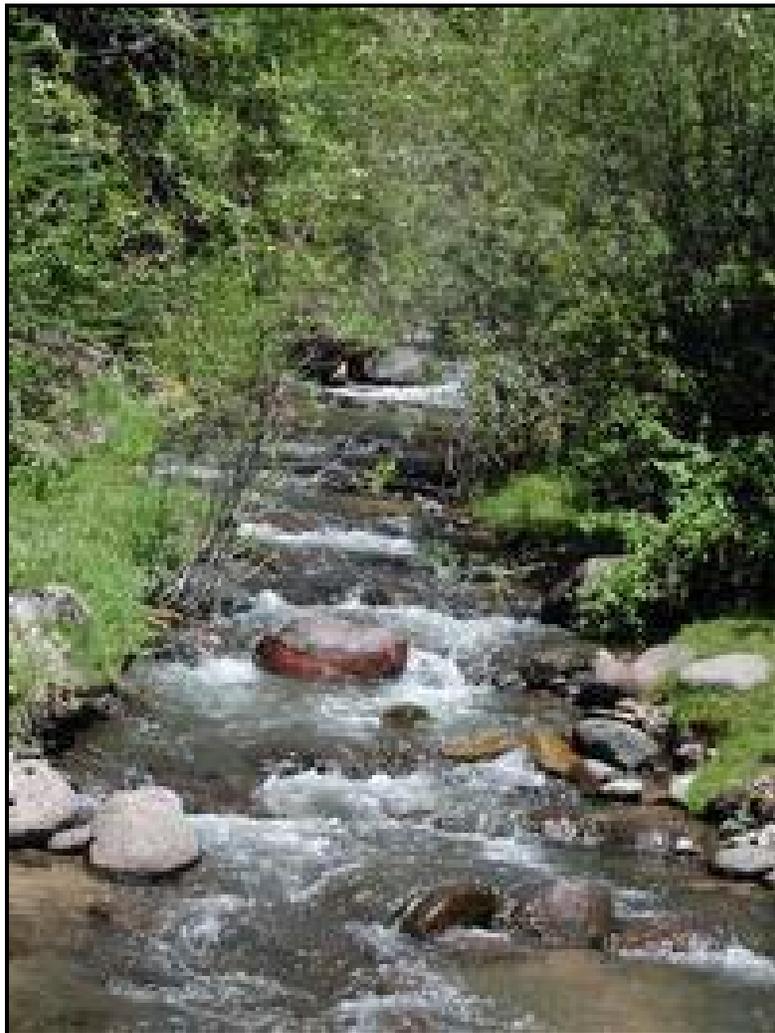


Dixie National Forest

**Monitoring Report for
Fiscal Year 2006**



Introduction

The purpose of this summary is to provide forest managers and the public with a brief look at the monitoring accomplished during fiscal year 2006 as part of implementing the Dixie National Forest Land and Resource Management Plan (forest plan). This report does not discuss individual management projects. Instead, it gives an overview, for fiscal year 2006 and by subject area, of specific monitoring items prescribed in the forest plan. More information is available from the Dixie National Forest, 1789 North Wedgewood Lane, Cedar City, Utah 84720.

Air Quality

All prescribed burning was implemented in compliance with the Utah Interagency Smoke Management Program. The forest submitted the annual burn schedule to the Utah interagency smoke management coordinator. Permission to burn was given before each prescribed burn was ignited.

In 2006, fire managers complied with state air-quality standards. Also during that time, the Dixie did not have any violations for significantly contributing to particulate matter. Smoke-monitoring equipment was set up in some areas potentially affected by prescribed-fire activities, and public complaints were monitored by local districts. Complaints were reported to the Utah interagency smoke management coordinator. Public comments reported a smoke level of "low" for all prescribed fires on the forest. Below is a photograph of the Pretty Tree pinyon-juniper prescribed fire.



Figure 1. Smoke dispersal from the Pretty Tree Pinyon-Juniper Prescribed Fire. The smoke from this 2000-acre, management-ignited fire was visible from the community of Boulder, UT and Highway 12 but dispersed as planned.

Cultural (Heritage) Resources

Federal law requires us to conduct surveys for historical and archeological resources prior to ground-disturbing activities. We surveyed 36 projects totaling approximately 2,400 acres, and found 48 archeological and historical sites. Of these sites, only 8 were found not to be eligible for the National Register of Historic Places. All historic properties were avoided in all project activities, and the forest met all the requirements in the law regarding cultural resources.

Dispersed Recreation and Wilderness

During 2006 the Dixie NF monitored 19 non-motorized trails and 5 motorized trails for use. Both active infrared and electromagnetic devices were used for counts. The monitoring occurred on Pine Valley Ranger District (6 trails), Cedar City Ranger District (11 trails), Powell Ranger District (4 trails) and Escalante Ranger District (3 trails).

Of the 19 non-motorized trail monitoring sites, 9 indicated increased use, 3 decreased use, 1 no change and 3 were in first-year monitoring. Of the motorized trail monitoring sites, 2 indicated increased use, 2 decreased use and 1 no change. There was an increase in the total use numbers for motorized trails.

Across the forest use numbers remain stable. Most of the high use trails tend to be either scenic and/or mechanized. The increase in use on these types of trails is consistent with findings of the National Visitor Use Monitoring data collected on the DNF in 2003.

Further monitoring of these trails is necessary to create a database with base-line data. Currently the Dixie National Forest has only been monitoring trail data for two to three years on most trails listed. In order to monitor usage over time, trail data needs to be collected, analyzed, and stored annually. The Forest is especially susceptible to increased use due to its proximity to the fast growing city of Las Vegas. In addition, the Forest provides many recreation opportunities for motorized recreation, which is the fastest growing sport in the United States.



Figure 2. ATV use on the Markagunt Plateau.

Economics

Since the development of the 1986 forest plan, many traditional sources of income, such as natural-resource extraction, have diminished in their percentage of overall economic output. This shift is due to a general growth of the state economy, and not necessarily to a shrinking of these traditional economic activities. Professional business, education, and health services are projected to grow; this is part of a larger trend in the western U.S. The forest is located in five counties: Garfield, Iron, Kane, Washington, and Wayne. Following is a summary of the changes in economic sectors, by county.

Garfield County

Slow job growth and unemployment are recurrent problems for the county. Traditionally, county residents have relied primarily upon ranching and timber. While there is a desire to retain these traditional sources of economic opportunity, services related to recreation and tourism are growing quickly in the county.

Services are projected to increase from a 30.1 percent share in the Garfield County economy in 2005 to a 37.8 percent share in 2030 (State of Utah 2003).

Iron County

Government is the largest sector of the Iron County economy, but the service sector is projected to grow the fastest through 2030. Services are projected to grow from a 21.6 percent share in the Iron County economy to a 25.5 percent share in 2030. Government jobs are projected to retain about a 21 percent share (State of Utah 2003). Overall, Iron County has a relatively balanced and broadly based economy.

Kane County

Kane County is projected to rely more heavily upon the service sector in the future. As in Garfield County, the leisure and hospitality sector provides the most jobs in the county, but the government sector makes the largest contribution to payroll wages.

Washington County

The trade, transportation, and utilities sector is currently the largest industry in Washington County. In the period from 1980 to 2002, as the economy grew (i.e., the service sector doubled) in other areas, many traditional industries (e.g., farming and ranching) saw their share of the county economy decrease. In fact, agriculture went from almost 5 percent of the economy to 1 percent.

Between 2005 and 2030, government employment will likely remain the same and services will continue to grow, while traditional industries will likely continue to struggle. Health and education services are expected to grow to meet the demands of increased population.

Wayne County

Education and health services are the largest sector in the Wayne County economy. This sector is buoyed by the presence of Aspen Health Services' Aspen Achievement Academy, a wilderness therapy program that is a major county employer. Headquartered in Loa, the program operates on BLM and Forest Service lands. Government is the second largest sector in the county. Since 1980, agriculture has decreased dramatically and services have increased. This is a trend that is projected to continue into 2030. In 1980, agriculture made up 26.9 percent of the economy, while services took only a 3.5 percent share. By 2002, agriculture had declined to 13.8 percent and services had increased to 24.9 percent. In 2030, agriculture is projected to occupy a 6.5 percent share, while services will have increased to 30.3 percent. This increase is visible in the increasingly popular numerous facilities in Torrey, near Capitol Reef National Park.

Facilities and Roads

Roads and Bridges

The Dixie NF completed the following roadwork during 2006 through contract or Forest Service crews:

Miles of system road constructed.....	3.5
Miles of system road reconstructed.....	28.9
Miles of road decommissioned.....	34.5

The forest also performed maintenance on 12 percent (415 mi) of its system roads. In 2006, all of the maintenance level 3, 4, and 5 roads (those suitable for travel by passenger car), were surveyed.

Approximately 34 percent of all forest system roads met established objective maintenance level.

Buildings

A total of 22 buildings were inspected, with their associated ratings. Buildings inspected were rated good (13), fair (4) and poor (5) condition.

Buildings that are in use and necessary for forest operations are maintained to a reasonable standard. Buildings that are abandoned or receive low use are not maintained. If this trend continues, unused buildings will continue to deteriorate until they will have to be renovated or demolished. This is in accordance with the facilities master plan, which calls for most unused buildings to be disposed of.

Dams

Seven (7) dams were inspected, including all high-hazard dams which were inspected by the State of Utah in coordination with forest engineering personnel. All inspections were done according to established state and federal regulations.

Public Drinking Water

All systems were monitored monthly for bacteria, in accordance with potable drinking water regulations and agency guidelines. Additional tests for nitrates are performed yearly, and for sulfates approximately every seven years.

All nitrate and sulfate monitoring returned acceptable results. Some positive bacterial samples were detected, but with follow-up testing all systems showed acceptable test results for bacterial water quality, and have approved status with the state.

Fisheries

Fish and Riparian Habitat

The forest monitored three streams on the Powell Ranger District in 2006: Cottonwood, Deep, and Deer creeks. All three were severely impacted by the Sanford Fire in 2002. Further evaluation is needed on these streams, and the surveys will be repeated in 2007. It is obvious that these streams do not currently provide high-quality fish and riparian habitat conditions; this is a result of the Sanford Fire. These three streams are trending towards acceptable conditions, and barring further natural disturbance are expected to continue to do so. Recovery from intense wildland fires is variable in duration, and predicting rates of recovery is tenuous at best. The best course of action will be to continue annual monitoring of these important habitats.

Bonneville Cutthroat Trout

The current monitoring effort for Bonneville cutthroat trout on the Dixie National Forest is adequate to assess current population and habitat trends. Current trends for the species on the Dixie National Forest are stable, with opportunities to expand the occupied habitat. This expansion will occur as previously occupied streams affected by the 2002 wildland fires recover to suitable conditions for supporting coldwater fisheries.

Trout: brook, brown, rainbow, and cutthroat

Non-native trout fisheries (i.e., brown trout, brook trout, cutthroat trout, and rainbow trout), are stable across the forest. The charts displayed below illustrate this by showing biomass (pounds per acre) and numbers of fish per mile. These fisheries are maintained through natural recruitment and stocking by the Utah Department of Wildlife Resources (UDWR). The fish-population data collected during the 2006 field season is difficult to compare with the variation stated in the forest plan ("variation which would cause further evaluation and/or change in management direction"). This is due to the lack of recent fish-population data on most streams on the forest. Until 2003, the UDWR collected the bulk of fisheries population data on the Dixie National Forest. Sampling locations for UDWR monitoring were determined by the UDWR with little input from the forest. For the past four years (2003 to 2006), Dixie National Forest personnel have collected fish-population data (Figure 3 & 4) at various sites across the forest, in cooperation with the UDWR. This data will allow us to compare current conditions with past and desired conditions.

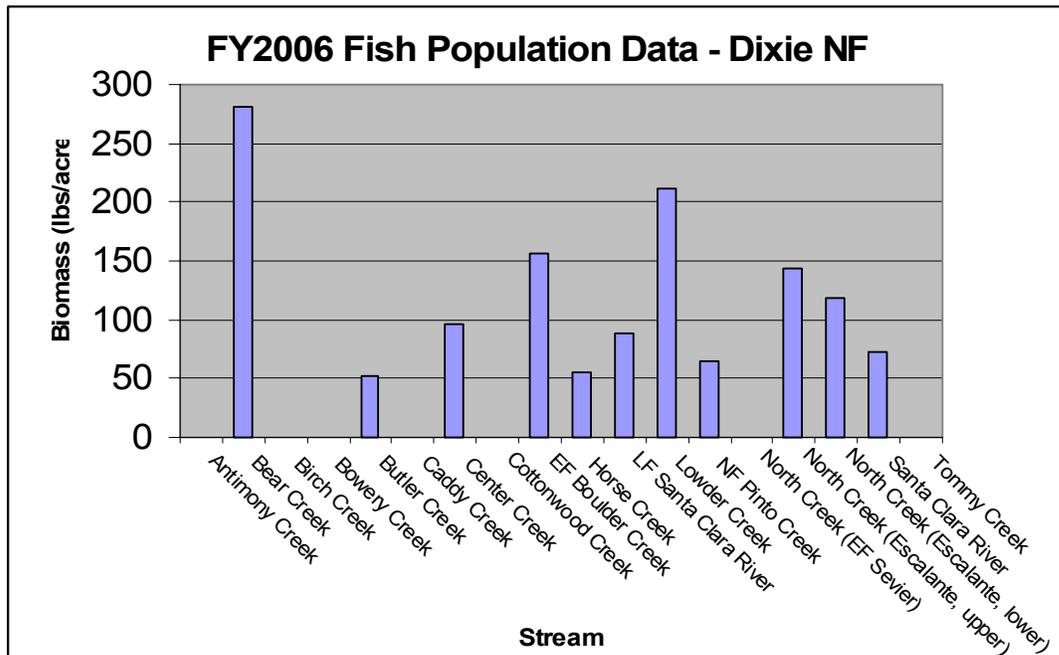


Figure 3. This chart shows the biomass, or pounds of fish per acre, on selected streams on the forest.

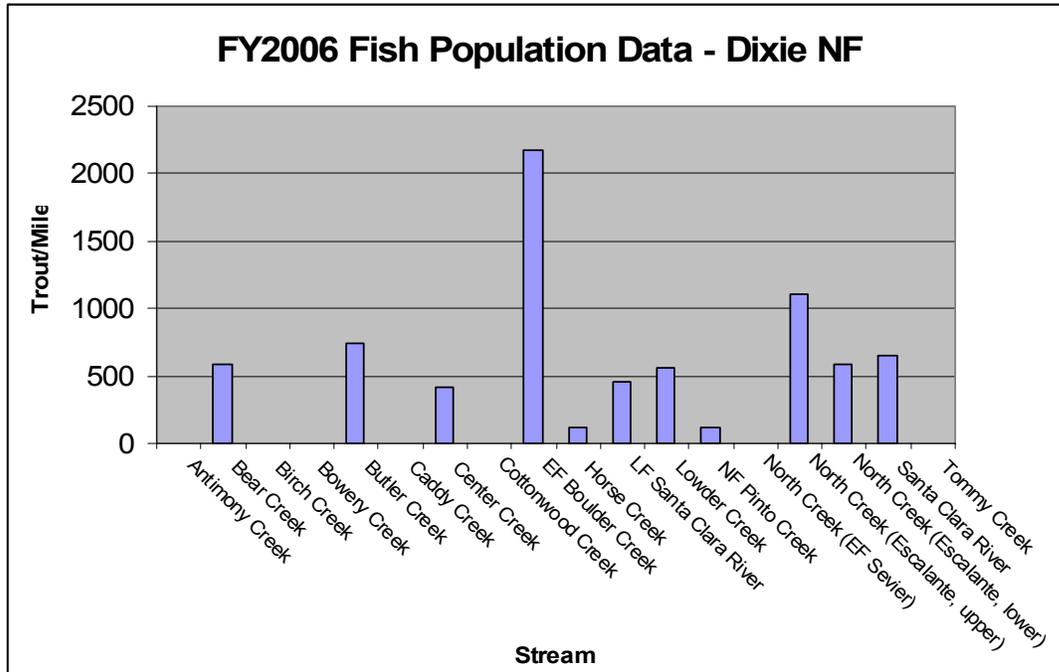


Figure 4. This chart shows the total number of trout on selected streams on the forest.

Minerals

Exploration Proposals-Adequacy of Permitting Proposals

A Plan of Operations was approved to conduct exploratory drilling for locatable mineral deposits in the Pine Valley Ranger District. The environmental analysis for the decision was documented in a Decision Memo. The action was permitted to occur once the reclamation bond was in place. No exploratory work was done on this site in FY 2006.

Lease/Permit Application Forms and NEPA process

Leasable operations consist of three capped carbon dioxide wells and the Upper Valley oil field (33 wells) on the Escalante Ranger District; both are in compliance with surface use plans for those leases.

Oil and gas industry interest is increasing and leasing on adjacent BLM lands is increasing. There is increased oil and gas industry interest in new leasing, but no activity will occur until a forest-wide leasing analysis has been completed. The Dixie National Forest has begun efforts to begin an EIS to complete this forest-wide analysis. A decision is expected by 2008. Oil and gas leasing activity is expected to resume and may achieve previously high levels encountered in the 1970s and 1980s, once the forest-wide oil and gas leasing analysis is completed.

Site-specific development proposals and administration of operations, compliance with terms of operating plans and existing agreements

The number of mineral material permits issued in 2006 remained relatively high at 69. Almost all permits are for material in existing gravel and cinder pits that have been in use for 30 to 40 years. Some pits have operating plans. Emphasis should be given to development of pit operating plans. There is increased demand on mineral material sites from both individuals as well as commercial interests.

Reclamation Results: Effectiveness of work done

Surface reclamation work was begun on one claim on the Pine Valley Ranger District. This included decommissioning out all surface travel routes, recontouring and replacing the stockpiled overburden and seeding with approved seed mix. Large rock barriers and organic debris were placed to discourage motorized use and conceal the site from public view. Bond release will be determined after all surface reclamation work is complete and revegetation success is monitored.

Protection—Fire

Adequacy of Fire-Prevention Programs

We measure the adequacy of our prevention programs by the number of human-caused fires. As the chart below shows, there were nine human-caused fires with a total of 41 acres burned in 2006.

	Lightning Caused	Human Caused	Wildland Fire Use	Total
Fires	86	9	9	104
Acres	8,269	41	405	8,715

Figure 5. Number of human-caused

and lightning-caused fires, and total acres burned

Number of Wildfires and Acres Burned

In 2006, a total of 8,715 acres were burned. Nine of these naturally started (lightning) fires were managed as a wildland fire use (WFU) event to achieve resource benefits. All other fires were successfully suppressed. The chart above shows totals for all fires on the Dixie. Pictured below is the Drill Hole WFU on the Escalante Ranger District.



Figure 6. The Drill Hole fire on the Escalante Ranger District was the largest of the nine that occurred on the forest in 2006. It burned 370 acres.

There were 95 wildfires that were actively suppressed on the forest in 2006, and much of the acreage (over 95%) was on the Pine Valley Ranger District. The largest fire on the Forest was Cove Mountain; it was part of the Bull Complex and was located primarily on the Pine Valley Ranger District but also burned onto Cedar City BLM and private land. The photograph below shows the Ranch fire.



Figure 7. Firefighters work to suppress the Ranch Fire, located on State and BLM lands.

Fire-Management Effectiveness Index

We no longer use this method of reporting because it does not adequately measure success of the fire program.

Compliance with Fuel-Loading Standards

The Dixie used prescribed burns to reduce fuel loading. Fuel treatment effectiveness was monitored across the forest by establishing and remeasuring sampling locations. In 2006 the forest treated 11,517 acres using mechanical and prescribed-fire treatments. This is up from 8,703 acres in 2005.

Protection - Insect and Disease

Bark Beetles

Insects and disease have increased over the past ten years overall. This has prompted more dead spruce salvage and delayed other treatment activities.

The pine bark beetle, along with limb rust and mistletoe, is slowly killing the over-mature ponderosa pine on the forest.

Localized mountain and western pine-beetle buildups have been observed over the years. The sustained drought conditions create greater moisture stress and stand susceptibility, particularly in older trees.

The spruce bark-beetle population grew to epidemic levels on the Cedar City district in the early 1990s. By 2006, the Engelmann spruce component on that district had been altered from an over-mature stand

structure to total replacement in some areas. In other areas, small seedlings and saplings predominate.

A similar process has been happening on the Powell district. The dominant species has changed from mature spruce to aspen and Subalpine fir due to Englemann spruce mortality.

The Escalante and Teasdale districts also experienced spruce-beetle epidemics in the early 2000s, killing mature spruce trees. The forest continues to salvage dead materials on all districts, although some projects have been delayed by litigation.

Recently the Douglas-fir bark beetle and fir engraver beetle populations have been building and killing large areas of Douglas-fir and white fir trees. The pinyon ips beetle population has reached epidemic levels in some areas in the pinyon-juniper type and has killed large areas of pinyon pine.

Range

Range Vegetation Condition and Trend

During 2006, 143 long-term trend monitoring studies were completed. Thirty-four of these monitoring studies were level III riparian inventories; 109 were upland range trend monitoring studies completed by forest personnel. Only 3 of the 109 Forest Service upland and riparian sites were replicated studies from which accurate trend data can be derived. Of these 3 replicated upland studies, the data analyses on 2 of them indicate a downward trend in vegetation condition. However, neither a general trend for forest range conditions nor a determination in a need for a change in management direction can be determined from this data. The 2 FS sites that indicate a downward trend are located in the 2004 Hawkins fire burn on the Pine Valley Ranger District. These burned areas are highly susceptible to cheatgrass invasion, especially following a wildfire like the Hawkins fire that burned through the area in 2004. The reason that these sites exhibit a downward trend between 2004 and 2006 is that cheatgrass frequency continues to increase since the fire. Based on this evaluation of data, no permanent changes in management direction are proposed.

In 1986, the forest plan did not define vegetation and soil (ground cover) conditions that would serve as a baseline from which to measure. Therefore, there are no reference conditions (from 1986) from which to measure trend. Since there is no baseline, sole reliance is placed on measuring trend during a defined time frame, from one long-term trend study reading to another. Therefore, variation that would cause further evaluation may be appropriate. Of the 143 monitoring studies reported

here, only 3 had previously established baseline studies using current methodologies. Other study sites have previous readings, but this data was collected using various methods which are not compatible with current measurements. In the absence of periodically recorded post-1986 data, we cannot project a clear picture of how much the range has improved (or not improved) over 1986 levels.

The forest has established a long-term monitoring program, as indicated by the number of studies re-read or established during 2006 and in previous years (206 Forest Service upland studies and 84 riparian level III inventories from 2004-2006). Over time, these studies will be repeated and trend data will become available. This data is stored in a database, where it can be accessed and repeat studies can also be stored and compared.



Figure 8. A forest employee gathers data for a trend study on upland vegetation.

Riparian Ecosystems

The forest plan (standard and guideline 4B) requires the forest to “maintain at least 70 percent of the linear distance of all riparian ecosystems in at least an upper mid-seral successional stage.” In a sample of 34 riparian areas across the forest during 2006, 22 of the sampled riparian areas or 65% are in a mid- or upper- (late or PNC – potential natural community) successional stage. Twelve riparian areas or 35% are in a very early, early, or early-to-mid-successional stages. Although the rating is close to the standard, it appears we found that the minimum 70 percent was attained in only 65 percent of the sample. This may be a variation that would cause further evaluation or change in management direction. Concentrated livestock use in riparian areas during the extended drought, and readings measured during the drought,

should be considered in determining the need for long-term change in management. Effective permit administration, implementation and enforcement of allowable forage-use guidelines, and compliance monitoring will continue to be emphasized.

Stream bank stability: forest plan standards and guidelines for bank stability (4A) and wildlife and fish (6B) require that we "maintain 50 percent or more of total stream bank length in stable condition". In a sample of three sites of the East Fork of the Sevier River drainage, all sites had a moderate, good, or excellent bank stability rating. These sites are meeting forest-plan specifications. Below is a photograph of a seasonal employee gathering data for an upland vegetation trend study.

Forage Utilization

While some isolated excessive use occurred in riparian areas, allotments generally appear to have been kept within allowable use levels in 2005. Most measurement sites were on uplands or riparian Kentucky bluegrass benches above wetter riparian areas. Higher use levels (40-50%) were recorded on Kentucky bluegrass meadows than on native uplands and crested wheatgrass seedings (20-30%). The Cedar City District reported only one area (Little Valley) that exceeded prescribed use levels by 20%. The Powell District reported no sites that exceeded prescribed use levels. Of the 50 sample sites on the Escalante District, three sites measured use at 65%. All allotments monitored were within established grazing guidelines. The 2004-05 water-year was above average. This precipitation made for excellent growth conditions in 2005, yielding residual forage for 2006 grazing. It also provided good soil moisture and forage-growth carryover effects into 2006. Forage and seed production in 2006 were average. Ample forage production allowed a normal consumption to show lighter use levels. Overall forage utilization was within prescribed utilization levels.

Some riparian areas did not have sufficient stubble height remaining at the end of the growing season and exceeded use standards by more than 20%. 2006 precipitation was approximately 95% of normal and forage production was average. Forage vigor and seed production was good for that eco-type.

Soils

Soil and Water Resource Improvement Needs Inventory

District hydrologists have begun to update the forest-wide watershed improvement needs inventory, and entering the information into a data base. This data will be used to plan watershed improvement projects. Other district resource specialists and the hydrologists will continue to coordinate the implementation of watershed improvement projects, by

clearly defining objectives and developing plans well in advance of implementation.

Soil Survey Activities

Collection of data for the forest-wide field soil inventory has been completed and entered into a data base (as directed in the forest plan, page II-52). Future analysis of this data will determine if additional field work is needed. Soil-survey work will now shift to using the data base to help with project and above-project analysis.

Long Term Soil Productivity

Two former prescribed-fire sites were monitored: Pretty Tree Bench and Cooper Knoll. We used accepted methods such as fabric dams, erosion pins, visual estimates, and photo points. Vegetative recovery on these sites, together with a ground cover of more than 70 percent, has stabilized the soil.

Compaction

We monitored compaction on two timber sales in 2006. It confirmed that compaction occurs during skidding (dragging the logs away from the harvest site). On average, 4.4 percent of the timber-sale units had experienced a 15 percent increase in bulk soil density. This was well within the soil-quality guidelines established by the Forest Service Intermountain Region (Forest Service Handbook 2509.18, p. 6). Timber harvests do cause compaction. But with proper use of soil and water conservation practices and a well-designed and managed trail network, compaction is within acceptable levels.

Soil and Water Resource Protection—Project EA Mitigating Requirements

New Harmony fuel break

Pile burning on this soil type, under wet soil moisture conditions and winter weather, resulted in no measurable negative effects to soil productivity. Pictured below are workers constructing the New Harmony fuel break.



Figure 9. Workers clear vegetation to create the New Harmony fuel break, protecting area homes from wildfire.

Kern River pipeline and flood repairs on fiber-optic line

At stream crossing locations, the design recommendations given were not used by the utility/contracting companies. The stream was heavily rip-rapped on both sides and constricted by a channel width too narrow for its high flow events, causing the system to begin to blow out again. Large energy and utility companies and their contractors that are not familiar with the local landscape, need to take into consideration more seriously the recommendations made by local experts.

South Fork Pinto Creek road decommissioning

Straw wattle implementation effectiveness was monitored associated with the road decommissioning on this project. When installed properly, straw wattles are effective at minimizing sedimentation when soil is still loose and mobile. (Wattles are structures like a rice-straw log—they are made of rice straw in a biodegradable mesh tube, from 10 to 15 feet long and 6 to 8 inches in diameter.) They are very labor intensive to install, and livestock can cause enough damage to the wattles to render them ineffective. Therefore it is essential for the success of project rehabilitation that the forest makes a change in the annual operating instructions for the grazing permittee. This change should manage livestock in such a way as to avoid the areas being rehabilitated, until the soil is sufficiently stabilized and the vegetation re-established. Without this change, the project might fail.

Kanab Creek bridge installation and Cottonwood bridge installation

The installation of these two structures was monitored in regards to water quality effects. Construction contracts involving activities in and around water must have more and stronger guidance on what contractors need to do to protect the aquatic resource and meet state water-quality

standards. The forest must provide more direct oversight in implementing projects involving aquatic species.

Forest-wide effective ground cover analysis

The minimum general regional standard as per the Intermountain Region Protocol as defined in FSH 2209.21 – Rangeland Ecosystem Analysis and Monitoring Handbook (R4 Amendment 2209.21-2003-1 : Effective Date 12/19/2003) is 60% effective ground cover in any community type for limiting water erosion in the Region. We are currently only meeting a 60% effective ground cover on 57% of our upland sites.

Further evaluation and direction from the Forest Service Handbook 2509.18 – Soil Management Handbook (R4 Supplement 2509.18-2002-1) has directed the forest to develop local minimum effective ground-cover guidelines. With the data that has been collected to date, we have developed the following guidelines:

The following data displays revised recommendations for the minimum percent effective ground cover needed for functioning, sustainable ecosystems for plant-community types on the Dixie National Forest. These should be revised for site specificity where appropriate, and are subject to change as more data becomes available.

<u>EcoType</u>	<u>Minimum % Effective Ground Cover</u>
Cool Desert Shrub	50
Grassland (converted from pinyon-juniper and cool desert shrub)	50
Pinyon-Juniper	45
Mountain Brush	65
Ponderosa Pine	70
Aspen	75
Mountain Meadow (mountain grass-dominated meadow and mid-to upper-elevation sagebrush)	60
Alpine (openings above 11,000 feet)	55

Upland Areas Adjacent to Riparian Management Areas

Lower Bowns road drainage structures

The effectiveness of the road drainage structure installation was evaluated in 2006. The majority of water-diversion structures along this segment of road are routing water and sediment into the adjacent channel. The diversion structures could be improved so as to prevent this. This could be done by (1) relocating some structures so they have a larger (wider) buffer area, and (2) placing riprap or other energy-dissipating structures at the end of some of the drainage structures. This would reduce the erosive power of the flowing water. (Riprap is a

foundation or sustaining wall of stones or chunks of concrete set on an embankment slope to prevent erosion.)

Radar Ridge Salvage Sale

The Radar Ridge salvage sale was monitored in 2006 for soil displacement. Spring runoff and summer thunderstorms have not caused any sedimentation from constructed road or skid trails in the project area. Therefore, logging and skidding on snow cover can be conducted up to the edge of the inner gorge of a stream channel without causing damage. The only noticeable sedimentation and bedload movement in Upper Midway Creek are from the existing power line road. (Bedload is streambed material that stays in contact with the streambed, and when it moves it does so by rolling, sliding, or hopping along the channel bottom.)

Timber

Timber Harvest Area

The projected average of acres of timber harvest, according to the forest plan, is 10,525 acres per year. The actual number of acres harvested, on average, was 3,501 per year from 1987 to 2006. Therefore, outputs and impacts from timber harvest are less than projected in the forest plan.

Suitable and Unsuitable Land Classifications

The table below shows the number of timber sales and acres verified for timber suitability, from 1987 to 2006.

District	Number of Sales	Total Acres Verified
Cedar City	34	119,809
Escalante	16	95,173
Powell	5	27,992
Teasdale	14	25,505
TOTAL	56	268,479

Figure 10. Number of timber sales and acres verified for timber suitability from 1987 to 2006.

The forest plan identified 300,100 acres of land suitable for timber, which is greater than the total of 268,479 (above). However, an accurate comparison is not possible until we complete the classification program, which is still underway.

Harvest Practices in Retention / Partial Retention

Mitigation measures to reduce impacts on the visual landscape were minimal for most silvicultural prescriptions. The forest landscape architect, sale-preparation and marking crews, and sale administrator implemented some of the mitigations. Overall, visual quality standards in

the landscape management report are being carried through the sale implementation process and accomplished on the ground. However, there is a need for more consistent post-sale monitoring; either it is not occurring or it is not being documented.

Harvest Practices in Riparian Areas

Riparian areas, ranging from isolated springs to streams and ponds, were present on 28 of the timber sales we reviewed. Hydrologists' recommendations were tracked through the environmental documents, silvicultural prescriptions, marking guidelines, and sale-area maps. A review of silvicultural prescriptions suggests that existing timber-sale contract provisions, when fully implemented with a map, adequately protect and maintain riparian areas in their existing conditions. We did not observe any riparian-area damage.

Adequate Restocking

Most areas that were harvested through a final harvest treatment prior to the adoption of the forest plan, have regenerated to an adequate restocking level. Most of the acres planted since 1990 have been associated with the Engelmann spruce bark-beetle epidemic, which has destroyed most of the spruce on the forest. We expect this work to continue for the next decade.

Drought has affected survival of young trees; however, the use of containerized seedlings has improved seedling survival, especially on basaltic soils.

Reforestation and Timber-stand Improvement (TSI) Accomplishment

Thinning and reforestation accomplishments to date have not met the projections of the forest plan. It projected 5,000 acres per year in thinning and 1,588 in reforestation. This is due to the decline in the timber harvest program and the accomplishment of most thinning needs early in the monitoring period.

Fuelwood Consumption and Supply

Vegetative management practices on the forest make available an estimated 14,000 cords of fuelwood each year. During the first five years the forest plan was in effect, an average of 7,446 cords of fuelwood was used each year. But after natural gas was delivered to the major population centers in the area, fuelwood use declined to approximately 5,000 cords per year. In the past ten years, the forest has experienced extensive Engelmann spruce tree mortality from a bark-beetle epidemic. This has resulted in thousands of acres of dead trees and heavy concentrations of fuel-loading. Consequently, there has been an increase in fuelwood availability.

Growth Responses

A random sample of 581 trees measured in the 1990 forest inventory showed a diameter growth of 0.7 inches per 10 years in natural stands. Post-harvest growth studies conducted in managed stands in 1991 showed a diameter growth of 1.6 inches per 10 years. This suggests that growth response to managed timber stands is positive.

Timber Supply Projections

The latest forest inventory (1998) showed the following results regarding sawtimber on non-reserved timber lands (lands not specifically designated for timber harvest):

- Net volume is 3,534,863 MBF (thousand board-feet).
- Net annual growth is 45,134 MBF.
- Annual mortality is 43,763 MBF.

Water

Compliance with State Water-Quality Standards

Forest hydrologists sampled and analyzed water quality on the Santa Clara River and Bowery Creek, a tributary to Parowan Creek to compare the results with state water quality standards.

Approximately 33 percent of our samples exceeded the state phosphorus criteria. One hundred percent of our samples for all the other parameters were in compliance with state water quality standards.

The Santa Clara River flows through igneous geology, and has overall higher phosphorous levels year round. By contrast, Bowery Creek flows primarily through sedimentary limestone, and phosphorous levels are usually not detectable except during runoff events.

Results from different sampling sites from different years on the forest are starting to show a trend of perpetually exceeding standards for phosphorus. This leads to a hypothesis that native geology is playing a measurable role in phosphorus input to streams in southwestern Utah.

Effectiveness of Best Management Practices in Meeting Water-Quality Objectives and Goals

Seven projects were monitored to determine if best management practices (BMPs) were effective in meeting water quality objectives.

1. Blue Springs fiber-optic line installation - The underground fiber-optic line has caused minimal soil displacement, and the BMPs were effective in deterring soil displacement.

2. Cooper Knoll prescribed fire monitoring - Ground conditions during the fall following burning indicate a stable soil surface, even after high-intensity summer rain storms. BMPs assisted in managing the residual organic litter was sufficient to for litter debris dams to hold sediment in place even in the high intensity burn sites.
3. Ikes Valley prescribed fire monitoring - Two summers after the initial burn, rill erosion is still evident. Observation indicated that much of the ground vegetation has reestablished and some litter deposition is evident. Overland flow and rill erosion although reduced has continued. The BMPs for this project were not effective on the short term (first two years).
4. Puma vegetation project implementation - Spring runoff and summer thunderstorms have not caused any sedimentation from constructed road or skid trails in the project area. Slash placed on steep skid trails, has reduced erosion and off-site sedimentation. The BMPs for this project were effective.
5. Tebbs Hollow vegetation project implementation - Use of the Dixie Harrow for vegetation modification is an acceptable tool, which does not detrimentally disturb the soil profile significantly. This is provided that soils are not at or near field capacity, and that all intermittent and perennial streams are buffered by a vegetated a "leave" strip of at least 50 feet. The BMPs for this project were effective.
6. Kanab Creek and South Fork Cottonwood Creek bridge installation - Construction contracts involving activities in and around water must have more and stronger guidance on what contractors need to do to protect the aquatic resource and meet state water-quality standards. The BMPs for this project were not fully understood by the contractor, more oversight for contract representative and inspectors is needed.
7. Pinto road decommissioning - When installed properly, straw wattles are effective at minimizing sedimentation when soil is still loose and mobile. (Wattles are structures like a rice-straw log—they are made of rice straw in a biodegradable mesh tube, from 10 to 15 feet long and 6 to 8 inches in diameter.) Livestock within this project caused enough damage to wattles to render them ineffective. It is very important for the success of project rehab that in the future a plan is set in place to manage livestock to avoid rehab areas until soil is sufficiently stabilized, and vegetation sufficiently re-established. The BMP for straw wattles is effective but not in areas were livestock trampling will destroy them.

Water Yield Increases in East Fork of Sevier Watershed

The forest has dropped this monitoring item from consideration, as we do not intend to increase the spring discharge of the Sevier River. Our intent is rather to improve and maintain the channel, floodplain and sponge /

filter system of the watershed in such a way as to maintain a dynamic equilibrium within the watershed.

Stability of Stream Banks in East Fork Sevier River Drainages

Three streams were monitored in 2006 for stream bank stability.

1. East Fork Creek - This stream system has downcut by about four feet into the valley floor sometime in the past. It is currently an entrenched, wide, shallow stream with a high amount of unstable banks and little adequate vegetation for shade. Due to no connectivity to its old floodplain, the stream is in the process of widening through bank erosion, in an evolutionary process to develop a new floodplain at its new lower elevation. Currently this system is not meeting the forest-plan standard and guide of maintaining 50 percent or more of total stream bank length in stable condition. Over time, if the stream system is given the opportunity to improve in condition, it will evolve into meeting this standard and guideline on its own. However, at this point in the channel development process, the stream can be very sensitive to disturbance. This could cause further down cutting and excessive widening, due to the overall low amount of stabilizing vegetation on its banks.
2. Deer Creek - Riparian woody vegetation has come back very thick to help stabilize stream banks. The upland watershed has also likely recovered enough to stabilize sediment inputs during runoff events that otherwise could aggravate channel erosion.
3. Deep Creek - Overall bank stability in the system is continuing to improve. Riparian woody vegetation has come back thick on the terraces, but in many places is taking much longer to get well established along the active floodplain due to periodic channel shifting and heavy bedload movement. (Bedload is streambed material that stays in contact with the streambed, and when it moves it does so by rolling, sliding, or hopping along the channel bottom.)

Effectiveness and Maintenance Needs of Watershed Improvements

All enclosures were maintained, and they effectively protected riparian areas. The effectiveness of the Duck Creek - Swains area road closures is being slowed by rock-barrier placement not being done on time. The Mammoth Springs dispersed recreation restoration project is working well, and the area is recovering. We will continue to place surface aggregate (crushed rock) to further define the dispersed camping sites.

Accomplishment of Riparian-Area Management Goals

Measurements such as pebble counts, cross-sections, and photo points are being done annually. So far this has mostly been to establish long-

term monitoring sites and collect baseline data. 2006 was the first year of sampling where a majority of our sites were for re-visits to collect a second set of data after 4 to 5 years. Ideally, 10 or more years of data are needed to distinguish a trend in a system. We must continue to collect data for those sites before we can infer a trend with more certainty. Initial results from three sites are summarized below:

1. Castle Creek survey - We hypothesized that with the death of the spruce forest in the watershed, stream-channel flows would increase, since less water would be taken up by vegetation. We expected that these higher flows would be reflected in changes to the physical structure of the stream channel. Data collected up to 2002 indicated that the channel was, in fact, widening. However, data collected in 2006 now indicates that the channel is narrowing. The area had been in a drought until about 2004, and had experienced an above-normal snowpack in 2005. This system appears to be in an improving trend, and is meeting forest-plan standards and guidelines.
2. East Fork Creek survey - This stream system had downcut by about 4 feet into the valley floor sometime in the past. It is currently an entrenched, wide, shallow stream with a high amount of unstable banks and little adequate vegetation for shade. Due to no connectivity to its old floodplain, the stream is in the process of widening through bank erosion, in an evolutionary process to develop a new floodplain at its new, lower elevation. Currently, this system is not meeting the forest-plan standard and guideline for maintaining 50 percent or more of total stream bank length in stable condition. There is an overall low amount of stabilizing vegetation along the stream banks. Over time, if the stream system is given the opportunity to improve in condition, it will evolve into meeting this standard and guideline. However, at this point, East Fork Creek can be very sensitive to disturbance, which could cause further down cutting and excessive widening.
3. Deep Creek survey - This system is continuing to recover. As in past years, trespass cows were sighted and reported within the Deep Creek drainage in 2006. This has been a continual problem in this drainage and may be impacting the very limited amount of herbaceous riparian vegetation that is trying to become established. This system is not yet meeting the forest plan standard and guide for maintaining 40% or more of overhanging vegetation along banks of streams.

Wild Horse Numbers and Habitat Trends

The Dixie NF counted 101 wild horses on the North Hills Wild Horse Territory on the Pine Valley Ranger District in February, 2006.

Monitoring methods include aerial counts, grazing impact studies, ocular reconnaissance, photo documentation.

The current estimated wild horse population is 120 horses. This population exceeds the allotment management plan approved population of 40 to 60 horses by 70 horses.

The Forest plans to remove the excess horses in 2007, to bring the numbers down to the appropriate management level prescribed in the 1977 North Hills Wild Horse and Burro Territory Plan.

Wildlife

Common Flicker

A total of 110 line transects, each 0.6 miles long, were surveyed for flickers in 2006. There were 447 call stations, and the total length of transects was 65.14 miles. The total area surveyed was 10,506.00 acres. Flickers were detected on 100 of the 110 transects. A total of 430 flickers were detected in 2006 on the Dixie National Forest. This number has increased from 211 individuals in FY2005. There were 329 detections in FY2004 and 289 in FY2003. In 2002, 103 of the line transects were surveyed, with 263 flicker detections. The increase in flicker numbers in 2006 could have been due to an increase of precipitation from the following year and good weather conditions during the monitoring period. Flicker numbers have been increasing since the establishment of this protocol in 2002, with 2005 being the exception. Until 2005, occupied territories have increased by more than 4 times since 2002, as well as the number of responses, which have increased by more than 11 times since 2002. The increase in Flicker numbers in 2006 (428) demonstrates more than a 2 fold increase over 2005 data.

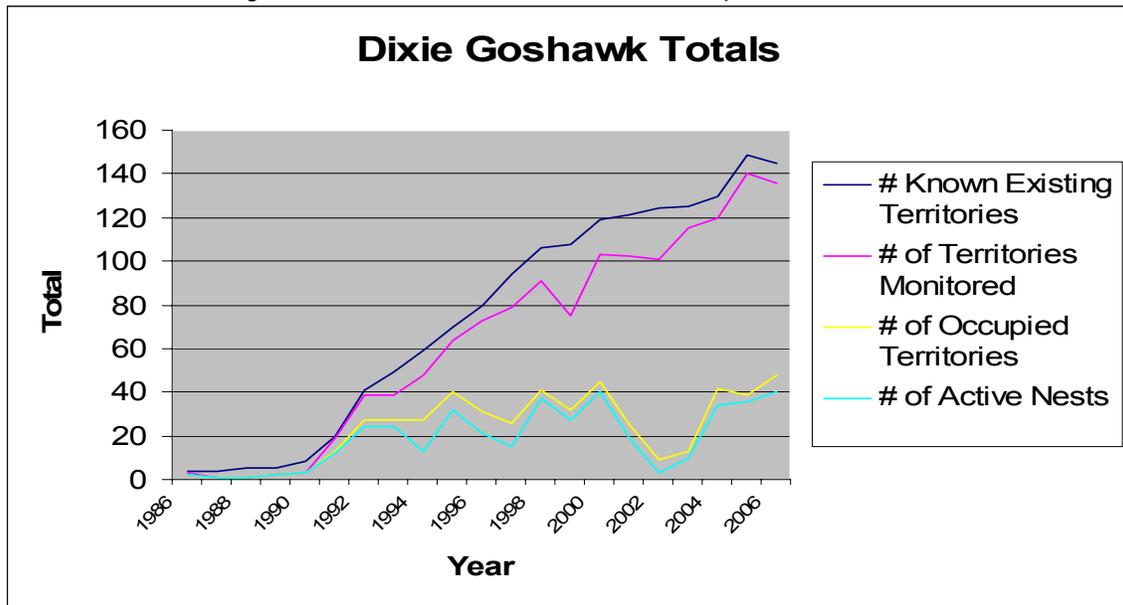
Flickers occupy a wide range of cover types, from low elevation pinyon/juniper sagebrush woodlands, to high elevation spruce ecosystems. Because this species occurs in a broad range of cover types, many factors can affect the population, and their distribution. Protective measures exist in the Forest Plan under the snag, and downed woody debris standards and guidelines section. These measures are implemented forest-wide and are effective in managing and protecting important habitats for cavity nesters. In addition, the Forest is currently experiencing heavy conifer mortality due to insects such as the spruce, and mountain pine beetle. As a result, snags and downed woody debris are in abundance in many areas across the Forest.

Northern Goshawk

Out of 149 existing goshawk territories on the Forest, 136 were monitored in 2006. In 2005, 39 territories were occupied (birds located in the territory but nesting was not confirmed) and 36 were confirmed active (either birds being observed incubating or young at the nest). There were 130 known territories in 2004. The increase in known territories was due

to the discovery of new territories and the division of some individual territories into two. In 2006, 50 territories were occupied and 42 were found to be active. In 2005, 39 territories were occupied and 36 were confirmed active. These totals are similar to the findings from 2004 when the number of occupied nests was 43 and the number of active nests was 34. Additional territories were very likely occupied but the absence of bird observations during the site visit prevented categorizing them as such. Not all active nests were revisited to confirm fledgling production; however, at least 67 nestlings/fledglings were confirmed on the Forest in 2006.

Known Existing Territories, Territories Monitored, Occupied Territories, Active Nests.



Goshawk numbers have been high, with approximately 50 occupied, and 42 active territories across the forest over the past 2 years. The total number of territories increased in 2006, resulting in more active nests and an increase in the number of young and birds fledged since 2004. This increase is likely due to the high level of precipitation received in the 2004/2005 season, and the corresponding increases in available prey species. The increase in active territories in 2004 through 2006 has corresponded with increased precipitation in southern Utah and will continue to be monitored closely.

The number of occupied Goshawk territories across the forest is high and well distributed, inhabiting all ranger districts. These results may indicate that our present method of protecting this species is adequate. Precipitation is another important factor that Forest Service data suggests to affect goshawk populations on the Dixie. Based on forest-wide precipitation data, active goshawk territories and goshawk production are correlated to high levels of precipitation.

Funding resources along with more employees, and equipment, would be needed to survey the amount of habitat that is desirable to be surveyed on the Dixie National Forest.

In 2006, two timber sale projects were selected to be reviewed for implementation of the Goshawk Amendment Standards and Guidelines. Both projects occur in landscapes dominated by mixed conifer species. Goshawk mitigation for these projects was built into the design criteria, and monitored throughout implementation. Based on monitoring information collected during inspection visits, goshawk recommendations were not sufficiently implemented in either project.

Inadequate coordination between the silviculturist and the wildlife biologist resulted in goshawk nesting areas being thinned (within 30 acres of nest areas). This has resulted in increased emphasis being placed on communication between these specialists prior to project implementation. In addition, the design criteria contained in the NEPA document should be included in the decision and the contracts.

Mule Deer and Rocky Mountain Elk

All big game species in Utah are managed by the UDWR. The Forest Service is consulted but has no control over population numbers. The UDWR data demonstrate stable elk numbers across the forest. Herd units are healthy and close to management plan objectives. The 2006 population estimates (4019) were down somewhat from 2005 (4575), probably due to increased hunting pressure and depredation issues. Of the six deer units that lie within the boundaries of the Dixie National Forest all population estimates have increased since the post 2003 season (from 36,800 to 53,925). These increases have likely been due to favorable weather conditions during critical fawning and wintering periods.

Mule deer occupy a wide range of cover types, ranging from high mountains and canyons to side hills and lower elevation sagebrush rangelands. They favor conditions where there is an adequate food supply mixed with cover types such as stands of Quaking aspen, conifer species, and draws. In the summer season deer tend to favor the higher elevations and during the winter season they migrate to lower elevations to avoid heavy snow pack and lack of food. There are many factors that contribute to and affect the population and distribution of mule deer. All deer population numbers are up from previous years of monitoring and are healthy.

Based on the data supplied by the UDWR the Forest has no concerns for the persistence of elk or deer across the forest. Deer population numbers are increasing and elk numbers continue to fluctuate with hunting

pressure and depredation issues. Based on these data big game populations across the Forest are well distributed and will continue to persist across the forest.

Arizona Willow

The condition of the Arizona willow sites monitored across the Forest in 2006 has been documented in a separate annual report. In summary of that report, the overall condition of Arizona willow is good, as it is more vigorous in 7 of the 11 sites that were monitored last year, plants monitored in 2006 demonstrate an increase in the production of catkins (fruiting bodies) than found in previous years.

Mexican Spotted Owl

The 2003 USFWS survey protocol was used to survey and monitor for Mexican spotted owls in 2006. Nighttime calling was conducted generally between the hours of 2100 and 0200. No spotted owls were detected during survey or monitoring efforts in 2006.

Habitat Connectivity within 5th and 6th Order Watersheds.

One thinning project was reviewed for implementation of connective corridors. Based on field reviews, the connective corridors identified during the planning phase have been thinned and now do not function as corridors. However, additional connective corridors of habitat exist in areas such as Ashdown Gorge, Box Death Hollow, and Pine Valley Wilderness areas. Areas such as the east and west slope of the Boulder and the north end of Mt. Dutton all continue to provide good connective corridors to adjacent watersheds. Many connective corridors exist across the forest. However, in the some project areas corridors and protection areas were not maintained.

Snag Habitat Maintained in Desired Spatial Arrangement.

A total of eight transects were monitored for snags on the Cedar City and Powell Ranger Districts in 2006. Four transects were conducted in spruce/fir mixed conifer habitat, two transects in Ponderosa Pine, one transect in Douglas-fir, and one transect in Quaking aspen habitat. Four of the mixed conifer transects had snag levels above the guideline number of 300 snags per one hundred acres (snags greater than 18 inches dbh). In another area 1136 snags per 100 acres were counted. For the ponderosa pine transect conducted at Duck Creek Sinks, forest guidelines were again exceeded with 340 snags per 100 acres. Snag numbers are adequate in the cover types sampled across the forest and greatly exceed desired forest plan numbers in the spruce type. Snag-dependant species have adequate habitat across the forest and will continue to persist.

Down Woody Material and Logs Maintained in Sufficient Amount, Sizes and Spatial Locations.

Three of the five ranger districts on the Dixie National Forest were monitored for down woody debris and log size in 2006. The guidelines for weight, in tons/10 acres for coarse woody debris greater than or equal to 3 inch diameter, were met for all cover types. The guidelines for weight were met for all cover types. For the Pine Valley RD the guidelines were met for Douglas-fir and ponderosa pine cover types. No other cover types were surveyed on that district. On the Cedar City RD guidelines were met for all cover types with the exception of white fir in which the calculated weight was 74 tons/ 10 acres and the guidelines call for 100 tons/10 acres. On the Powell RD guidelines were met for ponderosa pine, quaking aspen, mixed conifer and Douglas-fir cover types.

Grazing Management and "At Risk" Goshawk Locations.

Currently there are no goshawk territories on the Forest that have been identified as being threatened by livestock grazing; therefore, no "At Risk" areas have been delineated. Data collected in 2005 demonstrates that most of the allotments on the Forest are not in a downward trend (Long Term Vegetation Trend Study 2005)

