

Dixie National Forest
Land and Resource Management Plan
Fiscal Year 2012 Monitoring and
Evaluation Report

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USDA, Forest Service, Region 4

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EXECUTIVE SUMMARY

This report presents a synopsis of monitoring results based on reports from the Dixie National Forest. The function of this report is to prompt managers to take a closer look at some of the monitoring items for possible amendments and/or consideration in Forest Plan revision, and provide information to the public who are interested in management on the Dixie National Forest.

Of the monitoring items identified in the Forest Plan and amendments, 73 (86%) have been accomplished sufficiently to report results. Of the items monitored with results, 29 (40%) indicate a variation causing further evaluation and/or change in management direction.

Forest Plan changes are recommended for 29 monitoring items. Monitoring items are recommended for dropping or combining, for rewording, and to change the monitoring method.

Recommendations based on these results are:

- 1) Conduct further evaluation of those items that exceed the stated variation and may indicate a need for change in management direction;
- 2) Use this document as need for change to the Forest Plan with revision as appropriate;
- 3) Review priorities previously identified for these monitoring items to establish priorities for future monitoring;
- 4) Review annual monitoring report requirements and frequency for appropriateness.

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SECTION 1. INTRODUCTION

A. Background

The Record of Decision on the Environmental Impact Statement for the Dixie National Forest Land and Resource Management Plan (Forest Plan) was signed in September of 1986. The Forest Plan provides broad direction for managing resources to attain desired conditions. The Forest Plan is implemented by projects planned and implemented at smaller, more site-specific scales to move existing conditions toward the desired conditions. Implementation activities are generally identified by goals and objectives and guided by standards and guidelines.

Regulations¹ require monitoring in order to determine whether or not our actions are moving toward desired conditions and are being implemented within Forest Plan standards and guidelines. This is accomplished on a basis outlined in the Forest Plan (pages V-1 to V-13). Monitoring results may demonstrate needed changes in management direction², goals, objectives, standards and guidelines, and/or monitoring methods. These changes generally require a Forest Plan amendment. Forest-wide and site-specific monitoring elements are listed in the Forest Plan on pages IV-4 to IV-12.

Many Forest Service personnel have conducted monitoring efforts over the past year. Persons compiling and evaluating the data in this report are as follows:

Developed Recreation and Scenic Resources	Rick Dustin
Dispersed Recreation and Wilderness	Nick Glidden
Wildlife	Ron Rodriguez
Fisheries	Mike Golden
Range	Mark Madsen and Chad Horman
Timber	Jim Gerleman
Soils and Water	Rich Jaros
Air Quality	Linda Chappell and Kevin Greenhalgh
Minerals	Sue Baughman
Lands	Kathy Slack
Facilities	Paul Dastrup, Jake Dodds, and Steve O'Neil
Protection – Fire	Linda Chappell and Kevin Greenhalgh
Protection – Insects and Diseases	Jim Gerleman
Economics	Kenton Call

¹ Title 36 Code of Federal Regulations 219.11 (d).

² Title 36 CFR 219.12 (k).

B. Format

This report is organized corresponding to monitoring items listed in the Forest Plan, Chapter V, pages IV-1 to IV-13 plus Forest Plan amendments by resource. Each monitoring item is divided into six parts, which are described below:

Methods. This includes the methods prescribed in the Forest Plan and may include specifics regarding the item monitored. Where applicable, other methods used are also discussed.

Variation. For each monitoring item, the Forest Plan describes “Variation which would cause further evaluation and/or change in management direction.” This is described in this report as “Variation.” Where Forest Plan direction or goals are referenced, the page number and brief description is included. The extent to which further evaluation is needed and if further actions are warranted is not determined in this report.

Results. A summary of results from specialist reports is provided. More detailed information can be obtained from these reports.

Interpretation. The results are compared to the variation that may cause further evaluation and/or a change in management direction: “Are variations exceeded?” The monitoring results are described regarding what it means to the resource or the Forest Plan: “What are the implications?” “Conclusions” describe the consequences to the resources indicated by the results and implications.

Monitoring Resources Available. The availability of funding and/or labor to accomplish the monitoring is presented.

Recommendation. This section answers questions such as, “Should we continue to monitor?” and, “Is the monitoring identified in the Forest Plan still appropriate?” The recommendations identify items needing further analysis and do not suggest solutions. Solutions will be determined with the further analysis triggered by the variation.

Goals and objectives are identified in Section 20 with a brief statement whether or not they have been attained. Reasons for non-attainment are not included. If part of a goal was attained and another part not attained, it was counted as not attained overall in this report.

The last section of this document summarizes the results and recommendations regarding monitoring priorities, items where a variation is causing a further evaluation and/or change in management direction, and if a Forest Plan amendment is recommended. Results of Forest Plan objective attainment are also included.

SECTION 2. DEVELOPED RECREATION – PUBLIC

A. Condition of Facilities

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Condition of Facilities (whether the condition of developed facilities is declining from the current situation).	Annual RIM Reports - Total \$ needed to bring facilities to Condition Class 1; Measure bi-annually; Five-year reporting frequency.	H/M	Five year average exceeds 1985 by 5%

Methods.

The district recreation staffs monitor 20% of developed recreation sites every year and data is put into INFRA in October or November.

Variation.

Objective (b) in the Forest Plan relating to Developed Recreation Facilities is to bring the condition of the facilities to Condition Classes 1 or 2 by the year 2000 (page IV-1; Classes range from 1-5, with 5 being primitive and 1 most developed, with hardened sites, flush toilets, etc.). In addition, recreation facility water and sewage systems were to meet State standards by the year 2000 (page IV-1). The objective of this measure is to determine whether the conditions of developed facilities have improved or are declining from the 1986 condition.

Results.

The direction is to do developed recreation condition surveys on 20% of the sites each year. This was done and entered into INFRA. Survey data found that not all sites were being maintained to standard. Due to the lack of funding only critical health and safety issues are addressed. Newly constructed sites like: Pine Valley Recreation Area, King Creek Group Site and Posey Lake meet all or most standards.

Accessibility and ADA standards are met each time dollars are spent (i.e. a picnic table replacement). However access to that table may not meet the desired standard because of the lack of funding.

Interpretation.

Is further evaluation needed? The Forest plans on doing “Recreation Site Facility Master Planning” (RSI) in 2014. This will refocus our limited dollars and may move us to decommission some developed sites.

What are the implications? Conditions of facilities have improved at Pine Valley Recreation Area, Honeycomb Rocks CG, King Creek Group Site; Duck Creek loop “B”, and Posey Lake CG. Other sites like Pine Lake CG and Blue Spruce CG continue to decline.

Conclusion. Declining budgets and no capital improvement projects (CIP) make it hard to reduce deferred maintenance. Limited dollars from concessionaire receipts are not keeping up with the decline of facilities.

Monitoring Resources Available.

Monitoring information is available through Infra, National Visitor Use Monitoring (NVUM) and Recreation Site Inventory (RSI)

Recommendation.

Continue monitoring efforts on condition of facilities. Consider changing wording and changing the method of measure and/or monitoring frequency.

B. Soil and Vegetation Loss

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil and Vegetative Loss at Developed Sites.	Transects, photo points at selected key sites; monitoring and reporting every five years.	H/M	Campsite condition below Class III using the Limits of Acceptable Impact.

Methods.

INFRA data was collected in fiscal year 2012.

Variation.

The variation causing further evaluation for this measure in the Forest Plan is when campsite conditions fall below Class III using the Limits of Acceptable Impact. "Limits of Acceptable Impact" is a process to identify thresholds of acceptable impacts from use. In developed sites, it refers to the threshold or limit of conditions where the public would no longer visit the site because of deteriorated or undesirable conditions.

Forest Plan direction is to develop and implement a vegetative prescription for each developed site (page IV-2).

Results.

Forest wide, concessionaires do yearly maintenance on all campgrounds. Concessionaire reports indicate trends of occupancy are up by 13.2% in 2012. The overall occupancy at campgrounds for the forest is at 36.2%. High use campgrounds like Red Canyon shows 77.8%, Yellow Pine is at 53%. Low use campground like Deer Haven show 9.9% and Blue Spruce shows 11.7%. All data indicates that soil and vegetation impacts are a result of over use of occupancy. Data shows that we are not close to over using sites.

Interpretation.

Is further evaluation needed? Forest will continue monitoring 20% of developed recreation sites. The Infra data system will continue to be our place holder for monitoring data.

What are the implications? Infra data will show us if trends change.

Conclusion. Soil and vegetation at developed sites are being maintained.

Monitoring Resources Available.

INFRA, NVUM, Yearly Concessionaire Report.

Recommendation.

Continue monitoring efforts on soil and vegetation loss at developed sites. Consider changing wording and change the method of measure and/or monitoring frequency.

C. Facility Capacity and Developed Site Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Facility Capacity (whether construction and reconstruction of facilities is keeping pace with demand)	Annual PAOT, PAOT-Days, with five-year reporting frequency.	H/H	PAOT and PAOT-Days greater than or equal to 90% of projected demand.
Developed site use – Amount and distribution (does demand exceed supply?)	Annual double sample indicator sites, random sample all fee sites, with annual reporting frequency.	M/M	Use of an individual site exceeds 60% of theoretical capacity for the summer season or daily use exceeds capacity on more than 5% of the days in the summer season. The five-year average developed site use for the Forest varies from projected demand by more than 20%.

Methods.

NVUM, INFRA and Concessionaire report.

Variation.

Forest Plan Objective (a.) under Goal No. 1 is: Program to add facilities with a capacity of 875 PAOT to the current 5895 PAOT by 2020.

Forest Plan Direction for this goal is:

“Develop the following new sites to accommodate increased use:

1985-1995	Deer Creek - 250 PAOT
1995-2005	Blue Springs Point - 250 PAOT
2005-2015	Pine Valley - 250 PAOT
2015-2025	Fish Creek Lake - 125 PAOT

Rehabilitate and define the following sites to accommodate increased use:

1985-1995	Spruces - 160 PAOT, Cedar Canyon - 95 PAOT
1995-2005	Duck Creek - 395 PAOT
2005-2015	Juniper Park - 110 PAOT, Blue Springs - 100 PAOT
2015-2025	Kings Creek - 225 PAOT
2025-2035	Te-Ah - 210 PAOT”

Measuring these objectives will determine whether construction and reconstruction of facilities is keeping pace with demand. In order to determine demand, facility use data are needed. Therefore, this monitoring item and Developed Site Use monitoring are addressed together.

The variation causing further evaluation for visitor use is when use of an individual site exceeds 60% of theoretical capacity for the summer season, or daily use exceeds capacity on more than 5% of the days in the summer season. Also, the five-year average developed site use for the Forest varies from projected demand by more than 20%.

Results.

Existing supply does not exceed demand except for group sites.

Interpretation.

Is further evaluation needed? The forest could consider adding more group sites. However given existing budgets, no capital improvement projects funded and the fact we cannot maintain what we have, it is not recommended.

What are the implications? Large groups will need to find other alternatives.

Conclusion. None of the campgrounds are at capacity. Concessionaire reports provide data on use and NVUM provide satisfaction levels of public.

Monitoring Resources Available.

Concessionaire reports come yearly, INFRA data is updated yearly and NVUM is done every five years (2014).

Recommendation.

Continue monitoring efforts on facility capacity and developed site use. Consider changing wording and change the method of measure and/or monitoring frequency.

D. Developed Site Service

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Developed Site Service (whether Forest is able to provide service scheduled in the plan)	Annual PAOT-Days FSM (to standard), Mgmt. Attainment Report Item #26, with five-year reporting frequency.	H/H	PAOT-Days FSM (standard) five-year average exceeds or declines from the Forest Plan objective by 10%.

Methods.

Maintained in conjunction with Concessionaire permit schedule.

Variation.

The objective of this measure is to determine whether the Forest is able to provide developed site service scheduled in the Forest Plan. The Forest Plan direction (b) for Goal No. 1 states: "Regulate the opening and closing dates of facilities to serve the public in an efficient and economical manner." Standards and guidelines for managing developed recreation sites state that they be managed "at full service when at least one of the following are met and funding is available to meet them:

- A. A campground is a designated fee site;
- B. More than 20 percent of theoretical capacity is being utilized;
- C. A group campground or picnic ground has a reservation system and/or user fee; or
- D. The site is a swimming site, a boating site with a constructed ramp, or at staffed visitor information center."

Results.

All campgrounds are being managed at full service. All have user fees and all have some level of use from a reservation system.

Each year the forest and the concessionaire meet to approve the operating plan. This includes proposed opening and closing dates of campgrounds, maintenance needs, Granger-Thye project approval, required walkthrough dates prior to opening to make sure all requirements are met (like hazard trees are down and water system is up and running) and water testing is done and turned in on each site.

Interpretation.

Is further evaluation needed? Forest will do NVUM in 2014. NVUM is done every five years.

What are the implications? Concessionaire reports yearly on use and NVUM reporting every five years on satisfaction levels.

Conclusion. Concessionaire reports 85,861 users came and used forest campgrounds in 2012. NVUM reporting (2009) public satisfaction at 95%.

Monitoring Resources Available.

Concessionaire yearly report, NVUM.

Recommendation.

Continue monitoring efforts on developed site service. Consider changing wording and change the method of measure and/or monitoring frequency.

SECTION 3. DEVELOPED RECREATION – PRIVATE

A. Downhill Ski Area Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Downhill Ski Area Use (is it increasing as projected?)	Annual ski area attendance reports; five-year reporting frequency.	H/H	Five-year average varies from projected demand by more than 20%.

Methods.

Annual ski area attendance reports.

Variation.

Five-year average varies from projected demand by more than 20%. The projected demand for downhill ski use in the Forest Plan for the 1990 period was 426,000.

Results.

Skier-days at Brian Head Resort are less than 50% of capacity.

Interpretation.

Is further evaluation needed? Yes. The expected use was much less than projected, varying more than 20% from the projected demand of 426,000.

What are the implications? Forest Plan direction for ski area management was based on projected increased use that has not been realized.

Conclusion. This measure shows that Brian Head Resort has been able to operate over time. The use at Brian Head is not under Forest Service control; monitoring this item would not prompt a management change.

Monitoring Resources Available.

Recreation use data is gathered by Brian Head Resort under Special Use Permit.

Recommendation.

Drop this monitoring item.

B. Organization Site Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Organization Site Use (are existing sites being fully utilized?)	Permittee occupancy plan, pre-season occupancy reports, post-season regular visits to check occupancy; measure 1 st , 5 th , 10 th year; five-year reporting.	H/H	Unreported private sector vacancies on Forest Land exceeding 10% of the summer season or reported and inventoried vacant periods for which no reservations are received.

Methods.

The Forest reviews facilities annually in organization sites to ensure that all requirements of the special use permit are being met.

Variation.

Unreported private sector vacancies on Forest Land exceeding 10% of the summer season or reported and inventoried vacant periods for which no reservations are received.

Results.

The Forest has one organization camp and the permit requirements are being met.

Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. This monitoring item is not revealing meaningful information.

Monitoring Resources Available.

The special use permit is reviewed annually.

Recommendation.

Consider dropping this monitoring item.

SECTION 4. DISPERSED RECREATION

A. Dispersed Visitor Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Dispersed Visitor Use (summer and winter)	Annual road counters, parking lot counts, trail counters, RIM reports; five-year reporting.	M/L	Visitor use varies from projected demand by greater than 20%.

Methods.

The Dixie NF uses both active and passive infrared trail counters, as well as electromagnetic vehicle/trail counters.

Variation.

Visitor use varies from projected demand by greater than 20%. The projected demand in the Forest Plan for Dispersed Use was 843,100 RVDs for 1990, and 1,129,900 in 2000 (page II-9).

Results.

Dispersed recreation use numbers decreased slightly from the previous year. Most trail counts were static or slightly lower. These findings may be due to a downturn in the economy. Most of the high-use trails tend to be either scenic destination and/or mechanized/motorized route. Across the Forest, non-motorized use numbers were lower in 2012 than previous years.

Interpretation.

Is further evaluation needed? Unknown. Traffic counters alone do not give sufficient information to conclude if limits were met.

What are the implications? The types of dispersed uses occurring on the Forest were not anticipated in the Forest Plan. The measures prescribed in the Forest Plan are not suitable or sufficient to determine if projected demand has been exceeded.

Conclusion. 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 five years on most trails listed. In order to monitor change over time, trail data needs to be collected, analyzed, and stored annually. With an 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. In addition, the Dixie National Forest provides many recreation opportunities for motorized recreation, which is the fastest growing sport in the United States.

Monitoring Resources Available.

There are insufficient funds to monitor dispersed recreation use on the Dixie National Forest in its entirety. The current cost for an individual trail counter is around \$450. With 280 trails constituting 1,600 miles of trails, it is unlikely the Dixie National Forest will ever have the funding or personnel to adequately monitor all dispersed recreation; however, each year the Forest has been able to increase the number of routes monitored and the accuracy of the data collected.

Recommendation.

Monitoring of dispersed recreation use needs to continue on an annual basis on the Dixie National Forest. Dispersed recreation monitoring by the use of trail counters allows managers to determine current conditions and how use numbers may be changing over time. In addition to number monitoring (trail counters), occurrences of illegal motor vehicle use should be monitored as well to track visitor compliance with the Forest Motor Vehicle Use Map.

B. Site Condition

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Site Condition (Limits of Change)	Photo points, transects key sites adjacent to water, every five years; five-year reporting.	H/M	Campsite condition below Class III using the Limits of Change Table 1.

Methods.

No data collected in fiscal year 2012.

Variation.

Campsite condition below Class III using the Limits of Change Table 1. This is assumed to be Limits of Acceptable Change (LAC).

Results.

A "Limits of Acceptable Change" process has not been conducted and documented on the Dixie National Forest.

Interpretation.

Is further evaluation needed? Yes, there is a variation on the campsite inventories of data collected to date.

What are the implications? Frissell³ is a subjective measure, rating root damage, bare soil, and vegetation damage, and does not indicate impacts since it does not compare to natural

³ Frissell, Sidney S. 1978. Judging recreation impacts on wilderness campsites. Journal of Forestry. 76(8): 481-483. IN: USDA Forest Service Proceedings RMRS-P-15-VOL-5. 2000.

conditions. Southern Utah is arid, resulting in naturally-occurring soil exposure. This may not equate into undesired impacts from use.

Conclusion. Dispersed sites have exceeded expectations in the Forest Plan.

Monitoring Resources Available.

Resources for inventories have not been available. Further inventories may not be available to collect data on remaining sites.

Recommendation.

Consider dropping use of Limits of Acceptable Change and use of Frissell Classes.

Close or rehabilitate campsites that fall below a Class III that are showing unacceptable impacts. Determine the number of campsites needed to meet demands and locate those sites to minimize resource impacts while meeting the needs of the public. Research has shown that it is best to keep open heavily-used sites if other resources are not being impacted and close sites with minimal impacts. Since highly-impacted sites can be difficult and costly to rehabilitate and close, they are often best left open, thereby reducing the spread of impacts to other areas.

C. Trail Condition

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Trail condition	Trail condition surveys, 25% annually; reporting every four years.	H/M	Trail mileage classed as inadequate (substandard) exceeds the current inadequate mileage shown in the AMS.

Methods.

The Forest did not conduct trail inventories during 2012.

Variation.

Trail mileage classed as inadequate (substandard) exceeds the current inadequate mileage shown in the Analysis of the Management Situation (AMS) in the Forest Plan. The AMS (page II-10) states that at the time of Plan preparation, 462 miles were inadequate, and 175 were adequate.

Results.

No data collected in fiscal year 2012.

Interpretation.

Is further evaluation needed? Unknown. Data is not sufficient to determine.

What are the implications? More trails may be substandard than when the Forest Plan was developed.

Conclusion. More data analysis is needed to determine mileages of trails in substandard condition.

Monitoring Resources Available.

Resources to conduct this monitoring have not been available.

Recommendation.

Continue to inventory trails on the Forest. Once all trails have been inventoried, establish a funding level to keep trails at their management objective. If funding is not available to meet objectives for all trails, seek volunteers or groups to help maintain critical trails or seek to close those trails with little or no use. Close trails that are no longer needed.

Many of the trails are not adequate to accommodate motorized use. With this type of use rapidly increasing, an adequate motorized trail system needs to be identified and established within motorized ROS classes. Trails outside motorized ROS areas should be closed to motorized use.

D. Shifts Between ROS Classes

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Shifts between ROS Classes	Ten-year ROS mapping and reporting.	M/L	If the change between classes is 5% greater than predicted.

Methods.

In 2002, Geographic Information System (GIS) technologies were used to review the Forest Recreation Opportunity Spectrum (ROS). The different ROS classes (Roaded Natural, Semi-Primitive Motorized, Semi-Primitive Non-Motorized, and Primitive) were identified according to their distance from motorized roads. This effort has not been completed.

Variation.

If the change between classes is 5% greater than predicted.

Results.

When the inventory is completed, a comparison can be made of ROS classes that were identified when the Forest Plan was developed.

Interpretation.

Is further evaluation needed? Unknown. Results have not been completed and compared to 1986 ROS mapping.

What are the implications? Further analysis is needed.

Conclusion. Further information is needed to evaluate ROS classes.

Monitoring Resources Available.

Complete the ROS inventory and review.

Recommendation.

Complete the ROS inventory and compare to 1986 ROS mapping.

SECTION 5. WILDERNESS

A. Campsite Condition

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Condition of campsites and surrounding area (are conditions declining from the current situation?)	Limits of Change at key sites, 5-years monitoring and reporting.	H/M	Limit of Change analysis shows that the Condition Class has declined one class on 25% of inventoried sites.

Methods.

No data collected in fiscal year 2012.

Variation.

Limit of Change analysis shows that the Condition Class has declined one class on 25% of inventoried sites.

Results.

No results in fiscal year 2012.

Interpretation.

Is further evaluation needed? No, past data are lacking with which to compare recent data regarding the Limit of Change analysis to determine if the Condition Class has declined one class on 25% of inventoried sites. Six (6%) of the inventoried sites are in Frissell Class 4. Based on initial findings, use does not exceed capacity.

What are the implications? If the Limit of Change has been exceeded and use trends continue, resource damage could occur.

Conclusion. Monitoring to compare existing data is needed to assess potential implications.

Monitoring Resources Available.

Forest funding is needed to compile this monitoring.

Recommendation.

Continue to monitor recreation use, campsites, and vegetation plots. Change the monitoring method to allow for recent science with a Forest Plan amendment.

B. Human Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Amount and distribution of human use	Annual trail registration, trail counters, and trailhead counts with periodic intensive sample; annual reporting.	M/M	Human use exceeds area capacity identified in this plan.

Methods.

Trail registration boxes and trail counters were placed at various locations on the Forest.

Variation.

Human use exceeds area capacity identified in the Forest Plan. The capacity estimated in the Forest Plan is 26,500 RVDs (page II-13).

Results.

Although trail registration data was collected, the regularity and meaning of the data are lacking in order to justify displaying the results.

Interpretation.

Is further evaluation needed? Unknown. Data collected are not sufficient to draw conclusions.

What are the implications? Unknown.

Conclusion. Trailhead registration and trail counters do not provide suitable data to draw conclusions regarding use.

Monitoring Resources Available.

There are insufficient funds to monitor human use on the Dixie National Forest in its entirety. It is unlikely the Dixie National Forest will ever have the funding or personnel to adequately monitor all human use impacts; however, each year the Forest has been able to increase the number of routes monitored and the accuracy of the data collected.

Recommendation.

Continue monitoring with trail counters.

SECTION 6. CULTURAL RESOURCES

A. Cultural Resource Investigations

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Completion of cultural resource investigation for all site-disturbing projects where no inventory has been completed in the past.	Annual management review and reporting.	H/H	Failure to accomplish is a performance problem and does not indicate a need to change management direction.

Methods.

Management review of 2012 cultural resource survey.

Variation.

Failure to accomplish is a performance problem and does not indicate a need to change management direction.

Results.

19 cultural resources investigations were completed on ground-disturbing projects during 2012 (see **Error! Reference source not found.**). A total of 39 sites were recorded on 2,050 acres surveyed.

Number of projects, acres surveyed and number of sites recorded of heritage resource surveys on the Dixie National Forest during 2012.

Year	Number of Projects	Acres Surveyed	# Sites Recorded
2012	19	2,050	39

Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. Site-disturbing projects are being surveyed as needed.

Monitoring Resources Available.

Budgeting to support surveys for site-disturbing projects have been adequate.

Recommendation.

Continue to survey site-disturbing projects.

Cultural resource clearance work on the Garkane Powerline Project – Powell Ranger District.



SECTION 7. SCENIC RESOURCES

A. Compliance with Visual Quality Objectives

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with Visual Quality Objectives	Annually, Landscape Architect evaluate one retention corridor selected at random, Landscape Architect evaluate a minimum of two or 10% (whichever is more) of previous year's projects, selection at random from list of previous year's completed projects; annual reporting.	H/M	Corridor contains more than 2% of view area which does not conform to the Visual Quality Objective, more than one sampled project does not meet VQO in a given year, or one or more projects in two successive years do not meet VQO.

Methods.

In 1996, the Forest Service changed direction from USDA Handbook 462, *The Visual Management System* to USDA Handbook 701, *Landscape Aesthetics: A Handbook for Scenery Management* (October 1996). The Chief of the Forest Service directed employees to "...begin using the concepts and terms contained in this Handbook as you work on new projects or initiate Forest Plan revisions." As a result of this direction, the Dixie changed to the Scenery Management System (SMS) and to Scenic Integrity Objectives (SIO) instead of Visual Quality Objectives. Following these directions, the Forest was completely remapped in 2000 using the new system and a Forest Plan amendment was completed.

Variation.

Corridor contains more than 2% of view area which does not conform to the Visual Quality Objective, more than one sampled project does not meet VQO in a given year, or one or more projects in two successive years do not meet VQO.

Results.

Along the major travel routes with heavy use by those interested in the scenery, the Scenic Integrity Objective (SIO) has a high scenic integrity and the valued landscape character appears to be intact. In a landscape with a moderate scenic integrity, the valued landscape may appear slightly altered.

Most of the major travel corridors on the Cedar City District have received management activities during this monitoring period. These activities have been treatments in response to the spruce beetle infestation occurring on the District. Some of these management activities did not retain the SIOs along the major travel corridors.

The Powell District had two timber sales along major travel corridors. Portions of East Creek are located along the Great Western Trail that should be managed to retain a high Scenic Integrity Objective. Timber removal in these areas thinned the stands to existing levels, but managed to retain the visual character of a ponderosa pine stand.

Interpretation.

Is further evaluation needed? Yes. Due to beetle infestations and subsequent harvesting, there are areas that do not meet SIOs.

What are the implications? Scenic views have been impacted.

Conclusion. Stochastic events such as beetle infestations can impact scenic integrity over which the Forest has no control.

Monitoring Resources Available.

Forest Landscape Architects conduct most of the monitoring with some assistance from the Districts.

Recommendation.

Use a Forest Plan amendment to correspond current monitoring with using the Scenery Management System. Areas involved in the insect infestation should be identified with an interim SIO⁴ until a plan can be developed to bring the visual characteristics back in line with a high scenic integrity along travel corridors. Develop a vegetation management strategy for Management Area 2B, travel corridors. The goal would be to maintain forest health and prevent further outbreaks of insects and disease, thus maintaining the visual variety of the landscape most seen by the public.

⁴ SIO is Scenic Integrity Objectives

SECTION 8. WILDLIFE AND FISH

A. Big Game

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Big game (mule deer and elk)	Annual UDWR harvest and classification data, winter range rides, aerial reconnaissance, pellet transects; annual reporting.	M/M	Prior to reaching optimum Forest populations, a downward population trend of 10% over 3 years. Once optimum populations are reached, a 20% total population or hard [herd] composition change over a five-year period.

Methods.

UDWR classification data, winter range rides, and aerial reconnaissance were used in monitoring these species. Data were primarily collected by UDWR and evaluated by the Forest Service.

Variation.

Prior to reaching optimum Forest populations, the variation causing further evaluation is a downward population trend of 10% over 3 years. Once optimum populations are reached, variation is 20% total population or herd composition change over a five-year period. Optimum populations are considered as management unit objectives established by the UDWR. These population goals are changed by the state on an as needed basis.

Results.

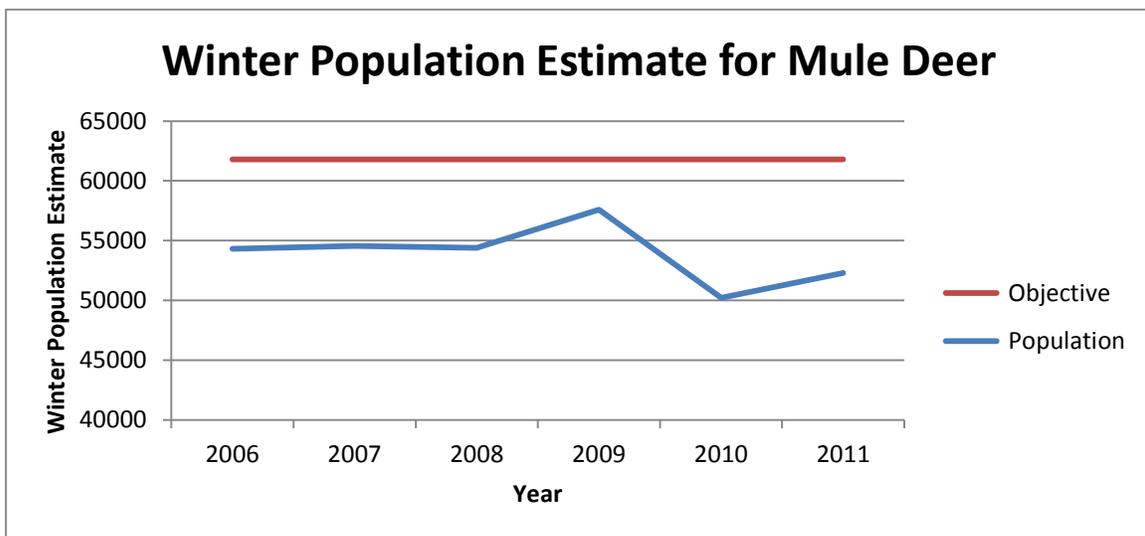
Mule Deer and Rocky Mountain Elk

The Dixie NF contains portions of seven different Wildlife Management Units (WMUs) in the Southern Region: Boulder Plateau, Kaiparowits, Mount Dutton, Panguitch Lake, Paunsaugunt, Pine Valley, and Zion. Currently, elk habitat has not been defined within the Pine Valley WMU, although the Utah Division of Wildlife Resources (UDWR) manages a limited number of elk in the area. The deer and elk numbers listed below come from data that is being used in the 2011 Utah Big Game Annual Report (UDWR 2011 in press, Heather Bernales.)

Mule Deer Winter Population Estimates by WMU

WMU	% Suitable habitat within Dixie NF	Management Plan Objective	2006	2007	2008	2009	2010	2011
Boulder Plateau	50%	22,600	17,000	15,800	12,000	15,500	12,500	12,800
Kaiparowits	3%	1,000	400	400	1,000	400	400	400
Mount Dutton	62%	2,700	2,000	2,300	2,500	2,400	1,800	1,900
Panguitch Lake	61%	8,500	8,925	8,700	10,000	10,500	8,100	8,500
Paunsaugunt	15%	5,200	6,500	6,600	6,000	5,800	4,900	5,200
Pine Valley	55%	12,800	12,500	13,400	13,400	13,400	12,600	13,000
Zion	9%	9,000	7,000	7,350	9,500	9,600	9,900	10,500
Total:	35%	61,800	54,325	54,550	54,400	57,600	50,200	52,300

The chart below displays the data provided in the table above.



*Objective determined in Deer Management Plan

The Dixie NF contains summer, winter, and year-round habitat for mule deer populations. Amount of habitat varies with WMU, and altogether the Dixie National Forest administers only 35% of suitable habitat within the seven WMUs (Table 2). Accurate estimates of populations on the Boulder Plateau are obscured due to the addition of the Fishlake and Thousand Lakes Boulder units. The Boulder, Kaiparowits, and Mount Dutton units are under objective. The Panguitch Lake, and Paunsaugunt units are at objective. The Pine Valley and Zion Units are above objective.

All big game species in Utah are managed by the UDWR. The Regional Advisory Council (RAC) process is used to make population management recommendations, and the Utah Wildlife Board makes all decisions on population management. The Forest Service has a representative on the RAC; however, the Forest in no way has control over population numbers. It should be noted that a WMU may be within approved population objectives, and as a result of UDWR management strategies, population numbers may be reduced.

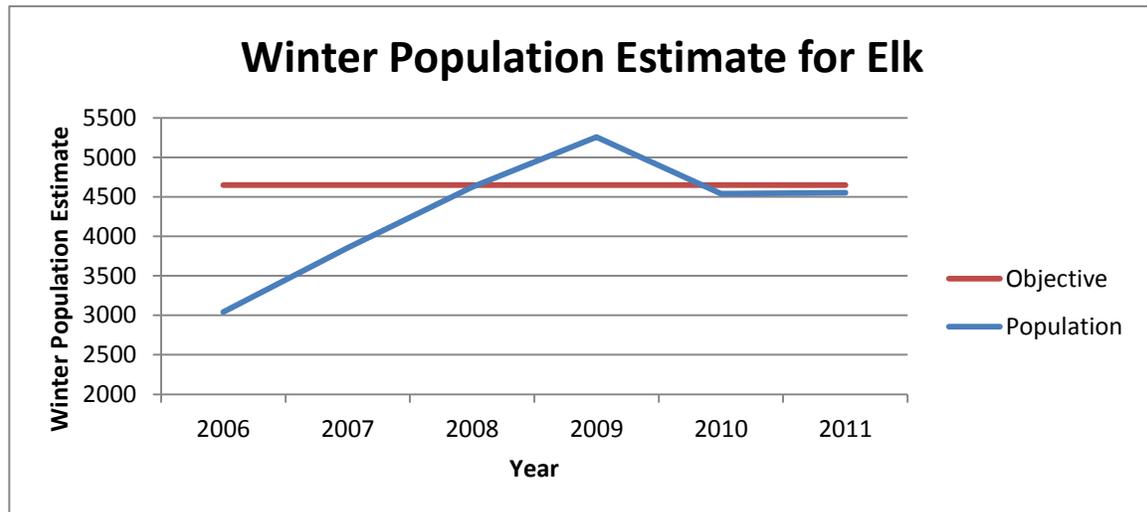
Deer populations appear to be healthy and will continue to persist across the Forest.

The table below displays winter population estimates from 2006-2011 for elk in the six WMUs that overlap the Dixie NF.

Elk Winter Population Estimates by WMU

WMU	% Suitable habitat within Dixie NF	Management Plan Objective	2006	2007	2008	2009	2010	2011
Boulder Plateau	58%	1,500	500	900	1,500	1,800	1,500	1,350
Kaiparowits	51%	25	25	25	25	25	50	25
Mount Dutton	77%	1,500	1,270	1,400	1,500	2,000	1,750	1,800
Panguitch Lake	75%	1,100	872	950	1,000	800	775	850
Paunsaugunt	33%	175	24	30	50	100	140	150
Pine Valley	NA	50	50	50	50	50	50	50
Zion	5%	300	300	500	500	480	275	325
Total:	54%	4,650	3,041	3,855	4,625	5,255	4,540	4,550

The chart below displays the data provided in the table above.



*Objective determined in Elk Management Plan

The Forest contains summer, winter, and year-round habitat for elk populations. The amount of habitat within the Forest varies with WMU, and altogether the Dixie National Forest administers only 54% of suitable habitat within the six WMUs. The Kaiparowits and the Pine Valley units are at management plan objective; the Mount Dutton and Zion units are above objective.

Elk populations appear to be healthy and will continue to persist across the Forest.

Interpretation.

Is further evaluation needed? No, mule deer populations have increased this year, by over 2100 head, and over the past 6 years have only shown a decline in 2010. Variation is determined over a three-year period. Elk populations are generally meeting current objective population goals with 2 units being over objective, 2 at objective and 3 slightly under objective allowing for more growth.

What are the implications? There are many factors influencing deer and elk populations, including weather, winter range conditions, calving and fawning conditions, forage, disease, predation, and hunting pressure/success. The elk and deer units on the Dixie National Forest extend beyond the boundaries of the Forest, particularly winter range. Therefore, conditions on lands other than those occurring on National Forest System administered lands influence these populations. Deer winter range conditions and areas available have been declining and are a major factor for declines of these deer herds. The UDWR is holding elk populations in check with accelerated hunting opportunities in certain units. This causes variable fluctuations in populations.

Conclusion. The Regional Advisory Council and the Wildlife Board, both of which are influenced by the Forest Service by recommendation only, must approve any changes in population objective and harvest changes. The Forest Service does not control population objectives or harvest limits. However, deer and elk populations are well distributed and are persistent across the forest.

Monitoring Resources Available.

UDWR conducts harvest and classification data, aerial reconnaissance, and models the population estimates.

Recommendation.

Continue monitoring the big game species in cooperation the UDWR; renew monitoring with pellet counts where appropriate in cooperation with UDWR.

Citations

Utah Division of Wildlife Resources (UDWR). 2011. Utah Big Game Annual Report. In Press. Heather Bernales.

B. Wild Turkey

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Wild Turkey	Annual UDWR harvest data, sighting records of reliable persons. Habitat evaluation during pre- and post-timber sale reviews and range analysis; annual reporting.	M/M	10% total decline in population size over a 3-year period and/or loss of important habitat components; i.e., roost trees in 2 or more areas of essential habitat as designated by UDWR and FS.

Methods.

UDWR harvest data, sightings from qualified persons, and habitat evaluations have been conducted. Habitat evaluations conducted were documented in wildlife specialist reports and through implementation, effectiveness, and validation monitoring efforts.

Variation.

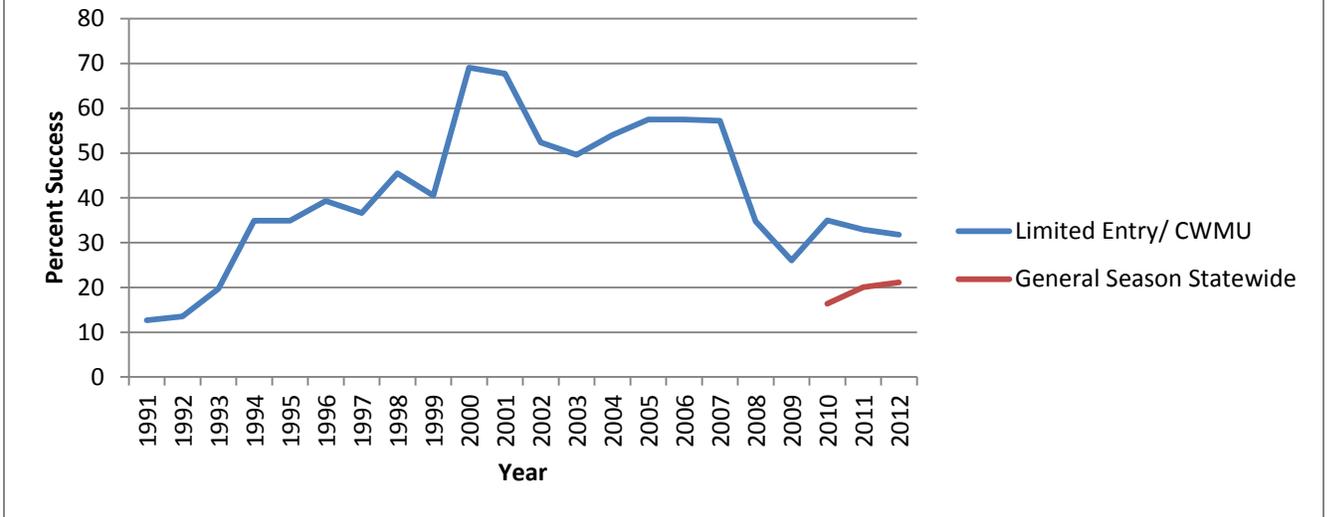
10% total decline in population size over a 3-year period and/or loss of important habitat components; i.e., roost trees in 2 or more areas of essential habitat as designated by UDWR and FS.

Results.

Utah's wild turkey populations are thriving and expanding across the state; they've grown to sufficient numbers for the Utah Wildlife Board to approve Utah's first statewide general-season turkey hunt starting in 2010 (UDWR 2009). The RAC process is used to make population management recommendations, and the Utah Wildlife Board makes all decisions on population management.

Based on the data provided by the UDWR (UDWR 2011), turkey hunter success in Utah has increased in recent years. The chart below shows this increase, which also reflects an increase in birds Statewide, including the Southern Region and lands administered by the Dixie NF.

Statewide trends of limited entry/CWMU and general season statewide wild turkey hunter success, Utah 1991–2012



*2002–2004 limited entry data does not include conservation permit information.

**2005 limited entry data does not include conservation permit or landowner permit information

***General season statewide permits were issued starting in 2010.

Based on hunter success information, turkey populations are in an upward trend despite decreased road access due to implementation of a motorized travel plan decisions. Therefore, populations are persistent in the Southern Region, including lands administered by the Dixie NF.

Incidental sightings are recorded inconsistently across the Forest and habitat evaluation occurs within project-specific analyses.

Interpretation.

Is further evaluation needed? No, wild turkeys have not declined more than 10% over a three-year period. There are insufficient data regarding important habitat components, however, harvest statistics remain good.

What are the implications? Winter severity and length have a much larger impact on turkey populations than management activities on the Dixie National Forest. Turkeys are habitat generalists and therefore may not reflect changes in the landscape that indicate whether we are moving toward desired conditions.

Conclusion. Wild turkey population fluctuations do not reflect management activities.

Monitoring Resources Available.

UDWR gathers and compiles the data for wild turkey population numbers and hunter success statewide. The Dixie National Forest records incidental turkey observations.

Recommendation.

Consider dropping wild turkey as a Management Indicator Species with a Forest Plan amendment. Otherwise, continue to work with the UDWR to gather and compile data for wild turkey.

Citations

Utah Division of Wildlife Resources (UDWR). 2011. Utah Upland Game Annual Report. Pub. No. 12-25.

_____. 2009. 2010 Utah Turkey Guidebook. Accessed 12-8-2009; available from http://wildlife.utah.gov/guidebooks/2010_turkey/2010_turkey_high.pdf

C. Northern Goshawk

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Goshawk	Nest survey for goshawk. Variable strip transect for goshawk annually if population near minimum level, or every 2-5 years in project areas; annual reporting.	M/M	10% total declining goshawk population size over a 3-year period.
Are known goshawk territories on national forests remaining occupied? ⁵	Annual goshawk territory occupancy at the Forest level; reporting every 3 years.	NA	More than 20% decline in territory occupancy over a 3-year period.

Methods.

Goshawk nest surveys and territory occupancy monitoring are conducted across the Forest. These methods, while very time-consuming, have been implemented and are effective.

Variation.

Population data are inferred from the number of active nests and occupied territories in relation to the number of known territories monitored.

Less than 20% declines in territory occupancy over a 3-year period is specified in the Utah Northern Goshawk Amendment as an acceptable range. The Forest Plan states 10% total declining goshawk population size over a 3-year period is a variation causing further evaluation.

Monitoring required in the Forest Plan and in the Goshawk Amendment are essentially the same and are therefore reported and evaluated here together.

Results.

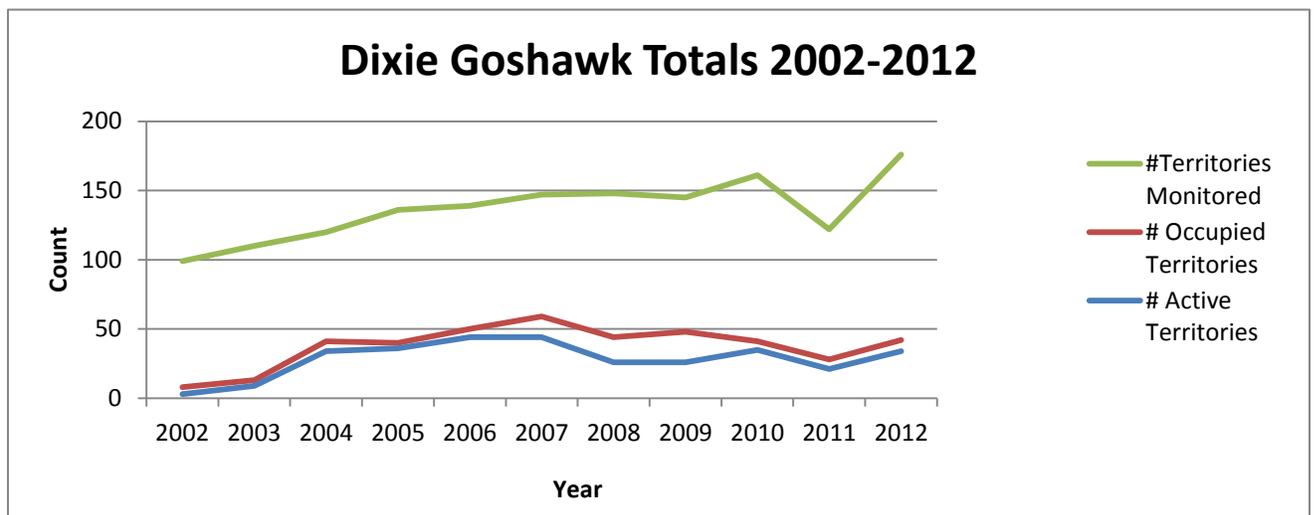
Out of 183 existing goshawk territories on the Dixie National Forest, 173 were monitored in 2012. Table 4 shows goshawk monitoring results for the previous seven years. The increase in territories monitored is due to the discovery of new territories and the ability to get to more territories during this monitoring season. Additional territories were very likely occupied, but the absence of bird detections during the site visit prevented categorizing them as such.

⁵ Utah Northern Goshawk Project Decision Notice 2000, including a Forest Plan Amendment.

Summary Results of Northern Goshawk Monitoring on the Dixie National Forest, 2006-2012

Northern Goshawk Monitoring Results							
Status	2006	2007	2008	2009	2010	2011	2012
Territories Monitored	138	148	149	144	161	120	176
Occupied Territories	50	59	44	47	42	28	42
Active Nests	44	44	26	26	35	21	34

The chart below shows monitoring results for the Dixie NF from 2002-2012.



Interpretation.

Is further evaluation needed? No, the current year has demonstrated an increase in active nests and territory occupancy on the Dixie National Forest.

What are the implications? Goshawk populations on the Dixie National Forest fluctuate within reproductive seasons, and from season to season. They are affected by a number of factors such as drought, cold and wet early spring conditions, low prey densities, significant wind events, fire, modified vegetation in the landscape, and predators. For instance, the 2012 season demonstrated an increase in occupied territories from the 2011 season. The number of occupied territories in the 2012 season is the same as it was two years ago in 2010. In addition, recent science has suggested that monitoring of populations at an individual Forest level may not be appropriate (Woodbridge and Hargis 2006).

Conclusion. Although overall numbers fluctuate, the number of occupied goshawk territories across the Forest is high and well-distributed among Ranger Districts with suitable habitat. These results likely indicate that our present method of managing the habitat is adequate.

Monitoring Resources Available.

Funding is provided to monitor territory occupancy each year. Territories are also prioritized according to likelihood of occupancy, and all high-priority territories were monitored in 2012. Funding for project-specific survey work is also available.

Recommendation.

Because the northern goshawk is a Region 4 Sensitive Species, it is recommended to continue to monitor goshawk territories. This item in the Forest Plan has been updated with the Utah Northern Goshawk Project Amendment.

Citation.

Woodbridge, B. and C.D. Hargis. 2006. Northern Goshawk Inventory and Monitoring Technical Guide. Gen. Tech. Rep. WO-71. Washington, DC: U.S. Department of Agriculture, Forest Service. 80 p.

D. Northern (Common) Flicker

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Common [Northern] Flicker	Variable strip transect, sighting records of reliable persons, annually if population near minimum level, or every 2-5 years in project areas; annual reporting.	L/M	25% decline in population size over a 5-year period

Methods.

All five Ranger Districts were monitored in 2012 for northern flicker.

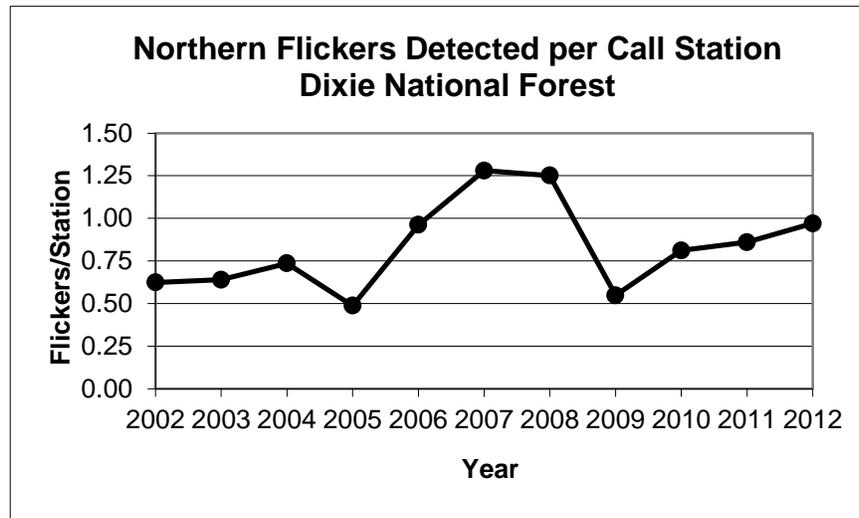
Variation.

The variation causing further evaluation for northern flickers is a 25% decline in population size over a 5-year period.

Results.

The chart below shows northern flicker detections per call station from 2002-2012 on the Dixie NF.

The chart below shows monitoring results for the Dixie NF from 2002-2012.



A total of 335 flickers were detected in surveys of 344 call stations, resulting in a detection rate of 0.97 flickers per station in 2012. This is a 19.8% increase from 0.81 flickers per station in 2010, and a 12.8% increase from 0.86 flickers per station in 2011. Detection rate was lowest in 2005 (0.49 flickers/station), and highest in 2007 (1.28 flickers/station). In 2009, 18 flicker calling transects were removed from monitoring to prevent overlap with neighboring calling transects. This event accounts for the sharp decrease in count during the 2009 monitoring season. However, since 2009 flicker occupancy has steadily increased Forest-wide. The variation in detection rates is likely due to changes in precipitation, insect populations, and weather conditions during the monitoring period.

Interpretation.

Is further evaluation needed? No. Forest data collected in 2012 indicate an increase in flickers across the Forest.

What are the implications?

This species is well-distributed, occurring on each Ranger District over a variety of habitat types. Protective measures exist under the snag and downed woody debris standards and guidelines of the Forest Plan. These measures are implemented Forest-wide, and are effective in managing and protecting important habitats for cavity nesters, including flickers.

Conclusion. Northern flicker populations appear to be viable across the Dixie National Forest and in Utah.

Monitoring Resources Available.

Funding is available for monitoring each year.

Recommendation.

Continue to monitor Common [Northern] Flicker populations on the Forest.

E. Native cutthroat trout: Bonneville/Colorado River

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Native cutthroat trout: Bonneville, Colorado River	Accepted methods, such as gill netting, electro-shocking, or creel census, in coordination with UDWR when possible. 7-year revisit interval with annual reporting.	M/H	20% decline in occupied habitat of any single population over a 7-year period or a major change in size or quality of catch.

Methods.

UDWR is the agency with primary responsibility for monitoring core and conservation populations of Bonneville cutthroat trout (BCT) and Colorado River cutthroat trout (CRCT) in southern Utah; however, Forest personnel cooperate and assist with sampling. Sampling in streams consists of multiple pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, measured for total length and weighed. Density, standing crop and condition factor are calculated. Sampling in lakes consists of gill netting efforts. Fish are collected, enumerated, measured for total length and weighed. Catch rate and condition factor are calculated. Results for sport fishing populations of BCT and CRCT are reported with MIS nonnative trout.

Variation.

The variation that would cause further evaluation and/or change in management direction is a 20% total decline in occupied habitat over a seven-year period or a major change in size or quality of catch.

Results.

UDWR and Forest personnel last completed cooperative sampling efforts on all known core and conservation stream populations of BCT from 2008-2010 and CRCT from 2006-2007 (Hadley, Ottenbacher, Chamberlain, Whelan, & and Brazier, 2008; Hadley, Ottenbacher, Golden, & Whelan, 2010; Hadley, Ottenbacher, & Golden, 2011). From the results of these surveys Forest personnel estimated that occupied habitat for Forest BCT core and conservation populations had declined by approximately by 35% compared to the maximum known occupied habitat and average standing crop across these populations had declined by over 50% (Dixie National Forest, 2011). The Forest identified impacts from the 2002 Sanford and Sequoia fires as the primary reason for the loss of both occupied habitat and Standing crop and is currently working on fire management recommendations in native cutthroat watersheds (Dixie National Forest, 2011). CRCT occupied habitat remained stable and average CRCT standing crop across populations increased by 52%. UDWR and Forest personnel will cooperate in sampling all stream core and conservation populations of CRCT in 2013-2014.

In FY2012 Forest and UDWR personnel did not conduct any quantitative monitoring of DNF BCT core or conservation populations in streams or lakes. BCT were collected for disease

certification in Ranch Creek in preparation for reintroducing Ranch Creek BCT into Cottonwood Creek and Left Fork Sanford Creek on the Powell Ranger District in 2013.

In FY2012 Forest, UDWR personnel and a Garkane Energy Contractor conducted sampling for CRCT in four stream core or conservation populations: East Fork Boulder Creek, Hall Creek, Unnamed tributary to White Creek, and West Fork Boulder Creek. No lake core or conservation CRCT populations were sampled in FY2012.

Qualitative investigations of Hall Creek in 2011 found cutthroat trout that appeared to be CRCT throughout at least 1.7 miles of stream (Golden, 2012). Genetic samples were collected by UDWR and these fish have been confirmed as pure CRCT (Evans, Houston, & Shiozawa, 2012). Additional qualitative sampling of Hall Creek in 2012 found a natural barrier that appeared to be the upstream extent of CRCT distribution approximately 0.5 miles upstream from where the Griffin Point trail crosses the stream. Additional suitable habitat was available upstream from the natural barrier. Two quantitative stations were established on Hall Creek in 2012. Both stations were within areas qualitatively sampled in 2011 (Golden, 2012). The downstream station had no CRCT despite having fish when qualitatively sampled in autumn 2011. The upstream station had a standing crop of CRCT that would be considered low compared to other southern Utah trout streams (Hepworth & Beckstrom, 2004). Temperature data collected in Hall Creek near its confluence with Birch Creek (Main Canyon) showed maximum temperature near 20.5°C and maximum diel fluctuations of 10.5°C (Golden, 2013). While these temperatures are not necessarily ideal they are within the tolerance range for CRCT (Young, 2008).

An unnamed tributary to White Creek was also qualitatively sampled in 2012 after an earlier field visit observed suitable habitat. CRCT were collected throughout the lower 0.3 miles of that tributary. The full upstream extent of CRCT distribution was not mapped.

Part of the license renewal for Garkane's Boulder Hydroplant requires them to conduct annual fish monitoring to determine the effectiveness of other relicensing conditions at improving populations of CRCT in East Fork Boulder Creek. Garkane's contractor has completed this monitoring and reported on it annually since 2008 (Williams, 2012). The 2012 results showed brook trout density and standing crop continuing to increase in the East Fork Boulder Creek upstream from King's Pasture Reservoir. This area was treated with rotenone to remove brook trout and restore CRCT in 2009; however, the second treatment was delayed because of public opposition to the use of rotenone. The station established above the headwater meadow has had a variable standing crop over time but the trend is stable since 2008 (Williams, 2012). The West Fork Boulder Creek was treated to remove brook trout and restore CRCT between the West Fork Reservoir and the East Fork Boulder Creek confluence in 2000-2001. Despite the decrease in standing crop in 2012, the trend in CRCT standing crop has been upward since 2006 in this area (Williams, 2012). The station above the West Fork Reservoir has shown high variability in terms of CRCT standing crop since 2006 (Williams, 2012). This station showed a large increase in CRCT standing crop in 2012.

Name, year sampled, species collected, average total length (range in parentheses), condition (K) factor, density (#/ha or #/mile; 95% confidence interval in parentheses), standing crop (kg/ha; 95% confidence interval in parentheses), and percent (%) change in standing crop between most recent sampling years for FY2012 CRCT stream quantitative sampling locations. Data from the Boulder Creek system taken from Williams (2012).

Sample site	Year	Species	Average total length (mm)	K factor	Density	Standing crop (kg/ha)	% change in standing crop
East Fork Boulder Creek (above King's Pasture Reservoir)	2012	Brook trout	186	1.16	528 fish/mile	64	28,400
	2011	Brook trout	92	1.01	16 fish/mile	0.2	Increase
East Fork Boulder Creek (above headwater meadow)	2012	CRCT	246	1.17	179 fish/mile	54	60
	2011	CRCT	235	1.17	116 fish/mile	34	-57
Hall Creek (downstream)	2012	None	na	na	0	0	Decrease
Hall Creek (upstream)	2012	CRCT	103 (58-202)	1	1,331(1,065-1,597) fish/ha	26 (10-48)	Possible increase
West Fork Boulder Creek above East Fork confluence	2012	CRCT	170	0.96	1,262 fish/mile	151	-28
	2011	CRCT	164	1.01	936 fish/mile	210	56
West Fork Boulder Creek (above the West Fork Reservoir)	2012	CRCT	212	1.09	447 fish/mile	151	322
	2011	CRCT	167	1.03	145 fish/mile	36	-50

Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. Monitoring activities in 2012 continue to show an expanded range and stable to improving populations for CRCT on the Forest, as well as potential opportunities to continue population expansion for CRCT and BCT. CRCT distribution is greater than previously thought because of a combination of previously unknown population distribution and expanding populations following renovation/reintroduction.

The fish monitoring required by the Garkane Boulder Hydroplant relicensing is providing a good long-term description of the fish community and its inherent variability in the Boulder Creek system. As additional requirements of the Hydroplant relicensing are implemented this data set will provide a good baseline to compare changes against.

The single 2009 rotenone treatment on East Fork Boulder Creek between the headwater meadow and King's Pasture Reservoir was unsuccessful at a complete removal of brook trout and the delay in completing the project is allowing brook trout to recover to near pre-

treatment levels. The 2000-2001 CRCT restoration project on the West Fork Boulder Creek continues to be a success.

Monitoring Resources Available.

Currently, BCT and CRCT monitoring on the Forest is accomplished by cooperation and coordination with UDWR. Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant on data collected by UDWR.

Recommendation.

Continue to work with UDWR to accomplish BCT and CRCT monitoring objectives, while identifying potential population expansion opportunities for the two species.

Additional distributional sampling should be conducted to map the maximum occupied habitat for CRCT in Hall Creek. Quantitative sampling stations on Hall Creek should be repeated as part of the 7 year interval UDWR trend monitoring in 2013. Current CRCT distribution should be mapped as part of the 7 year interval UDWR trend monitoring in 2013.

Citations

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Williams, C. S. 2012. Trout Population Monitoring in Boulder Creek: 2012 Results. Utah Water Research Laboratory, Utah State University.

Young. 2008. Colorado River Cutthroat Trout (*Oncorhynchus clarkii pleuriticus*): A Technical Conservation Assessment. USDA Forest Service, Rocky Mountain Station.

Colorado River cutthroat trout collected in a unnamed tributary to White Creek (Escalante Ranger District) sampled in 2012.



F. Virgin spinedace

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Virgin spinedace	Accepted methods, such as electro-shocking, in coordination with UDWR when possible. 5-year revisit interval with 5 year reporting.	M/H	20% decline in occupied habitat Forest-wide in any 5-year period, or a major change in age class structure or reproductive success.

Methods.

The Forest and UDWR cooperatively monitor Virgin spinedace with multiple-pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, and measured for total length and weighed. Density is calculated.

Variation.

The variation that would cause further evaluation and/or change in management direction is a 20% total decline in occupied habitat over a five-year period or in age class structure or reproductive success.

Results.

Moody Wash represents the only known habitat for Virgin spinedace on the Forest. Qualitative and quantitative sampling was last conducted in 2009 and 2010. This sampling showed increased upstream distribution of Virgin spinedace into Racer Canyon and stable to increasing numbers of Virgin spinedace (Rodriguez, 2012). No sampling was conducted in 2012.

Interpretation.

Is further evaluation needed? No.

What are the implications? None

Conclusion. Virgin spinedace were recently proposed for listing under the Endangered Species Act. Identifying the full current range of Virgin spinedace, as well as potential expansion opportunities will be important in determining the listing status of the species.

Monitoring Resources Available.

Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant on data collected by UDWR.

Recommendation.

Identify upstream extent of Virgin spinedace in Racer Canyon (a tributary of Moody Wash) and repeat quantitative monitoring by 2014. Work with UDWR to identify potential areas to expand the distribution of Virgin spinedace on the Forest.

Citations

Rodriguez, R. 2012; Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Dixie National Forest, v.6.0 2011.

G. Southern leatherside

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Southern leatherside	Accepted methods, such as electro-shocking, in coordination with UDWR when possible. 5-year revisit interval with 5 year reporting.	M/H	20% decline in occupied habitat Forest-wide in any 5-year period, or a major change in age class structure or reproductive success.

Methods.

The Forest and UDWR cooperatively monitor southern leatherside with multiple-pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, measured for total length, and weighed. Density is calculated.

Variation.

The variation that would cause further evaluation and/or change in management direction is a 20% total decline in occupied habitat over a seven-year period or a major change in size or quality of catch.

Results.

Known southern leatherside populations on the Forest were monitored in 2009 and 2010. Data through that time showed that southern leatherside distribution and abundance on the Forest was relatively stable, with the exception of Clay Creek on the Escalante Ranger District (Rodriguez, 2012). Multiple efforts by UDWR and Forest personnel indicated that southern leatherside had been lost from the Clay Creek system during flooding in 2008 (Rodriguez, 2012). Sampling in 2012 found that southern leatherside had recolonized that stream (Golden, 2013). The lack of overlap in 95% confidence intervals indicates that both density and standing crop estimates for southern leatherside were significantly higher in 2012 than those observed in 2005. No evidence of recent reproduction was observed.

Quantitative stream fish sampling site, Dixie National Forest Ranger District, Management Indicator Species (MIS), standing crop of the MIS, the previous year the stream was sampled, and the percent change in MIS southern leatherside standing crop between years.

Sampling site	Ranger District	MIS	Standing crop (kg/ha)	Previous sample year	Percent change in standing crop
Clay Creek	Escalante	Southern leatherside	16	2005	700

Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. Monitoring activities in 2012 continue to show an expanded range for southern leatherside on the Forest, as well as potential opportunities to continue population expansion for this species.

The Clay Creek population of southern leatherside has begun to recolonize/recover after flooding events appeared to locally extirpate the species from this stream.

Monitoring Resources Available.

Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant on data collected by UDWR.

Recommendation.

Continue to work with UDWR to accomplish southern leatherside monitoring objectives, while identifying potential population expansion opportunities for the species. Resample all southern leatherside streams on the Forest in 2014 and 2015.

The full distribution of southern leatherside in Clay Creek should be reevaluated to determine potential recolonization mechanisms and Aquatic Passage issues.

Based on data reported in 2011, discharge and temperature measurements should be continued on both East and West Fork Hunt Creek to compare with future fish results and determine the potential persistence of this population. And additional distributional sampling should be conducted to map the upstream extent of fish in these streams.

Citations

Golden, M. 2013. *Dixie National Forest Fish Surveys FY2012*. Cedar City, UT: Dixie National Forest, Supervisor's Office.

Rodriguez, R. 2012; *Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Dixie National Forest*, v.6.0 2011.

Southern leatherside collected in Clay Creek (Escalante Ranger District) in 2012.



H. Nonnative trout: brook, brown, rainbow, cutthroat

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Non-native trout: brook, brown, rainbow, cutthroat	Accepted methods, such as gill netting, electro-shocking, or creel census, in coordination with UDWR when possible. 5-year revisit interval; at least 15 streams per year. Annual reporting.	M/H	20% total decline in estimated biomass(streams)/catch rate(lakes/reservoirs) Forest-wide over a 5-year period or a major change in size or quality of catch.

Methods.

Nonnative trout sampling across the Forest is accomplished by cooperative efforts between Forest personnel and UDWR. While some sampling is conducted by each agency independently, sampling results are shared to maximize each agency’s effectiveness. Sampling in streams consists of multiple-pass depletion population estimates using a

backpack electrofisher. Fish are collected, enumerated, measured for total length, and weighed. Density, standing crop, and condition factor are calculated. Sampling in lakes consists of gill netting efforts. Catch rate and condition factor are calculated. Additional qualitative sampling was conducted in several streams to determine species composition and distribution. Qualitative sampling consisted of sampling high-quality fish habitat with a backpack electrofishing unit. Results for sport fishing populations of BCT and CRCT are included in the following results.

Variation.

The variation that would cause further evaluation and/or change in management direction is a 20% decline in estimated biomass (streams)/catch rate (lakes/reservoirs) Forest-wide over a 5-year period or a major change in size or quality of catch.

Results.

Qualitative sampling for MIS presence/absence or distribution confirmation was completed at fifteen locations in 2012 (Golden, 2013). Sampling in Birch Creek (East Fork Sevier River) confirmed earlier visual observations of brook trout distributed throughout at least the lower 2 miles of this stream. Sampling in Wilson Creek and Reed Valley Creek found new recorded distribution for nonnative trout MIS on the Forest. Sampling upstream from Bullberry Lake #1 showed that a series of natural waterfalls impedes upstream movement of CRCT from the lake except for the first 100-200 m of stream. Sampling in Butler Creek and Duck Creek confirmed that nonnative trout are the only MIS present in these systems on the Forest, although Utah chub were found in Duck Creek upstream from Duck Lake. Previous sampling in the lower portion of Caddy Creek had indicated that fish were not present in this stream; however, sampling in upstream areas during 2011 found rainbow trout (Golden, 2012). Sampling closer to the confluence of Butler Creek in 2012 found brown trout and rainbow trout, indicating that MIS trout are distributed throughout the Butler Creek/Caddy Creek drainage, at least during certain flow conditions.

Qualitative stream fish sampling sites, DNF Ranger District, and fish species collected in FY2012.

Sampling site	Ranger District	Species collected
Birch Creek (East Fork Sevier River)	Escalante	Brook trout
Bullberry Creek	Fremont River	CRCT
Butler Creek	Cedar City	Brown trout, rainbow trout
Caddy Creek	Cedar City	Brown trout, rainbow trout
Center Creek	Cedar City	Brook trout
Cottonwood Creek	Powell	None
Crow Creek	Cedar City	Rainbow trout

Sampling site	Ranger District	Species collected
Duck Creek	Cedar City	Rainbow trout, brook trout, Utah chub
Horse Creek (East Fork Sevier River)	Cedar City	None
Main Canyon	Pine Valley	None
Reed Valley Creek	Cedar City	Brook trout, cutthroat trout
Unnamed tributary to Oak Creek	Fremont River	None
Upper Valley Creek	Escalante	None
Willis Creek	Cedar City	None
Wilson Creek	Cedar City	Brown trout, brook trout

Additionally, qualitative sampling in 2012 confirmed that no fish were present in Cottonwood Creek, Main Canyon, an unnamed tributary to Oak Creek, and Willis Creek (Golden, 2013). Sampling in Upper Valley Creek showed that the speckled dace observed on private lands downstream from the Forest in 2011 do not extend upstream onto the Forest (Golden, 2012). Sampling in Horse Creek showed that brook trout were only distributed upstream to the base of a diversion structure less than 0.2 miles upstream from a larger diversion that dries the natural stream channel and meets with a connector canal between Birch Creek and Horse Creek. Approximately 4.2 miles of perennial stream upstream from the diversion remain fishless in Horse Creek.

Quantitative sampling for nonnative trout was completed at 26 locations on 21 streams in 2012 (Table 4). Average standing crop of MIS nonnative trout for DNF streams sampled in 2012 was 163 kg/ha. This would be considered above average when compared to other southern Utah trout streams (Hepworth & Beckstrom, 2004). Average standing crop of MIS nonnative trout from DNF quantitative fish sampling efforts from 2003-2011 was 138 kg/ha, so the average standing crop for sites sampled in 2012 was higher than average but was still within the range of standing crop estimates from prior years (Dixie National Forest, 2011).

Of the 2012 quantitative sampling sites 21 had qualitative or quantitative information on MIS density or standing crop estimate available from a prior year's sampling effort. Three of these sites (Caddy Creek – Lower, Santa Clara – Upstream, Birch Creek - East Fork Sevier River) had no fish collected previously and so only an increase can be noted. Two other sites only had density information available from the prior sampling (Oak Creek, Caddy Creek – Upper) so standing crop changes can only be estimated. The percent change in standing crop between the prior year and 2012 was extremely variable in the remaining 16 sampling sites, ranging from a 100% decline to an 856% increase. The Forest Plan, as amended, specifies that for MIS nonnative trout a 20% total decline in estimated biomass Forest-wide over a 5-year period or a major change in size or quality of catch is the “variation which would cause

further evaluation and/or change in management direction.” On average the standing crop estimates for the aforementioned 16 sites sampled in 2012 increased by 78% over the estimates from the prior years; therefore, data collected in 2012 do not suggest a Forest-wide decline in MIS trout standing crop.

Declines of greater than 20% in MIS trout standing crop occurred at four of the 21 sites with multiple years of quantitative sampling data: East Fork Sevier above Podunk Creek, Bear Creek (upper), Birch Creek (East Fork Sevier River) and Bullberry Creek. In early summer 2012 the Lost Lake Fire burned almost 70% of the Bullberry Creek subwatershed at moderate and high severities. Fish kills were observed in Coleman Reservoir downstream from Bullberry Creek later in summer 2012. It is probable that ash flows and water quality changes in runoff following the Lost Lake fire eliminated brook trout from this section of Bullberry Creek. While the upstream station at Bear Creek showed a 22% decline in 2012, the downstream station showed an 86% increase and both stations had above average standing crop for trout when compared to other southern Utah trout streams (Hepworth & Beckstrom, 2004). The 2012 standing crop estimate at the upstream Bear Creek was derived from a one pass sampling effort because poor weather impeded completion of a second pass. Using only data from the 2010 first pass, the 2010 standing crop estimate would have been similar to, but slightly lower (~7% lower) than, the 2012 standing crop estimate, indicating that having data from only one pass in 2012 may be the primary reason for the lower standing crop estimate. While MIS nonnative trout standing crop increased at the downstream station on Bear Creek by 86%, standing crop is still below the levels observed in 2003 prior to the fire (Golden & Mecham, 2010). The 2012 sampling showed that MIS nonnative trout standing crop in the fire affected area of Bear Creek was still 65% lower than the 2003 standing crop estimate. Lack of overlap in the 95% confidence intervals indicates that the difference between the 2012 and 2003 estimates is statistically significant.

The East Fork Sevier River has four stations that were originally sampled in 2004 and have been repeated either in 2010 and 2012. The results of this monitoring indicate that the East Fork Sevier River supports a nonnative trout standing crop that is average to below average when compared to other southern Utah trout streams and that the trend in standing crop is stable or downward (Table 4) (Golden & Mecham, 2010a). Historically the East Fork Sevier River upstream from Tropic Reservoir has had issues with poor livestock and recreation management, but management over the past 10-20 years has worked to reduce impacts to the river, so it remains unclear why the trout population in this stream appears to be struggling. Three pebble counts conducted in 2007 showed that riffles were meeting Forest plan Standards for fine sediment deposition (DNF unpublished data). It should be noted that all sampling efforts in this stream have suffered from poor efficiency, so it is likely that the standing crop estimates provided are underestimates.

The Horse Creek station showed a 20% decline in standing crop when compared to the 2006 standing crop estimate; however, the 2012 density estimate for brook trout was significantly higher than the 2006 estimate. Condition factors were similar between the two sample years but average total length was 91 mm smaller in 2012, indicating that the decline in standing crop was associated with a change in age class structure. The Horse Creek station is also between two diversions which may limit trout populations through flow volume and/or temperature limitations.

Gill net surveys for nonnative trout were completed at 3 lakes across the Forest (Table 5). A decline in Forest-wide MIS trout catch rate greater than 20% would be the change that would cause further evaluation and/or change in management direction as stipulated by the Forest Plan. Both Panguitch Lake and Yankee Meadows Reservoir showed catch rates well above the average (20 fish per net night) seen in lakes and reservoirs across southern Utah and neither showed a decline in catch rate greater than 20% between the prior catch rate estimate and 2012 (Hepworth & Beckstrom, 2004). Hendrickson Lake had a catch rate below average when compared to other southern Utah lakes and reservoirs and had no prior sampling data available (Hepworth & Beckstrom, 2004). Hendrickson Lake is a small (2.6 acres), shallow (mostly less than 5 feet deep) lake which probably explains the below average catch rate.

Quantitative stream fish sampling site, Ranger District, Management Indicator Species (MIS), standing crop of the MIS, the previous year the stream was sampled, and the percent change in MIS trout standing crop between years. na = not available

Sampling site	Ranger District	MIS	Standing crop (kg/ha)	Previous sample year	Percent change in standing crop
Santa Clara River (downstream)	Pine Valley	Brown trout, rainbow trout	153	2004	856
Santa Clara River (upstream)	Pine Valley	Brown trout, rainbow trout	106	2004	Increase
Santa Clara (Day use area)	Pine Valley	Brown trout, brook trout, rainbow trout	211	2008	-6
Butler Creek	Cedar City	Brown trout, rainbow trout	147	2006	153
Caddy Creek (upper)	Cedar City	Rainbow trout	11	2011	Stable
Caddy Creek (lower)	Cedar City	Brown trout, rainbow trout	137	2006	Increase
Center Creek	Cedar City	Rainbow trout	198	2006	77
Duck Creek	Cedar City	Rainbow trout, brook trout	142	na	na
Haycock Creek	Cedar City	Brook trout, rainbow trout	654	na	na
Lowder Creek	Cedar City	Brook trout	532	2006	115
Mammoth Creek (below FH50)	Cedar City	Brown trout, brook trout, rainbow trout, cutthroat trout	104	na	na
Reed Valley Creek	Cedar City	Cutthroat trout, brook trout	139	na	na
East Fork Sevier above Kanab Creek	Powell	Brown trout	45	2004	7
East Fork Sevier above Podunk Creek	Powell	Brown trout, brook trout	36	2004	-41
Antimony Creek (Middle)	Escalante	Rainbow trout	284	2003	42

Sampling site	Ranger District	MIS	Standing crop (kg/ha)	Previous sample year	Percent change in standing crop
Bear Creek (lower)	Escalante	Brook trout, rainbow trout, brown trout	119	2010	86
Bear Creek (upper)	Escalante	Brook trout	141	2010	-22
Birch Creek (East Fork Sevier River)	Escalante	Brook trout	31	2006	Increase
Horse Creek (East Fork Sevier River)	Escalante	Brook trout	48	2006	-20
Lake Creek (FR30712)	Escalante	Brook trout	108	2007	-6
North Creek (upstream)	Escalante	Brook trout, Colorado River cutthroat trout	184	2006	59
Sweetwater Creek (Dixie NF)	Escalante	Brown trout	67	na	na
Birch Creek (Fremont River)	Fremont River	Brook trout	290	2006	49
Bullberry Creek	Fremont River	Brook trout	0	2009	-100
Donkey Creek	Fremont River	Brook trout	143	2006	3
Oak Creek (upstream)	Fremont River	Brook trout	195	2003	Increase
Average			163		78

Lake sampling site, Ranger District, Management Indicator Species (MIS), standing crop of the MIS, the previous year the lake was sampled (sampling data from 2001-2010 included), and the percent change in MIS trout catch rate between years. Data provided courtesy of Utah Division of Wildlife Resources. na = not available

Lake	Ranger District	Species	Catch rate	Previous sample year	% change from previous sample
Hendrickson Lake	Cedar City	Brook trout	10	NA	NA
Panguitch Lake	Cedar City	Rainbow trout, Bonneville cutthroat trout, tiger trout	55	2011	-16
Yankee Meadows	Cedar City	Bonneville cutthroat trout, brook trout, rainbow trout	55	2009	24
Average			40		4

Interpretation.

Is further evaluation needed? No

What are the implications? None

Conclusion. While individual streams, lakes and years may vary in standing crop and catch rate estimates for nonnative trout, Forest-wide nonnative trout populations appear stable and have standing crop and catch rate estimates above average when compared to other southern Utah trout streams.

Fire effects to a localized section of Bear Creek that has connectivity to other source populations of MIS nonnative trout has still not recovered to pre-fire standing crop estimates four years following the fire. Additionally, post-fire runoff in Bullberry Creek appears to have eliminated all, or a large portion, of the trout in that stream.

The East Fork Sevier River continues to show relatively low standing crop estimates for MIS nonnative trout when compared to the remainder of the Forest's streams.

Monitoring Resources Available.

Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant on data collected by UDWR.

Recommendation.

Continue to work with UDWR to accomplish nonnative trout monitoring objectives, while identifying potential project opportunities to benefit nonnative trout sport fishing populations on the Forest. Continue to coordinate with UDWR regarding species and stocking rates in Forest lakes and reservoirs to maximize sport fishing opportunities.

The effects of fire to fish and fish habitat should continue to be evaluated across the Forest and proactive measures to reduce the risk of catastrophic fire in key watersheds should be investigated.

Physical habitat and water temperature should be evaluated as potential limiting factors for trout in the East Fork Sevier River.

Citations

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I. Habitat Diversity

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Habitat Diversity	Vegetative composition and age class surveys, calculation of Patton Edge-Shape Index from maps & air photos, annually in vegetative manipulation project areas; annual reporting.	M/H	Significant variation from standards and guidelines specifications; below 7% oldgrowth, less than 7% grass, less than 10% other age classes.

Methods.

The Patton Edge-Shape Index has not been used since the Forest Plan was written as it is outdated. However, the Forest has been monitoring habitat diversity at various scales from the landscape level to the site-specific project level using several different sources. Some of these sources include the review of UDWR long-term range trend data, Forest stand exam data, Vegetational Structural Stage (VSS), GAP data, old-growth evaluation at project level scales, soil surveys, visual reconnaissance, and Forest range trend data. This information has been documented and reviewed from the site-specific level to the planning unit level, and is catalogued in core GIS layers.

Variation.

The variation that would cause further evaluation and/or change in management direction is a significant variation from standards and guidelines specifications. This consists of edge contrast, and percent of habitats in a variety of structural and age classes (page IV-25-26).

Results.

In reviewing Forest standards and direction, and project level information and monitoring, edge habitat for terrestrial species is not lacking and is adequate in abundance and distribution to support the species that use edge. Although it was not logistically or economically feasible to assess every project that modified wildlife habitat diversity across the Dixie National Forest, sample projects have been looked at and edge is present in abundance with good distribution.

Interpretation.

Is further evaluation needed? Adequate information is available to determine how the Forest is managing for edge. Additional data collection and analysis would be beneficial in looking at the landscapes across the Forest, but not necessary to be compliant with the Forest Plan.

What are the implications? Maintenance of diversity on the National Forest has not been tracked or measured using the above methods, however, the Forest is using other more up to date methods to track diversity of habitat as it pertains to edge across the Forest.

Conclusion. Wildlife edge habitat is abundant and well distributed across the Forest based on the project level information gathered annually.

Monitoring Resources Available.

Project level resources are being used to help determine edge habitat across the forest. In addition, GIS, stand exams, VSS analysis, aerial photo interpretation, satellite imagery, and Properly Functioning Condition assessments are all available and used across the Forest. These tools are more widely used and are accepted means of monitoring edge habitat distribution and abundance

Recommendation.

The Patton Edge-shape Index should be replaced as a monitoring tool.

Citations

Patton, D.R. 1975. A diversity index for quantifying habitat edge. Wildl. Soc. Bull., 3, pp. 171-173.

J. Snag Management

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Snag management	Pre-sale, post-sale, post-fire wood count and condition survey for each sale; annual reporting.	H/H	10% below specifications of standards and guidelines.
Is snag habitat (i.e., number and size of snags) being maintained in desired spatial arrangement?	Snag densities and sizes within a 100-acre block treated by mechanical or wildland fire use. Measure 10% or more of the acres treated within a project area, within 2 years following completion of the vegetative treatment; five-year reporting.	NA	Less than 75% of the blocks measured meet guideline requirement.

Methods.

The assessment of snags has been reviewed at the project-specific level and at landscape level analysis across the Forest. On areas proposed for vegetation treatments, the retention of snags as described in the Forest Plan has been managed. Snag densities have been monitored in correlation with woodpecker occupancy and density. Some of these results have been obtained through cooperative efforts with UDWR and university graduate studies. Vegetation treatment projects are designed to meet Forest Plan standards and guidelines.

Variation.

The variation causing further evaluation is 10% below specifications of standards and guidelines for snags. The Utah Northern Goshawk Project Amendment states 75% or more of the blocks measured meet guideline requirements as an acceptable range.

Results.

Snag data is collected at the project specific level on all vegetation projects across the Forest. Specific data is available with project records for each vegetation manipulation project.

Interpretation.

Is further evaluation needed? Based on project level data review there is not a variation in snag abundance and distribution causing further evaluation and/or management change.

What are the implications? Snags are an important part of healthy ecosystems for soil nutrient recycling (after snags fall to the ground), for providing habitat for a multitude of birds, mammals, reptiles and insects, for providing structure in streams, and micro-site protection for seedling trees and other plants to grow. Based on project level data snags are well distributed across the Forest in Forested cover types.

Conclusion. Data contained in project records indicate that snag numbers and distribution to are being met and that this important habitat component is being maintained.

Monitoring Resources Available.

Resources have been allocated to measure snags other than in stand exam data collected for silvicultural objectives. If funding were available additional data collection would be beneficial to assist with this evaluation.

Recommendation.

Develop criteria with which to prioritize areas for snag data collection.

K. Fish/Riparian Habitat

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Fish/Riparian habitat	Vegetative composition and age class surveys, Dixie water quality monitoring plan, aquatic MIS habitat surveys per MIS monitoring; annual to develop baseline, every 5 years as needed thereafter; reporting as data collected.	H/H	20% variation from specifications of standards and guidelines.

Methods.

The 2010 Aquatic Amendment specifies that vegetative composition, age class surveys, Dixie water quality monitoring plan, and aquatic MIS habitat surveys per MIS monitoring will be used to assess fish and riparian habitat.

Variation.

A 20% variance from specifications of standards and guidelines would cause further evaluation or a change in management direction. Standards and guidelines for fish and riparian habitat are outlined in Aquatic Amendment.

Results.

Insufficient data have been presented to compare management actions or habitat conditions to standards and guidelines in the Forest Plan.

Interpretation.

Is further evaluation needed? Insufficient data have been compiled to compare management actions or habitat conditions to standards and guidelines in the Forest Plan.

What are the implications? With insufficient data presented, it is difficult to determine conditions of our riparian areas and if the existing standards and guidelines are appropriate.

Conclusion. It is imperative to gather appropriate information for supporting conclusions regarding riparian areas on the Forest.

Monitoring Resources Available.

Unknown.

Recommendation.

Continue monitoring.

L. Big Game Habitat Effectiveness

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Habitat effectiveness for big game	Annual road density: map, air photo; annual reporting.	M/M	10% below specifications of standards and guidelines
	Hiding, thermal cover; ground survey each timber sale. Reported annually	H/H	10-15% variation from specifications of standards and guidelines

Methods.

Assessment of annual road density and hiding and thermal cover.

Variation.

A variation 10% below specifications of standards and guidelines would indicate a need for further evaluation and/or management direction in road density. The guideline that relates to big game habitat effectiveness is on page IV-50, specifying that road densities should not exceed two miles per square mile of wildlife habitat. A variation 10-15% below specifications of standards and guidelines would indicate a need for further evaluation and/or management direction in hiding and thermal cover. The standards and guidelines that relate

to these components of habitat effectiveness are on page IV-34; big game hiding cover is defined as that needed to hide 90% of a standing deer or elk at a distance of at least 200 feet.

Results.

OMRD was analyzed across the Forest for the 2009 Motorized Travel Plan (MTP) EIS.

Open Motorized Road Density (OMRD) by existing condition and the selected alternative for mule deer Wildlife Management Units (WMU) within the planning area.

WMU	Existing	MTP
Boulder Plateau	1.24	0.80
Kaiparowitz	1.66	0.69
Mt. Dutton	1.32	0.74
Panguitch Lake	2.15	1.53
Paunsaugunt	3.01	1.58
Pine Valley	1.05	0.76
Zion	2.67	2.54

Open Motorized Road Density (OMRD) by existing condition and the selected alternative for Rocky Mountain elk Wildlife Management Units (WMU) within the planning area.

WMU	Existing	MTP
Boulder Plateau	1.31	0.86
Kaiparowitz	1.67	0.71
Mt. Dutton	1.37	0.76
Panguitch Lake	2.07	1.44
Paunsaugunt	3.38	1.76
Zion	1.61	1.53

Data for hiding and thermal cover has not been compiled for this report, but is analyzed on a project-specific basis.

Interpretation.

Is further evaluation needed? Data for hiding and thermal cover is evaluated at the project specific level, in part by evaluating VSS class distribution. The Forest Plan guideline states that road densities over 2.0 miles per square mile may decrease habitat effectiveness. As MTP is implemented, OMRD will decrease on all units except Zion to densities below the guideline.

What are the implications? Road densities are calculated and displayed in each project analysis. Sufficient GIS capabilities exist for this analysis. Hiding cover is analyzed on a project-specific basis along all arterial and collector roads.

Conclusion. The variation causing further evaluation is road densities are 10% *below* the two miles per square mile standard and guideline. The intent for the guideline is that higher habitat

effectiveness is desired and higher road densities decrease habitat effectiveness. Therefore, the variation should be written as 10% *above* guidelines.

Using open road densities for this calculation would be more meaningful for assessing big game habitat effectiveness. Roads themselves do not normally decrease habitat effectiveness; it is the use by motorized vehicles that causes a decrease in habitat effectiveness. Therefore, open road density is a good measure of habitat effectiveness for big game species. Open road densities are continuing to change across the Forest as roads and trails are closed through MTP implementation and as unauthorized use changes. Habitat effectiveness has increased across the Forest as the MTP decision has been in the process of being implemented.

Monitoring Resources Available.

Vegetation data at the project level has been collected, analyzed, and reviewed for big game habitat effectiveness. GIS systems calculate road mileage and acreages.

Recommendation.

Retain open road density as a measure of habitat effectiveness for big game (change “road density” to “open road density”). Change the variation to read 10% *above* open road density specifications. Specify as a guideline. Prioritize areas to evaluate road density. Eliminate thermal cover from monitoring and requirements from the standards and guidelines look at VSS class distribution to evaluate thermal cover by cover type. .

M. Occupied Goshawk Territories

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are known goshawk territories on national forests remaining occupied?	Goshawk territory occupancy at the Forest Level annually, reported every 3 years.	NA	Less than 20% decline in territory occupancy over a 3 year period is acceptable range.

See C. Northern Goshawk, above on page 8-34.

N. Goshawk Mitigation Measures

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are mitigation measures (standards and guidelines) employed during vegetative management project implementation sufficient to prevent territory abandonment?	Goshawk territory occupancy following vegetative management treatments. Monitor the first full breeding period following activity in all projects where pre-project surveys determined territory occupancy; annual reporting.	NA	Any territory abandonment on projects where mitigation measures are used.

Methods.

Monitor goshawk territory occupancy following vegetative management treatments. Monitor the first full breeding period following activity in all projects where pre-project surveys determined territory occupancy.

Variation.

Any goshawk territory abandonment on projects where mitigation measures were used. Territory abandonment occurs when nesting has been initiated and the birds leave the area and do not continue nesting.

Results.

Based on the increase in occupied goshawk territories across the Forest habitat effectiveness and territory use is up from previous years.

Interpretation.

Is further evaluation needed? Data collected at the Forest level on territory occupancy and use is very important to help determine if management guidelines are adequate. Because occupied territory use is up from previous years and habitat effectiveness appears to be adequate for use these measures are successful.

What are the implications? Mitigation measures used are still considered the best available science by the Forest and appear to be effective as numbers are up from previous years. .

Conclusion. Implementation of the Forest Plan guidance for goshawks is sufficient to prevent territory abandonments, recognizing that many factors can cause territory abandonment. There is a long list of environmental factors that can cause territory abandonments, including weather; either too much, or too little cold wet weather, lack of or decreased prey items, wind events and, predation from great horned owls or golden eagle to mention a few .

Monitoring Resources Available.

Project level data and Forest level monitoring data collection on territory occupancy and activity

Recommendation.

Determine projects where mitigation measures were prescribed and implemented and prioritize those projects for monitoring. Continue to monitor for occupancy and activity of all nests across the Forest.

O. Goshawk Habitat Connectivity

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Is habitat connectivity, as represented by structural and species diversity and dispersion thereof, within and among 5th to 6th order watersheds (or equivalent ecological scale) being maintained?	Spatial dispersion and patch size of mature and old forest groups within a 5th to 6th order watershed. Tree species composition mix within mature and old groups within a landscape. At the completion of each landscape assessment. Five-year reporting.	NA	Less than approximately 40% of the coniferous and/or 30% of the aspen forested acres within a landscape in VSS 5 and 6 classes. Seral species characteristic of the cover type are not well-represented in VSS 5 and 6 classes.

Methods.

Evaluate spatial dispersion and patch size of mature and old forest groups within a 5th to 6th order watersheds.

Variation.

Approximately 40% of the coniferous and/or 30% of the aspen forested acres within a landscape in VSS⁶ 5 and 6 classes is an acceptable range.

Results.

This level of data is prepared for all vegetation projects that occur in suitable goshawk. Because the goshawk management recommendations are implemented in all projects that manipulate goshawk habitat connectivity is adequate.

Interpretation.

Is further evaluation needed? Collection of these data is important to managing the more mature VSS classes for goshawks and their prey on the Forest. Because these data are important to this species, collection and evaluation is important to species persistence. Based on data collected at the project specific level including VSS class distribution and old growth, connectivity of VSS 5 and 6 is connected to support viable goshawk numbers as demonstrated above.

⁶ VSS = Vegetative Structural Stages as defined in Reynolds et al. 1992.

Conclusion. Based on data collected at the project specific level including VSS class distribution and old growth, connectivity of VSS 5 and 6 is connected to support viable goshawk numbers as demonstrated above.

Monitoring Resources Available.

Project level data collection on VSS distribution and old growth delineation.

Recommendation.

Continue to identify VSS distribution data and map existing old growth habitat by project area or landscape level analysis area. Display these areas on a map use these data to identify connectivity of VSS classes, and use these data to identify vegetation management opportunities as we look to manage VSS distributions.

P. Snag Habitat

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Is snag habitat (i.e., number and size of snags) being maintained desired spatial arrangement?	Snag densities and sizes within a 100-acre block treated by mechanical or wildland fire use.	N/A	75% of more of the blocks measured meet guideline requirements is the acceptable range.

See H. Snag Management, on page 8-54, above.

Q. Down Woody Material

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are down woody material and logs being maintained in sufficient amounts, sizes and spatial locations?	Down log and woody debris amounts and sizes within a 10-acre block treated by mechanical or wildland fire use. Measure 5% of more of the acres treated within a project area, within 2 years following completion of the vegetative treatment. Five-year reporting.	NA	Less than 75% of the blocks measured meet guideline requirements.

Methods.

Collection of down log and woody debris amounts and sizes within a 10-acre blocks treated by mechanical or wildland fire use.

Variation.

Seventy-five percent or more of the acres treated within a project area meeting guidelines, within 2 years following completion of the vegetative treatment, is the acceptable range.

Results.

Stand exam data coupled with Brown's transects is generally collected prior to projects being analyzed. These data are loaded into FS-VEG database and used in the analysis process and when needed. Because the Dixie vegetation management program has been primarily bug killed salvage projects meeting the down woody debris has not been a lacking resource.

Interpretation.

Is further evaluation needed? Further data analysis and mapping is needed.

What are the implications? Down woody material and log data is being collected at the project specific level. Although further analysis and mapping should occur the Forest is not lacking in in down wood in past or current vegetation management project areas. Mapping will assist the unit in calculating the impacts of wildland fire on the resource.

Conclusion. Down woody material and log data is being collected at the project specific level. Although further analysis and mapping should occur the Forest is not lacking in in down wood in past or current vegetation management project areas. Mapping will assist the unit in calculating the impacts of wildland fire on the resource.

Monitoring Resources Available.

Stand exam data combined with Brown's transects data contained in project record files.

Recommendation.

Include Brown's collection in all stand exam data collection, and record results in a table and map.

R. Goshawk Habitat – Grazing Adjustments

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are appropriate adjustments made to grazing practices in identified “at-risk” locations where grazing is contributing to the “at-risk” condition?	Ungulate grazing practices (i.e., utilization, season of use, grazing system) in identified “at-risk” locations. Review grazing practices annually on at least 2 allotments where “at-risk” conditions have been identified; five-year reporting.	NA	Grass, forb, and shrub production objectives are outside the range identified in landscape assessments.

Methods.

Ungulate grazing practices (i.e., utilization, season of use, grazing system) in identified “at-risk” locations. Review grazing practices annually on at least 2 allotments where “at-risk” conditions have been identified.

Variation.

Grass, forb, and shrub production objectives are within the range identified in landscape assessments is the acceptable range.

Results.

No “at risk” locations have been identified on the Forest.

Interpretation.

Is further evaluation needed? No. No “at risk” locations have been identified on the Forest, and until this happens further evaluation is not necessary.

What are the implications? At risk allotments are not known, and therefore, no adjustments to grazing practices in at risk allotments are needed.

Conclusion. At risk allotments are not known, and therefore, no adjustments to grazing practices in at risk allotments are needed..

Monitoring Resources Available.

During goshawk nest monitoring general conditions of the territory are observed. Through this process no at risk allotments have been identified.

Recommendation.

Continue to review general range conditions while conducting territory occupancy monitoring and identify “at risk” allotments if needed. If areas are identified these areas will be scheduled for further evaluation and recommendations will be developed.

Tree diameter breast height (dbh) measurements are taken on trees that have Goshawks nests, such as this one.



SECTION 9. RANGE

A. Range Vegetation Condition and Trend

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Range Vegetation Condition and Trend	Measurement of plant composition and vigor, ground cover and soil stability. Monitoring and reporting frequency as per approved allotment management plan ⁷ .	M/M	Downward vegetation and/or soil trend.

Methods.

236 sites were visited in 2012 using the following reference methods:

- FSH 2209.21 – Rangeland Ecosystem Analysis and Monitoring Handbook – Chapter 40 – Rangeland Trend Monitoring (R4 Amendment 2209.21-2005-2 : Effective Date 12/23/2005)
- Chapter 20 – Rangeland Analysis (R4 Amendment 2209.21-2005-2: Effective Date 12/23/2005).
- Chapter 20 – Rangeland Analysis (Dixie NF Supplement No: 2209.21-2010-1: Effective Date: February 25, 2010) - Amends effective ground cover guidelines for the Dixie NF.
- Ocular Macroplot: USDA Forest Service Ocular Macroplot Field Guide (September 2008)
- With additional clarification provided in: Terrestrial Ecological Unit Inventory (TEUI) Guide (USDA, Forest Service General Technical Report WO-68).
- General Technical Report RMRS-GTR-47 “Monitoring the Vegetation Resources in Riparian Areas” by Alma H. Winward, April 2000.
- Additional clarification for riparian studies was adapted from General Technical Report RMRS-GTR-121 “Guide to Effective Monitoring of Aquatic and Riparian Resources – Part III: Effectiveness Monitoring for Streams and Riparian Areas within the Upper Columbia River Basin: Sampling Protocol for Integrator Reaches Vegetation Parameters” by Marc Coles-Ritchie and Richard C. Henderson, March 2004.
- Additional clarification for riparian studies and species’ ecological status and stream bank stability ratings were adapted from Idaho Technical Bulletin No. 2005-02

⁷ See discussion under “Methods” for update on methods and frequency.

“Monitoring Stream banks and Riparian Vegetation – Multiple Indicators” by Ervin R. Cowley and Timothy A. Burton, September 2005.

Variation.

Variation that would cause further evaluation and/or change in management direction would be a “downward vegetation and/or soil trend”.

Results.

During 2012, 236 long-term trend monitoring studies were completed on the Dixie National Forest. 96 were upland range trend monitoring studies, 69 were Level III Riparian Inventories, and 71 were photo points completed by Forest personnel.

These monitoring studies were performed in 63 allotments across the Dixie National Forest. This work was accomplished by the Forest Vegetation Monitoring Crew. People on this crew included Mark Madsen (Forest Botanist), Shannon Hess (Biological Science Technician), and Erika Dobson (Biological Science Technician). These monitoring studies were accomplished during the 2012 field season from April 16 – November 6.

93 of 96 FS upland range trend monitoring sites (97%) were replicated studies from which accurate trend data can be derived. 42 of 69 of the FS Level III Riparian Inventories (61%) were replicated and have accurate trend available. 69 of 71 FS photo points (97%) were replicated and have accurate trend available.

Of the 93 replicated upland range trend monitoring studies, the data analysis on 31 of them (33%) indicate a downward trend in vegetation condition, effective ground cover, and/or frequency of invasives. The other 62 sites (66%) demonstrated stable or upward trends. 11 of the 31 monitoring sites (35%) that indicate downward trends are located in areas of the Dixie National Forest that have burned (wildfire or prescribed fire) or been mechanically treated within the past ten years. These burned and mechanical treatment areas are highly susceptible to cheatgrass invasion and low effective ground cover resulting from reduced fuel loads. There are a total of 5 of 93 sites (5% of all upland trend studies re-read in 2012) where downward trends may be a result of mechanical or prescribed burn project-level management activities not influenced by uncontrolled wildfire. These 5 monitoring sites are located on 5 pastures of the Pine Valley and Escalante Ranger Districts. In summary, 25 monitoring sites of 93 sites (27% of all upland trend studies re-read in 2011) exhibited downward trends that may be a result of any management activity not influenced by uncontrolled wildfire. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them.

Of the 42 replicated Level III Riparian Inventories, the data analysis on 4 of them (10%) indicate a downward trend in vegetative successional status, bank stability, and/or effective ground cover. These occur on 4 pastures of the Pine Valley and Cedar City Ranger Districts. None of these 4 monitoring locations were impacted by wildfire. Further evaluation of these four sites may be warranted to determine if a change in management direction is needed and able to improve them. A total of 38 of the replicated Level III Riparian Inventories (90%) demonstrate a stable or upward trend since they were last read in 2007.

Of the 69 replicated photopoints, the photo interpretive analysis on 7 of them (10%) indicate a downward trend in effective ground cover and/or soil stability. These occur on 4 pastures of the Powell Ranger District. None of these 7 monitoring locations were impacted by wildfire. Further evaluation of these 7 sites may be warranted to determine if a change in management direction is needed and able to improve them. A total of 62 of the replicated photo points (90%) demonstrate a stable or upward trend since they were last read in 2007.

In 1986, the Forest Plan did not define vegetation, ground cover, and soil stability 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, using trend as variation that would cause further evaluation would be appropriate. Of the 236 monitoring studies and photo points reported here, 204 (86%) 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 which are not compatible with current measurements and/or locations and photos could not be replicated. In the absence of periodically recorded post-1986 data, we cannot project a clear picture of how much the range has improved or declined over 1986 levels on the Dixie National Forest. However, current trend re-read from 2007 and/or 2008 does give a clear picture of trend on the Forest between that time period and 2012. Of the 204 sites re-read and evaluated in 2012, 42 (21%) exhibited downward trends since these sites were last read in 2007 and/or 2008.

The Forest has established a long-term monitoring program, as indicated by the number of studies re-read or established during 2012 and in previous years (673 FS upland range trend monitoring studies, 249 Riparian Level III Inventories, and 185 photo points from 2004-2012). 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.

Interpretation.

Is further evaluation needed? Yes, both downward and upward range vegetation condition and trends are apparent on the Forest.

What are the implications? For upland sites re-read in 2012, 25 monitoring sites of 93 sites (27% of all replicated upland trend studies read in 2012) exhibited downward trends that may be a result of any management activity not influenced by uncontrolled wildfire. 6 additional sites directly influenced by wildfire also exhibit downward trends. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them.

Of the 42 replicated riparian sites re-read in 2012, 4 of them (10%) indicate a downward trend in vegetative successional status, bank stability, and/or effective ground cover. These occur on 4 pastures of the Pine Valley and Cedar City Ranger Districts. None of these 4 monitoring locations were impacted by wildfire. Further evaluation of these four sites may be warranted to determine if a change in management direction is needed and able to improve them.

Of the 69 replicated photopoints, the photo interpretive analysis on 7 of them (10%) indicate a downward trend in effective ground cover and/or soil stability. These occur on 4 pastures of

the Powell Ranger District. None of these 7 monitoring locations were impacted by wildfire. Further evaluation of these 7 sites may be warranted to determine if a change in management direction is needed and able to improve them.

Conclusion. Areas in downward upland and riparian range condition trend should be sent to the appropriate District rangeland management specialist to be evaluated. If the range specialist determines that these areas are able to be improved through permit action, then an adjustment in the AOIs for each site affected should be made.

Monitoring Resources Available.

Yes. This monitoring is the responsibility of the Dixie NF Botanist and long-term vegetation monitoring crew.

Recommendation.

Continue to monitor range vegetation condition and trend annually.

Range condition and trend data collection on Blubber Creek – Powell Ranger District.



B. Forage and Grazing Utilization

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Forage utilization	Grazing impact studies by standard Forest Service methods. Reporting and monitoring frequency as per approved allotment management plan	M/M	Exceed prescribed utilization by 20% one time or 10% consistently.

Methods.

The 1986 measurement frequency requirement was “as per direction in approved AMPs”. The Forest Plan monitoring method is “grazing impact studies by standard Forest Service methods”. In 1992, the methodology was changed to “utilization studies”. Utilization (percent of forage removed) was retained for measuring use in uplands as well as browse species in both uplands and riparian areas.

Variation.

Exceed prescribed utilization by 20% one time or 10% consistently.

Results.

During the 2012 grazing season, 43 of 76 allotments (78%) were reported to have been monitored for compliance with forest forage utilization standards. A total of 155 pastures were monitored within the 43 allotments. Of the 155 pastures monitored, 137 (88%) were in compliance with the forest plan standards and guides. There were a total of 179 key areas monitored for compliance, 62 (35%) in riparian areas and 117 (65%) in upland sites. Compliance occurred in 79% of the riparian monitoring sites and in 87% of the upland locations. Stubble height, height/weight method, key species method, ocular reconnaissance, and photo documentation were the primary methods used for assessing utilization compliance.

Of the ten allotments monitored on the Pine Valley Ranger District two had pastures that did not meet standards. Bank alteration standards were exceeded by more than 20% within the Calf Springs enclosure. The situation was evaluated per forest plan direction and a willow planting project occurred in the fall and the area will not be grazed until desired conditions are being met. Upland utilization standards were exceeded by 20% in the Four Mile Bench Unit of the Pine Valley Allotment. Grazing management strategies will be evaluated prior to next grazing season in order to correct this problem.

Of the 23 allotments on the Cedar City Ranger District monitored for compliance three had pastures that did not meet standards. Riparian stubble height standards were exceeded in the Dark Hallow Unit of the Bower Allotment and in the Blow Up Unit of the Red Creek Allotment. Even though standards were not exceeded by more than 20% or exceeded by more than 10% for consecutive years a pro-active approach was taken and notice of non-compliance letters were sent to the permittees. Riparian stubble height standard was exceeded by more than 20% in the Sandy Creek and Three Mile Riparian Units of the Little Valleys

Allotment and in the Williamson Unit of the Red Creek Allotment. Notice of non-compliance letters were sent to the permittees. Grazing management strategies will be evaluated prior to next grazing season in order to correct these problems.

Fifteen allotments on the Powell Ranger District were monitored in 2012. All monitored pastures were within Forest utilization standards.

Of the eleven allotments monitored on the Escalante Ranger District ten had pastures where standards were not met. Upland utilization standard was exceeded in portions of the Deer Lake Unit of the Boulder Allotment, the Coyote Hollow Unit of the Coyote Allotment, the Roundy/Davis Flat Unit of the Pine Creek Allotment, the Upper Valley Spring Pasture of the Upper Valley Spring Allotment, and the Stump Springs Unit of the Upper Valley West Allotment. No actions other than continued monitoring is planned for these areas since they did not meet the forest plan threshold of exceeded standards by 20% in one year or 10% for consecutive years.

Upland and riparian utilization standards were exceeded by 20% or 10% in consecutive years in the following units:

- Big Swale/Clayton and Pollywog Units of the Coyote Allotment (upland and riparian)
- Grass Lakes Unit in the Horse Creek Allotment (uplands)
- Holby Bottom and Main Canyon Units of the North Creek Allotment (upland and riparian)

A notice of non-compliance letter was sent to the North Creek allotment permittee. Prior to next grazing season grazing management strategies will need to be evaluated in order to comply with forest plan direction.

Interpretation.

Is further evaluation needed? Further evaluation is needed in the pastures that have utilization standards that were exceeded by more than 20% in the current year or by 10% in consecutive years.

What are the implications? General satisfactory rangeland conditions indicate that stocking levels are fairly consistent with established capacities. However, some areas may be used to excessive levels. In most cases, this is a management problem rather than a capacity problem. Most often the excess use occurs because livestock enter an area too early because of poorly maintained fences; stay too long because permittees fail to make a complete gather, or return after being removed because of poorly maintained fences.

Conclusion. There are no indications that, at a landscape scale, livestock stocking rates are consistently 10% or more in excess of prescribed utilization levels, which would require further evaluation and/or change in management direction.

Monitoring Resources Available.

In the past 20 years, inflation, static range budgets, and escalation in support and overhead costs, coupled with ever-increasing legal and environmental documentation requirements, have continued to erode away the Forest's ability to provide efficient and effective administration of livestock grazing and rangeland resources. The direct result of insufficient

staffing is a lack of accomplishment in all facets of the range program. For the last several years, program emphasis has been placed on permit administration as the number one priority.

Recommendation.

Continue monitoring.

C. Wild Horse Numbers and Trend

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Wild Horse Numbers and Habitat Trends	Annual aerial horse counts, grazing impact studies, habitat assessment as per allotment management plans; annual reporting.	M/M	Horse numbers deviate by 10% or range trend is down.

Methods.

Annual aerial horse counts.

Variation.

Horse numbers deviate by 10% or range trend is down.

Results.

The North Hills Wild Horse Territory (WHT) and Herd Management Area (HMA) management plan, dated May 1977, charges the Forest Service and the Bureau of Land Management (BLM) to jointly manage the WHT/HMA at 40-60 horses. This area is approximately 71,000 acres, comprised of 50% Bureau of Land Management, 35% the Forest, 8% State land, and 7% Private. Wild horses also solely use an additional 7,000 acres that are not part of the designated WHT.

In December 2010, the BLM conducted a gather and removed 99 animals from BLM lands. Part of the gather was a census count on BLM, FS, and other lands. Population counts found 22 animals on BLM, 18 on FS, and 16 outside of BLM/FS HMA. Given that FS lands comprise 35% of the unit, Appropriate Management Level (AML) for FS lands is 18-27 animals and the population count was within the AML. No population counts occurred in FY 2012. Based on 15% population growth rate it is expected that current population for FS lands would be about 21 head, again this is within the AML for the unit.

Five long-term monitoring sites are in the territory; three locations were rated as functioning, one rated as functioning-at-risk, and the final non-functioning. Causes for functioning-at-risk and non-functioning were due to high presence of cheatgrass and low ground cover. Annual utilization was estimated at 75% in uplands and 95% in riparian.

Interpretation.

Is further evaluation needed? Yes, aerial counts and adjusted estimates indicate that populations fluctuate more than 10% annually. Past monitoring has indicated that there are wide fluctuations in population numbers because of annual mortality and colt survival. Reproductive rates vary between 15% and 20%. Utilization levels are being exceeded and rangeland conditions could improve in some areas.

What are the implications? As of 2012, wild horse numbers are projected to be at 21 which is still within the AML range. However, herd numbers fluctuate widely and are generally in excess of the prescribed numbers. The additional 16 horses located in areas outside the WHT/HMA should be removed. Routine removals have generally fallen short of maintaining the herd within the AML.

Conclusion. Monitoring does not indicate a need to change management direction.

Monitoring Resources Available.

The Forest is in a cooperative program with BLM to achieve this monitoring.

Recommendation.

Continue to cooperate and coordinate with the BLM in managing wild horse numbers in both the North Hills Wild Horse Territory and the BLM's adjacent North Hills Herd Management Area (HMA).

The variation causing further evaluation is wild horse populations fluctuating more than the 10% from that prescribed by the Forest Plan. Review this monitoring for possible Forest Plan amendment to better reflect accepted population changes.

SECTION 10. TIMBER

A. Timber Harvest Area

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Timber Harvest Area	Semi-annual review and reporting of timber program to ensure that harvest area will not exceed 10-year estimate by more than 10%	H/M	Planned harvest area exceeded by more than 10% in any given year.

Methods.

Evaluation of timber harvest areas.

Variation.

Harvest areas exceed more than 10% in any given year. The Forest Plan projected average is 10,525 acres per year.

Results.

Acres harvested are monitored annually and compared with the Forest Plan projected average of 10,525 acres per year. An average of 3,876 acres was in timber sales sold from 1987 to 2012. Individual year's data are shown below.

Acres in timber sales sold and harvested from 1987 to 2012 on the Dixie National Forest.

Year	Total Acres in Sales Sold 1987-2012	Total Acres Harvested in Sales Sold in 1987-2012
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

Year	Total Acres in Sales Sold 1987-2012	Total Acres Harvested in Sales Sold in 1987-2012
2007	4,604	1354
2008	1,191	1124
2009	616	318
2010	709	200
2011	3,806	885
2012	2,009	295

Interpretation.

Is further evaluation needed? No, harvested acres have not exceeded the projected decadal average stated in the Forest Plan.

What are the implications? Impacts from timber harvest and outputs are less than projected in the Forest Plan.

Conclusion. There is no variation that would cause further evaluation and/or change in management direction.

Monitoring Resources Available.

The sold and harvest acres are taken from the Timber Information Manager (TIM), Forest Service Activity Tracking System (FACTS), and Cut and Sold Report from TSA.

Recommendation.

Continue monitoring volume and acres as harvested.

The Forest Plan states the monitoring method as, "Review of timber program to ensure that harvest area will not exceed 10-year estimate by more than 10%". The variation causing further evaluation and/or change in management direction is, "Planned harvest area exceeded by more than 10% in any given year". These two measures are not consistent: one states a 10-year estimate and the other is in any given year. Monitoring changes are needed to make these items consistent.

The Deer Hollow Timber Sale north of Navajo Lake on the Cedar City Ranger District was harvested in 2012.



B. Timber Research Needs

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Timber Research Needs	Annually document and report recurring or unusual problems	M/M	Inability to solve problems though existing technology or practices.

Methods.

Englemann spruce beetles

Long term monitoring for spruce beetles (*Dendroctonus rufipennis*) continues across the forest and specifically on the Griffin Top area of the Aquarius Plateau on the Escalante Ranger District. These studies are designed to determine infestation levels in uninfested harvested and non-harvested areas. These studies are conducted by the Dixie National Forest and the Forest Service Region 4 Forest Pest Management (FPM) office.

Root disease

Also, the Forest, in conjunction with FPM, has been looking at timber harvest and slash treatment methods to control the spread of Tomentosus root rot (*Inonotus tomentosus*) in Engelmann spruce and blue spruce. This disease has been detected by pathologists in several stands of blue spruce on the Aquarius Plateau.

Aspen Management

Many recent vegetation management projects on the Forest have focused at least some treatments on the regeneration and improvement of aspen. While treatment objectives are generally focused on the seral state of aspen, and the need to improve or maintain aspen dominated stands, there have been reports of aspen decline across the Forest, which may result in the permanent loss of some aspen clones (Guyon et al. 2012). Recent service trips by Forest Health Protection scientists to the Reed Valley and Navajo project areas of the Cedar City Ranger District, indicate that aspen decline is present in some stands and needs to be addressed when prescribing treatments.

Ips beetle

In December of 2010, a wind event caused many ponderosa pine trees to be, uprooted, broken, and downed on the Cedar City Ranger District. A recent service trip by FHP scientists indicate that these trees are now infested with *Ips Pini*, and since Ips can infest the tops of adjacent healthy trees there a concern with the amount of down material in the affected area (Guyon et al. 2012).

Variation.

Inability to solve problems though existing technology or practices.

Results.

Research is ongoing. For long term monitoring of spruce beetles on the Griffin Top, studies are indicating that while spruce beetle caused mortality has decreased on the Plateau, many stands are still at high to moderate susceptibility, and are of concern because spruce beetles are capable of long distance dispersal, and with the general depletion of host resources on Griffin Top, populations may begin to spread north and east (Hebertson 2010). One conclusion so far is that, prevention strategies including silvicultural treatments, such as thinning and group selection offer the greatest chance of reducing long-term susceptibility to spruce beetle infestation because they increase diversity of species and structure across the landscape. If silvicultural treatments are used, they must occur while spruce beetle populations are at low levels to maximize their effectiveness (Hebertson 2010). Spruce beetle monitoring will continue in this area.

Treatment options for dealing with *Tomentosus* root rot spread, are the result of a study in the Row Lakes area, adjacent to the Escalante Ranger District. Although only blue spruce trees were infected, this root disease is known to infect all spruce species throughout south-central Utah. Harvesting, particularly partial cutting, could intensify the root disease and potentially affect residual spruce or spruce regeneration. Recommendations are to minimize partial cutting in those portions of stands where *Tomentosus* root disease is prevalent or favor disease tolerant species such as aspen or Douglas-fir where possible (Hebertson 2010).

Recommendations for aspen treatments in stands experiencing decline and little regeneration are to focus on removing all aspen overstory trees, and competing vegetation, to give these stands the best chance for aspen survival (Guyon et al. 2012). Protection of regeneration by fencing may also be necessary.

Recommendations for dealing with potential *Ips* beetle effects in the Cedar City RD area are to remove any infested material before fall 2012, when beetle populations are at their highest. There is a need to monitor this the next season to see if there are any new infestations in the area.

Interpretation.

Is further evaluation needed? Research is ongoing, monitoring will continue. The Forest will continue to work with R4 FHP scientists to monitor all of these issues.

What are the implications? So far this has resulted in prioritizing treatments in Englemann spruce stands that are at moderate to high susceptibility of beetle infestation. Also, the results will focus treatments, where applicable, to control the spread of *Tomentosus* root rot. The presence of aspen decline in some areas of the Forest, has not necessarily resulted in reprioritizing stands for treatment, but is an important consideration in how the treatment is prescribed in aspen stands affected by this. The presence of *Ips pini* has resulted in consideration of this area for planning for treatment, but implementation of the recommendations was not completed in 2012.

Conclusion. There is no variation that would cause further evaluation and/or change in management direction at this time.

Monitoring Resources Available.

Research Stations and Forest Pest Management conduct research projects.

Recommendation.

Continue to use research to study Forest problem.

The wording in the variation is out of place and should be changed to read “Inability to solve problems through existing technology or practices”.

Citations.

Hebertson, L. 2010. FHP Functional Assistance Visit to the East Zone of the Dixie National Forest, OFO-TR-10-16, 2010.

Guyon, J., 2012. Evaluation of Western Bark Beetle Projects on the Cedar City Ranger District, Dixie National Forest.

C. Suitable and Unsuitable Land Classifications

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Verify Classification of Suitable and Unsuitable lands	Examine lands during silvicultural exams, timber inventories, and ID team reviews to ground truth capabilities on a project basis; report annually.	H/H	10% of land area found to be incorrectly identified.
	On a project basis as available, but prior to Plan update, complete soil/geologic survey of lands identified as unsuitable because of potential irreversible resource damage by 1990; report every 5 years.	M/H	

Methods.

A process was developed to verify suitability during timber sale project planning, and to accomplish the classification on the earlier sales made since 1986.

Variation.

10% of land area found to be incorrectly identified. The Forest Plan identified 300,100 acres of suitable forest land.

Results.

The table below displays the number of timber sales and total acres verified for timber suitability. The total forest acres verified for suitability equals 269,035.

Number of timber sales and acres verified for timber suitability from 1987 to 2012.

District	Number of Sales	Total Acres Verified
Cedar City	44	119,964
Escalante	23	95,362
Powell	6	28,204
Teasdale	14	25,505
TOTAL	87	269,305

Interpretation.

Is further evaluation needed? Data are not available to determine. Project level suitability classification is progressing. The acres verified are less than was identified in the Forest Plan as suitable forest land (page II-28).

What are the implications? A comparison with the suitability classification shown in the Forest Plan will not be possible until the classification program is completed. The resulting classification data will be used in the revision of the Forest Plan.

Conclusion. No variation that would cause further evaluation and/or change in management direction has been identified at this time.

Monitoring Resources Available.

District personnel are conducting the project-level suitability classification on a project-by-project basis.

Recommendation.

Continue project-level classification process.

D. Harvest Practices in Retention/Partial Retention

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Harvest Practices in Retention, Partial Retention, and Riparian Areas	Review of silvicultural prescriptions for timber sales and post-sale stand exams on a project basis; report annually.	M/H	Violation of Visual Quality Objectives or riparian area damage.

Methods.

Evaluation of harvest practices in retention, partial retention, and riparian areas.

Variation.

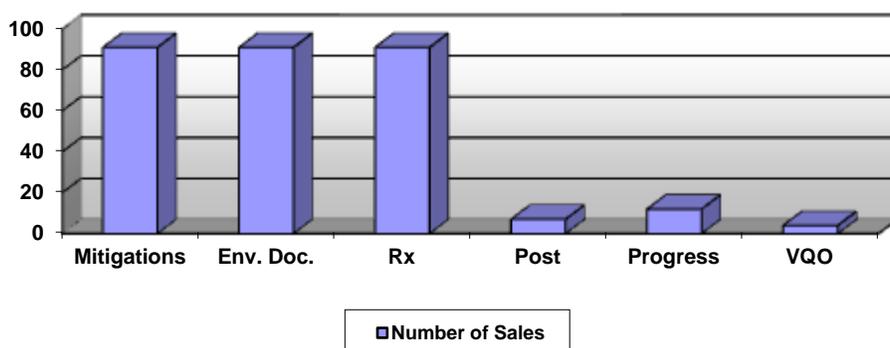
Violation of Visual Quality Objectives (VQOs) or riparian area damage.

Results.

Of 146 timber sales planned and implemented from 1987 to 2012, 55 had no mitigations identified in the landscape architect report. Of the remaining 91 sales for which mitigations

were recommended, all contained the mitigations in the environmental document and in the silvicultural prescription. Of these sales, seven have documentation of post sale monitoring completed by a landscape architect, and twelve sales are still in progress. The remaining 72 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. Post harvest monitoring has not been occurring or documented since 2006.

Number of sales on the Dixie National Forest that contained mitigations recommended in the landscape architect report (“mitigations”), mitigations in the Environmental Document (“Env. Doc.”), in the silvicultural prescription (Rx), documented post-sale monitoring (“Post”), sales still in progress (“Progress”), and where Visual Quality Objectives were documented as accomplished (“VQO”).



VQOs were documented as met on four completed sales (4 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 96 percent of the completed sales for which mitigation measures were identified.

Interpretation.

Is further evaluation needed? Yes, mitigation measures necessary to reduce management impacts on the visual landscape were minimal for most silviculture 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 Architect Report are being carried through the sale implementation process and accomplished on the ground.

What are the implications? Documentation is needed to determine if achieving Visual Quality Objectives is occurring.

Conclusion. Overall, specific visuals protection measures are being documented in environmental analysis and silviculture prescriptions, and are documented in only a few sales through post sale monitoring, and none since 2006. There is a need for more consistent post-sale monitoring.

Monitoring Resources Available.

The resources are available for planning, but do not appear to be available for post-sale monitoring.

Recommendation.

Continue to monitor sales and improve the accuracy of the Landscape Management Reports. Change “Variation” standard to “Deviation from Visual Quality Objectives” (Forest Plan amendment). Update this monitoring to include use of Scenery Management System rather than Visual Quality Objectives.

E. Adequate Restocking

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Adequate stocking of stands within a reasonable time period, generally 5 years of final harvest.	Silvicultural exam (Type 3), five years after final harvest; report annually.	H/H	Less than 5th year stocking standards in FSH 2409.26b—5.31-4.

Methods.

Code of Federal Regulations 36 CFR 219.27(c)(3) states, “When trees are cut to achieve timber production objectives, the cuttings shall be made in such a way as to assure that the technology and knowledge exist to adequately restock the lands within five years after final harvest... Five years after final harvest means five years after clearcutting, five years after final overstory removal in shelterwood cutting, five years after the seed tree removal cut in seed tree cutting, or five years after selection cutting.”

Variation.

Less than 5th year stocking standards in FSH 2409.26b—5.31-4.

Results.

Acres in the various “Final Harvest” silvicultural treatments for sales made during 1987-2012 are shown below. Intermediate treatments such as commercial thinning, shelterwood preparatory cut and seed cut, initial seed tree cut, or sanitation and salvage are not included.

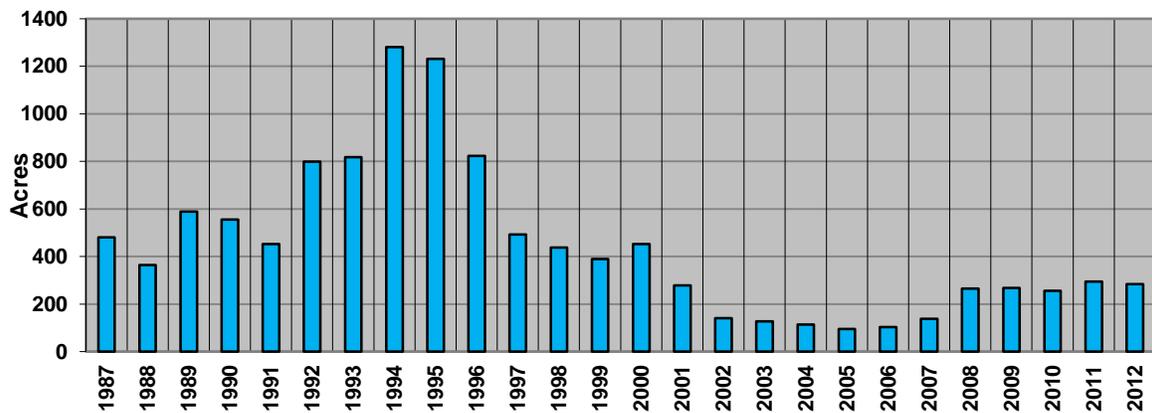
Acres harvested with silvicultural treatments from 1987 to 2012 on the Dixie National Forest.

Year	Clearcutting	Final Overstory/ Shelterwood	Seed Tree Cutting	Selection Cutting	Total
1987	0	0	0	0	0
1988	0	0	0	0	0
1989	26	57	0	543	626
1990	0	251	0	433	684
1991	0	0	0	1642	1,642
1992	107	0	0	62	169
1993	14	1150	0	3392	4,556
1994	43	0	0	126	169
1995	34	0	0	0	34
1996	26	0	0	0	26
1997	0	0	0	0	0

Year	Clearcutting	Final Overstory/ Shelterwood	Seed Tree Cutting	Selection Cutting	Total
1998	0	0	0	0	0
1999	148	0	0	175	323
2000	0	0	0	0	0
2001	0	0	0	0	0
2002	67	0	0	0	67
2003	97	0	0	0	97
2004	63	0	0	0	63
2005	0	0	0	0	0
2006	190	0	0	0	190
2007	0	0	0	0	0
2008	110	0	0	243	110
2009	4	0	0	0	4
2010	36	0	0	0	36
2011	0	0	0	0	0
2012	39	0	0	0	39

The tables below provides the 1st and 3rd year survival records for artificial regeneration (planting) that has occurred between 1987-2012. Because some of these planted acres did not fall into the silvicultural treatment categories listed above, the acre totals will not match.

Acres planted annually on the Dixie National Forest from 1987 to 2012.



First and third year survival records for regeneration between 1987 to 2012, and acres certified as stocked from 1992 to 2012.

Year Planted	Acres Planted	1st Year Survival	3rd Year Survival	Acres Certified
1987	481	78%	64%	0
1988	364	95%	78%	0
1989	589	90%	65%	0
1990	555	96%	92%	0
1991	452	92%	70%	0
1992	799	82%	70%	3,154
1993	818	89%	66%	1,021
1994	1,281	71%	57%	1,189
1995	1,231	80%	45%	773
1996	823	33%	33%	673
1997	492	96%	88%	464
1998	438	86%	77%	633
1999	390	74%	74%	109
2000	452	95%	84%	571
2001	278	97%	NA	0
2002	141	44%	NA	0
2003	127	NA	NA	1,794
2004	114	NA	NA	802
2005	96	NA	NA	84
2006	104	NA	NA	1,808
2007	138	NA	NA	859
2008	265	NA	NA	178
2009	268	92%	80%	146
2010	256	92%	72%	0
2011	295	96%	55%	280
2012	284	70%	74%	0

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. Recent planting activities have been focused on restoration of Engelmann spruce from the bark beetle epidemic, which has destroyed much of the mature spruce on the Cedar City RD and Powell RD. Survival rates for recent spruce plantings have generally been above 90 percent, although plantings completed in 2012 had a slightly lower rate at about 80 percent, likely due to more droughty conditions during the summer. Third year surveys for past spruce plantings are indicating survival rates at 70 percent, which was true for surveys completed in 2012. Spruce restoration has been highly successful where seedlings are established and containerized stock is used.

The Forest has recently been planting ponderosa pine in burned over areas that are in need of reforestation, mostly on the Escalante RD. These planted areas have occurred on a variety of sites including some that are on harsh sites that were severely burned. Survival rates have generally been very good in ponderosa pine with survival rates greater than 90 percent for the 1st year. However, in 2012, surveys indicated that for trees planted in 2012 on the Bridge and Toad areas, survival was much lower than normal, with rates about 75% in the Bridge area, while the Toad area had a failure with rates less than 20%, resulting in a need to plant this area again. Reasons can be traced back to droughty conditions in that there were little to no

summer rains in these areas, especially the Toad area. The Toad project area is also one of the lower elevation areas where ponderosa pine occurs so it may be drier than other ponderosa pine areas. This area may be deferred for future plantings until the area receives some precipitation during the winter. If trees are planted in this area, look at focusing planting on north aspects or other areas where soil moisture is more favorable. Installation of vexar tubing to protect seedlings from browsing continues in these areas.

Climate continues to be a challenge to seedling establishment. Drought has continued to affect survival of young trees; however, the use of containerized seedlings has improved seedling survival, especially on basaltic soils. Also, the use of microsites has improved survival rates. These high survival rates are encouraging and all of these planted areas should contain adequate stocking within five years.

There is a need to increase the forest's tree seed inventory, as collections of cones for Engelmann spruce have dramatically decreased with the high levels of mortality, but will need to be replenished as spruce is desired to be planted over many more acres. There is also a need to collect ponderosa pine seeds to reforest burned over sites as well as sustain ponderosa pine if there is a mountain pine beetle outbreak.

Overall, reforestation needs continue to be identified during vegetation management planning. All harvested areas have been and will continue to be adequately stocked. Planting will likely continue to be the method of reforestation in conifer stands, although natural regeneration will be encouraged where feasible. Natural regeneration will be the method of reforestation for aspen stands.

Interpretation.

Is further evaluation needed? No. Though no five-year measurements have been made for treatments harvested since 1987 under the Forest Plan, provides the 1st and 3rd year survival records for artificial regeneration (planting) that has occurred between 1987-2012.

What are the implications? 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. However, some areas have not reached adequate stocking level. In these areas, work and evaluation will continue toward adequate restocking. The standards and guidelines implemented in the Forest Plan will be used to prevent these problems in the future.

Conclusion. Monitoring information for final harvest treatments implemented after the adoption of the Forest Plan have been available since 1992. This information will allow us to assess the effectiveness of the standards and guidelines and make additional adjustments, if necessary.

Monitoring Resources Available.

Certified Silviculturists conduct monitoring to meet the Code of Federal Regulations.

Recommendation.

Continue monitoring.

F. Maximum Clearcut Opening Size

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Maximum size of openings created by clearcuttings	Annually report and review timber sale silvicultural prescriptions and post-sale silvicultural exams on a project basis.	H/H	Clearcut sizes either restrict timber harvest practices or adversely affect visuals or other resource values.

Methods.

Evaluation of maximum size of openings created by clear-cutting.

Variation.

Clearcut sizes either restrict timber harvest practices or adversely affect visuals or other resource values.

Results.

A total of 1,516 acres were clearcut in various sales during 1987-2012 to meet objectives such as insect and disease control, and aspen regeneration. 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.

Interpretation.

Is further evaluation needed? No, the data indicate that clearcut sizes have not restricted timber harvest practices or adversely affected visuals or other resource values.

What are the implications?

The use of clearcuts does not appear to result in adverse impacts.

Conclusion. No variation that would cause further evaluation and/or change in management direction has been identified.

Monitoring Resources Available.

Resources have been allocated for this monitoring.

Recommendation.

Continue monitoring to assess the impacts of clearcut size and effects on other resources. Forest Plan Amendment is recommended. It was proposed in the Spruce Ecosystem Recovery Project (SERP) Environmental Impact Statement, signed January 30, 1998, "When responding to catastrophic events, such as insect and disease, no opening size limitations will apply".

G. Reforestation and TSI Accomplishment

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Reforestation and Timber Stand (TSI) improvement accomplishment.	Annually report and review TSI and reforestation needs and accomplishment reports, KV plans.	H/H	Failure to meet targets or accomplish KV needs in timber sale plans.

Methods.

Evaluation of reforestation and timber stand (TSI) improvement accomplishment.

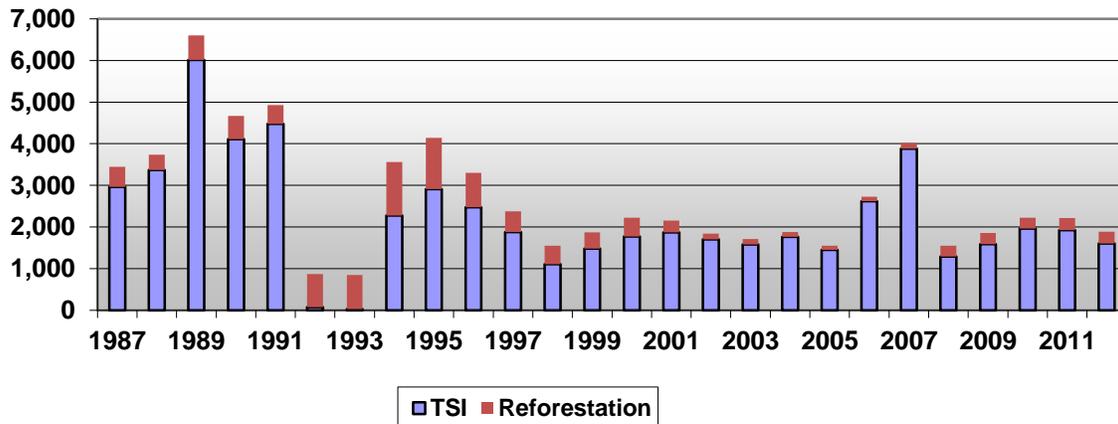
Variation.

Failure to meet targets or accomplishments using funds under authority of the Knudsen Vandenburg Act (KV) needs in timber sale plans.

Results.

The Forest Plan projected 5,000 acres per year in thinning and 1,588 acres per year in reforestation. The following acres have been reforested and thinned from 1987 to 2012.

Acres thinned and reforested on the Dixie National Forest from 1987 to 2012.



Interpretation.

Is further evaluation needed? No. Thinning and reforestation needs are assessed and identified during the site-specific timber sale project analysis, and are being accomplished as identified. Thinning/reforestation accomplishments to date have not met the projections of the Forest Plan. This is due to the decline in the timber harvest program and the accomplishment of most thinning needs early in the monitoring period. Reforestation projections are expected to continue in conjunction with the bark beetle recovery projects in the spruce type.

What are the implications? Thinning and reforestation needs are assessed and identified during the site-specific timber sale project analysis, and are being accomplished as identified.

Reforestation projections are expected to continue in conjunction with the bark beetle recovery projects in the spruce type.

Conclusion. No variation that would cause further evaluation and/or change in management direction has been identified.

Monitoring Resources Available.

Thinning targets are reported annually in the Forest Service Activity Tracking System (FACTS)

Recommendation.

Continue monitoring.

H. Fuelwood Consumption and Supply

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Fuelwood consumption and supply	Determine supply by fuels inventories and acres available; determine demand by monitoring permits issued and sampling actual removal on a project basis; annual reporting.	H/M	Supply is not meeting or projected to not meet demand within 5 years.

Methods.

Evaluation of fuelwood consumption and supply.

Variation.

Supply is not meeting or projected to not meet demand within five years.

Results.

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 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 ten 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/acre of fuel loading contributing to an increasing amount of fuelwood availability.

Fuelwood (Cords) Permitted by Ranger District, 2007-2012

Fiscal Year	Pine Valley	Cedar City	Powell	Escalante	Total
2007	765	2,128	897	516	4,306
2008	812	2,259	1,107	540	4,718
2009	732	2,410	1,172	478	4,792
2010	802	2,351	1,120	609	4,882
2011	871	2,374	1,148	729	5,122

Fiscal Year	Pine Valley	Cedar City	Powell	Escalante	Total
2012	740	2,215	1,003	695	4,653

Interpretation.

Is further evaluation needed? No. Although localized fuelwood shortages may occur, primarily in the St. George area, the fuelwood supply appears to be able to meet the projected demand during planning time.

What are the implications? The importance of meeting demands for fuelwood may have changed since the Forest Plan was written.

Conclusion. No variation that would cause further evaluation and/or change in management direction was identified.

Monitoring Resources Available.

Sales of fuelwood are recorded annually in the Timber Information Manager (TIM) system.

Recommendation.

Continue monitoring.

I. Growth Responses

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Growth response of regenerated stands, precommercially thinned stands, and cutover sawtimber (including effects of insects and diseases).	Every 5 th year, stage II stand examinations, permanent growth plots; annual reporting.	H/H	± 10% variance in actual growth measured against assumptions made in growth simulations (PROGNOSIS)

Methods.

Stage II stand examinations and permanent growth plots. Four permanent growth plots were established in 1991, and one in 1990. Post harvest Stage II stand examinations were completed on stands on the Cedar City, Powell, and Teasdale Districts during 1991.

Variation.

A 10% plus or minus variance in actual growth measured against assumptions made in growth simulations (PROGNOSIS) is the variation that would cause further evaluation and/or change in management direction. The Forest Plan projected potential growth (cubic feet/acre/year) to be 20 to 40 on 89,424 acres, and 50 to 84 on 241,776 acres.

Results.

Four permanent growth plots were established in 1991, and one in 1990. Post-harvest Stage II stand examinations were completed on stands on the Cedar City, Powell, and Teasdale Districts during 1991.

A random sample of 581 trees measured in the 1980 Forest Inventory shows a diameter growth of 0.7 inches per 10 years in natural stands. Post-harvest growth studies conducted in managed stands during 1991 disclosed an average diameter growth of 1.6 inches per 10 years. Preliminary findings are that increased growth response is evident in sampled managed stands. Permanent growth plots have not been measured since 1991.

Interpretation.

Is further evaluation needed? No. Although data presented were in inches per ten years rather than cubic feet/acre/year, growth responses to managed stands are positive.

What are the implications? Thinning was intended to promote wood growth. Since the Plan was written, emphasis is now on ecosystem health rather than growth for production.

Conclusion. No variation that would cause further evaluation and/or change in management direction was identified.

Monitoring Resources Available.

Monitoring of the recently established growth plots provided data for this Forest Plan requirement.

Recommendation.

Continue monitoring. Revisit growth plots and re-measure.

J. Timber Supply Projections

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Timber supply projections.	Stage II stand examination to complete exam on remainder of commercial Forest land annually in an accelerated basis until completed. Work toward goal of 45,000 acres per year on a continuing basis; annual reporting.	H/H	± 10% variation in projections measured against Forest Plan projections.
	Stage I timber inventory by 1989 or sooner; reporting 5-years or before Forest Plan update.	H/H	

Methods.

Work was completed on a 10-year Forest timber inventory and vegetation classification. The vegetative classification portion of the timber inventory (using LANDSAT imagery) was initiated in 1991.

The Interior West Resource Inventory, Monitoring, and Evaluation (IWRIME) Program of the U.S. Forest Service, Intermountain Research Station, completed an extensive, comprehensive inventory of all forested lands in Utah in 1995, which included the Dixie National Forest. A

two-phase sampling procedure was used. Phase 1 used a grid of sample points on maps and photos and Phase 2 was the field phase that involved measuring of sample points. Stand examinations have been completed on an average of 23,400 acres per year, and the data used in the evaluation of out-year sales.

Variation.

A 10% plus or minus variation in projections measured against Forest Plan projections would cause further evaluation and/or change in management direction. Projections for timber supply productions are estimated as an annual average for the first decade equaling 24,700 MBF⁸/4,960 MCF⁹ (Table II-24 on page II-29).

Results.

The latest Forest inventory (1998 Inventory) shows the following results:

- Net volume of sawtimber (Scribner rule) on nonreserved timberland is 3,534,863 MBF/1,197,122 MCF
- Net annual growth (Scribner rule) of sawtimber trees on nonreserved timberland is 45,134 MBF/15,364 MCF
- Annual mortality of sawtimber (Scribner rule) on nonreserved timberland is 53,763 MBF/18,800 MCF

Interpretation.

Is further evaluation needed? Not determined.

What are the implications? Stand examinations have not proven effective in determining forest-wide timber supply projections. Timber supply projections should be determined by the Forest-wide timber inventory.

Conclusion. Timber supply projections should be determined by the Forest-wide timber inventory.

Monitoring Resources Available.

The latest Forest inventory in 1998 is the source used.

Recommendation.

Results of the timber inventory will be incorporated into the Forest Plan revision process. The monitoring requirement for Stage II stand exams should be modified or dropped and stand exams limited to use in timber sale project planning (Forest Plan amendment). Use the 10-year Forest-wide inventory and vegetation classification to determine timber supply.

⁸ MBF = thousand board feet.

⁹ MCF = thousand cubic feet.

SECTION 11. SOILS

A. Long-Term Soil Productivity

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Long-term soil productivity	Fabric dams, erosion pins, visual estimates, photo points, and/or other accepted methods on 2 locations per year; annual reporting.	H/M	Exceeding established soil loss tolerance levels.

Methods.

Recommendations are made on a project-by-project basis to ensure long-term soil productivity is maintained.

Variation.

The variation which would cause further evaluation and/or change in management direction is exceeding established soil loss tolerance levels.

Results.

Two sites were monitored in 2012:

Stumps Springs Prescribed Fire – Prescribed fire was utilized as a vegetative management tool in 2009 to accomplish sagebrush/meadow restoration on the Escalante Ranger District. Rosewood and some rabbit brush had sprouted during the first growing season after the burn. During the 2010 growing season there was an increase in vegetative cover due to more rabbit brush sprouting, rosewood growth, and some grass establishment. In 2011 the vegetative cover didn't appear to increase from 2010 except where the rosewood plants were. In 2012 rabbit brush dominated the landscape with some as tall as 5ft. More of the interspace between the rabbit brush is vegetated with grasses than in the previous 3 years. Cattle tracks and grazing evidence was observed in 2010, 2011, and 2012. Evidence of wind erosion was observed during the first three years but more particularly during 2009 and 2010. However, in 2012 there was minimal sign of wind erosion in the meadow. This site has shown slow vegetative recovery and wind-erosion hummocks.

Puma Timber Sale Monitoring – Skid trails on unit 6 exceeded the 40% slope restriction. Soil movement from these steep skid trails was not observed since the summer of 2008 nor has the use of fire in the area increased sediment movement on the hillslopes or in the drainages. Fire severity was moderate to light and left some duff in place but not enough to dissipate raindrop impacts and absorb the all of the moisture. Rill formation was evident on slopes from 50%-70%.

Interpretation.

Is further evaluation needed?

Stumps Springs Prescribed Fire – The soil type for the meadow in the Stump Springs project has a high percentage of sand and is not very cohesive, lending it susceptible to wind erosion

when exposed by removing vegetation. The wind erosion and the grazing pressure by cattle could account for the initial slow recovery of vegetative cover in this meadow, particularly grasses. However, the meadow has vegetated in noticeably during the most recent growing season. Based on these observations it is recommended to seed and rest from grazing similar sites (similar soils and topography) after a burn until the desired vegetation has been established. It may also be important to have some type of treatment plan for invasives, like rabbit brush, if the desired vegetation type is something other than the invasive most likely to come back in.

Puma Timber Sale Monitoring – Spring Runoff and Summer Thunderstorms have not caused any sedimentation from constructed road or skid trails in the project area. Area outside of skid trail shows evidence of rill formation.

What are the implications?

Stumps Springs Prescribed Fire – Consider grazing effects and supplemental seeding to assist in the successful implementation of prescribed fire treatment in sagebrush meadows.

Puma Timber Sale Monitoring – Skid trails and timber harvesting on slopes of more than 35 percent are highly susceptible to water erosion events.

Conclusion. We need to continue to monitor various projects associated with prescribed burning, forage utilization, and timber sales.

Monitoring Resources Available.

Project monitoring by District and Forest personnel has been available for soil resources.

Recommendation.

Continue monitoring.

Photo sequence taken in December 2009, September 2010, July 2011 and August 2012 of the Stump Springs Prescribed Fire project.



Photo of a steep skid trail (60-70% slope and rill formation outside of the skid trail due to a lack of coarse woody debris on the Puma Vegetation Management Project.



B. Soil Compaction

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compaction	Measurement of bulk density and/or pore space on 2 timber sales per year; report annually.	H/H	15% increase in bulk density or 50% decrease in pore space

Methods.

Bulk density core sample analysis on the Deer Hollow and Midway Valley timber sales were monitored in 2012.

Variation.

A 15% increase in bulk density or 50% decrease in pore space is the variation that would cause further evaluation and/or change in management direction.

Results.

Compaction monitoring was completed on two timber sales in 2012.

Deer Hollow Sale Monitoring – All of the skid trails in the analysis area were not compacted by more than a 15% bulk density increase. The largest increase in bulk density was 14% increase that was associated with multi-pass skid trails. 0.64 acres of log landings within the analysis area have visual indications of excessive compaction (more than 15% increase in soil bulk density). This occurs from very frequent activity from skidders and log loading and hauling equipment. In total, 4.3% of the analysis area measured is affected by more than a 15% increase in bulk density (soil compaction).

Midway Valley Timber Sale Monitoring – All of the skid trails in the analysis area were not compacted by more than a 15% bulk density increase. This unit was harvested in the winter and the “over the snow” logging methods were effective at eliminating soil compaction concerns.

Interpretation.

Is further evaluation needed? No, findings have shown that an increase in bulk density has occurred, but these sites may not be detrimentally disturbed by following Forest Service Manual direction (FSM 2550).

What are the implications? None.

Conclusion. We are limiting bulk density increases to less than 15% in project areas monitored in 2012.

Monitoring Resources Available.

Timber sale administrators and soil scientists conduct soil compaction monitoring on a project basis.

Recommendation.

Implementation and effectiveness monitoring will continue to be done on selected timber sales to ensure compaction damage does not exceed Soil Quality Manual direction.

Soil compaction monitoring on skid trails associated with the Deer Hollow timber sale was completed in 2012.



C. Uplands Adjacent to Riparian

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Upland areas adjacent to riparian management areas.	Fabric dams, erosion pins, visual estimates, photo points, and/or other accepted methods on 2 locations per year; report first and fifth year following management practice.	H/M	Exceed Forest Standards and Guidelines.

Methods.

The Hoodle Creek Timber Sale (Powell Ranger District) and the Leeds Creek Dispersed Camping Project (Pine Valley Ranger District) were monitored in 2012.

Variation.

Exceed Forest standards and guidelines.

Results.

Hoodle Creek Timber Sale - Field review of this timber sale occurred during the summer of 2012, determining that in order to avoid excessive ground disturbance by skidding uphill from Willow Spring Creek by avoiding crossing the stream, it was necessary to allow designated corduroy stream crossings. Based on ocular observations made in the field during monitoring, initial impacts to the stream were negative as it has led to soil compaction and displacement, vegetation impairment, and channel alteration, all of which could lead to stream channel instability.

Leeds Creek Dispersed Camping Project - This project has been successful at limiting damage to riparian areas due to dispersed camping. However, a dedicated trail needs be built to Leeds Creek (on Site #8) due to a user created trail that is depositing sediment directly into the creek. Also one site (Site #13) is migrating back toward Leeds Creek from camping use.

Interpretation.

Is further evaluation needed? What are the implications?

Hoodle Creek Timber Sale - Proper disclosure of effects is needed on projects, this may require supplemental analysis when harvesting methods change. Additional implementation monitoring to the riparian system will needed to determine if stream restoration work is required.

Leeds Creek Dispersed Camping – Annual evaluation of the sites is needed to contain this sites from directly impacting the riparian management area.

Conclusion. We need to continue to monitor various projects associated with Riparian Management Areas (9A & 9B).

Monitoring Resources Available.

Projects near riparian Management Areas are monitored annually by zone hydrologists.

Recommendation.

Continue monitoring.

Stream crossing on Willow Spring Creek where channel bank had been destabilized.



Designated camping sites on Leeds Creek are starting to migrate back to the creek.



D. Soil and Water Resource Protection

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil and water resource protection – project EA mitigating requirements	Visual estimates on 1 project per year per Ranger District; annual reporting.	H/M	Mitigating requirements not implemented or not working

Methods.

Four projects emphasizing monitoring specifically of EA mitigating requirements (also known as “best management practices” or BMPs) were completed in 2012.

Variation.

Mitigating requirements not implemented or not working would cause further evaluation and/or change in management direction.

Results.

Sawmill Aspen Project (Escalante Ranger District) – Because the logs had not been removed as of the last visit to the site, the full impact of the stream crossing cannot be observed and therefore these interpretations and conclusions are based only on observable impacts before the removal of logs. Although this stream is very small it was important to use a corduroy crossing in order to prevent the stream from being channeled into ruts leading down the road and away from the natural channel. Based on the observations, using more logs than just enough to fill the channel was very effective and is likely better than using just the minimum amount of logs to fill the channel.

Midway Valley Salvage Sale (Cedar City Ranger District) – The implementation winter based logging and adherence to Soil and Water Conservation Practices (SWCPs) relating to proper snow depths for logging operations was effective in minimizing detrimental soil disturbance within this sale.

Deer Valley Salvage Sale (Cedar City Ranger District) – The implementation of a properly spaced skid trail network and adherence to Soil and Water Conservation Practices (SWCPs) relating to soil moisture operational levels and the design and management of log landings was effective in minimizing detrimental soil disturbance within this sale.

Iron Springs Area Soil Temperature Monitoring (Escalante Ranger District) – The biggest temperature differences were found from May through August, with a 15 degree F. peak on July 1st. The lack of canopy and above ground organic matter was the driving factor of soil temperature differences. Numerous reforestation efforts along with natural regeneration of trees have both failed in these strip cuts. Future efforts of reforestation should include utilizing containerized stock and dropping trees across the clear cuts to provide a micro-climate for the new trees. Above ground organic matter (litter retention and coarse woody debris) are vital to the spruce-subalpine fir ecosystem. At least 30 tons per acre of coarse woody debris along with the retention of 2 to 3 inches of “O” horizon is needed to maintain long term soil productivity.

Interpretation.

Is further evaluation needed? Yes, best management practices need further monitoring and emphasis in environmental documents to ensure that they can be implemented properly on the Forest.

What are the implications? Best management practices are being implemented on the Forest, communication is needed on the importance of properly implementing the practices described in projects.

Conclusion. The Forest soil scientist and Zone hydrologists need to continue to educate resource staff on the use of BMPs.

Monitoring Resources Available.

Projects are monitored annually by Zone hydrologists and Forest soil scientist.

Recommendation.

Continue monitoring. Project administrators should document BMP implementation on site through use of simple BMP checklist compiled from NEPA document.

Stream crossing with logs placed in the channel on the Sawmill Aspen Project on the Escalante Ranger District.



E. Soil Survey Activities

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil survey activities.	Progress reviews, management attainment report annually during years of programmed survey work; report annually.	H/H	± 15% of Plan direction

Methods.

Evaluation of soil survey activities on the Dixie National Forest.

Variation.

Forest Plan direction is to complete the soil resource inventory at an Order 3 level on the productive forest and rangeland, and an Order 4 level on lower producing lands (page II-52).

Results.

Forest-wide field soil inventory data collection (described on page II-51 of the Forest Plan) has been completed. Future analysis of this data will determine if additional fieldwork is needed.

Interpretation.

Is further evaluation needed? No. Inventory completion is within the 15% variance.

What are the implications? None.

Conclusion. No variation that would cause further evaluation and/or change in management direction was identified.

Monitoring Resources Available.

Resources have been available for this inventory.

Recommendation.

Soil survey work will now shift to population and utilization of the National Soil Information System (NASIS) database to assist with project- and above-project-level analysis.

F. Soil and Water Improvements Inventory

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil and water resource improvement needs inventory	Annual Update and report.	H/H	Detection of improvement needs requiring early treatment or of higher priority than on current list.

Methods.

Assessments of ecosystems above the project-level to identify and prioritize restoration and land management actions necessary to achieve management objectives for watersheds and landscapes.

Variation.

Detection of improvement needs requiring early treatment or has higher priority than on current list.

Results.

The Watershed Condition Framework was completed in 2011 and rated all watersheds as properly functioning, functioning-at-risk, or impaired. This database will be used to select watershed projects in the future for the Forest. Two watershed action plans (Birch Creek and Tropic Reservoir) were developed from this process that identifies specific watershed improvement projects that will be pursued within the next few years.

Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. Watershed improvement needs are being identified where desired conditions are not being achieved.

Monitoring Resources Available.

The hydrologists have increased support to Districts and will update the Forest-wide watershed condition framework (WCATT) as needed, to develop proposals for out-year project planning to define improvement objectives and, with the Soil and Water Program Manager and Ecosystem Management Staff Officer, program adequate out-year funding to accomplish objectives. Districts and the hydrologists will coordinate more closely on implementation of complex projects, by clearly defining objectives and developing plans well in advance of implementation.

Recommendation.

Continue updating watershed needs inventories.

Road decommissioning projects, such as this one near Big Springs on the Cedar City Ranger District, are treatments that reduce wet meadow soil compaction.



SECTION 12. WATER

A. Water Quality Standards Compliance

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with State Water Quality Standards	Monthly baseline monitoring as described in Dixie Water Quality monitoring Plan, coordination with State 208 Agency; report annually.	M/M	Violation of Utah Water Quality Standards.

Methods.

Monthly baseline water quality monitoring sampling.

Variation.

Violation of Utah Water Quality Standards.

Results.

Water quality on five sites were sampled and analyzed in fiscal year 2012.

1. Headwaters Santa Clara River (STORET 4940660), tributary to the Virgin River
2. Pinto Creek (STORET 4950640), flows into Newcastle Reservoir
3. Birch Creek (STORET 4953942), tributary to the Escalante River
4. North Creek (STORET 4954625), tributary to the Escalante River
5. *E. coli* Sampling on Pine and Antimony Creeks on the Escalante Ranger District

Santa Clara River: Twelve field samples were taken; no exceedence occurred. This compared to 2 exceedences on phosphorous in 2011 and 4 exceedences on phosphorous in 2010. As in previous years, the winter showed the highest levels of phosphorous, though levels were markedly steady throughout the year. Winter 2010 produced a combination of high temperatures and high precipitation which lead to episodes of runoff and flooding in excess of 25 year events, which may have explained exceedences the previous year. Some phosphorous normally flushed out during spring run-off may have come early this year as a result of these events. Also, in spring of 2009 a project was initiated in Pine Valley to remove recreation and camping areas adjacent the stream and build larger campgrounds at upland locations which allow a more effective vegetative stream buffer. While construction has continued through 2011, much of the restoration activity near the stream was completed early in implementation, during 2009 and 2010. This may be one factor contributing to higher phosphorous levels in 2010. There was also a fire in the Pine Valley Wilderness during late summer 2009 which may have provided higher levels of organic phosphorous than normally available during the spring of 2010. A combination of improved buffer near the stream, restoration of vegetation and ground cover in the fire area and lower flow during 2012 may all have contributed to the improved water quality in the Santa Clara River.

Phosphorous loading lower and less erratic in 2012 than the previous year, and lower in 2011 than in 2010. Flow was lower in 2012, but higher in 2011 than 2010. Turbidity was lower

each successive year, suggesting that sedimentation of fine clays (which are likely to contribute adsorbed phosphorous) may have also occurred at lower rates each year. TDS was also lower in 2012 than the previous year.

Pinto Creek: 12 samples were taken; exceedence occurred with phosphorous on 3 samples, compared to 8 in 2011 and 7 in 2010. The phosphorous results for three months were missing from the data, and that may contribute to the reduced number of exceedences. The largest factor however is probably the reduced flow in Pinto Creek during 2012. All exceedences were with the acute water quality standard. The months that were exceeded were April, May, and August 2012. The other months were just below the acute level allowed. The month with the highest level of phosphorous, April 2012, was during the high flow associated with the snowmelt during the spring runoff period.

Flow rates in Pinto Creek were lower in 2012 and slightly higher in 2011. Phosphorous was lower in 2012, though April peaked higher than any samples in 2011 and was higher in August than the previous two years. Like the Santa Clara, Pinto Creek was also affected by flooding in the winter of 2010, which may account for a lower initial pulse of phosphorous early in that year. One factor contributing to phosphorous levels may be the general instability of Pinto Creek banks and the added fines resulting from widening and entrenchment of the stream channel over the last several years. Pinto Creek was also added to the 2010 draft Utah 303(d) list of impaired waters for macro-invertebrates.

Birch Creek: Although 10 field samples were taken only 9 samples had in-situ parameters measured due to equipment failure one month. All pH and all but one Dissolved Oxygen measurements were within the range of standards. The May measurement of Dissolved Oxygen was 7.0 which is below the 8.0 mg/l requirement for early life stages. In the 2012 water year (WY) exceedence occurred with phosphorous on 2 samples whereas in the 2011 WY exceedences occurred 4 times. The months that were exceeded in WY 2011 were not the same months exceeded in WY 2012 (the months exceeded in WY 2012 were July and August). Four of the other months had detectable levels just below the acute level allowed. In WY 2011 the months with the highest level of phosphorous were during the high flow associated with the snowmelt during the spring runoff period. In WY 2012 although the months with the highest level of phosphorous are typically during a baseflow period, both times water was sampled the flows were higher due to recent flooding associated with rain storm events.

North Creek: Like with Birch Creek, although 10 field samples were taken only 9 samples had in-situ parameters measured due to equipment failure one month. Also data from the lab for one sample was apparently lost by either the lab or the Utah Department of Environmental Quality. There were no exceedences for pH or Dissolved Oxygen on the months measured. Although there were no exceedences that occurred with phosphorous in WY 2012, nearly all of the samples had detectable phosphorus levels just below the acute level allowed. Contrastingly in WY 2011 most of the samples were at or just above the acute level allowed.

In Birch Ck Phosphorus levels are likely to be related to the surrounding geology and flow-paths associated with runoff through a particular lithology. Although the two streams can not be said to be different (in statistically significant terms using a T-test at 95% confidence level)

the phosphorus levels in North Ck fluctuated less which could be associated with the attenuating impact of the reservoir upstream of the sampling site. The one dissolved oxygen measurement that was below the standard during May was only 1 mg/l below the standard and occurs in a location of Birch Creek where the forest fisheries biologist has never observed fish and has observed that the habitat is lacking for fish. Therefore, it is unlikely that this minor decrease in dissolved oxygen below the minimum required is causing any negative impacts to the aquatic biota in the stream.

Approximately 11% of the combined samples from Birch Creek and North Creek exceeded the state total phosphorus criteria. One hundred percent of our samples for all the other parameters were in compliance with state water quality standards.

Results from different sampling sites from different years on the forest are 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 many of the streams in southwestern Utah.

The data from WY 2012 suggests that rain storm generated runoff is as likely or more likely to impact certain water quality parameters like phosphorus as is snowmelt generated runoff. Since the sampling is done discretely (once per month) and the temporal extent of some of the parameters is not known, it is unknown if other acute exceedences occur throughout the year.

E. coli Sampling on Pine and Antimony Creeks on the Escalante Ranger District

No *E. coli* concentrations exceeding state standards were observed on either stream sampled. Pine Creek had higher *E. coli* Concentrations than Antimony Creek with concentrations being highest in July for Antimony Creek and August for Pine Creek. Although *E. coli* concentrations did not exceed state standards for the designated use 2B the most probable concentration in August was only 89 counts/ 100 ml below the standard (579 vs 668) for the highest sample taken that day. Samples with relatively high counts were taken on the receding limb of a rainstorm induced flow event. It is likely that the higher concentration of *E. coli* was a result of either or both of the following processes associated with the higher streamflow:

- 1) Sediment and hosted fecal coliforms in the water column being scoured into suspension from the channel bottom and banks due to increased stream power.
- 2) *E. coli* being transported from fecal matter through overland flow paths and ephemeral draws.

Although total coliform concentrations in Pine Creek do not show as dramatic as an increase for the August sampling as do *E. coli* concentrations, they too are elevated for likely the same reason as that stated above. Due to asynchronous sampling, expanded comparisons between Antimony Creek and Pine Creek cannot be made.

Interpretation.

Is further evaluation needed? Yes. Some samples exceeded the State phosphorus criteria levels. The remaining parameters (except dissolved oxygen on one measurement) had a one hundred percent compliance with State Water Quality Standards.

What are the implications? Some streams may not have the capability to meet water quality standards due to the nature of the soil and geology, especially phosphorus. Water quality sampling indicates that we are usually in compliance with State of Utah Water Quality Standards. Exceptions to this appear to be phosphorus and suspended sediment.

Results from different sampling sites from different years on the Forest are 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 many of the streams in southwestern Utah.

Conclusion. Natural background of geologic materials may be affecting water quality more than land management practices.

Monitoring Resources Available.

District and Forest Hydrologists plan and implement monitoring water quality. Sampling has been done every year on a monthly basis.

Recommendation.

In order to measure water quality that is reflective of watershed conditions, it is important to select sites for sampling that will be as stable as possible so as to avoid measuring localized anomalies in the stream water quality.

B. Best Management Practices – Water Quality

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effectiveness of Best Management Practices in meeting water quality objectives and goals.	Project monitoring as described in Dixie Water Quality Monitoring Plan or project plans, to include chemical, physical, bacteriological, invertebrate, sedimentation or other parameters needed to meet monitoring objectives, variable frequency for measurement and reporting.	H/H	Non-achievement of water quality goals, violation of Utah Water Quality Standards
	Inspection of drainage and erosion control measures on ground disturbing activities annually; annual reporting.	M/M	Exceed Forest standards and guidelines.

Methods.

Project monitoring to evaluate if sedimentation or other parameters are needed to meet monitoring objectives.

Variation.

Not achieving water quality goals, violation of Utah Water Quality Standards, and exceeding Forest standards and guidelines would cause further evaluation and/or a change in management direction.

Results.

Sunset North Fuels Project (Powell Ranger District) – This project was monitored after the thinning and piling implementation was conducted. Burning of slash piles did not damage the residual Cottonwood Gallery adjacent to Hillsdale Canyon and post burn slash pile locations did not contribute sediment or runoff.

Barney Top Firewood Cutting Zone Extension (Escalante Ranger District) - Ocular observations of locations within the designated area where it could be determined that firewood was cut (evidence primarily included cut stumps and/or saw dust pilings along the length of where the log had laid on the ground before being removed). Fire wood cutting off of the road by more than 50 feet was only evident in a few locations (found approximately 5 locations where off road uses occurred). Of these locations, evidence of vehicles off road was only observed on 3 of them. Rutting from vehicle tires was not observed at any of the locations; furthermore, vegetation was laid down but did not appear to be damaged.

Bridge Fire Use Monitoring (Powell Ranger District) - The Bridge Fire Use Fire occurred during the summer of 2010 and resulted in large areas of high severity burn within the Ingram Hollow sub-watershed which is an area containing the Clarion Formation subsurface geology. Following some high intensity short duration thunderstorms that August and subsequent spring runoff large gullies have formed in the sub-watershed. Spring runoff and summer

thunderstorms caused considerable gullying and sedimentation. Head-cuts which formed in 2010 have now developed into a complete gully system throughout the watershed.

Duck Creek Campground Monitoring (Cedar City Ranger District) - Monitoring of Loop D was initiated when on the ground disturbance exceeded 15% of each of the sites..

At a minimum Sites 90 and 91 should be rested from use at least 50 % of the time or until the ground cover has reestablished over most of each of these sites. The use of a grass seed mix and the use of wood chips would be one approach.

If a more complete rehabilitation approach is preferred then D Loop should be considered for a rebuild. This should include:

- Gravel or paving at each site to delineate parking
- Gravel or paving on the loop roads
- Construction of tent pads at each site
- Use of wood chips on designated trails throughout the loop.

Interpretation.

Is further evaluation needed? Yes. Rest for developed campsites may be needed to restore these sites.

What are the implications? Further degradation to developed sites and expansion of disturbance zones with future use.

Conclusion. Soil and water conservation practices need to be applied within developed recreational facilities.

Monitoring Resources Available.

Zone Hydrologists conduct monitoring on a project basis.

Recommendation.

Consider closing Duck Creek Campground Loop D for rehabilitation.

Hillsdale Canyon (within the Sunset North Fuels Project) Cottonwood Gallery with residual slash.



C. East Fork Sevier River Water Yield Increases

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Water yield increases in East Fork of Sevier Watershed	WRENSS water yield methodology; annual monitoring and reporting.	L/M	Exceed minimum management requirements in timber harvest model

Methods.

Water yield measurements.

Variation.

Exceeding minimum management requirements in timber harvest model.

Results.

This monitoring has been dropped from consideration. It is not our intent to increase the spring discharge of the Sevier River but 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.

Interpretation.

Is further evaluation needed? No, not relevant.

What are the implications? The premise for this monitoring is no longer accepted science.

Conclusion. There is a variation causing further evaluation and/or change in management direction, which is the premise that management activities would be designed to increase water yield, when the desired conditions are not such.

Monitoring Resources Available.

No resources have been allocated for this monitoring.

Recommendation.

A Forest Plan change is needed to drop this monitoring requirement.

D. East Fork Sevier River Stream bank Stability

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Stability of Stream banks in East Fork of Sevier River drainages	Sequential photopoints, measure stability rating in representative reaches; annual reporting and monitoring.	M/M	Exceed Forest standards and guidelines

Methods.

General Technical Report RMRS-GTR-47 “Monitoring the Vegetation Resources in Riparian Areas” by Alma H. Winward, April 2000.

Additional clarification for riparian studies was adapted from General Technical Report RMRS-GTR-121 “Guide to Effective Monitoring of Aquatic and Riparian Resources – Part III: Effectiveness Monitoring for Streams and Riparian Areas Within the Upper Columbia River Basin: Sampling Protocol for Integrator Reaches Vegetation Parameters” by Marc Coles-Ritchie and Richard C. Henderson, March 2004.

Additional clarification for riparian studies and species’ ecological status and stream bank stability ratings were adapted from Idaho Technical Bulletin No. 2005-02 “Monitoring Stream banks and Riparian Vegetation – Multiple Indicators” by Ervin R. Cowley and Timothy A. Burton, September 2005.

Variation.

Variation that would cause further evaluation and/or change in management direction would be to “Exceed Forest standards and guidelines”.

Results.

During 2012, 236 long-term trend monitoring studies were completed on the Dixie National Forest. 96 were upland range trend monitoring studies, 69 were Level III Riparian Inventories, and 71 were photo points completed by Forest personnel.

These monitoring studies were performed in 63 allotments across the Dixie National Forest. This work was accomplished by the Forest Vegetation Monitoring Crew. People on this crew included Mark Madsen (Forest Botanist), Shannon Hess (Biological Science Technician), and Erika Dobson (Biological Science Technician). These monitoring studies were accomplished during the 2012 field season from April 16 – November 6.

Stream bank stability: Forest Plan standards and guidelines for bank stability (general direction – standard and guideline 4A – pg. IV-42) and wildlife and fish (general direction - standard and guideline 6B – pg. IV-33) require that we “maintain 50 percent or more of total stream bank length in stable condition.” For this analysis, this standard is interpreted as maintaining 50 percent of all riparian areas with at least a moderate bank stability rating. Out

of the 69 Level III Riparian Inventories sampled on the Dixie National Forest in 2012, 64 (93%) had stream bank stability ratings that were rated as moderate, good, or excellent. These ratings indicate long-term stable bank conditions in these riparian areas. There were three sample sites evaluated for the East Fork of the Sevier River drainage in 2012. All three of these sites had stream bank stability ratings that were rated as good or excellent.

Interpretation.

Is further evaluation needed? The 2012 sample of riparian areas within the East Fork Sevier River drainage of the Dixie National Forest are meeting this Forest Plan standard and guideline. Therefore, no further evaluation and/or change in management direction is needed at this time.

What are the implications? If the stream bank stability levels drop below 50 percent, increased habitat loss and sedimentation could occur.

Conclusion. In 2012, there were three sample sites evaluated for the East Fork of the Sevier River drainage. All three of these sites had stream bank stability ratings that were rated as good or excellent. These sites are meeting this Forest Plan standards and guideline. Therefore, no further evaluation and/or change in management direction is needed at this time.

Monitoring Resources Available.

Yes. This monitoring is the responsibility of the Dixie NF Botanist and long-term vegetation monitoring crew.

Recommendation.

Continue to monitor the East Fork Sevier stream bank stability annually. Areas not meeting Forest Plan standards and guidelines for riparian condition should be sent to the appropriate District rangeland management specialist to be evaluated. If the range specialist determines that these areas are able to be improved through permit action, then an adjustment in the AOIs for each site affected should be made.

E. Watershed Improvement Effectiveness and Maintenance Needs

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effectiveness and Maintenance needs of watershed improvements	Visual inspection 1 st year after installation and every 5 years thereafter. Annual reporting.	L/H	Maintenance required or project not accomplishing stated objectives.
	Volumetric measurements of retained sediments, variable frequency and reporting.	M/M	Project not accomplishing stated objectives

Methods.

Visual project monitoring.

Variation.

For watershed improvements, stated objectives are not met or maintenance not completed.
 For retained sediment, project not accomplishing stated objectives.

Results.

During 2012, three watershed improvements projects were monitored:

Sweetwater Riparian Enclosure (Escalante Ranger District) - The Sweetwater riparian enclosure contains 32 acres of springs, streams, riparian area, and forest. It is constructed with both wooden worm and t-post with wire styles. It is unknown at this time when and why exactly the enclosure was built, but the assumption is being made that it was for water resource protection. On the north side of the fence there is an ephemeral draw which has flooded in the recent past depositing sediment to the same height as the wooden worm fence in that section. The wire portion of the fence on the east end has also received damage in part due to flooding and is not functional as it has broken fencing wire and t-posts. The remainder of the fence has a number of sections where trees have fallen on and damaged it. Also in 2012, base flow discharge was measured at the upstream and downstream ends of the enclosure in order to determine lateral flow contribution from the hillslope springs in the enclosure. Based on the results of those measurements it was calculated that the stream has a net gain of approximately 170 L⁻¹min. of lateral flow from the springs within the enclosure. Although it is unknown how long this fence has been in place and what kind (if any) of maintenance has been performed on it, the wooden portion of the fence appears to have held quite well except in isolated locations where trees have fallen on it or flooding has occurred. Based on observations of the wire fence that crosses the stream, it is recommended that a swinging type of fence be installed in that location. It is also recommended that qualitative monitoring of springs and vegetation use occur in the enclosure to determine if repairing the fence leads to a noticeable difference in vegetation use and springs condition.

Dipping Vat Spring Area Restoration (Escalante Ranger District) - This project involved removal of Juniper and conifer from the aspen stand around the spring and some of the

meadows by way of a Bobcat machine with a fecon head and also by chainsaw. Some of the Dipping Vat Spring Area Restoration Project was implemented during the Fall and Winter of 2009, 2010, 2011, and summer of 2012. During the first year of implementation (2009), the fuels crew implementing the project placed some of the wood designated as slash in the ephemeral stream channel near Dipping Vat Spring in order to decrease channel erosion and aggrade the downcutting channel. Ocular observations in 2012 of the stream channel with slash placed in it. Some of the sections of stream channel had more slash in them than initially envisioned. It was noted that there have not been any flows large enough to scour the channel since the wood was placed in it. Because there had not been any scouring flows at the time of monitoring, conclusions as to the effectiveness of the wood in the channel at decreasing channel erosion and leading to channel aggradation cannot be made at this time. Although some sections seemed to have an overabundance of wood placed in them, after the limbs lose their needles and snow is able to compress the limbs the amount of wood in the channel may not appear over abundant. Although this channel is clearly ephemeral at this point in time, there were observations made of an old willow skeleton and a few chokecherry and dogwood plants which indicate that the channel may have at one time been intermittent seasonal. It will be of interest in the future if the channel does aggrade substantially, to note if the stream channel also changes in its temporal flow classification because of its hypothesized ability to retain water longer.

Mud Springs Improvement Project (Escalante Ranger District) - In 2011 a wooden post and pole enclosure fence was constructed around the springs. Photos were taken in 2010, 2011, and 2012 of the springs and fences condition. Although the springs are still down-cut, vegetation in the springs has noticeably increased in both extent and in health (Figure 16). This noticeable change appears to have occurred within 1 year of the enclosures being built and has not changed as noticeably from 2011 to 2012. The wooden post and pole fence is in good condition as expected since it is still quite new

Interpretation.

Is further evaluation needed? Yes, many projects were not monitored after they were installed.

What are the implications? We are learning from projects we are implementing to improve resource protection.

Conclusion. We need to emphasize follow-up monitoring on watershed project implementation.

Monitoring Resources Available.

District and Forest Hydrologists conduct monitoring on a project basis.

Recommendation.

Continue monitoring.

Mud Springs photos taken in 10/2009 (top), 9/2011 (middle) and 9/2012 (bottom).



F. Riparian Area Management Goal Accomplishment

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Accomplishment of riparian area management goals	Sequential photopoints, forage utilization level measurements (total and browse), stream channel stability ratings, stream channel morphology measurements, streambed materials measurements; annual monitoring and reporting.	M/H	Exceed Forest standards and guidelines.

Methods.

Stream channel morphology and materials measurements and water temperature monitoring.

Variation.

Forest Plan standards and guidelines exceeded.

Results.

Escalante Ranger District Water Temperature Monitoring - Nine stream temperature monitoring locations within the Headwaters Escalante River Watershed were chosen based on location of current or future management actions where it would be of benefit to determine baseline water temperature conditions. The following table lists the stream monitoring locations as well as the sub-watershed and elevation of the monitoring site.

2012 Stream Temperature Monitoring			
Stream	Location	Elevation (ft)	6th Field Huc
4 Spring Draw	At FH 17 Crossing	7770	Birch Creek
Hungry Ck	At Upstream End of Old Beaver Pond Meadow	8380	Lower Pine Creek
Hungry Ck	At Downstream End of Old Beaver Pond Meadow	8370	Lower Pine Creek
Pine Ck	Lower Pine Ck Near Gauging Station	6390	Lower Pine Creek
North Ck	At Forest Boundary	6590	Lower North Creek
Birch Ck	At Forest Boundary	6760	Birch Creek
Upper Valley Ck	At Lower X-section Below 146 rd xing	7100	Upper Valley Creek
Water Canyon	Approximately 0.25 miles Below Water Canyon Trail Head	8050	Upper Valley Creek
Hall Ck	Approximately 400 feet Above FH 17 Crossing	7510	Birch Creek

Stream temperature average, maximum, and range vary widely across the Headwaters Escalante River Watershed. The highest daily average recorded did not necessarily occur during the same months for each stream. Some of the streams did record the highest

temperatures in late June which were followed by a sharp drop in temperature for a few weeks period before rising again. For all of the streams the daily average and maximum temperatures appear to trend closer to convergence during the autumnal cool down period (for some of the streams this is only weakly observed). On Hungry Creek, the temperature at the upstream end of the meadow was consistently cooler than the temperature at the downstream end of the meadow. The anomalous observation of a temperature decrease in early July could not be correlated with discharge or weather due to a lack of that data being readily available. It is recommended that temperature probes be deployed to measure air temperature at some of the sites to perhaps be able to help provide insight into some of the stream temperature observations. The temperature measurements made on Hungry Creek suggest that even small open meadows can lead to observable increases in stream temperature. It is recommended that other similar stream meadow situations be monitored to determine if this observation is unique to Hungry Creek or also holds true to other streams. Based on the temperature data variations and anomalies, it would be useful to have deployable stage loggers for many of the streams in better understanding the base hydrologic conditions of the streams. This in turn would be useful in determining the sensitivity of some streams water temperature to management actions.

Forestwide Riparian Vegetation and Ground Cover Monitoring

Successional Status: The Forest Plan requires the Forest to maintain riparian areas at $\geq 60\%$ of potential for management level 3 riparian areas. Potential for late seral community types is defined by % gradient and substrate classes (Dixie NF LRMP IV-41 amended 9/95; revised 3/96). In a sample of 69 riparian sites across the Forest during 2012, 47 of the sampled riparian areas (68%) are maintained at 60% of potential or above as required in the Forest Plan for management level 3 riparian areas. 22 riparian sites or 32% are not being maintained at 60% of potential as required by the Forest Plan. 1 of these 22 riparian sites not meeting Forest Plan requirements is on the Powell Ranger District and is the direct result of the Sanford wildfire that burned through this area in 2002. This riparian area has not yet recovered from this large wildfire. Therefore, there are a total of 21 monitoring sites of 69 (30% of all Level III Riparian Inventories performed in 2012) where the Forest Plan Standards and Guidelines have been exceeded. These sites may be a result of management activities not influenced by uncontrolled wildfire. The riparian areas that are not meeting Forest Plan standards and guidelines are located on the Pine Valley, Cedar City, Powell, Escalante, and Teasdale Ranger Districts of the Dixie National Forest. Therefore, further evaluation of these riparian sites may be warranted to determine if a change in management direction is needed and able to improve them.

Percent Ground Cover: Forest Plan standards and guidelines specific to Management Areas 4A, 9A, and 9B for ground cover in riparian areas (Management Area 4A direction – standard and guideline 4B – pg. IV-79, Management Area 9A direction - standard and guideline 3B – pg. IV-141, and Management Area 9B direction – standard and guideline 3B – pg. IV-150) require that the Forest: “Maintain at least 80 percent of potential ground cover within 100 feet from the edges of all perennial streams, lakes, and other water bodies, or to the outer margin of the riparian ecosystem, where wider than 100 feet.” Since no potential ground covers have been defined for riparian areas on the Dixie National Forest, for the purpose of this analysis, potential is assumed to be 100 percent for all riparian areas. Out of the 69 Level III Riparian Inventories sampled on the Dixie National Forest in 2012, 14 fell within Management Area

9A. 1 sampled site fell within Management Area 9B. Of these 15 riparian inventories, none of them had ground covers of less than 80% along the green-line. Therefore, no further evaluation or change in management is needed for ground cover in Management areas 9A or 9B on the basis of percent ground cover in 2012.

Areas identified as exceeding this Forest Plan Standard and guideline for riparian condition are sent to the appropriate District rangeland management specialist to be evaluated. If the range specialist determines that these areas are able to be improved through permit action, then an adjustment in the AOIs for each site affected should be made.

Cherry Creek (Powell Ranger District) Cross-Sectional Analysis - Cherry Creek displays morphology indicative of recent activity and instability including headward erosion of plunge pools and low cementation. Vegetation along the banks is limited while riparian vegetation is nearly absent beyond the cottonwood groves. Establishment of riparian vegetation along the channel will provide stability to the structure. Changes in stream morphology will be monitored with consideration of the removal of junipers and any effect on stream stability.

Prospect Creek (Powell Ranger District) Cross-Sectional Analysis - Prospect Creek displays a continuum of morphology ranging from deeply incised sandy banks to wide coarse gravel and cobble beds. Riparian vegetation is virtually absent except for the cottonwood groves outlining the channels. Junipers dominate areas of finer soils along the channel producing shade subsequently trampled by livestock. Changes in stream morphology will be monitored with consideration of the removal of junipers and any effect on stream stability.

Rock Creek (Powell Ranger District) Cross-Sectional Analysis - Rock Creek displays morphology indicative of recent activity and instability including wavering and colluvial fans extending from the terrace walls. Riparian vegetation along the banks and terrace walls is very limited though existing vegetation does provide some support. Establishment of riparian vegetation along the channel will provide stability to the structure; however, in order for establishment to take place, livestock incursion must be limited. Current instability of loose terrace walls may be improved by small structure grasses. Changes in stream morphology will be monitored with consideration of the removal of junipers and any effect on stream stability.

Birch Creek (Escalante Ranger District) Cross-Sectional Analysis - Birch Creek progresses through varying levels of entrenchment with limited vegetative support. Due to high pine needle coverage preventing the establishment of riparian vegetation and loose bank walls in many locations, it is anticipated that future high flows will result in changes to channel morphology. Immediate concerns include the impacts of recent disturbances due to installation of a grade control structure below cross-section #3. Establishment of riparian vegetation along these newly developed slopes will provide stability to the structure; however, near-term livestock incursions along the banks would be detrimental to riparian vegetation establishment and therefore inhibit channel establishment. Changes in stream morphology will be monitored with consideration of the constructed grade control structures.

Clay Creek (Escalante Ranger District) Cross-Sectional Analysis - Clay Creek appears to be in a transition of slope including braiding, cascades along sudden changes in slope, and frequent high water activity with high sediment loads. Future visits should include interpretation of changes in slope above the cross-section. Changes to stream morphology

will be monitored with consideration of recent installation of a culvert below the cross-section.

Griffin Springs Creek (Escalante Ranger District) Cross-Sectional Analysis - Griffin Spring future stability is strengthened by the presence of lush riparian vegetation. At this time, definitive distinctions can be observed between grass height within and without the enclosure. Changes to stream morphology will be monitored with consideration of the impacts of recent disturbances due to installation of the enclosure and effects of the enclosure over time.

Hall Creek (Escalante Ranger District) Cross-Sectional Analysis - Hall Creek's channel banks experience high pine needle coverage limiting the establishment of riparian vegetation. The lack of riparian vegetation does cause concern for stream stabilization, and it is anticipated that future high flows may result in changes to channel morphology due to limited stability. This site may be a candidate for juniper removal and consequential monitoring. Immediate concerns include possible impacts associated with the installation of a culvert and changes in stream morphology will be monitored with consideration of the anticipated culvert construction.

Horse Creek (Escalante Ranger District) Cross-Sectional Analysis - Horse Creek experiences low levels of entrenchment within the bounds of steep terrace walls. Terrace walls are laying back; however, stabilization is limited due to exposed, loose soils, and cattle trail disturbances. Though internal channel structure is supported by lush riparian vegetation, future high flows will result in changes to terrace morphology and significantly increase fine sediment burden. Immediate concerns include the impacts of continued livestock disturbances including terrace and bank erosion as well as cropping of grasses that maintain channel stability. Encouragement of riparian vegetation along terrace slopes and reduction of livestock incursion will increase stability of the structure. Changes in stream morphology will be monitored with consideration of channel and terrace impacts and stability.

North Creek (Escalante Ranger District) Cross-Sectional Analysis - It is recommended that future research on this study area includes a longitudinal profile and slope determination. Stream stability at this time appears relatively strong; however limited riparian vegetation is of immediate concern. High flows may significantly impact steep, exposed terrace walls to the east and areas of limited grass coverage on the west. Impacts will include addition of fine materials to the stream and ultimately accumulation of sediments downstream. Changes in stream morphology will be monitored with consideration of a potential culvert replacement.

Pine Lake Creek (Escalante Ranger District) Cross-Sectional Analysis - Cascading erosion through terrace walls is due to short-term, sporadic high flows. Changes in stream morphology will be monitored with consideration of high flows and headword erosion of the terrace plunge.

Upper North Creek (Escalante Ranger District) Cross-Sectional Analysis - North Creek appears to have experienced a consistently low flow regime for an extended period of time allowing the establishment of a stable channel with greater than expected sinuosity. Distinct ecological niches within the area merit further investigation. Future stability will be strengthened by the presence of large riparian vegetation such as water birch and rosewood which may be threatened by the encroachment of juniper along the river channel. Changes to

stream morphology and sediment input will be monitored with consideration of the impacts of changes in stream flow, livestock incursion, and riparian vegetative stability.

Water Canyon Creek (Escalante Ranger District) Cross-Sectional Analysis – Though Water canyon channel walls are supported by existing root systems, it is not known how much of those root systems are alive and propagating since the fire. Most riparian vegetation in the area is young and in the early stages of establishment. Despite embedded substrates, visual inspection after high water activity since the time of this study reveals that the channel morphology incurred some modification. It is anticipated that future high flows will also result in changes to channel morphology. Immediate concerns include the impacts of recent disturbances due to installation of a grade control structure below cross-section #2. Continued vegetative establishment post fire will stabilize the channel and its resistance to change. Additionally, substrate composition will be monitored for stabilization.

Santa Clara River (Pine Valley Ranger District) Cross-Sectional Analysis - Despite recent reconstruction of the surrounding recreational area, the Santa Clara river has appeared to have progressively stabilized since 2002. Long term changes in channel morphology will continue to be monitored in consideration of recent impacts due to construction.

Interpretation.

Is further evaluation needed? Yes, monitoring indicates that many of the wetlands and riparian areas associated with streams are at some level of risk.

What are the implications? Riparian areas may not be in or moving toward desired conditions.

Conclusion. More data is needed to determine if there is a variation causing further evaluation.

Monitoring Resources Available.

Hydrologists and the Forest Botanist have been conducting measurements.

Recommendation.

Continue monitoring to acquire data from which to compare in the future.

Monitoring stream cross section on the Santa Clara River (Pine Valley Ranger District).



SECTION 13. MINERALS

A. Exploration Proposals

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Exploration proposal: adequacy of permitting process	Evaluation of one case history on each Ranger District; annual reporting.	M/M	Non-compliance with the Regional standards and direction

Methods.

Evaluation of mineral proposals.

Variation.

Non-compliance with the Regional standards and direction.

Results.

In 2012, the Dixie NF has monitored the activities for two existing Plans of Operations for exploration of locatable minerals. Dixie National Forest works closely with State officials for locatable mineral operations compliance, bonding and reclamation. Demand continues to be moderate and steady for locatable minerals and mineral material disposals from common use mineral sites. Interest and demand continues from State, County, private, and commercial organizations to provide mineral materials (gravel, landscape rock etc.).

Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. All exploration activities remained compliant with the Plans of Operation.

Monitoring Resources Available.

Dixie Mineral Staff and Utah State Department of Oil Gas and Mining personnel.

Recommendation.

Continue monitoring when new proposals are received and at least quarterly during active explorations.

B. Lease/Permit Applications

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Lease/Permit application forms and NEPA process (compliance with Regional standards and direction)	Inventory pending cases, evaluate adequacy of lease/permit and operating plan requirements, review EAs covering leasing and permits. Evaluate one on each Ranger District. Annual reporting.	M/M	Deviation from 1984 (1991) FS/BLM Agreement, lease and operating plan requirement are found inadequate to meet multiple resource needs, EAs inadequate.

Methods.

Evaluation of leasing/permit process.

Variation.

Deviation from 1984 Forest Service/Bureau of Land Management (FS/BLM) Agreement, lease and operating plan requirement are found inadequate to meet multiple resource needs, Environmental Assessments (EAs) inadequate.

Results.

Expressions of interest for 8 parcels are being considered for future BLM oil and gas lease sales. The BLM is responsible to respond to these expressions of interest and to inform the Dixie NF when expressions are being considered. The BLM State Office must provide the Forest Service a copy of the notice of competitive lease sale at least 30 days prior to final posting and printing to allow the Dixie NF 30 days to review and respond that the correct stipulations are being used for each sale parcel on FS lands.

The Environmental Impact Statement for Oil and Gas Leasing Analysis was completed for the Dixie NF and a Record of Decision was signed August 23, 2011. Approximately, 231,513 acres are available with Controlled Surface Use; the remaining 1,246,714, acres are available for lease with No Surface Occupancy. Approximately 59,000 acres of sensitive aquifers will not be available for leasing.

The Forest Plan was amended (Amendment # 24) to include Procedures for Oil and Gas Leasing, the Oil and Gas Leasing Matrix, and updated resource protection stipulations for lands administered by the Dixie NF. No changes were made to management directions.

Interpretation.

Is further evaluation needed? Respond to requests from BLM when Expressions of Interest are identified.

What are the implications? BLM will forward Expressions of Interest to the Dixie NF.

Conclusion. None.

Monitoring Resources Available.

Not applicable this reporting period.

Recommendation.

Monitor leasing and on-lease activity when they resume in the future.

C. Development Proposals and Administration

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Site-specific development proposals and administration of operations, compliance with terms of operating plans and existing agreements.	Field examination ongoing during operations, outlines in Regional standards. Annual reporting.	H/H	Any unacceptable or unexpected results that deviate from the Environmental Assessment and approved operating plan; inadequacy or unreasonableness of lease/permit terms and operating plan requirements.

Methods.

Field examinations are development proposals.

Variation.

Any unacceptable or unexpected results that deviate from the environmental assessment and approved operating plan; inadequacy or unreasonableness of lease/permit terms and operating plan requirements.

Results.

All active exploration projects have been examined quarterly for compliance with operating plans. All operations are compliant. Annual inspection reports are completed for 26 oil and gas operations. Surface use plans are being updated where necessary.

The number of community mineral material sales and free-use permits (State and County) issued each year remains relatively high. Most permits are for material in existing gravel and cinder pits. Some but not all pits have operating plans. Updated operating and reclamation plans are being analyzed and reviewed for the east zone Ranger Districts. Some of these plans are 20 or more years old and need review and revision. Emphasis is needed on this aspect of mineral activity to meet future demands and to be responsive to in-Forest, County and State needs.

Interpretation.

Is further evaluation needed? Continue to evaluate for future needs.

What are the implications? None.

Conclusion. There have been no unexpected or unacceptable results that deviate from the Environmental Assessments or Operating Plans for mineral projects during 2012.

Monitoring Resources Available.

Continue to evaluate for future needs.

Recommendation.

Continue monitoring existing pits. Prepare updated analysis for expansions to meet future needs.

D. Reclamation Results

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Reclamation results: Effectiveness of work done	Field examination annually of 25% of operational areas that have been closed 2-3 years; annual reporting.	H/H	Any unacceptable or unexpected results that deviate from the Environmental Assessment and approved operating plan

Methods.

Reclamation and close-out was completed at two locations.

Variation.

Any unacceptable or unexpected results that deviate from the Environmental Assessment and approved operating plan.

Results.

Concurrent reclamation efforts have been monitored on two sites, neither resulting in the release of the reclamation bonds since activities are ongoing. One reclamation bond was evaluated and reassigned to a new operator for an existing exploration project.

Cleanup and reclamation for the General Steam abandoned mine site on the Pine Valley Ranger District was completed.

Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. No variation that would cause further evaluation and/or change in management direction was identified.

Monitoring Resources Available.

The Forest Minerals Management Specialist will conduct annual inspection to monitor revegetation results and to ascertain no encroachment occurs on decommissioned travel ways.

Recommendation.

Continue to contact operators when operations are nearing completion to discuss reclamation required by operating plans. Release bonds only when work is satisfactory.

E. Reserved and Outstanding Mineral Rights

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Exercise of reserved and outstanding rights by owner of minerals	Monitor mineral-related activity on NFS surface, ongoing frequency. Reporting as activity affecting NFS management occurs.	M/M	Any impacts adverse to NFS management of surface resources.

Methods.

Evaluation of mineral rights.

Variation.

Any impacts adverse to National Forest System (NFS) management of surface resources.

Results.

The Dixie National Forest has very limited areas of reserved or outstanding mineral rights. No opportunity to process or administer reserved or outstanding rights occurred over the monitoring period.

Interpretation.

Is further evaluation needed? N/A

What are the implications? N/A

Conclusion. N/A

Monitoring Resources Available.

The Forest Minerals Administrator along with each Ranger District has a resource specialist with minerals management duties to conduct monitoring.

Recommendation.

Oil and gas (O&G) leasing activity is expected to resume and may achieve previously high levels encountered in the 1970s and 1980s since the Forest-wide O&G leasing analysis (Environmental Impact Statement) was completed. Monitoring of lease activity, including exploratory drilling, would become a high priority and could require significant increases in funding and personnel time to accomplish.

The number of mineral material sale and free-use permits issued each year remains relatively high. Almost all permits are for material in existing gravel and cinder pits. Some but not all pits have operating plans, but the plans are 20 or more years old and need review and revision. Emphasis is needed on this aspect of mineral activity monitoring in the future.

SECTION 14. LANDS

A. Special Use Permits

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Special Use Permits, applications, amendments, and transfers	Quarterly land use reports. Reporting as scheduled in fiscal year action plan.	M/M	Deviation from R-4 standards

Methods.

Special Uses Permits¹⁰ applications, amendments, and transfers evaluated in 2012.

Variation.

Deviation from R-4 standards.

Results.

Seventeen special use applications, amendments, or transfers in 2012 were evaluated on the Dixie National Forest.

Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. This item tracks the volume of work relating to special use permits, applications, amendments and transfers.

Monitoring Resources Available.

No resources were allocated to maintain records of applications, amendments, or transfers that were processed.

Recommendation.

Continue monitoring to determine trends across the Forest and effects to resource specialist time allocations.

¹⁰ This monitoring item refers to non-recreation special use permits.

B. Special Use Permit Administration and Inspection

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Special Uses (non-recreation) permit administration and inspection	Land use reports annually on permits scheduled for inspection. Reporting as scheduled in fiscal year action plan.	M/M	Deviation from R-4 standards

Methods.

Special Uses (non-recreation) permit administration and inspection completed in 2012.

Variation.

Deviation from Regional (R-4) standards.

Results.

Non-recreation special use administration and inspection was implemented in 2012 on 182 permits. Recreation special use administration and inspection was implemented in 2012 on 99 permits. Region 4 standards were met.

Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. None.

Monitoring Resources Available.

Resources have been limited to accomplish this monitoring.

Recommendation.

Continue monitoring.

C. Land Survey

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Land Survey	Annual management attainment report. Reporting as scheduled in fiscal year action plan.	H/H	± 10% of planning period target

Methods.

Surveying has been zoned to the Regional Office Team and is no longer accomplished through the Dixie National Forest.

Variation.

Plus or minus 10% of planning period target.

Results.

Regional staff manages land survey.

Interpretation.

Is further evaluation needed? No. Accomplishment was within targets for surveying.

What are the implications? None.

Conclusion. No variation causing further evaluation and/or change in management direction has been identified.

Monitoring Resources Available.

Resources have been available for target accomplishment and monitoring.

Recommendation.

Review this monitoring item for possible Forest Plan change because the responsibility for this resource is no longer on the Forest.

D. Land Exchange

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Land Exchange	Land adjustment plan, management attainment report annually on all acres planned for exchange. Reporting as scheduled in fiscal year action plan.	H/H	± 50% of planning period target

Methods.

Land exchange activities monitored.

Variation.

Plus or minus 50% of planning period target.

Results.

No land exchanges occurred in 2012. The responsibility, funding, and priorities for land exchanges no longer reside on the Dixie National Forest. This resource has been zoned to Regional Office teams.

Interpretation.

Is further evaluation needed? No. The Forest did not accomplish land exchanges as expected in the Forest Plan.

What are the implications? Over time, case processing for a land exchange has increased from approximately 1-3 years to 4-5 years, which has affected the Forest’s ability to meet Forest Plan expectations.

Conclusion. The projected target in the Forest Plan is no longer accurate.

Resources Available.

The Forest has no resources available to accomplish this monitoring – funding is held in the Regional Office for this resource.

Recommendation.

Use a Forest Plan change to drop this monitoring item.

E. Rights-of-Way

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Rights-of-Way	Right-of-way acquisition plan annually on assigned targets. Reporting as scheduled in fiscal year action plan.	H/H	± 50% of planning period target

Methods.

Annual right-of-way acquisitions.

Variation.

Plus or minus 50% of planning period target.

Results.

The responsibility, funding, and priorities for rights-of-way no longer reside on the Dixie National Forest. This resource has been zoned to Regional Office teams.

Interpretation.

Is further evaluation needed? No. Rights-of-way targets were met to the best of the Forests abilities.

What are the implications? This monitoring, accomplishment, and priorities are determined by the Regional Office.

Conclusion. The targets and monitoring are no longer a responsibility of the Forest since this resource has been zoned.

Monitoring Resources Available.

The Forest has no resources available to accomplish this monitoring – funding is held in the Regional Office for this resource.

Recommendation.

Drop this monitoring item.

F. Through Utility Construction

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Construction of Through Utilities	Construction within approved corridors/windows; monitoring and reporting every 5 years.	H/H	Environmental analysis determines that a proposed corridor/window is better suited than those approved in the Forest Plan

Methods.

Implementation activity relating to the construction of through utilities.

Variation.

Environmental analysis determines that a proposed corridor/window is better suited than those approved in the Forest Plan.

Results.

No utilities were approved for construction in 2012.

Interpretation.

Is further evaluation needed? No.

What are the implications? Corridors appear to remain appropriate. This monitoring item is out of date and not needed. Utility corridors must be designated in the Forest Plan, they cannot be designated with and EA or EIS.

Conclusion. No variance has been identified to change management direction.

Monitoring Resources Available.

Monitoring resources have been available for this item.

Recommendation.

Consider a Forest Plan change to drop this monitoring item.

SECTION 15. FACILITIES

A. Road and Bridge Construction/Reconstruction

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Road and bridge construction and reconstruction	Annual accomplishment report; report every five-years.	H/H	5% deviation from projected quantities

Methods.

Road and bridge construction projects are accomplished through Forest Service labor or formal contracts. Engineering personnel monitor each project for contract compliance as the project is accomplished. Accomplishments are recorded in an annual roads accomplishment report.

Variation.

5% deviation from projected quantities. Table IV-2 in the Forest Plan projects 35 miles of local roads constructed or reconstructed in 2012. Permanent road construction is relatively rare on the Forest. Due to funding restrictions, less than ten miles of roads are generally reconstructed annually, although the number fluctuates based on the award of special project funding.

Results.

The following roads were reconstructed or rerouted in 2012:

1. Burnt Canyon Road – FSR# 30004
2. Clay Deposit Road – FSR# 30274
3. Collie Flat Road – FSR# 30003
4. Barney Top Road – FSR #30132
5. Main Canyon Road – FH 17
6. Bowery Creek Road – FSR #30049

The following bridges and major culverts were reconstructed in 2012:

1. Bear Creek Culvert
2. Lake Creek Culvert

Interpretation.

Is further evaluation needed? No.

What are the implications? Road reconstruction projections should be updated to match work that can be completed with anticipated funding levels.

Conclusion. The Forest annually constructs bridges for aquatic organism passage and reconstructs roads and bridges when special project funding is available, but at lower levels than are projected in the Forest Plan.

Monitoring Resources Available.

Monitoring resources are needed to inspect roads and bridges to identify health and safety issues and prioritize reconstruction projects.

Recommendation.

Adjust Forest Plan road reconstruction projections, continue monitoring.

B. Road Management

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Road Management	Continuous road logs condition surveys, and signs; report every five years.	M/M	5% downward trend in the condition of existing roads

Methods.

The Washington Office annually determines road condition surveys to be performed on the Forest according to a random sample. Over the past few years, the Dixie has been assigned roughly 2-3 road surveys per year.

Road bridges are inspected on a bi-annual basis. Concrete bridges are inspected by the Regional structural engineer; timber bridges are inspected by certified inspectors on the Forest.

The Forest sign crew annually identifies signs in need of repair or replacement.

Variation.

A 5% downward trend in the condition of existing roads.

Results.

The number of roads surveyed annually is too low to determine the trend in the condition of existing roads. However, funding for roads maintenance has dropped significantly over the past few years and the miles of roads receiving maintenance has dropped. Forty-one bridges were inspected in 2012. Many bridges on the Forest were constructed between 40 and 50 years ago. They are reaching the end of their design life. The Forest sign crew is actively installing and replacing signs throughout the Forest.

Interpretation.

Is further evaluation needed? Yes.

What are the implications? There is insufficient data to determine the overall trend in the condition of existing roads. Many bridges are near the end of their usable life. If they are not repaired, Forest access will be restricted.

Conclusion. There is insufficient data to determine whether the overall condition of the Forest road system is improving or deteriorating. Bridges are being constructed and replaced on the Forest, but these activities are generally in response to flood damage or an aquatic organism passage barrier. The numbers of bridges reaching their design life is higher than the number being replaced on heavily-used Forest roads. Signage on Forest roads is improving as the sign crew is installing and repairing signs faster than they deteriorate.

Monitoring Resources Available.

There are insufficient resources to conduct road condition surveys as required by the Forest Plan.

Recommendation.

Pursue funds to increase condition survey frequency. Continue to monitor the condition of bridges and pursue funding for replacement and reconstruction.

C. Buildings

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Buildings	Annual Inspection reports. 5-year reporting.	M/M	Excessive deterioration of existing buildings

Methods.

All Forest Service owned facilities are monitored according to FS direction. The Dixie National Forest is currently on a 5 year rotation for condition surveys, accomplishing approximately 20% each year. Survey results and deferred maintenance needs are entered into the INFRA database. The monitoring and entering of deferred maintenance needs allows the Forest to prioritize facility work each year.

Variation.

Excessive deterioration of existing buildings.

Results.

The following table shows the facilities that were monitored in FY2012.

Building ID	Building Name	Condition Survey Date	Inspector
0723	Navajo Lake Pump House	07/26/2012	Steven O’Neil
0725	Duck Creek C.G. Pump House	07/26/2012	Steven O’Neil
0231	Panguitch Dwelling (South)	08/06/2012	Steven O’Neil

Building ID	Building Name	Condition Survey Date	Inspector
0234	Panguitch Bunkhouse Building	08/06/2012	Steven O'Neil
0241	Escalante Dwelling #1	09/18/2012	Heaton/O'Neil
0242	Escalante Lower Admin Bunkhouse	09/18/2012	Heaton/O'Neil
0361	Escalante Dwelling Garage	09/18/2012	Heaton/O'Neil

All buildings have been inspected over the past ten years. Inspections revealed buildings in various states of condition. Buildings that are in use are maintained to a reasonable standard. Abandoned or unused buildings are not adequately maintained and are to be explored for decommissioning, conveyance or alternate use.

Interpretation.

Is further evaluation needed? Yes. Buildings that are in use and necessary to support the Forest's daily operations are to be maintained to a reasonable standard. Buildings that are abandoned or do not support the Forest's daily operations are not maintained as adequate funds are not available to maintain all buildings. Because this trend will continue, the Forest is in the process of re-writing its Facility Master Plan to better manage the facility deferred maintenance back-log.

What are the implications? Buildings will continue to deteriorate unless the deferred maintenance backlog is reduced.

Conclusion. A variation causing further evaluation and/or change in management direction has been identified.

Monitoring Resources Available.

Building Inspections are performed by the Forest on schedule.

Recommendation.

Continue the inspection process. Implement Facilities Master Plan (FMP), with emphasis on disposal of buildings identified in the FMP for decommissioning. Identify alternative funding sources for buildings identified in FMP for alternative uses. Decommission buildings identified in FMP for alternative use if proper use and adequate alternative funding cannot be identified. Continue safety inspections to identify critical maintenance items to prioritize allocation of funding. Monitoring is required by the Forest Plan and other direction. Monitoring should continue at a rate of 20% per year for five years until 100% of the buildings have been monitored.

D. Dam Administration

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Dam Administration	Annual Inspections and reporting.	H/H	Administrative failure to follow-up on unsafe dams

Methods.

The dams located on the Forest, including those owned by the Forest Service and those owned by others, are inspected according to the hazard class. High-hazard dams are inspected annually, moderate-hazard dams biannually, and low-hazard dams every five years. Most dams have been inspected according to the schedule with the results being that many have been reconstructed and upgraded to bring them up to State and Federal standards. High hazard dams are inspected by the State, with coordination from the Forest.

Variation.

Administrative failure to follow-up on unsafe dams.

Results.

The Forest dam program has been active in reconstructing and upgrading permitted dams. Beaver Dam, Fish Creek, Upper Barker, Lower Barker, Joe Lay, Upper Enterprise, and Calf Springs Creek dams have been reconstructed during the last five years to bring them up to current standards. Kings Creek and Lower Enterprise dams have been core drilled to evaluate structural adequacy. Remote telemetry devices have been installed on Lower Bowns and Spectacle Reservoir dams. A new outlet pipe was installed on Spectacle, a new hydraulic gate was installed on Lower Enterprise, and a new outlet gate was installed at Panguitch Lake.

Forest-owned dams (Pine Valley, Flat, Robs, and Pine Creek) continue to be under-funded, and in need of heavy maintenance and/or reconstruction. The Navajo Lake Dam is operated under a shared maintenance agreement between the Forest Service and the State of Utah. It failed twice during the last few years.

Interpretation.

Is further evaluation needed? No.

What are the implications? Maintenance items identified during inspections of special use dams are generally repaired in a timely manner. Because maintenance of Forest Service owned dams is dependent on special project funding, it is often deferred until funding is available.

Conclusion. The Forest is meeting its obligation to inspect dams on the State mandated schedule. The maintenance of Forest Service owned dams needs to improve.

Monitoring Resources Available.

There are sufficient monitoring resources available to perform the required inspections.

Recommendation.

Continue the annual inspection of the dams according to the dam hazard classifications. The Forest Engineer will coordinate with the State Agency for high and moderate hazard dam inspections. Continue to pursue all funding opportunities to repair/maintain Forest Service owned dams.

E. Drinking Water Regulation Compliance¹¹

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with Utah Public Drinking Water Regulations	Required chemical analyses and reporting every 3 years	H/H	Violation of primary maximum contaminant levels

Methods.

All Forest Service water systems (see below) are monitored according to state and federal requirements. Federal requirements indicate monthly monitoring for bacteria in accordance with FS guidelines while state requirements indicate quarterly monitoring and reporting. All public water systems are monitored monthly as required by FS guidelines while samples are submitted quarterly to the State of Utah in accordance with state standards. Additional tests for nitrate are performed yearly, and tests for sulfate are performed on a 9 year interval.

Currently the Dixie National Forest is under permit with Scenic Canyons Recreation Services for campground concessionaire. This company is the primary care taker of the water systems located across the Forest with exception to Oak Grove and Tropic Roadside Spring. Their responsibilities include sampling and reporting for the campground water systems.

Location

The Dixie National Forest currently owns seventeen public drinking water systems that serve twenty campgrounds or rest stops across the forest. The following table reflects the public drinking water systems.

Water System Number	Water System Name	Ranger District	County
27027	Honeycomb Rocks Campground	Pine Valley	Washington
27028	Pine Valley Campground	Pine Valley	Washington
27029	Oak Grove Campground	Pine Valley	Washington

¹¹ This monitoring item is listed under "Water" in the Forest Plan. It is moved to be under the Facilities heading because it involves maintaining safe drinking water with our facilities rather than water quality of surface water.

Water System Number	Water System Name	Ranger District	County
11041	Cedar Canyon Campground	Cedar City	Iron
11019	Deer Haven Campground	Cedar City	Iron
13019	Navajo Campground	Cedar City	Kane
13019	Spruces Campground	Cedar City	Kane
13020	Te-ah Campground	Cedar City	Kane
13022	Duck Creek Campground	Cedar City	Kane
09043	Panguitch Lake North Campground	Cedar City	Garfield
09043	Panguitch Lake South Campground	Cedar City	Garfield
09019	White Bridge Campground	Cedar City	Garfield
11072	Yankee Meadow Campground	Cedar City	Iron
09044	Red Canyon Campground	Powell	Garfield
09052	King Creek Campground	Powell	Garfield
09047	Tropic Spring Roadside Stop	Powell	Garfield
09017	Pine Lake Campground	Escalante	Garfield
09015	Posey Lake Campground	Escalante	Garfield
09078	Barker Reservoir Campground	Escalante	Garfield
09016	Blue Spruce Campground	Escalante	Garfield

Sanitary Surveys for Water Systems on the Dixie National Forest:

In FY2012 the Forest completed sanitary surveys with the State on three water systems. The water systems that were surveyed are listed in the following table.

State ID Number	Water System Name	Ranger District	Sanitary Survey Date
13061	Navajo Basin (Navajo/Spruce/Teah)	Cedar City	09/18/2012
09043	Panguitch Lake Campgrounds	Cedar City	10/16/2012
09047	Tropic Spring Roadside Stop	Powell	10/23/2012

Variation.

Violation of maximum contaminant levels. Tests performed are: Nitrate and Sulfate contaminant testing and monthly sampling for bacteria.

Results.

All drinking water systems on the Dixie National Forest have been monitored in accordance with State and Federal standards in 2012 with the following exception(s):

Navajo Basin Water System (includes Olsen, Boy Scout and Larsen Springs) – No Nitrate Sample for all sources was collected.

All completed nitrate and sulfate monitoring returned acceptable results. One coliform test exceeded the allowable maximum contaminant level. This test was taken at the White Bridge

Campground water system in an investigative sample. Follow up testing was completed and satisfactory results were obtained.

Interpretation.

Is further evaluation needed? Yes. Bacteria limits are occasionally exceeded in some systems. Routine testing for bacteria is performed as an indicator of operational problems. Some positive samples can be expected in most systems.

What are the implications? Occasional positive bacterial samples can indicate system operational problems requiring corrections, such as leaks. Routine sampling indicates the presence of problems, allowing for correction.

Conclusion. All Forest drinking water systems produce water with contaminant levels below State and Federal standards. No pattern of excessive bacteriological contamination is apparent in the Forest drinking water systems. Continue routine monitoring in accordance with State regulations to insure proper system operation. The Dixie National Forest's water systems are not violating MCL levels and are in compliance with state and federal standards.

Monitoring Resources Available.

Adequate funds and resources were available to accomplish the monitoring to the standards required.

Recommendation.

The monitoring is required by other direction, in addition to the Forest Plan. Monitoring should be continued at the current rate, as required by State and Federal standards.

Broken support stringer on the Page Ranch Bridge (Pine Valley Ranger District).



Unsupported footer on the Harmon Creek Bridge (Pine Valley Ranger District). Note the free flowing water fully 2 feet past the bridge footer.



SECTION 16. PROTECTION – FIRE

A. Fire Prevention Programs

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Adequacy of fire prevention programs	Measure of number and size of person-caused fires annually; report every five years.	H/H	20% increase in cumulative 5-year average

Methods.

Fire prevention officers are employed by the Dixie National Forest and work with cooperating agencies (BLM, Park Service, State). They engage in a variety of activities including public education, signing, patrolling, and enforcing fire restrictions. Funding for these positions are included in the preparedness budget.

Variation.

20% increase (of number and size of person-caused fires annually) in cumulative five-year average.

Results.

We measure the adequacy of our prevention programs by the number of human-caused fires. As shown in the table below, there were thirteen human-caused fires with a total of 8,798 acres burned in 2012. The number of human-caused fires is slightly higher than the five-year average of 11 fires, and acreage burned is above the five-year average of 2,508 acres. Initial attack on human-caused fires was very effective.

Summary of number and acres of human-caused and lightning-caused fires in 2012.

Type of Fire	Ignitions	Acreage
Wildfires-lightning	62	2,415
Human-caused	13	8,798
Total	75	11,213

Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. No variation that would cause further evaluation and/or change in management direction has been identified.

Monitoring Resources Available.

Monitoring resources have been allocated for this monitoring.

Recommendation.

Continue the fire prevention program and monitoring.

B. Wildfires

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Number of wildfires and acres burned	Frequency by size distribution, intensity level, and acres burned annually; report every five years.	H/H	20% increase in cumulative 5-year average for any of the factors

Methods.

Number of wildfires and acres burned.

Variation.

A 20% increase in cumulative five-year average for any of the factors (size distribution, intensity level, and acres burned).

Results.

In 2012, a total of 11,213 Dixie National Forest acres were burned, above the five-year average of 7,179 acres. There were 75 wildfires on the Forest, with the acreage distributed across all Districts.

The Cedar City Ranger District of the Dixie National Forest had the largest fire of the season. The Shingle fire started from human causes on July 1 and grew to 8,061 acres. The next largest fire on the Forest was the lightning-caused Little Pine Fire at 2,222 acres on the Pine Valley Ranger District.

Interpretation.

Is further evaluation needed? No.

What are the implications? The number of fires and acres burned each year fluctuates due to a variety of factors including the number of ignitions and drought.

Conclusion. Continue to monitor trends in number and acres of wildfires.

Monitoring Resources Available.

Monitoring resources have been allocated.

Recommendation.

Continue monitoring.

C. Fire Management Effectiveness Index

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Fire management Effectiveness Index (FMEI)	Evaluate cost plus net value change during fire annually; report every five years.	M/M	20% increase in FMEI (FFP+FFF+NVC)

Methods.

The FMEI is not part of NFMAS (National Fire Management Analysis System). It is made up of some of the same components that are used in NFMAS, which is currently used to measure the efficiency of the planned program against historical fire occurrence. Measurements for current years with this method are not possible.

Variation.

20% increase in FMEI (FFP+FFF+NVC).

Results.

We no longer use this reporting method because it does not adequately measure success of the fire program. As a surrogate for this obsolete metric, initial action effectiveness is calculated. Of the 75 fires in 2012, only 3 escaped initial action efforts. This equates to a 96% initial action 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.

Interpretation.

Is further evaluation needed? Yes, due to recent changes in fire management planning and emphasis placed on the fire management program from Congress and others, the preparedness budget (FFP in the formula) has risen to a point where it exceeds the previous five-year periods' budgets by 20%. Suppression costs (FFF in the formula) have also risen due to increased use of aircraft and contract resources in recent years that also exceed previous time period expenditures by 20% or more.

What are the implications? There is the appearance that the Forest Plan standard is not being met due to changes in the fire program and in measurement criteria in recent years (post-2000).

Conclusion. There needs to be a new measure determined and implemented. Monitoring of the cost-effectiveness of the fire management program is difficult due to wide fluctuations from year to year based on the number of fires, seasonal weather, and appropriated budget fluctuations. The items listed in the formula above are essentially those things used under the NFMAS system but in a slightly different arrangement to measure the efficiency of various fire program options. This system is being replaced by a new interagency planning system that does not use cost as the measure of efficiency, but rather uses cost and measurable program objectives as the measure of efficiency.

Monitoring Resources Available.

On the Dixie National Forest, suppression resources and staffing level is determined by the NFMAS process and funded at the appropriate MEL level. Monitoring resources are currently available.

Recommendation.

Measure the efficiency of the fire program by using number of human starts. Use the number of fires that escape initial attack to measure initial attack efficiency.

D. Fuel Loading Standard Compliance

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with fuel loading standards	Field measurements after activity or field treatment; sample 30% of projects; report every five years.	M/M	Exceeding fuel level guidelines or 10% failure to make targets

Methods.

Acres of prescribed fire, wildfire, and mechanical treatments to reduce fuel loading.

Variation.

Exceeding fuel level guidelines or 10% failure to make targets.

Results.

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 wildfires. This involved data gathered from 328 plots across the Forest. In 2012, the Forest fuels program completed 6,555 acres of treatments. This included 1,780 acres of prescribed fire treatments, 4,775 acres of mechanical treatments and 8,216 acres accomplished under current and prior year contract awards.

Interpretation.

Is further evaluation needed? Yes. 6,555 acres accomplished was only 77% of target for the forest. Limited burning windows, an above average fire season, regional restrictions on prescribed fire and wildfire use decisions and fire restrictions all limited fuel reduction goals.

What are the implications? The forest is cumulatively falling behind on fuel reduction goals.

Conclusion. Continue to monitor and focus on effectiveness of fuel reduction.

Monitoring Resources Available.

Pre- and post-treatment monitoring is not occurring on a regular basis. No standard for effectiveness monitoring has been established.

Recommendation.

Continue monitoring.

Typical Pinyon and Utah Juniper mastication on the Dixie National Forest.



SECTION 17. PROTECTION – INSECTS AND DISEASES

A. Insect and Disease Populations

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Population levels of insects and diseases	Annual aerial surveys by R-4 F.P.M.; annual reporting.	M/M	Building of past [pest] populations

Methods.

Annual aerial surveys, conducted by the Region’s Forest and Pest Management section, have shown that insect activities have been sporadic over the 1987-2011 period. FPM personnel have completed numerous project level insect and disease evaluations during this period. A date visualization project has also been initiated in cooperation with Forest Pest Management which is designed to blend stand data, growth and yield projections, and site photography together in a simulation model to display pest infestation effects over time.

Variation.

Building of past [pest] populations.

Results.

Localized mountain (*Dendroctonus ponderosae*) and western (*Dendroctonus brevicomis*) pine beetle buildups have been observed over the years, as the sustained drought conditions create greater moisture stress and stand susceptibility, particularly in the older trees. Approximately 2000 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 mountain pine bark beetle, along with limb rust and mistletoe, are slowly killing the over-mature ponderosa pine on the forest.

A spruce beetle (*Dendroctonus rufipennis*) population grew to epidemic levels on the Cedar City District in the early 1990’s. The beetle outbreak spread across the Markagunt Plateau resulting in losses of up to 90 percent of the mature and overmature Engelmann spruce trees on thousands of acres. By 2002, the Engelmann spruce subalpine fir forest on the Cedar City District had been altered from a forest dominated by mature Engelmann spruce to one dominated by mature subalpine fir with an understory of mostly subalpine fir, with some Englemann spruce seedling/saplings and variable sized aspen clones.

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.

Since the early 2000s spruce beetles have been active on the Escalante and Teasdale ranger districts. Aerial Detection Surveys from 2003 to 2007 had estimated more than 100,000

Engelmann spruce trees have been killed by spruce beetle on the Escalante Ranger District. These epidemic outbreaks resulted in replacement of mature/overmature spruce stands with a composition of aspen, subalpine fir, and small diameter sized Englemann spruce. Spruce beetle populations continue to be looked at including annual beetle trap monitoring on the Griffin Top of the Escalante District.

Recently the Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) and fir engraver beetle (*Scolytus ventralis*) populations have been affecting large areas of Douglas-fir and subalpine fir trees.

On a service trip in 2012 by FHP scientists, *Ips pini* was identified in an area of the Cedar City District that had been affected by a 2010 wind event that resulted in many downed ponderosa pine trees. There are likely other areas on the Forest that have experienced this same wind event, or others, that have the potential for *Ips* build up. This small population is currently restricted to one small area, but if treatment does not occur in a short time, there is potential for *Ips* to expand into the tops of live trees in the area, affecting a larger areas.

Root rot continues to be widespread. A research/treatment program initiated in the Peterson Grove area on the Teasdale District, and localized treatments have been prescribed in timber sale projects. Results of the research and treatments are pending.

Interpretation.

Is further evaluation needed? Yes.

What are the implications? While spruce beetle infestations have slowed, it is important to continue monitoring their activity in areas that haven't experienced an epidemic. While much of the Cedar City RD has undergone a spruce beetle epidemic, the Escalante RD has not had such widespread epidemics but are at high susceptibility of future infestations. Other insects and disease have increased over the past ten years such as Douglas fir beetle and dwarf mistletoe. These increases have prompted more salvage and delayed other treatment activities such as improving growth in stands of green trees.

Conclusion. A variation causing further evaluation and/or change in management direction has been identified.

Monitoring Resources Available.

Annual aerial surveys, conducted by the Region's Forest and Pest Management completes this monitoring.

Recommendation.

Continue annual aerial surveys, and other FPM field work.

B. Dwarf Mistletoe Suppression

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effectiveness of dwarf mistletoe suppression projects to protect regeneration	Field reviews, follow-up on projects; five-year reporting frequency.	H/H	Infestation in regeneration of pre-commercial thinned areas

Methods.

Pre-treatment surveys, follow-up surveys are completed to monitor dwarf mistletoe activity and reported in activity databases.

Variation.

Infestation of dwarf mistletoe in regeneration of pre-commercially thinned areas.

Results.

Dwarf mistletoe treatments have been prescribed in all affected timber sale project areas initiated during this period, and thousands of acres within individual control projects have been completed. Permanent growth plots have also been established to monitor the long-term effects of mistletoe on tree growth.

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

Interpretation.

Is further evaluation needed? Yes.

What are the implications? The variation causing further evaluation, “Infestation in regeneration of pre-commercial thinned areas” implies any infestation, which may not be feasible.

Conclusion. Disease continues to be widespread in many stands, requiring continued emphasis on treatment and management.

Monitoring Resources Available.

Resources have been available for the Forest to monitor thinned and reforested areas for mistletoe infestation.

Recommendation.

Continue the cooperative work with FPM to properly implement and monitor dwarf mistletoe management projects. Develop a variance that better represent effectiveness of dwarf mistletoe suppression.

SECTION 18. AIR QUALITY

A. Air Quality Compliance

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with Utah State Air Quality Guidelines and Standards	Compliance with weather forecast, burning index, ongoing; report as violations occur.	M/M	Adverse public reaction, settling of smoke into inhabited areas

Methods.

All prescribed burning is implemented in compliance with the Utah Interagency Smoke Management Program. The Dixie National Forest submits an Annual Burn Schedule containing all planned prescribed burns for the calendar year by March 15 of that year to the Utah Interagency Smoke Management Coordinator. For burns greater than 20 acres or those that produce more than 0.5 PM T/D (particulate matter in tons per day), pre-burn information including the burn plan with day/night smoke flow maps to address sensitive receptors and smoke mitigation measures, must be submitted to the smoke coordinator. Permission to burn is given on a daily basis by the Utah Interagency Smoke Management Coordinator.

Variation.

Adverse public reaction, settling of smoke into inhabited areas.

Results.

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 as required. Permission to emit smoke was given before each prescribed burn was ignited. In 2012, Dixie National Forest fire managers complied with State Air Quality Standards, with no violations for significantly contributing to particulate matter. 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.

Interpretation.

Is further evaluation needed? Yes, air quality violations did not occur; however, adverse public reactions did occur.

What are the implications? Plans for burning need to respond to the public's concerns about smoke in their communities.

Conclusion. Variation causing further evaluation and/or change in management direction did occur.

Monitoring Resources Available.

Air quality monitoring in association with prescribed burning is implemented in compliance with the Utah Interagency Smoke Management Program by the District and Forest Fire Management Officers.

Recommendation.

Continue Monitoring. Review this monitoring item in light of likely increased fuels treatment as directed by the National Fire Plan for possible Forest Plan change. The variation that would cause further evaluation and/or change in management direction, “Adverse public reaction, settling of smoke into inhabited areas” may no longer be appropriate.

Citations

Utah Interagency Smoke Management Program

SECTION 19. ECONOMICS

A. Local Economics

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effects on local economies of Forest outputs	District staff reviews and reports of affected sectors annually	[No precision specified in the Forest Plan]	Significant changes in sectors within economic impact areas

Methods.

District staff reviews and reports of affected sectors annually.

Variation.

Significant changes in sectors within economic impact areas

Results.

No data was presented.

Interpretation.

Is further evaluation needed? Unknown.

What are the implications? Unknown

Conclusion. No data was presented.

Monitoring Resources Available.

Insufficient data is available.

Recommendation.

Remove this monitoring item.

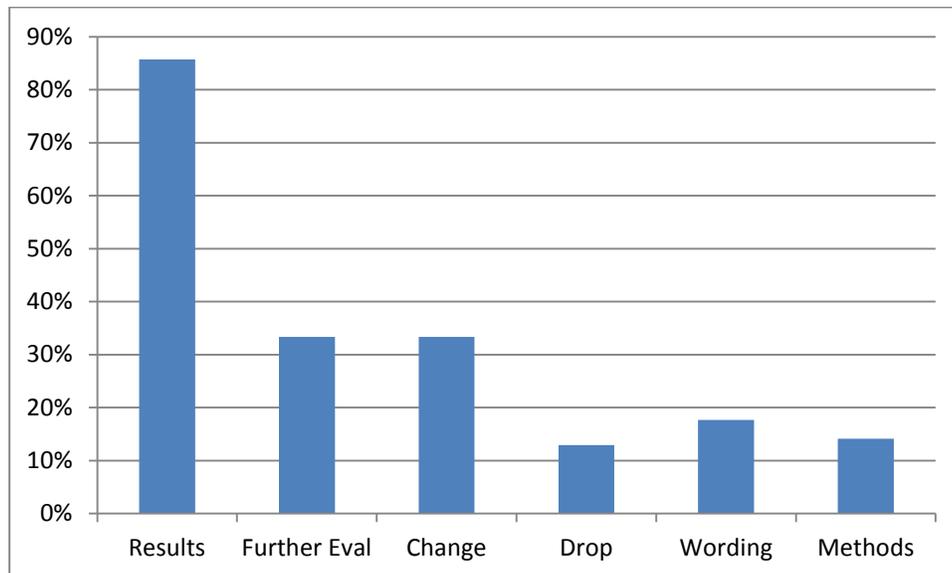
SECTION 20. RESULTS AND RECOMMENDATIONS

Monitoring Results

There are 85 monitoring items listed in the Forest Plan, including 7 monitoring items added with the Northern Goshawk Amendment. Three of the monitoring items in the goshawk amendment monitor essentially the same resource as three in the Forest Plan and are referenced to each other for results in this document. The items in both the amendment and the Forest Plan are: northern goshawk territory occupancy; snag habitat; and forage (grazing) utilization. Results of the monitoring reported for the fiscal year 2012 period are summarized below.

Of the 85 total monitoring items in the monitoring identified in the Plan and amendments, 73 (86%) have been accomplished sufficiently to report results. Of these, 29 (34%) indicate a variation causing further evaluation and/or change in management direction.

Percentages of Forest Plan monitoring items with results (Results), those with variation causing further evaluation and/or change in management direction (Further Eval), items for which a Forest Plan change is recommended (change), and items recommended to drop (Drop), change wording (Wording), and change the method of measure and/or monitoring frequency (Methods).



The total number of monitoring items in each resource and the number with sufficient data to come to conclusions are shown below. Wildlife and Fish, Timber, and Recreation (Developed, Dispersed and Wilderness) have the largest number of monitoring items in the Plan.

Number of monitoring items by resource in the Dixie National Forest Land and Resource Management Plan, and those with results sufficient to make determinations.

