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Dixie National Forest

Monitoring Report for Fiscal Year 2007



Garfield, Iron, Kane, Piute, Washington, and Wayne Counties, Utah

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Introduction

The purpose of this report is to provide Forest managers and the public with a brief look at the monitoring accomplished during fiscal year 2007 as part of implementing the Dixie National Forest Land and Resource Management Plan (Forest Plan). All references to the year 2007 refer to fiscal year 2007: October 1, 2006, through September 30, 2007. This report does not discuss individual management projects; instead, it gives an overview of specific monitoring items prescribed in the Forest Plan. More information on specific projects is available from the Dixie National Forest, 1789 North Wedgewood Lane, Cedar City, Utah, 84721.

Air Quality

Compliance with Utah State Air Quality Guidelines and Standards

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 2007 Dixie National Forest fire managers complied with



Figure 1. Smoke dispersal from the Hog Wildland Fire Use event. The smoke from the 449-acre lightning-caused fire was visible from the community of Escalante and from Highway 12.

state air quality standards, with no violations for significantly contributing to particulate matter. Smoke monitoring equipment was set up in some areas with the potential to be affected by prescribed fire and wildland fire use activities. Public complaints were monitored by local ranger districts and reported to the Utah Interagency Smoke Management Coordinator. There were fewer than five public comments about smoke concerns for all prescribed fires on the Forest.

Soils

Long Term Soil Productivity

Two prescribed fire sites were monitored for soil productivity: Stump Springs on the Escalante Ranger District and Sunset North on the Powell Ranger District. These prescribed fires burned at a low severity with adequate duff remaining to protect the soil from raindrop impact and to limit erosion.

Compaction

We monitored compaction on the Bunker and Barney Top timber sales in 2007. Results confirmed that compaction occurred during skidding (dragging the logs away from the harvest site) and at log landing sites. On average, 4.5 percent of the timber sale units had experienced a 15 percent increase in bulk soil density. Timber harvests do cause compaction, but monitoring results showed that the proper use of Soil and Water Conservation Practices (SWCPs) kept compaction within acceptable levels.

Upland Areas Adjacent to Riparian Management Areas

Two timber sales adjacent to riparian areas were monitored in 2007: Bunker and Radar Ridge salvage sales. The Bunker Salvage Sale had minor disturbance of the soil profile and damage to the stream channel from harvest and yarding equipment. However, the disturbance proved to be short-term and the residual slash will dissipate any movement of water off-site. The only sediment movement into the drainage can be directly attributable to the Bunker Creek Trail, which is located adjacent to the stream channel.

The Radar Ridge Salvage Sale stream course protection best management practices (the SWCPs) were not adhered to. Skidding operations occurred within one riparian area of Upper Midway Creek. The crossing of the stream channel on Upper Midway Creek with skidder operations did considerable soil damage (rutting) to wetlands and the channel.

Soil and Water Resource Protection – Project Environmental Assessment Mitigating Requirements

Five implementation projects were monitored in 2007. These projects showed that best management practices (the SWCPs) were effective in protecting the soil and water resources.

Soil Survey Activities

Data collection for the forest-wide field soil inventory has been completed and entered into a database (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 database to help with project and landscape scale analysis.

Soil and Water Resource Improvement Needs Inventory

District hydrologists have begun to update the forest-wide watershed improvement needs inventory, including entering the information into a database. 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.

Water

Compliance with State Water Quality Standards

Forest hydrologists sampled and analyzed water quality on the Santa Clara River and Wilson Creek, a tributary to Mammoth Creek, to compare the results with state water quality standards. Approximately 57 percent of our samples exceeded the state phosphorus criteria and 14 percent exceeded the dissolved oxygen saturation standard. One hundred percent of our samples for all other parameters were in compliance with state water quality standards.

The Santa Clara River and Wilson Creek are influenced by igneous geology, and have overall higher phosphorous levels. Results from different sampling sites from different years on the Forest is starting to show a trend of perpetually exceeding standards for phosphorus, leading to a hypothesis that native geology is playing a measurable role in phosphorus input to streams in southwestern Utah.

The dissolved oxygen saturation exceedance in April, May, and June, 2007, at Wilson Creek contained a large amount of algae growth, which could have contributed to a super saturated effect.

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

SWCPs are recognized as best management practices with the State of Utah Division of Water Quality. SWCPs were monitored at the following three locations in 2007:

1. Bunker Salvage Sale, Cedar City Ranger District,
2. Barney Top Resource Management Project, Escalante Ranger District, and
3. Puma Vegetation Project Implementation, Powell Ranger District.

The implementation of a properly spaced skid trail network and adherence to SWCPs relating to soil moisture operational levels and the design and management of log landings was effective in minimizing detrimental soil disturbance within these three timber sales.

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. Rather, our intent is 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

In a sample of three sites on the East Fork of the Sevier River drainage, all sites had a good or excellent bank stability rating. The 2007 sample of riparian areas on the Dixie National Forest is meeting this Forest Plan direction.

Effectiveness and Maintenance Needs of Watershed Improvements

Four previously completed projects were monitored in 2007.

1. Griffin Top Road Relocation. This project was successful in rerouting the road away from the Griffin Springs riparian area. The recovery of native grass/forbs and shrubs is slow at this high elevation site (>10,000 feet). The reclaimed road bed is stable and not eroding.
2. Duck Swains Access Management Project. Phases of this project are continuing with placement of rock barriers and ripping of old road beds. The best success has been where coarse woody debris has been placed on the decommissioned road segments. Grass seeding has been successful.



Figure 2. Road obliteration on Henrie Knoll, part of the Duck Swains Access Management Project.

3. Upper Swains Creek Riparian Exclosure. Initial establishment of barbed wire drop fence was not successful due to the fence design, which used steel posts and wire that were destroyed in heavy snow loads. This exclosure has been upgraded to an aspen worm fence.
4. East Fork Dispersed Recreation Management. This project was successful in minimizing effects to East Fork Sevier River riparian areas. Barriers have been installed at 13 designated sites, and have been improved to limit impacts upon the stream corridor.

Accomplishment of Riparian Area Management Goals

Measurements such as pebble counts, cross-sections, and photo points are being collected annually. These data have been used mainly to establish long-term monitoring sites and collect baseline data. In 2007, 10 sites were established or re-read. 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 six sites are summarized below.

1. Bullrush, Forest, Horse Valley, Lowder, and Willow Creek Survey. These survey sites were established in 2007.
2. Santa Clara River. Comparing cross-section surveys taken in 2007 and 2002 revealed that the inchannel bars have disappeared and the outside of the meander bend has moved 1 foot to the outside. These changes are probably attributable to the early spring and late winter flooding of 2005.
3. Upper Kanab Creek. Comparing cross-section surveys taken in 2007 and 2002 revealed that the stream is aggrading with sands and silts. These changes are probably attributable to the flooding of 2005.
4. Three Mile Creek. Comparing cross-section surveys taken in 2007 and 2002 revealed that the permanent survey markers could not be located. This is based on the cross-sections, which seemed to be very different. This cross-section will be resurveyed in fiscal year 2008.
5. Podunk Creek. Comparing cross-section surveys taken in 2007 and 2002 revealed that the channel widened in the cross-section within the run and remained about the same for the riffle and pool. Substrate counts indicated more fines in 2007 than in 2002. These changes are probably attributable to the flooding of 2005.
6. Mammoth Creek. Comparing cross-section surveys taken in 2007 and 2002 revealed that little had changed in any of the cross-sections. Substrate counts were also about the same between the two surveys.



Figure 3. Stream cross section data being collected.

Fisheries

Fish and Riparian Habitat

Aquatic macroinvertebrates were collected on the following streams in 2007: Center Creek, Delong Creek, East Fork Sevier River (three stations), Lake Creek, Pine Creek, Ranch Creek, Santa Clara River, Twitchell Creek, and White Creek.

Aquatic macroinvertebrate communities can be good indicators of overall habitat conditions within a specific waterbody. The Biotic Condition Index (BCI), currently used by the forest in the absence of fish, is recognized as credible data, yet when used alone it fails to completely describe the condition of aquatic habitat at any one site. The Forest is using macroinvertebrate data to track recovery of fire-affected streams, establish baseline datasets, and for project level analysis. This data is best viewed and applied at a site-specific level, as it is less helpful when used at larger spatial scales. In general, sampled streams on the Forest indicate aquatic macroinvertebrate communities are within the expected range for southern Utah. The macroinvertebrate samples collected in 2007 are currently at a non-forest service lab for analysis.

In conjunction with the macroinvertebrate monitoring, pebble count data was collected at all sample sites. Forest Plan direction specifies that where natural conditions allow, “no more than 25% of stream substrate should be covered by inorganic sediment less than 3.2 mm in size.” Data collected in 2007 indicated that 8 of the 11 streams met this Forest Plan direction. The three streams that did not meet the direction were Delong Creek (28 percent covered), Lake Creek (29 percent covered), and the Santa Clara River (37 percent covered). Delong Creek and Lake Creek fall within the specified 20 percent variance, while the Santa Clara River exceeds it.

The pebble count data indicates that the sampled streams generally meet the Forest Plan direction or fall within the 20 percent variance (Forest Plan page IV-33, V-6). The one exception to this is the Santa Clara River, where approximately 37 percent of the stream substrate was composed of material smaller than 3.2 mm. This sample site is located near the inflow of the Pine Valley Reservoir within the Pine Valley Recreation Area. The prevalence of fine sediment at this location is a reflection of impacts from flooding in 2005 and sediment influx from adjacent developed recreation sites within the recreation area. Over time, impacts from the 2005 flooding will become less prevalent. Additionally, developed campgrounds and day use sites within the Pine Valley Recreation Area are scheduled to be reconstructed further away from riparian habitats. This action is expected to greatly reduce fine sediment influx within the Santa Clara River, and ultimately stream substrate composition should trend towards a more coarse size distribution.

Bonneville Cutthroat Trout

No electroshocking surveys were conducted for Bonneville cutthroat trout (BCT) on the Forest in 2007. Aquatic macroinvertebrates were collected at the following BCT streams:

- Cedar City Ranger District
 - Delong Creek
- Escalante Ranger District
 - Center Creek
 - Ranch Creek

Water temperature monitoring was conducted at the following BCT streams:

- Pine Valley Ranger District
 - Water Canyon
 - Horse Creek
 - Spirit Creek

The Utah Division of Wildlife Resources (UDWR) is in charge of all BCT population surveys on the Dixie National Forest, including all electroshocking surveys. The UDWR currently surveys all known populations of BCT on a 7-year rotation. The last survey dates for known populations on the Forest occurred in 2001 and 2002. The next scheduled population inventories will occur in 2008 and 2009.

Wildfires in 2002 heavily impacted BCT populations and habitat on the Pine Valley and Powell ranger districts. High water temperatures, lack of overstream shade and cover, poor pool habitat, lack of spawning habitat, lack of overwintering habitat, and poor aquatic macroinvertebrate community composition are currently contributing to the degraded fisheries habitat quality within the affected streams. Limited numbers of BCT have been reintroduced into all affected BCT streams. These fish are being monitored by the UDWR.

Full laboratory analysis of aquatic macroinvertebrate data collected in 2007 is pending. This data will be used to assess recovery rates in fire-affected streams and as baseline and trend data.

Water temperature data that was collected in 2007 indicates that Water Canyon, Horse Creek, and Spirit Creek are within the suitable temperature range for BCT. The 7-day moving average for maximum temperature was below 70° on all three streams.

Table 1. 2007 Temperature Data Summary, Bonneville Cutthroat Trout Streams

Stream	Ranger District	Dates Collected	Elevation (Feet)	7-day Maximum Temperature Moving Average (degrees F)
Water Canyon	Pine Valley	04/10/07-10/30/07	7,041	69.35
Horse Creek	Pine Valley	03/15/07-10/26/07	5,933	59.04
Spirit Creek	Pine Valley	03/15/07-10/26/07	5,895	63.05

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

Brook, Brown, Rainbow, and Cutthroat Trout

The fish population data collected during the 2007 field season is difficult to compare with the variation stated in the Forest Plan. This is due to the lack of recent fish population data on most streams on the Forest. Until 2003, the UDWR was collecting the bulk of fisheries population data on the Dixie National Forest. Sampling locations for UDWR monitoring was determined by the UDWR with little input from the Forest. For the past five years (2003-2007), Forest personnel have collected fish population data 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 4. Colorado River cutthroat trout found on the Dixie National Forest.

Further evaluation and data collection are needed to clearly define site-specific fisheries population trends across the Forest. Non-native trout fisheries (i.e., brown trout, brook trout, cutthroat trout, and rainbow trout) are stable across the Forest. These fisheries are maintained through natural recruitment and stocking by the UDWR.

The streams monitored in 2007 were selected based on need for data to support forest-level environmental analysis; therefore, this data is not intended to represent fisheries population and habitat trends across the Forest. Data from each stream is indicative of local conditions at the time of the survey and should not be extrapolated beyond the stream in question. No fish were

found during one survey in 2007 (East Fork Deer Creek). This is likely a result of limited or poor habitat, seasonal use by fish species, or that the waterbody is historically fishless. It is assumed that a fishless monitoring station is not necessarily indicative of the whole waterbody.

Chart 1. Biomass (Pounds of Fish per Acre) on Selected Forest Streams

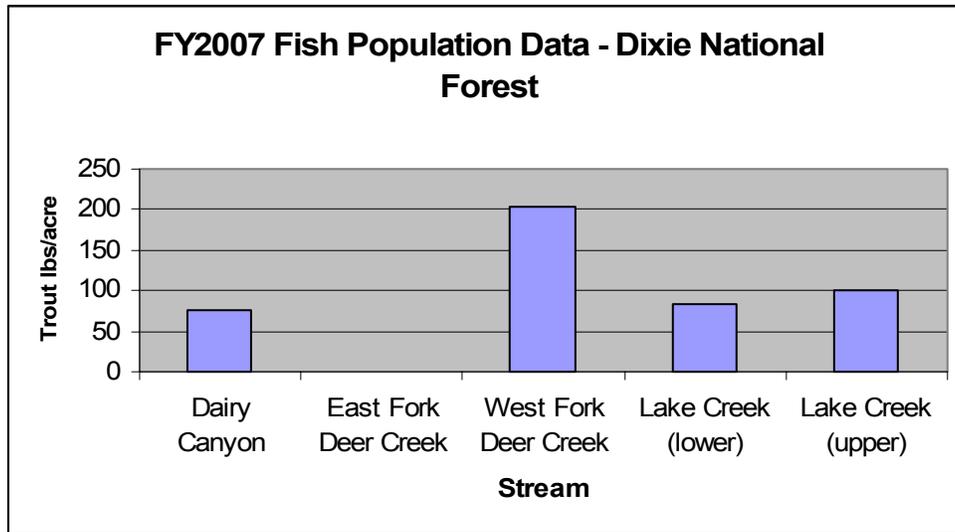
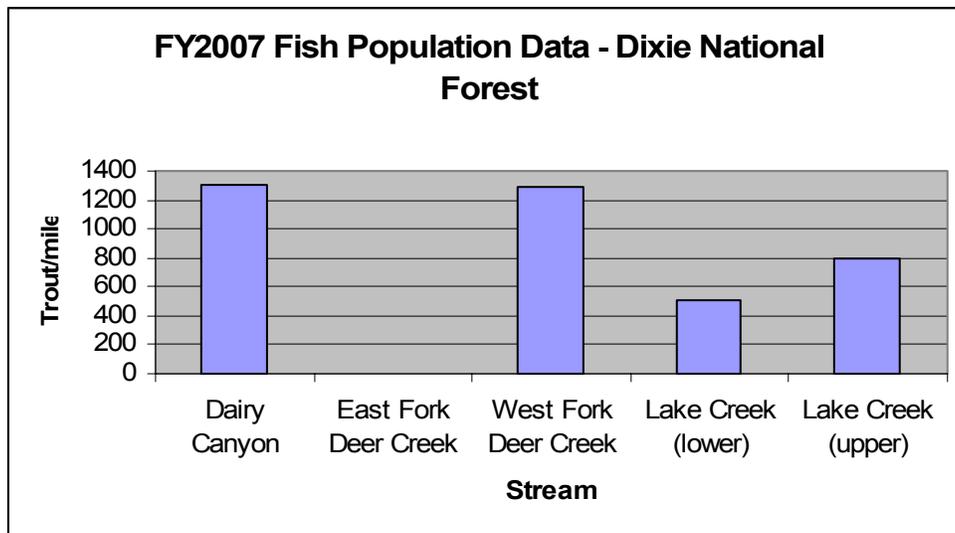


Chart 2. Total Number of Trout on Selected Forest Streams



Wildlife

Common Flicker

A total of 110 line transects, each 0.6 miles long, were surveyed for flickers in 2007. There were 447 call stations, and the total length of transects was 65.14 miles. The total area surveyed was 10,506 acres. Flickers were detected on 102 of the 110 transects. The increase in flicker numbers in 2007 could have been due to an increase in precipitation from the following year and good weather conditions during the monitoring period.

Table 2. Common Flicker Detections, 2002-2007

Fiscal Year	Number of Common Flickers Detected
2007	559
2006	129
2005	213
2004	329
2003	289
2002	263

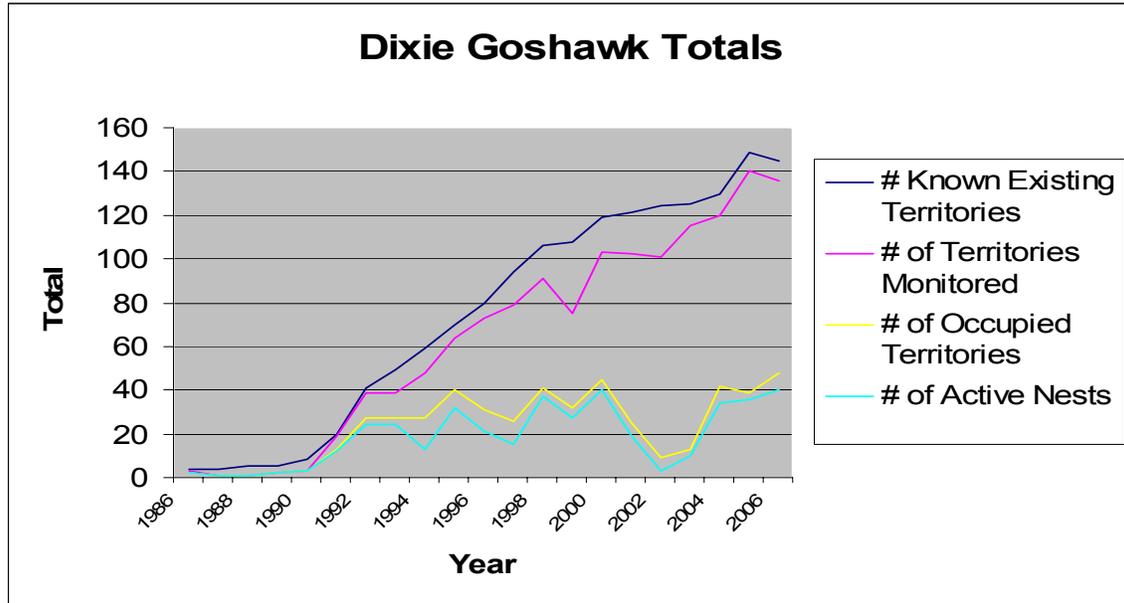
Flickers occupy a wide range of cover types, from low elevation pinyon/juniper sagebrush woodlands to high elevation spruce ecosystems. Because this species occurs in a broad range of cover types, many factors can affect the population and their distribution. Protective measures exist in the Forest Plan under the snag and downed woody debris standards and guidelines sections. 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

In 2007, 119 of the 152 existing northern goshawk territories on the Forest were monitored; a total of 58 territories were occupied and 46 were active. In 2006, 50 territories were occupied and 42 were active. In 2005, 39 territories were occupied and 36 were 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.

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 territories. 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.

Chart 3. Known Existing Territories, Territories Monitored, Occupied Territories, and Active Nests



The total number of occupied territories increased in 2007, 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 2004-2006 seasons, and the corresponding increases in available prey species. The increase in active territories from 2004 through 2007 has corresponded with increased precipitation in southern Utah. Territories 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 can affect goshawk populations on the Forest. Based on forest-wide precipitation data, active goshawk territories and goshawk production are correlated to high levels of precipitation.

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 mule deer and elk numbers across the Forest.

Table 3. Mule Deer Population Numbers by Hunt Unit

Hunt Unit	Management Plan Objective	Post 2003 Season	Post 2004 Season	Population Estimate 2005	Population Estimate 2006
Mount Dutton	2,700	1,800	1,900	1,700	2,000
Plateau	22,600	13,200	15,150	15,400	17,000
Paunsaugunt	5,200	3,800	3,975	5,100	6,500
Panguitch Lake	8,500	6,000	8,500	7,150	8,925
Zion	9,000	5,000	8,300	6,600	7,000
Pine Valley	12,800	7,000	8,300	11,700	12,500

Source: UDWR.

Table 4. Rocky Mountain Elk Population Numbers by Hunt Unit

Hunt Unit	Management Plan Objective	Post 2001 Season	Post 2002 Season	Population Estimate 2003	Post 2004 Season	Post 2005 Season	Population Estimate 2006
Mount Dutton	1,500	1,400	1,400	1,635	1,625	1,600	1,270
Plateau	1,500	1,350	1,500	1,540	1,700	1,400	1,500
Paunsaugunt	200	50	60	80	80	75	24
Panguitch Lake	1,100	900	900	1,065	1,125	1,150	875
Zion	300	300	300	300	300	300	300
Pine Valley	50	30	30	30	50	50	50

Source: UDWR. Post-season numbers are taken after all harvest has occurred for that year.

Mule deer and elk 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 aspen and conifer species. In the summer season deer tend to favor the higher elevations, migrating to lower elevations in the winter 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 all populations 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.

Arizona Willow

The overall condition of Arizona willow is good. Plants at 8 of the 11 monitored sites were more vigorous than they were last year. Plants monitored in 2007 demonstrated an increase in the production of catkins (fruiting bodies) over previous years.

Mexican Spotted Owl

The 2003 U.S. Fish and Wildlife Service (FWS) survey protocol was used to survey and monitor for Mexican spotted owls in 2006. Nighttime calling was generally conducted between 9:00 p.m. and 2:00 a.m. One spotted owl detection was recorded during survey efforts at the North Canyon Protected Activity Center (PAC) in 2007. One additional detection was made on the Teasdale portion of the Fremont River Ranger District on the east side of Boulder Mountain. This detection was an audio location approximately 5 air miles from the Sheets Gulch PAC. Additional funding resources, more employees, and more equipment would be needed to survey the amount of habitat that has been designated as Critical habitat by the FWS on the Dixie National Forest.

Habitat Connectivity Within 5th and 6th Order Watersheds

The Puma Hollow Thinning Project on the Powell Ranger District was reviewed for implementation of connective corridors. The connective corridors that were identified in the overall landscape for this project were somewhat maintained during the implementation portion of this project. Due to the cumulative effects from other projects in the area and the lack of tightly spaced groups and clumps of trees in the Puma area, connective corridors were only minimally maintained.

Areas such as the East Slope and West Slope of Boulder Mountain and the north end of Mount Dutton all continue to provide good connective corridors to adjacent watersheds. Many connective corridors exist across the Forest on each ranger district; however, in the project areas described above, these corridors and protection areas are minimal.

Snag Habitat Maintained in Desired Spatial Arrangement

A total of eight transects were monitored for snags on the Cedar City Ranger District in 2007. Four transects were conducted in spruce/fir mixed conifer habitat, three transects in ponderosa pine habitat, and one transect in aspen habitat. The mixed conifer transects were conducted at Mill Canyon, Clear Creek, Bunker Creek, and Strawberry Ridge. With the exception of the Mill Canyon transect, where no snags were present, the snag levels were calculated to all be above the guideline recommendation of 300 snags per 100 acres (snags greater than 18 inches dbh).

Ponderosa pine transects were conducted at Birch Creek, Turkey Track, and Cooper Knolls. Both the Birch Creek and Turkey Track transects were above the guideline recommendation of 300 snags per 100 acres. The Cooper Knoll transect had many snags below 18 inch dbh, but none higher. The aspen transect was conducted at Sydney Valley. It was calculated to be above the guideline with 1,000 snags per 100 acres. Based on these data, snag numbers are adequate in the cover types sampled across a portion of the Forest. Therefore, snag-dependant and associated species have adequate habitat 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 2007. 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.

Grazing Management and “At Risk” Goshawk Locations

There are currently 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 2007 demonstrates that range condition was found to be functioning on 92.5 percent of goshawk territories. Because an allotment can consist of several pastures, one pasture can be experiencing a downward trend and the remaining pastures can be in a static or even upward trend. It is also important to note that a pasture within an allotment can be experiencing a downward trend but still be in a proper functioning condition.

Timber

Timber Harvest Area

Acres harvested are monitored annually and compared with the Forest Plan projected average of 10,525 acres per year. An average of 3,646 acres in timber sales were sold annually from 1987 to 2007. The average acres harvested in timber sales sold from 1987 to 2007 was 3,125 acres.

Table 5. Timber Sale Acres Sold and Harvested, 1987-2007

Year	Total Acres Sold	Total Acres Harvested
1987	5,656	84
1988	5,369	2,946
1989	7,193	3,590
1990	5,184	7,454
1991	7,403	5,029
1992	2,907	6,629
1993	4,366	4,962
1994	2,044	3,807
1995	822	1,411
1996	11,762	4,068
1997	5,131	6,600
1998	4,092	3,743
1999	2,695	3,332
2000	1,553	6,196
2001	536	1,173
2002	804	990
2003	449	856
2004	2,266	144
2005	1,500	539
2006	230	723
2007	4,604	1,354

Timber Research Needs

Research was initiated in 1991 to study the survival and growth differences between spring and fall lifting of nursery seedlings. The results of this information will determine the best time to lift seedlings from nursery beds so as to provide the best survival and growth.

The Forest, in conjunction with Forest Pest Management (FPM), implemented a study on timber harvest and slash treatment methods to control the spread of *Tomentosus* root rot in Engelmann and blue spruce. The study began with the first treatment in 1984. Another series of study plots were established in 1989. This is long-term study to assess the results of the various treatments, with no results to report yet.

Suitable and Unsuitable Land Classifications

The table below shows the number of timber sales and acres verified for timber suitability from 1987 to 2007.

Table 6. Number of Timber Sales and Acres Verified for Timber Suitability, 1987-2007

Ranger 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

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

Harvest Practices in Retention/Partial Retention

Of 125 timber sales planned and implemented from 1987 to 2007, 38 had no mitigations identified in the landscape architect report. Of the remaining 87 sales for which mitigations were recommended, all contained the mitigations in the environmental document and in the silvicultural prescription. Of these 87 sales, seven have documentation of post sale monitoring completed by a landscape architect, and nine sales are still in progress. The remaining 71 sales have no documentation of post sale monitoring. On three sales the Visual Quality Objectives (VQOs) were not met in the first Forest Plan decade (1987-1998) because bark beetle suppression objectives took priority over full accomplishment of visual quality objectives.

VQOs were documented as met on four completed sales (6 percent) of those with mitigation measures identified in the landscape architect report. There is no documentation to determine if VQOs were accomplished on the remaining 94 percent of the completed sales for which mitigation measures were identified.

Harvest Practices in Riparian Areas

Riparian areas ranging from isolated springs to streams and ponds were present on 28 of the reviewed sales. Twenty-six sales included the riparian areas in the final layout. The hydrologist's recommendations were tracked through the environmental analysis, silvicultural prescription, marking guidelines, and contract/sale area map in the documents. A review of silvicultural prescriptions suggests that existing timber sale contract provisions, when fully implemented with a map, are adequate to protect and maintain riparian areas in their existing condition.

During project planning, specific restrictions (buffer zones) or special harvesting practices intended to protect riparian areas were identified. Most of these were carried into the environmental analysis as stated in the report. Recommendations were based on informal field visits. Several projects contain general recommendations such as "protect riparian areas." Most of these recommendations were included in the environmental analysis.

Twenty-one of 26 sale area maps showed the riparian areas identified by the hydrologist. Eighteen of these showed all of the riparian areas identified. The riparian areas have been adequately protected in 17 of 18 sale areas that were reviewed on the ground.

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.

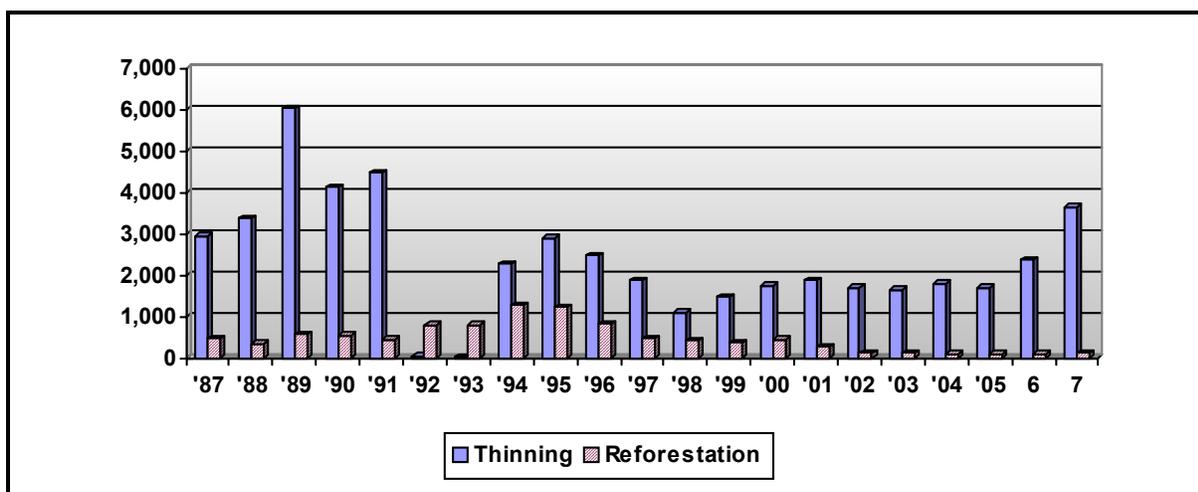
Drought has affected survival of young trees; however, the use of containerized seedlings has improved seedling survival, especially on basaltic soils. Survival rates exceed 80 percent following three years after planting.

Maximum Size of Openings Created by Clearcuts

Numerous areas less than 40 acres in size were clearcut from 1987 to 2007 to meet disease control objectives. There have been no perceived or recorded adverse effects to harvest practices, visual quality, or other resources values because of the size or location of the clearcut.

Reforestation and Timber Stand Improvement (TSI) Accomplishment

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

Chart 4. Acres Thinned and Reforested, 1987-2007

Fuelwood Consumption and Supply

Vegetative management practices on the Forest result in the availability of an estimated 14,000 cords of fuelwood annually. During the first five years of the Forest Plan period, an average of 7,446 cords of fuelwood was utilized each year. After natural gas was delivered to the major population centers in the area, the fuelwood consumption has declined to approximately 5,000 cords per year. In the past 10 years, the Forest has experienced catastrophic Engelmann spruce tree mortality due to a spruce bark beetle epidemic. This has resulted in thousands of acres of dead trees and heavy volumes per acre of fuel loading, contributing to an increasing amount of 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 (i.e., lands not specifically designated for timber harvest):

- Net volume is 3,534,863 MBF (thousand board-feet),
- Net annual growth is 45,134 MBF, and
- Annual mortality is 53,763 MBF.

Protection – Fire

Adequacy of Fire Prevention Programs

We measure the adequacy of our prevention programs by the number of human-caused fires. As shown in the table below, there were eight human-caused fires with a total of <1 acre burned in 2007.

Table 7. Number and Acres of Human-caused and Lightning-caused Fires

Type of Fire	Number of Fires	Acres Burned
Lightning-caused (suppression)	67	231
Human-caused	8	<1
Wildland fire use	5	2,409
Total	80	2,641

Number of Wildfires and Acres Burned

In 2007, a total of 2,641 acres were burned. Five of these naturally-started (lightning) fires were managed to achieve resource benefit, while all others were successfully suppressed.

There were 67 wildfires on the Forest in 2007, with the 231 acre total distributed across the Forest. The Powerline Fire (830 acres total, 100 acres of which were on the Forest) was the only wildfire to reach 100 or more acres. Fires managed for resource benefit burned 2,409 acres on the Powell Ranger District (697 acres), Escalante Ranger District (1,711 acres), and Pine Valley Ranger District (<1 acre). The largest fire on the Forest was the Toad Wildland Fire Use event, which burned 1,262 acres on the Escalante Ranger District.

Fire Management Effectiveness Index

We no longer use this method of reporting because it does not adequately measure success of the fire program. As a surrogate for this obsolete metric, initial attack effectiveness is calculated. Of the 75 fires that were managed with a suppression strategy, only one escaped initial attack efforts in 2007. This equates to a 99 percent initial attack success rate for this year. This high success rate also means that suppression expenditures were minimized. Typically, higher suppression costs are attributable to larger fires.



Figure 5. Smoke from the Toad WFU event on the Escalante Ranger District. Fire managers worked to manage the fire within a defined area to meet specific resource objectives.

Compliance with Fuel Loading Standards

The Dixie National Forest used prescribed burns and mechanical treatments to reduce fuel loading. Fuel treatment effectiveness was monitored across the Forest by establishing and re-measuring sampling locations for both fuels treatments and wildland fire use. In 2007 the Forest treated 4,892 acres using prescribed fire and 12,291 acres using mechanical treatments for a total of 17,183 acres treated. This is up from 11,517 treated acres in 2006.

Protection – Insect and Disease

Population Levels of Insects and Diseases

Localized mountain pine beetle (*Dendroctonus ponderosae*) and western pine beetle (*Dendroctonus brevicomis*) buildups have been observed over the years as sustained drought conditions have created greater moisture stress and stand susceptibility, particularly in older trees. Approximately 2,000 mountain pine beetle infested trees were treated in the Panguitch Lake Campground in an attempt to retain the important tree cover at that site. In 2002 the campground was non-commercially thinned to reduce tree densities and subsequent risk of bark beetle infestation. The pine bark beetle, along with limb rust and mistletoe, is slowly killing the over-mature ponderosa pine on the Forest.

A spruce bark beetle (*Dendroctonus rufipennis*) population grew to epidemic levels on the Cedar City Ranger District in the early 1990s. The beetle outbreak spread across the Markagunt Plateau, essentially killing all of the over-mature/mature and intermediate

Engelmann spruce trees over thousands of acres. By 2003, the Engelmann spruce component on the Cedar City Ranger District had been altered from an over-mature stand structure to total stand replacement in some areas and small seedling/saplings in others. Over the next century the spruce-dominated landscape will revegetate to seral aspen stand structure.

In the mid to late 1990s, the spruce beetle population grew to epidemic levels on Mount Dutton on the Powell Ranger District. Here, too, the mature/over-mature spruce stands have been replaced with aspen and subalpine fir because of the Engelmann spruce mortality. In the early 2000s the spruce beetle was active on the Escalante and Teasdale ranger districts, having developed to epidemic levels, killing mature spruce trees that survived the spruce beetle outbreak as seedlings and saplings in the early 1920s.

Recently the Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) and fir engraver beetle (*Scolytus ventralis*) 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.

Root rot continues to be widespread. A research/treatment program initiated in the Peterson Grove area on the Teasdale Ranger District and localized treatments have been prescribed in timber sale projects. Results of the research and treatments are pending. Timber sale prescriptions and cultural treatment activities appear to have reduced the incidence of limb rust in ponderosa pine.

Insects and disease have increased over the past 10 years overall. This has prompted more dead spruce salvage and delayed other treatment activities.

Effectiveness of Dwarf Mistletoe Suppression Projects to Protect Regeneration

Dwarf mistletoe treatments have been prescribed in all affected timber sale project areas initiated in the period since the Forest Plan was adopted in 1986, and thousands of acres within individual control projects have been completed. Permanent plots have also been established to monitor the long-term effects of mistletoe on tree growth, though these studies are not complete at this time.

Treatment prescriptions and projects have been successful in reducing localized dwarf mistletoe infections. However, the disease continues to be widespread in many stands, requiring continued emphasis on treatment and management.

Range

Range Vegetation Condition and Trend

During 2007, 216 long-term trend monitoring studies were completed: 45 were Level III Riparian Inventories, 101 were upland range trend monitoring studies, and 70 were photo points completed by Forest personnel. Only 17 of the 101 upland range trend monitoring sites were replicated studies from which accurate trend data can be derived. Sixty-one of the 70 photo points were replicated, with photo interpretive trend available. There were no replicated Level III Riparian Inventories performed during 2007.

The data analysis on six of the 17 replicated upland range trend monitoring studies indicates a downward trend in vegetation condition, effective ground cover, and/or frequency of invasive species. The other 11 sites demonstrated slightly upward trends. 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. Sixteen of the 17 monitoring sites that indicate both upward and downward trends are located in the Cove Mountain/Bull Complex, Dammeron, and Blue Springs wildfire burn areas (burned in 2005 and 2006) on the Pine Valley Ranger District. These burned areas are highly susceptible to cheatgrass invasion and low effective ground covers resulting from reduced fuel loads. The reasons that six of these sites exhibited a downward trend between 2005 and 2007 is because cheatgrass frequency continues to increase and effective ground covers are still low from these recent fires. The remaining unburned site that exhibited a downward trend is located in the Skull Springs area of the Escalante Ranger District. This area was recently treated for pinyon-juniper encroachment.

All of the 61 replicated photo points re-taken on the Dixie National Forest are on the East Fork/Crawford and Robinson/Lower Blubber C&H allotments on the East Fork Sevier River on the Powell Ranger District. Thirty-nine of the photo points (64 percent) demonstrated stable trends, 17 (28 percent) demonstrated upward trends, and 5 (8 percent) demonstrated downward trends. Cumulatively, 92 percent of these allotments demonstrated stable or upward trends.

Based on this evaluation of this range condition and trend data, no further evaluation or changes in management direction are proposed.

The 1986 Forest Plan did not define vegetation and soil (i.e., 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 216 monitoring studies and photo points reported here, 78 had previously established baseline studies using current methodologies where accurate trend data or photo interpretation could be derived. Other study sites may have previous readings, but this data was collected using various methods that are not compatible with current measurements and/or locations and photos were not replicated. 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 on the Dixie National Forest.

The Forest has established a long-term monitoring program, as indicated by the number of studies re-read or established during 2007 and in previous years (291 upland range trend monitoring studies, 129 Riparian Level III Inventories, and 76 photo points from 2004 to 2007). Over time, these studies will be repeated and trend data will become available. This data is stored in a retrievable database where it can be accessed and additional repeat studies can also be stored and compared.

Riparian Condition

Successional Status. The Forest Plan 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” (General Direction, Standard and Guideline 4B, p. IV-42). In a sample of 45 riparian areas across the Forest during 2007, 41 of the sampled riparian areas (91 percent) are in a mid or upper successional stage (late or Potential Natural Community), and 4 riparian areas (9

percent) are in a very early, early, or early to mid successional stages. Therefore, we have met this Forest Plan direction for riparian areas. No further evaluation and/or change in management direction is needed.

Stream Bank Stability. Forest Plan standards and guidelines for bank stability (Standard and Guideline 4A, p. IV-42) and wildlife and fish (Standard and Guideline 6B, p. IV-33) require that we “maintain 50 percent or more of total stream bank length in stable condition.” Out of the 45 Level III Riparian Inventories sampled on the Dixie National Forest in 2007, 41 (91 percent) had streambank stability ratings that were rated as moderate, good, or excellent. These ratings indicate stable bank conditions in these riparian areas. In a sample of three sites on the East Fork of the Sevier River drainage, all sites had a good or excellent bank stability rating. The 2007 sample of riparian areas on the Dixie National Forest are meeting this Forest Plan direction. Therefore, no further evaluation and/or change in management direction is needed.

Forage Utilization

During the 2007 season of use, 60 of 81 allotments (74 percent) were reported to have been monitored for forage utilization. Stubble height, ocular reconnaissance, and photo documentation were the primary methods used for assessing utilization. Of the 60 allotments monitored, only the following five allotments exceeded prescribed utilization by 20 percent:

1. Gunlock, Pine Valley Ranger District,
2. Bull Valley, Pine Valley Ranger District,
3. West Pinto, Pine Valley Ranger District,
4. Shingle Mill, Cedar City Ranger District, and
5. Sand Creek, Escalante Ranger District.

The Powell Ranger District reported no sites that exceeded prescribed utilization levels.

On the Pine Valley Ranger District, overuse of riparian areas such as Spring Creek, Garden Springs, Shinbone Creek, Willow Creek (Gunlock Allotment), Little Grassy, Lost Creek, and Park Canyon (Bull Valley Allotment) may result in a degradation of rangeland conditions on these allotments. However, these allotments do not represent a continual recurring overuse problem. In 2007, poor herding coupled with ongoing drought largely contributed to poor resource conditions in these areas. Therefore, in 2008, alterations in herding, salting, seasons of use, and time spent in each pasture will be made to alleviate the potential to exceed prescribed utilization in these allotments. Holt Canyon on the West Pinto Allotment also exceeded use by 20 percent; however, this allotment will not be grazed for two years. Two year rest from livestock use will help to address these overused sites on the West Pinto Allotment. This measure will be implemented in 2008 and 2009.

On the Cedar City Ranger District, the Shingle Mill Allotment as a whole had approximately 70 percent utilization, with stubble heights averaging 2 inches. The remaining 22 allotments on the Cedar City Ranger District had an average of less than 50 percent use.

On the Escalante Ranger District, the Sand Creek Allotment exceeded use by 20 percent at one key area. The average use on the Escalante Ranger District was 39 percent over 45 sample sites on 13 allotments.

While some excessive use occurred on the five allotments described above, forage utilization on approximately 92 percent of the measured allotments were kept within allowable use levels in 2007. Management measures are already being taken to alleviate overuse on the Pine Valley

Ranger District. Overuse on the one Cedar City Ranger District allotment (Shingle Mill) and one key area of the Escalante Ranger District allotment (Sand Creek) are likely isolated events, but may warrant further evaluation and/or a change in management.

Wild Horse Numbers and Habitat Trends

In 2006, the estimated wild horse population on the North Hills Territory on the Pine Valley Ranger District was 120. This estimate exceeded the allotment management plan approved population of 40-60 horses by 60-80 horses. Therefore, between July 20 and 24, 2007, 82 horses were removed from the Territory. This roundup or removal brought the population down near its approved population level of 40-60 horses.

It is currently estimated that approximately 50 wild horses remain in the Territory. Although horse numbers deviated by 68 percent through a management removal, this action was necessary to bring the wild horse population back down to within approved levels.

Nephi Spring exceeded prescribed utilization by 20 percent. This was likely a result of two factors: one, abnormally high horse numbers (estimated 120+ wild horses) in the Territory in spring, and two, Nephi Spring is the only water in the Territory. This excessive use was to be expected given the high wild horse numbers. By mid-summer 2007, when 82 wild horses were removed from the Territory, the overuse was remedied.

On September 15, 2007, 23 domestic horses were turned loose on the Territory by an unknown private entity. It is likely that more domestic horses will be released illegally on the Territory in coming years because of the high price of hay and because many horse slaughter plants in the United States have been shut down.

Developed Recreation

Facility Capacity and Developed Site Service

During 2007 the Persons At One Time (PAOT) figure for all developed sites was 8,374 daily with a seasonal capacity of 1,928,997 PAOT days. During 2007 we had 952,195 PAOT days on the Forest.

Downhill Ski Use

Brian Head Resort reported 135,602 skier days for the 2006/2007 winter season.

Dispersed Recreation and Wilderness

In 2007 the Forest monitored 29 non-motorized and motorized trails for use. Both active infrared and electromagnetic devices were used for counts. The monitoring occurred on 5 trails on the Pine Valley Ranger District, 14 trails on the Cedar City Ranger District, 5 trails on the Powell Ranger District, and 5 trails on the Escalante Ranger District.

Dispersed recreation use numbers increased by 68 percent from the previous year. Most of the high use trails tend to be either scenic destination and/or mechanized/motorized routes. The increase in use on these types of trails is in agreement with the findings of the National Visitor Use Monitoring data collected on the Dixie National Forest in 2003.

Further monitoring of these trails is necessary to create a database with baseline data. The Dixie National Forest has been consistently monitoring dispersed recreation use for the last three years. In order to monitor change over time, trail data needs to be collected, analyzed, and stored annually. With increasing population growth and an increasing recreating public, trail use is expected to increase. The Dixie National Forest is especially susceptible to increased use due to its proximity to the fast growing city of Las Vegas, Nevada. In addition, the Forest provides many recreation opportunities for motorized recreation, which is growing in popularity in the United States.

Cultural (Heritage) Resources

Completion of Cultural Resource Investigations For All Site-disturbing Activities Where No Site Inventory Has Been Completed

Federal law requires us to conduct surveys for historical and archeological resources prior to ground-disturbing activities. We surveyed or evaluated 15 projects totaling approximately 1,500 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. The Forest met all the requirements in the law regarding cultural resources.

Facilities

Road and Bridge Construction and Reconstruction

Fourteen miles of road were reconstructed and 0.3 miles of new road were constructed in 2007. The Forest Plan predicted that construction and reconstruction through 1990 would consist of 2 miles for public works, 28 miles for timber development, and 5 miles for oil and gas activities, totaling 35 miles.

During 2007, 4.3 miles of road were reconstructed for public works and 10 miles were reconstructed for timber development, totaling 14.3 miles. Timber harvest is occurring at about 25 percent of levels during the 1980s, which accounts for fewer miles constructed or reconstructed than estimated in the 1986 Forest Plan.

Road Management

During 2007, 100 percent of the random sample condition surveys were completed for this cycle. Sampled roads include:

1. Collie Flat (30003),
2. Hungary Creek (30804), and
3. Sand Pass South (31103).

The random sample is not large enough to determine the trend in the condition of existing roads.

Buildings

18 buildings were inspected in 2007:

1. Duck Creek Visitor Center,
2. Pine Valley Visitor Center,
3. Duck Creek Bunkhouse,
4. Enterprise Barn,
5. Enterprise Warehouse,
6. Enterprise Storage – Office Building,
7. Enterprise Horse Shed – Office Building,
8. Pine Valley W.C. Barn,
9. Pine Valley W.C. Shop,
10. Pine Valley W.C. Paint Storage,
11. Duck Creek Fire Control Storage,
12. Duck Creek Paint Storage,
13. Duck Creek Barn/Storage,
14. Duck Creek Generator House,
15. Red Canyon Equestrian Campground Toilet,
16. Sheep Creek Trailhead Toilet,
17. Duck Creek Shower House, and
18. Red Canyon Campground Pumphouse.

All but four buildings (all of which are abandoned) have been inspected over the past 10 years (98 percent of all buildings). All but 13 buildings have been inspected over the past five years (95 percent of all buildings). Inspections revealed buildings in various states of condition.

Adequate resources are available to maintain buildings that are being used to a reasonable standard; buildings that are not used or receive low use are not maintained. If this trend continues, buildings that are not used will continue to deteriorate until they will have to be either renovated or demolished. This will be in accordance with the Facilities Master Plan, which calls for most unused buildings to be disposed of. The methods for determining deferred maintenance have changed such that data are not comparable from year to year. No additional evaluation is necessary.

Dam Administration

All high hazard dams were inspected by the State of Utah in coordination with Forest engineering personnel. The following dams required inspection by the Forest according to the existing Memorandum of Understanding with the State of Utah, Division of Water Rights:

1. Lower Ned Adams,
2. Posy Lake,
3. Sams Mill Set Reservoir,
4. Middle Ned Adams,
5. Robs, and
6. Flat Lake.

All inspections were accomplished according to established state and federal regulations. Results are in compliance. Forest-owned dams (Pine Valley, Flat Lake, Robs, and Pine Creek) continue to be under-funded for necessary heavy maintenance and/or reconstruction.

Compliance with Utah Public Drinking Water Regulations

All drinking water systems on the Dixie National Forest have been monitored in accordance with state and federal standards in 2007, with the following exceptions for the sulfate testing when it was omitted during its 9-year cycle:

- Kings Creek Campground,
- Cedar Canyon Campground,
- White Bridge Campground, and
- Panguitch Lake Campground.

All nitrate and subsequent sulfate monitoring returned acceptable results. One fecal coliform test exceeded the allowable maximum contaminant level. This test was taken at the Pine Lake water system. Follow-up testing showed acceptable water quality. With the required follow-up testing, all systems have had acceptable water quality test results, and have an approved status with the State of Utah.