire risk, old growth conditions, timber resources and, in general, the

difference between desired and existing conditions. The problem is not judged to be serious at this time, however, it is cumulative.

## Transportation Facilities Inventories

The transportation system (Forest roads and trails) is maintained in TontoCAD at this time, where attributing of roads is occurring at a slow pace, due to funding and priority limitations. This information is being moved into the GIS as time permits, matching the much less complete CFF layer in GIS with the TontoCAD data. At this time, the system seems adequate for project planning and scheduling maintenance.

The INFRA database has been implemented on the Kaibab NF. At this time, all the buildings on the Forest are in the system. The next few steps include adding in recreation facilities, range improvements, permit information and building appropriate links to the GIS.

## Cultural Resources

All heritage sites have now been digitized and attributed in the GIS for the entire Forest. The sites are linked to the CRAIS database. The Heritage resources Section is also tying digital photos to sites in ARC-Info, so a visual representation of many sites are now quickly available electronically.

<b>Wildlife 1</b>	Wildlife & Fish Non-structural Improvements	266 Acres
<b>Wildlife 2</b>	Wildlife & Fish Structural Habitat Improvements	4 Structures

We have been directed to return to our previous method of reporting wildlife non-structural improvements. This method does not include treatment carried out primarily for creation or maintenance of wildlife habitat unless it was specifically paid for by money allocated specifically for wildlife management. This approach does not reflect what is actually occurring with the resources; it instead seems to be aimed at sustaining functional organizational structures. A more illustrative approach of what the Forest is doing might focus on attainment or progress toward certain conditions, rather than just "improvements". This will be considered in future amendments whether or not our upward reporting requirements accept this type of information.

<b>Wildlife 3</b>	Goshawk and Spotted Owl: Old Growth Habitat	100,000+ acres
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The entire Forest was inventoried to determine the "best" areas with suitable old growth or with the "best" potential old growth in 1989-1991. The "best" 15 percent of the "suitable timber base" was allocated and is recorded in RMRIS. Each Ecosystem Management Area has the prescribed 15%. Because the allocation was made based on the best within a EMA and not on each landscape block, some blocks exceed the 15% and some are less.

An additional allocation - by various means - is being made to equal at least 20 percent of the forested landscape to comply with the June, 1996 amendment. The table above shows the results of a query of the stand data base, using cover type, basal, area, number of trees per acre over diameter thresholds, and site index, where these data are available and applicable. The population the table comes from is only sites with stand exams. Actual area of sites meeting the Old Growth

table criteria may be two to three times higher than the figures in the table. The stand data base does not include historical information, so queries of change over time are not directly obtainable.

<b>Examined Areas Meeting Old Growth Criteria</b>			
<b>CoverType- Productivity</b>	<b>Southern RDs</b>	<b>North Kaibab RD</b>	<b>Forest Total</b>
Ponderosa Pine - H	2855	40243	43098
Ponderosa Pine - L	2533	6619	9152
Aspen - ALL	102	11781	11883
Blue Spruce - H	0	60	60
Blue Spruce - L	0	0	0
Douglas-Fir - H	0	266	266
Douglas-Fir - L	0	94	94
White Fir - H	0	3648	3648
White Fir - L	31	660	691
SW White Pine - H	0	0	0
SW White Pine - L	0	0	0
Englemann Spruce - H	0	288	288
Englemann Spruce - L	0	0	0
Spruce-Fir - H	0	4311	4311
Spruce-Fir - L	0	606	606
Juniper Woodland - H	13183	0	13183
Juniper Woodland - L	15041	0	15041
Rocky Mtn. Juniper - H	0	138	138
Rocky Mtn. Juniper - L	0	138	138
<b>Total</b>	<b>33745</b>	<b>68852</b>	<b>102597</b>
H- higher sites; L -Lower Siles; All - All sites			

There continues to be much controversy concerning the definition of "old growth". Old growth is not some structure but more of a value. Science is continuing to update our knowledge on the pre-settlement forest structure. The emerging picture of "natural" forests as old growth conflicts with some public values about what old growth should be. It is impossible to agree upon measures of old growth when there is no commonly shared definition. The thinking within the original Plan called for "blocks" of land allocated totally to large old trees. Science is now revealing that most large old trees in the Southwest occurred in small groups of less than an acre in association with younger trees.

We are continuing a collaborative effort to articulate the questions associated with the structure and management of old growth with an emphasis on sustainability. While we have identified catastrophic fires, insects and high site densities as major risks to large old trees, some members of the public are more concerned about the threats management brings. There currently is no monitoring prescribed in the Plan for these types of risks. We will need to answer the questions of how many acres we have in large old trees, how these are arranged across the landscape, and how many acres are we moving into the large old tree structure.

<b>Wildlife 4</b>	Goshawk and Spotted Owl - nest location, occupancy, and productivity.
northern goshawks	133(nk) + 47(sk, incl. 12 historic) territories 50/108(nk)+11/35(sk) occupied/checked 44/50(nk)+6/11(sk) fledged at least one/tracked

Mexican spotted owls	6 territories 5/5 occupied/checked ?/0 fledged/tracked
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The intent is to maintain population and habitat effectiveness. The habitat has been defined in the "Management Recommendations for the Northern Goshawk in the Southwestern United States" and in the "Recovery Plan for the Mexican Spotted Owl". Habitat monitoring is being done today with pre and post-stand exams. Realistic evaluations can be made to determine if treatments are valid in moving existing conditions to desired conditions.

Population monitoring is very difficult and cannot be done by only revisiting old nest sites. Population monitoring is defined for the Mexican spotted owl through the Recovery Plan. It will be done on a Region wide basis and will be very expensive. This type of intensive monitoring has never been done in the Region and it is not known if the Region will receive adequate funding. Research is doing population monitoring on the Kaibab Plateau, however, it is not being done anywhere else in the Region. Therefore, it does not provide information on the southwest population. Like the spotted owl, any population monitoring needs to be on a Region wide basis and will be very expensive. This is true for any wide ranging species. An exception to this would be the game species currently monitored by the Arizona Game and Fish Department.

The Forest will be most effective in evaluating habitat and that populations be monitored through inferences made by changes in habitat.

<b>Wildlife 5</b>	Pygmy Nuthatch - amount old growth habitat	71,870+ acres
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For further detail see discussion under No. 3, above.

<b>Wildlife 6</b>	Pygmy Nuthatch - snag densities and sizes (existing and future).	lg. snag/ac sm. snag/ac
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Cover Type	Large, Tall Snags ( $\geq 18"$ , $\geq 30'$ )	Large Snags ( $\geq 18"$ )	Small Snags (12-17.9")
<b>Southern RDs</b>			
aspen	.22	.24	.63
Douglas-fir	.30	.30	.50
juniper	.05	.23	.30
oak	.12	.17	.27
pinyon-juniper	.07	.31	.67
ponderosa pine	.15	.23	.25
white fir	.32	.36	.53
<b>North Kaibab RD</b>			
aspen	.15	.22	.62
blue spruce	.25	.33	.71
Douglas-fir	.45	.62	.81
Englemann spruce	.33	.52	.68
oak	.18	.27	.17
pinyon-juniper	.07	.34	1.28

ponderosa pine	.23	.34	.49
spruce-fir	.14	.20	.58
white fir	.26	.44	.60

This monitoring effort should be for the special component, snags. Snags (as well as green trees with cavities) are essential for a number of species and should be the monitoring element, not pygmy nuthatch. An inventory that includes snags is included in stand exams. For a large area the stand exam data (as stored in RMRIS) is adequate for determining adequacy of snags. A larger sample size is necessary for sampling on smaller scales. Current direction describes the desired condition of snags and reserve trees. The Forest will consider a minor Plan amendment to clarify this situation.

<b>Wildlife 7</b>	Turkey - roost density	N/A roosts/ac
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Turkey roosts are critical only where there is a shortage of large old trees and they may be removed. Finding roosts on the North Kaibab is not critical with the current management direction of maintaining the mature forest over the landscape and the existence of abundant large old trees. On the southern Districts it is not critical under the current management where most large old trees are maintained with the exception of disease. The largest threat to this special component on the southern three Districts is fire and insects due to overstocking. There currently is no monitoring prescribed in the Plan for this risk (also see No. 3, old growth). The Forest will consider a Plan amendment to include monitoring for this risk instead, along with tree density by size class.

<b>Wildlife 8</b>	Turkey - population trend	N/A birds
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Arizona Game and Fish Department monitors turkey numbers through modeling and through hunter success rates. These numbers are available from the Department. On the southern Districts, brood counts are done. This past winter, as a result of the Bridger fire, the Arizona Game and Fish Department, North Kaibab and the Arizona Chapter of the National Turkey Federation made a coordinated effort to monitor winter survival (49 turkeys with transmitters) on the west side winter range.

We have not met the Comprehensive Plan goal for turkey numbers, however, there has not been a 25% decrease in numbers.

<b>Wildlife 9</b>	Red Squirrel	N/A Acres
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This was an issue with short rotation, even-aged management. Under the current direction, this should no longer be an issue, and is being provided for on all vegetation-modifying projects in red squirrel habitat.

<b>Wildlife 10</b>	Elk and Mule Deer - amount of hiding and thermal cover	N/A Acres
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This was an issue with short rotation, even-aged, evenly spaced management. It is an issue when current conditions are still even-aged and there is little or no regeneration. Through a collaborative and adaptive management process current S&G's need to be reviewed.

<b>Wildlife 11</b>	Elk and deer - reproductive and key area parameters	N/A acres
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No post-treatment monitoring has been done by the FS. Numbers of deer and elk remain either steady or on the increase. Again this was an issue with short rotation, even-aged, evenly spaced management. For some areas this may still be an issue with the current conditions.

<b>Wildlife 12</b>	Elk and deer - browse and forage use and age class structure of browse.	N/A acres
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Browse/forage monitoring is conducted in association with allotment analysis and includes all grazing animals. No break-out of use by elk and deer has been made. Another question that is not asked is, "are areas that were historically or currently in browse being maintained or are they being lost or suppressed due to invasion of trees.?" Whether to change, drop or supplement this item will be considered in a future Plan amendment.

<b>Wildlife 13</b>	Elk and Mule Deer - population trends and distribution.	N/A Head
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Both elk and mule deer numbers are within the Comprehensive Plan goals. We presently have the risk of elk numbers exceeding these goals. These are available from Arizona Game and Fish Department.

<b>Wildlife 14</b>	Tassel-eared Squirrel - amount of suitable habitat	N/A acres
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The S&Gs were written to be used with the R03WILD habitat model. This is a very crude model based on even-aged, even-spaced, and short-rotation management. R03WILD is not able to take into account either landscape patterns or inter-stand variation. Current direction is for uneven-aged, mature forest, with irregularly spaced trees which should benefit the tassel-eared squirrel. However, there is not agreement with landscape patterns and further work needs to be done collaboratively to seek consensus.

<b>Wildlife 15</b>	Tassel-eared Squirrel - population trend	N/A numbers
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According to the Plan, Arizona Game and Fish Department surveys are to be used. However, the Arizona Game and Fish has not developed a reliable technique for surveys. The research branch of the Department is currently doing a multi-year study with this objective. As of now there is no

data. Whether to change, drop or supplement this item will be considered in a future Plan amendment.

<b>Wildlife 16</b>	Hairy Woodpecker and Yellow-Bellied sapsucker	snag densities, sizes, and species (existing and future)
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See No. 6. There need be only one monitoring item for snags. Whether to change, drop or supplement this item will be considered in a future Plan amendment.

<b>Wildlife 17</b>	Plain Titmouse	amount of old growth habitat
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See No. 3. There should be only one monitoring item for old growth. Whether to change, drop or supplement this item will be considered in a future Plan amendment.

<b>Wildlife 18</b>	Plain Titmouse	snag densities and sizes
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See number 6. There should be only one monitoring item for snags. Whether to change, drop or supplement this item will be considered in a future Plan amendment.

<b>Wildlife 19</b>	Antelope - forage use	N/A acres
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Browse/forage monitoring is conducted in association with allotment analysis and includes all grazing animals. No break-out of use by antelope has been made. Another question that is not asked is, "are areas that were historically or currently in browse being maintained or are they being lost or suppressed due to invasion of trees? ". Whether to change, drop or supplement this item will be considered in a future Plan amendment.

<b>Wildlife 20</b>	Antelope - population trends	N/A head
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Data is available from Arizona Game and Fish Department.

<b>Wildlife 21</b>	Cinnamon Teal - amount of suitable nesting habitat.	N/A acres
<b>Wildlife 22</b>	Cinnamon Teal - nesting success	N/A numbers

The cinnamon teal was selected as an indicator because of the importance (rarity) of wetlands. A more appropriate measure may be the health of the existing wetlands not nesting habitat and nesting success. Therefore, monitoring should deal with the wetlands and not one species. If the wetlands are in good condition, then, one can infer that cinnamon teal, and other wetland dependant species, are in as good a condition as one could expect. Whether to change, drop or supplement this item will be considered in a future Plan amendment.

<b>Wildlife 23</b>	Riparian Areas - habitat condition	N/A acres
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Most of the riparian areas were inventoried in 1990. There is no satisfactory rating system at this time. Riparian areas have not been systematically inventoried as to condition class and no quantitative monitoring has been done to determine changes.

Several wetlands have been enhanced through exclusion of livestock use and have shown significant improvements. Many of the other wetlands have improved through management of livestock. For example, habitat condition in Kanab Creek Wilderness, the largest riparian area for the Kaibab N.F., is steadily improving through grazing management that only allows grazing during the winter season and soon, it may not even be grazed at all.

Based on an allotment analysis system that keys on those allotments where there are problems and the increase in areas excluded from livestock, Forest wetlands, as a whole, are improving in condition. This monitoring item would probably also cover the intent of Nos. 21, 22 and 24 effectively.

<b>Wildlife 24</b>	Riparian Indicator Species - (Lincoln's sparrow and yellow-breasted chat) population trends	N/A numbers
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There is no meaningful way that we can monitor population trends within the Kaibab National Forest. This would have to be done with Region wide sampling. Funding is doubtful, given our obligations the funding for listed species, such as the Mexican spotted owl, and declining budgets. It probably makes more sense to monitor riparian habitat conditions and make inferences concerning these indicator species. Habitat monitoring is our most effective and cost efficient method. Whether to change, drop or supplement this item will be considered in a future Plan amendment.

<b>Wildlife 25</b>	Aquatic Macro-Invertebrates - Species diversity and biomass	81 & 83 BCI
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There is only one live stream on the Kaibab, North Canyon Creek. It had a base line inventory for macro-invertebrates done on North Canyon Creek in 1990. A follow-up in 1998 is discussed above in *Invertebrate Monitoring of North Canyon Creek*.

Sampling has not been done on the 2 year time frame prescribed. Monitoring should continue, but, a five year time interval would be adequate based on the risk to change. This is because the entire stream is located within the Saddle Mountain Wilderness.

<b>Wildlife 26-27</b>	Threatened and Endangered Species - amount of suitable habitat and population trends	acres/numbers
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The Kaibab only has the presence of four listed species, peregrine falcon, wintering bald eagle, Apache trout, and the Mexican spotted owl. The Mexican spotted owl has already been covered earlier. The issues need to be articulated and monitored.

Habitat in North Canyon for the <b>Apache trout</b> is not anticipated to change but water quality measurements should be sampled (Item Wildlife 25).	N/A acres N/A numbers
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There really is no threat to the <b>wintering bald eagle</b> from Plan activities. Many other factors, such as the availability of open water, and animal carcasses present affect where the eagles are. The amount of snow on the roads affects where the counters get to for the inventories. Figures for 1993 through 1996, respectively are 21, 17, 11 and 13.	N/A acres 16 numbers
The Arizona Game and Fish Department has been monitoring reproductive success for the <b>peregrines</b> . With their long term data, they are tracking favorable trends, which support possible de-listing of the peregrine. For the peregrine, the threat is disturbance to the cliff nest sites.	N/A acres N/A numbers

The largest current threats to the amount of suitable habitat for the Mexican Spotted Owl probably come from the risk of catastrophic wildfire and major outbreaks of bark beetles and budworms. With decades of fire suppression, the mixed conifer portion of the Forest has become more dense than any available evidence indicates it ever has been. Areas previously dominated by aspen and ponderosa pine have been succeeded by white fir and Douglas-fir in multiple canopy layers. While this may present a short-term benefit for the Mexican Spotted Owl, it has also created conditions which lead to forest-replacing fires, which were uncommon or even unprecedented in pre-Columbian times in the Southwest.

Bald eagles are monitored by the Forest once per year by visiting popular sites and counting. Peregrine falcon populations have been monitored cooperatively by AZ Game & Fish Department and the Forest. The Peregrine population is doing very well. The Forest has two spotted owl territories that have been part of the Regional monitoring effort. Both territories still exist with no indication of a decline in the Regional or Forest population.

<b>Wildlife 28</b>	Sensitive Species - amount of suitable habitat and population trends.	N/A acres
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This item directs population monitoring. We have an estimated 50 sensitive species. As discussed in earlier items, population monitoring is very expensive and needs to be done at a larger scale. It would be impossible to monitor the populations of 50 species. The risk of spending a lot of money and not getting reliable populations trends is very high. An example is all of the money the Region spent on the spotted owl monitoring that could not be used by the Recovery Team. The exception to this is where a species only occurs locally.

We need to monitor for the rare and special components. We have two conservation strategies which will recommend monitoring. We need to review all of the sensitive species and articulate special habitat needs and concerns and based on these build monitoring item(s). In that regard, monitoring emphasis should be placed on habitat, not population.

<b>Wildlife 29</b>	Diversity - successional stages of major vegetative types	N/A acres
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The 1997 query, using Most Similar Neighbor information is not yet complete.

We have a radically different desired condition with the 6/96 Regional Plan Amendment than previously. An evaluation needs to be made of the progress from the existing condition to the desired condition. This is being done with each Ecological Management Area (EMA). Populations can be cyclic in numbers and density-independent variables like climate, could very well be a major factor that has not been considered.

VSS is a very poor measure of successional stage in uneven-aged Forests and in most Southwestern conditions in general, where most natural and human-caused disturbance has tended to be incremental rather than stochastic. A better measure is probably the amount of biomass by size class and life form and the general trajectory these are taking on the Forest. Actual change in these factors is likely to be quite slow; none of them may be a good Plan monitoring measure. This will be considered in a future Plan amendment.

Facilities 1	Forest Transportation System
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The National Forest Transportation Information System (TIS) as a measure turned out to be considerably more inaccurate than anticipated. This is because a large number of existing "two-track" roads had not been inventoried at the inception of the Forest Plan. Inventory work continues still, with 10% more miles on the inventory than in 1987. Perhaps a thousand more miles of "two-track" roads are not inventoried yet. The Forest has converted the road database information to Infra - an Oracle-based system and is moving the spatial information to Arc-Info this year..

Since the 1993 monitoring report, an additional 67 miles of road have been obliterated. We do not have summary records of closures available.

In summary, the monitoring we are doing indicates that far from getting a handle on this problem, the situation is worse than the planners anticipated and at current budget levels, we do not have the resources available to begin to deal with it.