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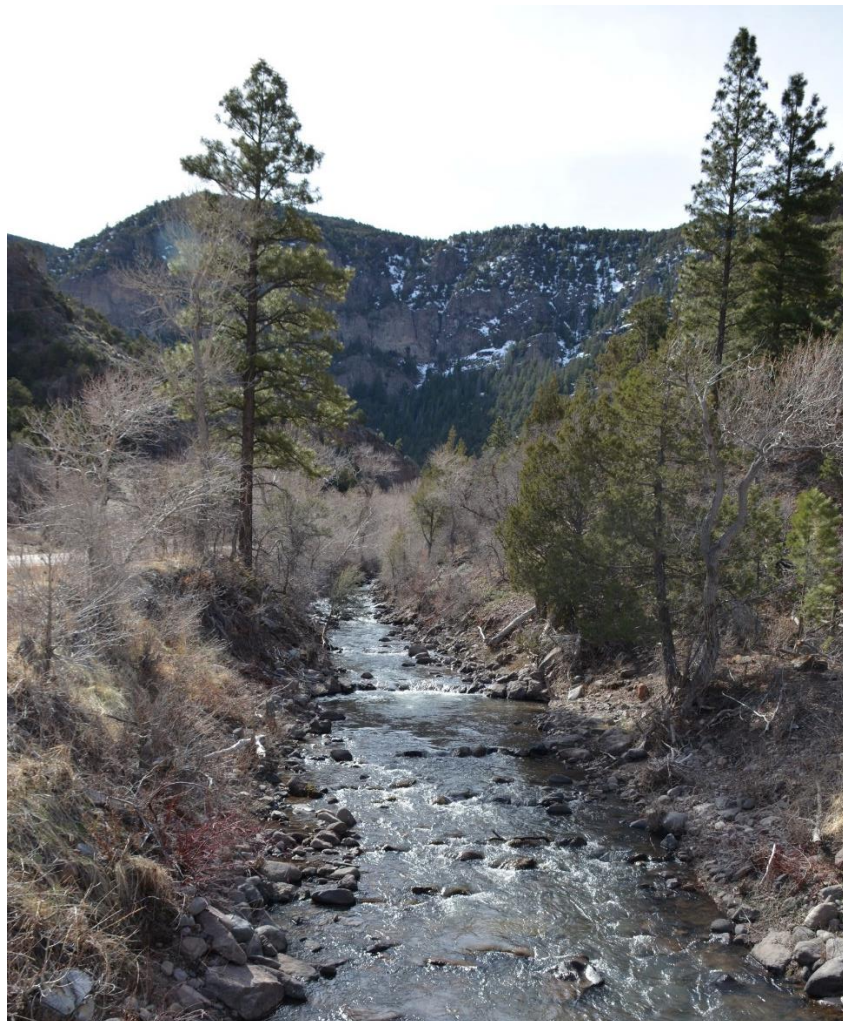
May 2020



Fishlake Forest Plan Monitoring Program

Evaluation of Monitoring Information

In Compliance With 36 CFR 219.12(d)



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Introduction

The 2012 USDA Forest Service Planning Rule directs the development, amendment, and revision of land management plans for 155 forests, 20 grasslands, and 1 prairie in the National Forest System (NFS) in accordance with the National Forest Management Act (NFMA) of 1976. The planning rule ensures that collaborative and science-based plans are developed to provide for ecosystem sustainability, species diversity and conservation, watershed protection, and benefits to public users and communities. The planning rule's three-part adaptive management framework consists of assessments; developing, amending, or revising a plan; and monitoring. Monitoring, as described in 36 CFR 219.12(a)(1), informs management effectiveness and enables the responsible official to determine if changes to plan components, content, or implementation strategies are warranted. Plan monitoring is integrated with broader-scale monitoring strategies outlined by the regional forester in coordination with State and Private Forestry, Research and Development, partners, and the public.

This Biennial Monitoring Report for the Fishlake National Forest presents the monitoring evaluations for 2018-19. The report is separated into two parts. Part one summarizes the determinations from the biennial monitoring evaluations as to whether or not changes to either the forest plan, management activities, the monitoring program, or an assessment relating to the forest plan is needed. The second part presents the program specific monitoring reports as per conformance with requirements of 36 CFR 219.12 (a)(5).

The Fishlake National Forest has been operating under the 1986 Land and Resource Management Plan (LRMP), with several amendments. To comply with the 2012 Planning Rule, modifications to plan monitoring requirements were developed in 2016 to assess key ecological conditions and public benefits; specifically, questions and associated indicators were identified to evaluate resource areas under these contexts.

Part I: Determinations from the monitoring evaluation

Monitoring indicators designed to inform management effectiveness toward achieving the Fishlake National Forest Plan's desired conditions and objectives were evaluated for 2018-19. Based on the new information gathered, determinations as per 36 CFR 219.12(d)(2) are as follows:

Need for change to the Forest Plan

Monitoring evaluations did not indicate a need for change to the Fishlake National Forest Plan.

Need for change to Management Activities

The biennial monitoring evaluation did not indicate a need to change management activities.

Need for change to the Monitoring Program

No need for change to the monitoring program was detected through this biennial evaluation.

Need for an assessment relating to the Forest Plan

Monitoring evaluation did not indicate a need to assess the Forest Plan for change.

Overall, the monitoring evaluation for the Fishlake National Forest shows that the forest plan, management activities, and monitoring program are effectively managing resources to meet the goals outlined in the 2012 Planning Rule. Constraints, such as limited funding and capacity, point to a need to prioritize treatment types, use interdisciplinary approaches, and work with a variety of outside entities to meet collective desired goals for forest resources. Monitoring will continue on the Forest and inform not only adaptive management as conditions change, but allow the Fishlake to identify potential future needs for forest plan revision.

Part II: Program Area Monitoring Evaluation

Recreation

Land and Resource Management Plan (LRMP) Desired Conditions for Recreation (Visitor Use)

Manage the land and activities on it, including visitor use, to achieve desired physical and social recreation settings (LRMP Page IV-3).

Activities and Monitoring Questions

Assure that developed and dispersed recreation site use and physical conditions meet Forest Plan standards.

- **LRMP Standard: “Manage Development Scale 3 and 4 Sites for full service when at least one of the following are met: A.) A campground is designated a fee site; B.) More than 20% of the 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 a staffed visitor information center.**
- **LRMP Standard: Close or rehabilitate dispersed sites where unacceptable environmental damage is occurring (close sites that cannot be maintained in Frissell Condition Class 1, 2, or 3 and rehabilitate sites that are in Frissell Condition Class 4).**

Are developed and dispersed recreations sites meeting Forest Plan standards for use and site condition, and are visitors satisfied?

Monitoring Indicator

Site use and/or evidence of the extent of use. Developed site condition surveys; Frissell condition at dispersed sites; fee collection data; visitor satisfaction data.

Monitoring Methods and Data

Visitor use occurs in a variety of forms and at all times of the year. The Forest has used a variety of tools to collect data to determine use values.

For developed sites tracking the fees collected provides a measure of use trends.

For dispersed sites, where fees don't apply, monitoring the impacts of visitor use provides information on use patterns to determine if there is an increase, decrease or stable trend at these sites. The LRMP identifies Frissell condition as the monitoring method for dispersed site condition. Sidney *Frissell's* article "Judging recreation impacts on wilderness campsites" (Journal of Forestry 1978) was adopted as a standard for the LRMP. *Frissell* proposed a *condition class* method of monitoring campsites, which describes site use in 5 classes:

1. Ground vegetation flattened but not permanently injured. Minimal physical change except for possibly a simple rock fireplace.
2. Ground vegetation worn away around fireplace or center of activity.
3. Ground vegetation lost on most of the site, but humus and litter still present in all but a few areas.
4. Bare mineral soil obvious. Tree roots exposed on the surface.
5. Soil erosion obvious. Trees reduced in vigor and dead.

The LRMP general guideline (LRMP p. IV-15) directs managers to close any sites that cannot be maintained at Frissell condition class 1, 2, or 3.

Formal surveys through the National Visitor Use Monitoring program are conducted on the forest every five years, with the most recent survey completed in 2018. The National Visitor Use Monitoring (NVUM) program provides reliable information about recreation visitors to national forest system managed lands at the national, regional, and forest level. Information about the quantity and quality of recreation visits is required for national forest plans, Executive Order 12862 (Setting Customer Service Standards), and implementation of the National Recreation Agenda. To improve public service, the agency's Strategic and Annual Performance Plans require measuring trends in user satisfaction and use levels. NVUM information assists Congress, Forest Service leaders, and program managers in making sound decisions that best serve the public and protect valuable natural resources by providing science based, reliable information about the type, quantity, quality and location of recreation use on public lands. Specifics on methodology and sampling techniques are detailed in the [NVUM Visitor Use Report 2018](#).

The NVUM classifies forest visits into 3 categories:

1. Day Use Developed Sites (DUDS)
2. Overnight Use Developed Sites (OUDS)
3. General Forest Area (GFA)

Interviews conducted by willing participants resulted in annual visitor use estimates and satisfaction of services provided.

Assumptions

- **Utilization of fee data will capture the majority of use at fee sites. Sites that are reserved through recreation.gov must be paid up front. Walk-in site payment is based on the honor system, especially when a campground host is not present.**

- **Frissell condition classes are adaptable to cover sites where the pre-use conditions exhibit bare mineral soil. This applies mainly to lower elevation sites where annual rainfall amounts from 8-11 inches do not support the development of humus and extensive ground cover vegetation.**
- **2018 NVUM data is sufficiently current to describe existing conditions for use in 2019.**

Results

Developed Sites

Developed recreation site use fee data indicates that use levels are stable overall suggesting that site conditions are meeting the need and level of expectations for visitors. This data was gathered through National Recreation Reservation Service (NRRS) recipient distribution reports from 2015 through 2019. The reports show that use fees at developed recreation sites have slightly increased 2015 to 2019 (Fig 1). It should be noted that use fees are not the same as gross revenues, although trends in gross revenues generally mimic use fee trends.

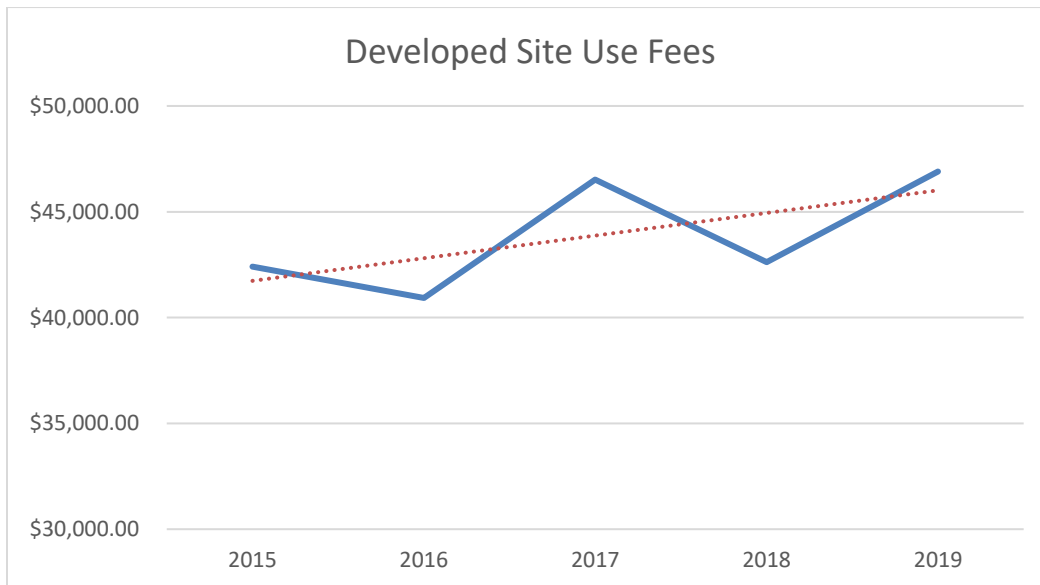


Figure 1. Developed Site Fee Revenue, 2014-2019.

Satisfaction ratings for developed facilities, access, services, and feeling of safety range from 75% to 97% with most reports indicating a rating of “Keep up the Good Work”. Undeveloped areas reported similar satisfaction ratings ranging from 72% to 95% (Fig 2). On average 75% reported being very satisfied with their overall recreation experience (Fig 3), which is identical the 2013 NVUM results, indicating stable overall visitor satisfaction ratings.

Dispersed Sites

In 2018 and 2019 no dispersed sites were identified in Frissell Condition Class 4 or 5 and closures or rehabilitation was not required. Satisfaction ratings for dispersed sites averaged 82% (Fig 2).

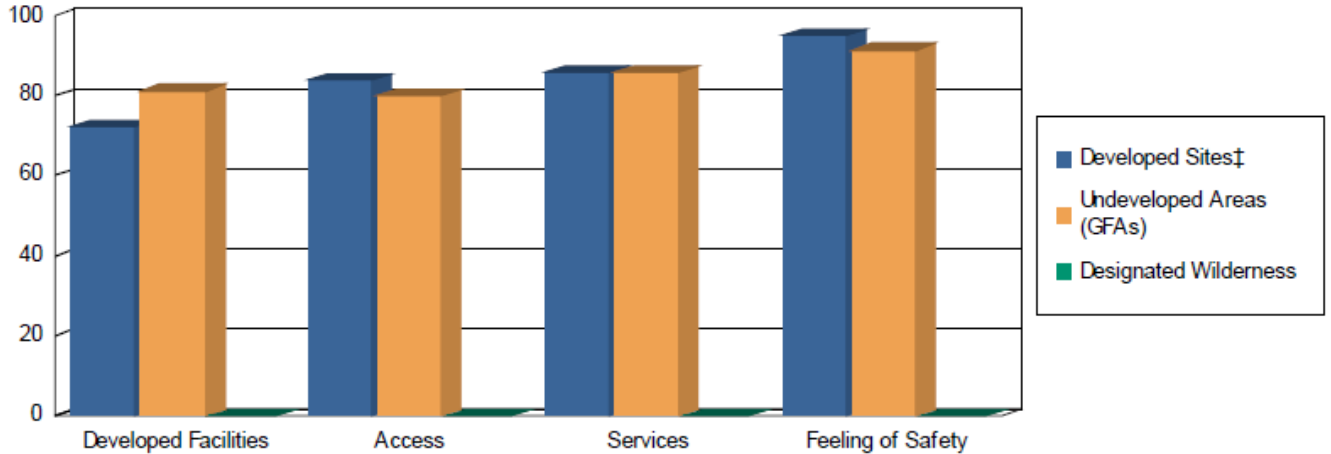


Figure 2. Visitor Satisfaction Ratings (percentage) for Developed and Dispersed Sites.

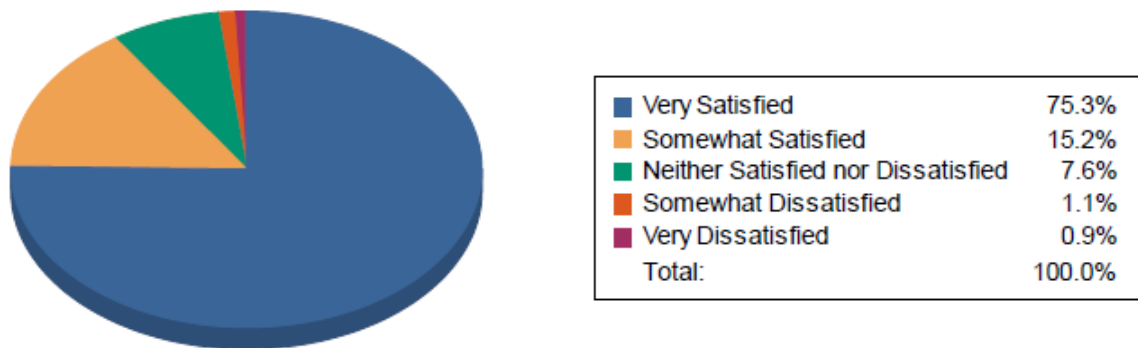


Figure 3. Overall Satisfaction Rating by Forest Visitors.

Recommendations

Continue to support the current NVUM effort on the Forest. Monitor developed sites for infrastructure maintenance needs and educate volunteer campground hosts to provide the best visitor experience possible.

LRMP Desired Conditions for Recreation (Trails)

Provide a trail system for public and resource needs (LRMP Page IV-3).

Activities and Monitoring Questions

Assure that non-motorized and motorized trails are managed to standard and visitors are satisfied.

- Maintain all trails to meet standard of use designated in travel plan.
- Provide a full range of trail opportunities in coordination with other federal, state, and municipal jurisdictions and private industries both on and off NFS lands.

Are trails meeting Forest Plan standards for use and condition, and are visitors satisfied?

Monitoring Methods and Data

Forest ranger districts record and report annual trail maintenance accomplishments. In addition, the program manager for the Forest motorized trail program prepares an annual report detailing work completed. The motorized annual report uses magnetic trail counters and trail cameras to gather data over 920.7 miles of motorized trail within the Paiute and Great Western Trail systems. This data provides an accurate indication of the quantity and trends of use.

Assumptions

- The number of vehicles counted by electronic, non-photo, trail counters assume 1 rider per vehicle. Acknowledgements are made to the increase in popularity of side by side and two-up configuration ATVs may under represent number of users in some instances. Use patterns are further refined through the use of trail cameras which record number of riders per vehicle and vehicle type.
- Implementers are aware of trail designations in the travel plan when completing repairs and trail maintenance.

Results

In 2018 and 2019 non-motorized trail maintenance was completed by forest employees and volunteers. In 2018, 371.6 miles of trails were maintained and 34.4 miles of trails were improved. In 2019, 289.0 miles of trails were maintained, and 78.7 miles of trails were improved.

The motorized trail program is an inclusive approach to trail management system that capitalizes on state, federal, and private resources to complete work. This approach has proven to be very successful to incorporate grant funding, maximize equipment deployment, and increase the workforce which has resulted in a nationally recognized trail system. The trail network that is maintained through the Fishlake Motorized Trail Program incorporates Bureau of Land Management, State of Utah, Private, and NFS lands.

Motorized trail activity and OHV use is the 2nd highest reason visitors come to the Fishlake (NVUM 2018). Use patterns for motorized trails are consistently increasing.

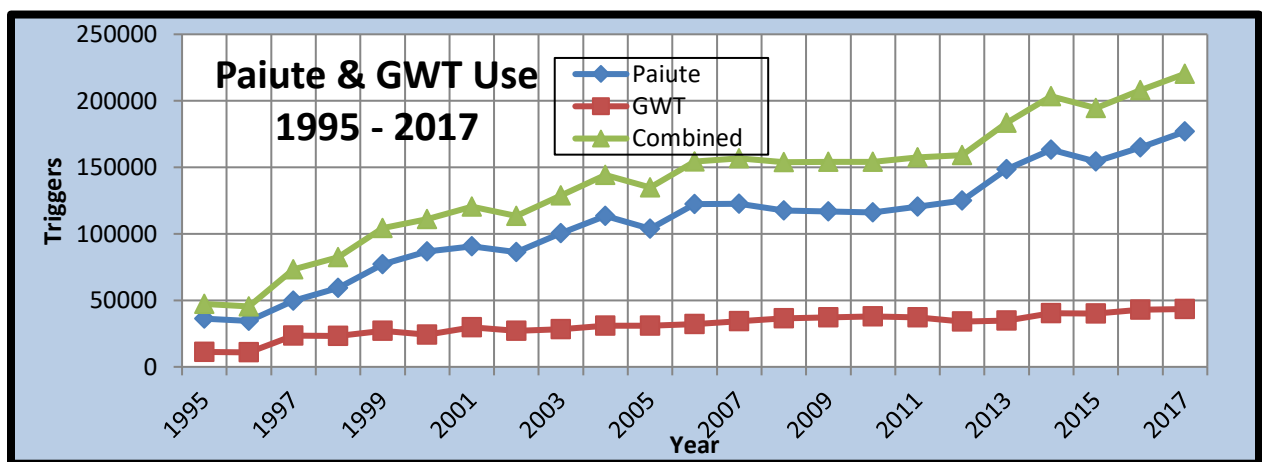


Figure 4. Paiute and Great Western Trail Use, 1995-2019.

Non-motorized trail activity includes hiking, equestrian, and mountain bike trails. These trails, together with the forest’s motorized trail system, meet the standard of providing a full range of trail opportunities across multiple jurisdictions.

Access and services ratings associated with trail use recorded moderately high satisfaction with users; 87% and 76% respectively (NVUM 2018). These 2018 satisfaction ratings are about 13% lower than the 2013 satisfaction ratings. The decline in satisfaction ratings may be at least partially attributed to a trend of diminishing trail maintenance activities, as depicted in Figure 5.

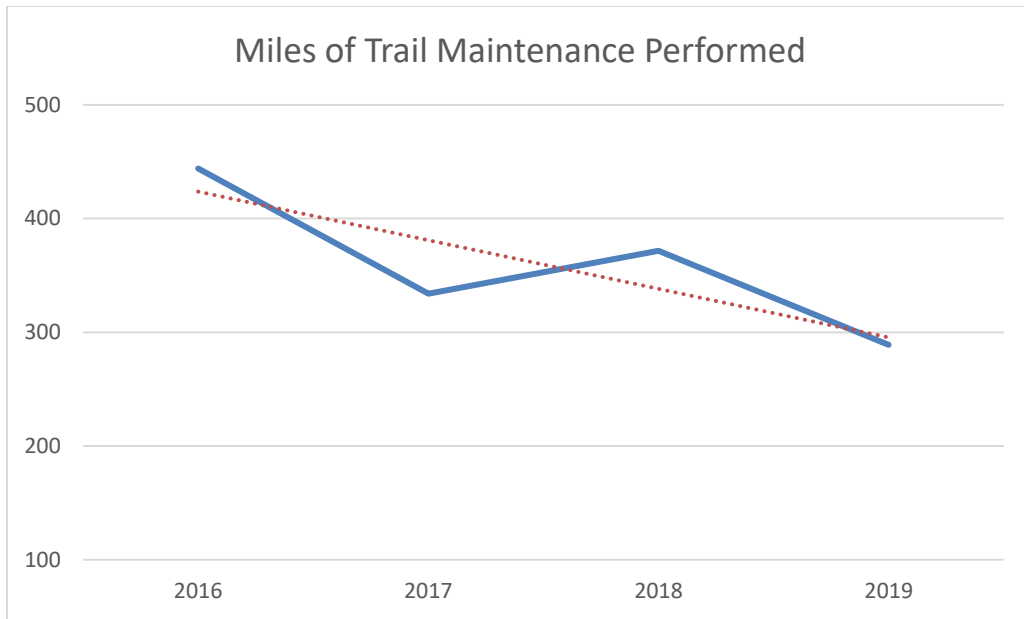


Figure 5. Trail Maintenance Performed, 2016-2019.

In summary, visitors are generally satisfied with the level of services and access currently provided, although satisfaction levels are declining as visitation increases.

Recommendations

Continue to support the Forest Motorized Trail Program with partnerships between the State of Utah and private riding clubs. This program has been an effective way to meet users’ needs and desires for OHV opportunities.

Seek opportunities to increase non-motorized trail maintenance and improvement activities. Continue to seek out opportunities for partnerships and volunteer work for trail maintenance needs. Trail maintenance opportunities can be listed on volunteer websites such as <https://www.justserve.org/>. Partnerships with non-profit organizations that support non-motorized trail activities should also be pursued, as well as grant funding opportunities to support non-motorized trail maintenance work.

Cultural Resources

Land and Resource Management Plan (LRMP) Desired Conditions for Cultural Resources (Protection)

Identify, protect, interpret, and manage significant cultural resources on the Fishlake National Forest (LRMP Page IV-3).

Activities and Monitoring Questions

Sites located and protected: Are historical and cultural resources being protected both from forest plan implementation activities and from vandalism or neglect?

Monitoring Indicator

Number of historical or cultural sites adversely impacted by projects or the public.

Three Priority Heritage Asset sites were documented in FY19 to have been adversely impacted by the public. No known adverse project impacts recorded in FY18 or FY19.

1. Chief Walkara Burial – looted in the last twenty years
2. Greenwich Canyon Burials – looted in the last thirty years
3. Coal Hollow Mine – homeless encampment

Monitoring Methods and Data

The Fishlake National Forest employs a Forest Archaeologist to develop, coordinate, and implement the Cultural Resources program on the unit, including planning, directing, and executing surveys for the location and verification of historical sites and providing guidance to management in marking, protecting, and salvage of these sites. The forest archaeologist ensures that scientific and systematic procedures are followed in identifying, evaluating, and classifying cultural resources. Identified cultural resources are documented and recorded using appropriate site forms, and this data is recorded in a Forest Service cultural resource database and with the Utah State Historic Preservation Office.

Data Limitations

In 2018 the Fishlake National Forest began sharing data with the Utah State Historic Preservation Office and is currently collating state data with Forest Service Data. The Fishlake continues to migrate incomplete data from the 2017 legacy database to the new application with a geospatial component. Furthermore, nearly half of the Fishlake's records and reports are not digital or accounted for in the new database. The Fishlake has hired a seasonal archivist to help rectify the situation.

Historical and Cultural Resource Protection

The following information, derived from the data in the new database, indicates cultural resources were located, monitored, and protected:

A. Although no cultural resource tasks are specifically identified as monitoring tasks in the new database, ten priority heritage assets were visited and their conditions assessed in fiscal year 2019:

04070501667 Wild Cat Guard Station

04080000007 Nawthis Village
04080000361 Old Woman Site
04080000877 Aspen Rock Shelter
04080001330 Lost Creek Site
04080001496 Little Lost Creek Mounds
04080001497 Greenwich Canyon Burials
04080001515 Coal Hollow Mine
04080001531 Lost Creek Mounds
04080002071 Belknap Guard Station

B. Five Section 110 projects were completed in fiscal year 2019:

1. Big Flat Guard Station Stewardship
2. Belknap Guard Station Interpretive Project
3. Condition assessments for 10 Priority Heritage Assets (see above)
4. Section 110 Survey of 200 Acres
5. Mike Griffin Rock Art Surveys

C. 19 Section 106 projects were completed in fiscal year 2019:

19-1319	Emergency Watershed Protection in Cedar Ridge Canyon
19-1314	Box Creek Road Widening
19-1313	Last Chance Guzzlers
19-1307	Pelican Point Pit Material Extraction
19-1305	Holcim Koosharem Clay Mine Expansion
19-1304	NRCS Sevier County Watershed Project
19-1297	Junction Town Culinary Water
19-1296	Fishlake Marina Project
19-1294	Pine Canyon to Koosharem Creek
19-1290	USGS Thermo-Volcanic Geologic Study
19-1289	Richfield Mountain Bike Phase I
19-1286	Last Chance Phase I
19-1284	Fool Creek Water
19-1283	Butterfield Meadows
19-1281	I-70 Fencing
19-1280	Torrey Town Springs Development project
19-1278	SCC Fiber Optic - Dixie
19-1277	SCC Fiber Optic - Fishlake
19-1275	North Fork North Creek Quarry

Recommendations

No changes to the cultural resources monitoring program are recommended.

Timber

Land and Resource Management Plan (LRMP) Desired Conditions for Forest Vegetation (Protection)

Prevent and control insect infestation and disease (LRMP Page IV-5).

Activities and Monitoring Questions

Assure that timber manipulation will not favor an increase in forest pests (insects, diseases, etc.): Are forest vegetation conditions stable or moving toward Forest Plan desired conditions?

Monitoring Indicator

Extent of insect and disease infestations.

Monitoring Methods and Data

For the past 25 years, the Forest Service's Forest Health Protection (FHP) aviation group has conducted annual insect and disease detection surveys throughout the Intermountain Region. Using fixed wing aircraft, the FHP flies in a grid pattern over the forest while entomologists sketch map the foliage below. These Insect and Disease Detection Surveys (IDS) are used to detect and monitor insect outbreaks. The completed sketch maps are digitized for use in Geographic Information Systems (GIS), while the results are published in condition reports.

Assumptions

Data and Data Quality

Aerial detection surveys are an efficient and economical method of collecting and reporting data on forest insects, diseases, and other disturbances. Aerial sketch mapping is the primary data-collection method: data are collected by aerial observers from the Forest Service and other cooperating state and federal agencies. Areas of damage are captured as polygons on hardcopy 1:100,000 scale maps or through a Digital Sketch mapping System (D-ASM). The D-ASM uses a moving map display, GPS tracking, and touch screen technology to create a digital version of the data on-the-fly in the aircraft. Regardless of the method, it is important to note that sketch mapping is a valuable but subjective endeavor with inherent spatial and attribute inaccuracies.

Polygons are coded to identify the damage agent, damage type, and other attributes. Reporting the number of dead trees or dead trees per acre is required for areas with mortality. In large areas where mortality is widely scattered, other attributes may be used to capture the pattern of damage, but are not required. In all cases, mortality may be continuous or discontinuous; therefore, acres are reported as acres "with" mortality.

Areas with mortality are summarized on this map by 12-digit or 6th-level USGS subwatersheds. These 10,000 to 40,000 acre units are consistent with those in the Forest Service Watershed Condition Framework (Potyondy and Geier 2011). At the national scale, watershed summarization makes it easier to visualize mortality information. It especially helps highlight areas where activity consists of small and sparsely located polygons as is the case with some key species like southern pine beetle and emerald ash borer.

Managing Insects and Diseases

While there is little scientific support for the notion that insect epidemics or diseases can be arrested or "prevented" through silviculture (DeRose and Long 2007), there is ample evidence that forest management can provide for stand conditions that are less conducive to high levels of disease and mortality (Amman and Logan 1998; Fettig and others 2010; Wallin and others 2008). Treatments that provide for reduced stand density, enhanced individual tree vigor, and reduced competition for light, water, and nutrients have long been used to reduce the risk of insect and

disease induced mortality. Moreover, treatments that provide for structural diversity may improve resiliency—as larger trees are killed by beetles, smaller ones remain to replace them.

Providing for Healthy Forests

Among the many conditions that promote insect and disease infestations in the forests of the Fishlake, there is one over which managers have some control: Stand composition, density, and age. It has long been known that stands densely packed with mature and over-mature trees of uniform composition are ripe for an epidemic (Fettig and others 2007). To the extent that the Fishlake can be managed to provide for a wide range of age, size, stocking, and species classes, it is likely to be less susceptible to wide-spread insect or disease induced mortality.

Results

Current Value

Table 1 shows the current insect and disease affecting the Fishlake. Most of the die-off is occurring in the beetles and engravers. Fir engraver has been increasing for the last three years. Defoliators have the largest impact of all the insect and disease species. Of the defoliators, spruce budworm has had the largest impact. This insect is a defoliator affecting the outer buds of the tree. Species on the Fishlake affected are subalpine fir, Douglas-fir, white fir, Engelmann spruce, Colorado blue spruce. Smaller trees tend to suffer more from the effects of defoliation, and larger trees tend to suffer more mortality from subsequent bark beetle attack (Halooin 2003).

Table 1. Affected acres from insect and disease on the Fishlake National Forest, 2017-2019.

Species	2017 Acres	2018 Acres	2019 Acres
Douglas-fir Beetle	130	516	104
Fir Engraver	10782	7972	3139
Forest Tent Caterpillar	0	199	0
Marssonina Blight	181	0	0
Mountain Pine Beetle	66	1	1
Pinyon Ips	331	156	446
Root Disease and Beetle Complex	1239	1983	0
Spruce Beetle	592	18	0
Subalpine Fir Decline	0	0	1773
Unknown	600	86	25
Unknown Defoliator	0	0	587
Western Pine Beetle	98	0	10
Western Spruce Budworm	38757	42389	43395
Total	52775	53321	49478

Trends

The trend for the last three years indicates a slight decline in affected acres (Figure 6).

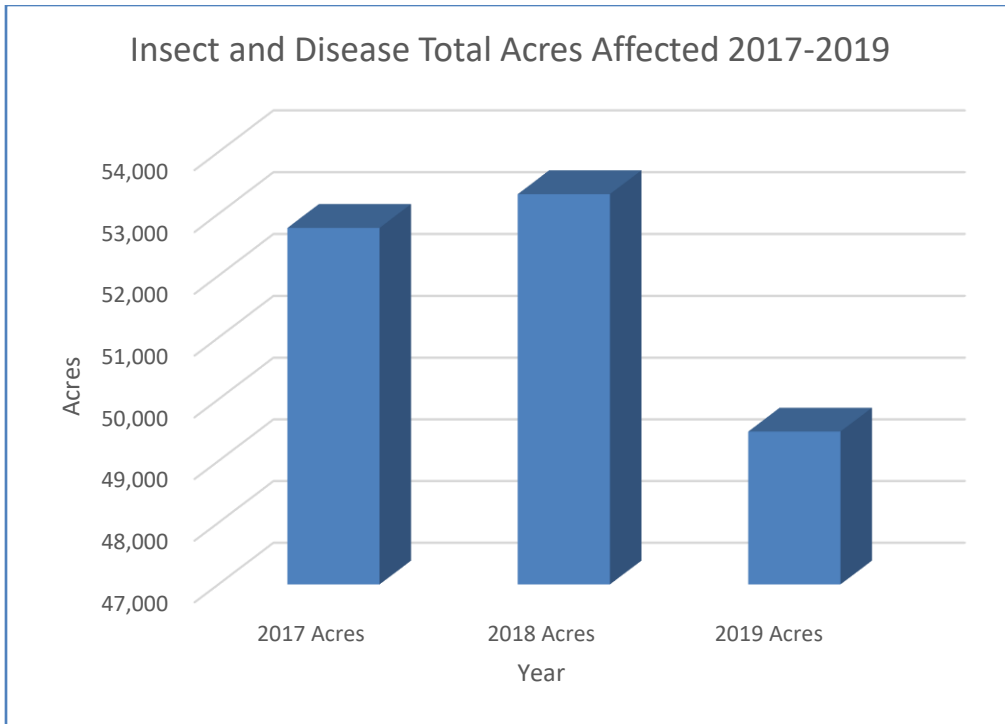


Figure 6. Three-Year Trend Total Insect and Disease.

Recommendations

Forest vegetation on the Fishlake is currently managed—removed, regenerated, thinned, and restocked—by way of commercial timber cutting and non-commercial thinning. To provide commercial forest products is one of the missions of the Forest Service, and the Fishlake contributes to this mission by offering timber sales to local loggers. The forest is currently thinning and regenerating Engelmann spruce by implementing several thousand acres of commercial timber sales in the Monroe Mountain and Big Flat project areas. In addition, the Fishlake is currently implementing several thousand acres of non-commercial stand improvement treatments composed of hand cutting, piling, and burning of primarily small-diameter shade tolerant species such as subalpine and white fir. These project areas include Little Res, Monroe Mountain and other areas tied to Shared Stewardship with the State of Utah.

Controls for spruce budworm outbreaks are costly for large areas; therefore, we have targeted high value sites. The Fishlake is spraying campgrounds with carbaryl and using MCH caps (pheromone cap) to protect high value sites. MCH caps are used to mitigate for potential beetle outbreak as a result of the stress caused by the Western spruce budworm. It is recommended to continue this practice until the outbreak over. The Western spruce budworm has also affected cone crops, especially in Engelmann spruce and Douglas-fir. Cone crops have been light to none existent where outbreak has occurred (personal observation). Recommend capitalizing on cone crops outside these areas for the foreseeable future.

While projects such as these were designed, in part, to provide for age class diversity and reduced stand density, they are also necessarily small in scale. Both commercial and non-commercial cutting require access—roads—and operable ground. Neither treatment is truly feasible in the “back-40,” where there are no roads and the ground is often very steep. Moreover, much of the Fishlake is not administratively “suitable” for tree cutting, especially commercial logging,

because it has been planned for wilderness, recreation, wildlife, or rangeland management, each of which is also part of the agency's mission.

Which brings us to fire. Fire is another disturbance that kills trees, and that may be undesirable in many circumstances. But, it is also a management tool that can be used across large acreages and outside of roaded and operable ground. We cite it here because many in the Forest Service recognize that fire can be a "good" disturbance that can serve to regenerate over-mature forests, reduce stand densities, and create diverse assemblages of species and age classes across the landscape (Parker and others 2006). In the case of the Fishlake, fire—both natural and managed—has been used in recent years to do all of those things, with the result, that risk of insect and disease infestation may have been reduced where fire has been effective. In the North Beaver project area on the Beaver Ranger District, for example, prescribed fire is currently being implemented on tens of thousands of acres. Moreover, during 2016, the BRD experienced the remote Briggs Fire, a lightning ignited fire managed to reduce heavy pockets of insect killed trees while regenerating aspen. Fires like the Briggs, far from any roads and in steep country, will—for the foreseeable future—likely be the best tool the Fishlake has to reduce forest susceptibility to insect attack by thinning stands and providing for increased age class and compositional diversity.

Thus, despite the potential for reducing the susceptibility of stands to insect attack using silvicultural treatments, the most promising tool may be the reintroduction of fire into many of the stands on the Fishlake.

Fuels Treatment

Land and Resource Management Plan (LRMP) Desired Conditions for Fuels Treatment (Protection)

Use prescribed fire to reduce fuel buildup and meet resource objectives. Provide cost-effective (level of) fire protection (LRMP Page IV-5).

Activities and Monitoring Questions

Assess the effectiveness of fuel treatments on wildfire behavior and effects: Are fuel treatments projects protecting property, human health and safety, and reducing the potential for unwanted fire effects?

Monitoring Indicator

Effectiveness of fuel treatments in reducing unwanted fire effects.

Monitoring Methods and Data

The Fuel Treatment Effectiveness Monitoring (FTEM) database can be found at the following website: <https://fireportal.usda.gov>. Fuel treatment effectiveness assessments are completed on all wildfires which start in, or burn into, a fuel treatment area that has been completed within the last 10 years. If a wildfire impacts more than one treatment unit, all treatment units that were affected must be entered into FTEM. All fuel treatment effectiveness assessment reports must be submitted within 90 days of control of the fire. Data will be reviewed from fire management resources, post fire field visits and information within the FTEM database to determine the success of the fuels treatment in reducing the effects and behavior of the wildfire.

Results

From 2018 through 2019, the Fishlake has experienced four vegetation treatments that have been impacted by wildland fire. The treatments and effectiveness are summarized below:

Baker / Face, Mud Flat / Duncan Creek (Skull Flat Wildfire 2019) – Beaver Ranger District:

These projects consisted of various mechanical and prescribed fire treatments in multiple vegetation types across the landscape. At the lower elevations a combination of bobcat skid steer with brush saws and fecon heads as well as prescribed fire was used to remove pinyon and juniper and break up the continuity of fuels at the landscape scale. As elevation increased prescribed fire was used to reduce fuel loadings, stimulate aspen regeneration, and promote watershed health and diversity by creating mosaic patterns across the landscape. These treatments were at various stages, some areas had been treated as recent as 2018, and others as early as 2012. The wildfire that impacted these projects was the Skull Flat Fire of 2019.

The Skull Flat wildfire was started by an early season lightning strike while prescribed burning operations were still being implemented on other parts of the forest. Due to its location, time of season and the numerous vegetative treatments in the surrounding area it was assessed as needed while resources completed prescribed fire operations on an adjacent district. As resources became available managers made the decision to utilize the existing treatments in place as holding lines and burn out the interior. Because these treatments were already in place minimal ground resources were needed and the aerial ignition operation was ready to go as soon as the ignition resources were onsite. Aerial ignitions were successful at lighting off the edge of the previous treatments and allowing the fire to move naturally within the watershed with few if any holding resources needed. Fire spread outside of the targeted areas for aerial ignition was minimal if at all due to the prior treatments and the diversity of fuel makeup. The final size of the Skull Flat wildfire was 2,268 acres.

Baker / Face, Mud Flat / Duncan Creek (Skull Flat 2 Wildfire 2019) – Beaver Ranger District:

These projects consisted of various mechanical and prescribed fire treatments in multiple vegetation types across the landscape. At the lower elevations a combination of bobcat skid steer with brush saws and fecon heads as well as prescribed fire was used to remove pinyon and juniper and break up the continuity of fuels at the landscape scale. As elevation increased prescribed fire was used to reduce fuel loadings, stimulate aspen regeneration, and promote watershed health and diversity by creating mosaic patterns across the landscape. These treatments were at various stages, some areas had been treated as recent as 2018, and others as early as 2012. The wildfire that impacted these projects was the Skull Flat 2 Fire of 2019.

The Skull Flat 2 wildfire was discovered on October 2nd 2019. Because of the location of this fire, the numerous prior vegetative treatments in the area, and the fact that this area was targeted for prescribed burning, managers made the decision to manage this fire and use the treatment areas as holding and contingency lines. Over the next couple weeks minimal resources (at the most 5 individuals) were needed to carry out ignition operations and treat 3,025 acres with fire. These operations created stand replacement crown fire in mixed conifer with long range spotting and rapid rates of spread, however these spots and spreading fire reached prior treatments where they transitioned into a smoldering creeping ground fire that with night time RH recoveries soon extinguished themselves. The Skull Flat 2 wildfire was observed as a stand replacement crown fire with rapid rates of spread impacting the managed Briggs wildfire of 2016 and once it hit this

area is when it transitioned into a smoldering ground fire and soon went out on its own. On other areas of the wildfire the edge of prior treatments were used as ignition and holding lines and the results were consistent as observed in the Briggs wildfire, minimal fire spread which extinguished itself in a matter of time. The Skull Flat 2 wildfire burned 3,025 acres and was managed by no more than 5-7 individuals at one time. No holding actions or line construction were required due to the prior treatments in the area being effective at minimizing and modifying fire behavior.

Monroe Mountain Aspen Ecosystem Restoration Project (Spring Entry) – Richfield Ranger District

This treatment consisted of the mechanically removing fir through cutting, piling then burning of piles along prescribed fire unit boundaries providing a buffer for nearby private property with structures. Other treatment included prescribed fire implementation in strategic areas on southern facing slopes and a slash line contract that was later burned via prescribed fire. The mechanical and prescribed fire treated areas are all located near Vale Creek and Manning Creek drainages. These treatments were completed in 2017 and 2018. The fire that impacted the treatment was the South Monroe Prescribed Fire of early summer 2019.

The South Monroe Prescribed Fire within the Manning Creek drainage was ignited at around 1300 on 6/13/19 with two helitorches. Ignitions did not go well in the Vale Creek portion of the drainage primarily due to cloud cover and light precipitation impacting ignitions at this time. The weather in conjunction with a steep northern slope/aspect that was slightly wetter than the rest of the burn unit that faced more northwest most likely resulted in poor ignitions in this Vale Creek area. Ignitions went real well throughout the rest of the unit and snow impacted the burn unit later that night just after ignitions were completed. The area that did not burn very well in Vale Creek continued to show heat throughout the upcoming two weeks as the wetter fuels continued to dry out. Ignitions were planned to commence again on June 28th to finish burning Vale Creek and mitigate the holding concern that was present. Prior to beginning ignitions on June 28th, the fire began to build in intensity and made a moderate run up Vale creek through the crowns of the unburned mixed conifer. The fire ran into a previously prescribed fire treated area at the top of Vale Creek that stopped the fire's advance. With this high intensity run, spotting occurred on the north side of Manning Creek and began making uphill runs in the brush on the southern facing slope of Manning Creek. We began bucket work immediately on this portion of the fire. The helicopter was effective but was not keeping up with the fire advancement due to turn around times. This portion of the fire also finally ran into a previously mechanical and prescribed treated areas as well, slowing the fires movement. This slowed fire progression allowed the helicopter to knock out further spread and allow the staged IHC to safely engage the fire and contain all further fire spread.

Monroe Mountain Aspen Ecosystem Restoration Project (Fall Entry) – Richfield Ranger District

This treatment consisted of the mechanically removing fir through cutting, piling then burning of piles along prescribed fire unit boundaries providing a buffer for nearby private property with structures. Other treatment included prescribed fire implementation in Manning Creek the previous early summer and on southern facing slopes that was burned. The mechanical and prescribed fire treated areas are all located near Vale Creek and Manning Creek drainages. These treatments were completed in 2017, 2018 and 2019. The fire that impacted the treatment was the South Monroe Prescribed Fire of fall 2019.

The South Monroe Prescribed Fire within the Smiths Creek drainage was ignited at around 1200 on 11/13/19 with two helitorchs. Ignitions went real well through the upper portions of Smiths Canyon. Winds increased significantly around 1400, well past forecasted speeds. Fire advanced into Collins Creek and began making a substantial run down drainage towards Manning Creek. Ignitions were ceased at this time. Fire continued to build in intensity and over the next few hours burned all of Collins Creek and into the Manning Creek. The fire's advance was stopped by both previously mechanical and prescribed fire treatments located in the Manning Creek and Vale Creek areas. No holding actions was needed in this area. This allowed attention by holding resources to be focused in one small area near Barney Lake with road access.

Conclusion

Fuels treatments across the Fishlake have been and are implemented to reduce and/or redistribute ground, surface, and canopy fuels by removing trees, masticating small diameter trees and shrubs, mechanically and/or hand piling then later burning them, or applying prescribed fire. An effective fuel treatment will slow the spread of fire and reduce the likelihood of crown fire, aid suppression efforts, and reduce the intensity and severity of a wildfire under all but the most extreme weather conditions (Vaillant and Reinhardt 2017).

Fuel treatments strategies on the Fishlake typically fall within two overarching land management objectives: ecosystem restoration / maintenance or fire control. The primary goal of ecosystem restoration is to promote or maintain fire resilient landscapes. For fire control, the goal of fuel treatments is to facilitate wildfire suppression activities through the reduction of fuel hazards with strategic placement across the landscape (Vaillant and Reinhardt 2017). Because fuel treatments are an important aspect of land management, we have implemented fuel treatments on numerous acres across the landscape during the monitoring period (Table 2).

Table 2. Acres of Fuels Treatments across the Fishlake National Forest, 2012 through March 2019.

Year	2012	2013	2014	2015	2016	2017	2018	2019	Total
Reported Accomplishment (acres)	14,364	7,353	8,449	11,636	24,513	9,346	34,800	29,533	139,994

It is not realistic or necessary to do fuel treatments on every acre of the Fishlake National Forest. With limited funding and capacity along with other constraints, we must realize the importance to prioritize when, where, and how to properly plan and implement successful fuel treatments.

During the monitoring period, four wildland fires have been recorded that impacted fuel treatments. All treatments have been successful in moderating fire behavior and effects. We believe that fuel treatments are an effective way to manage fire across the landscape and provide increased protection to identified values.

Facilities

Land and Resource Management Plan (LRMP) Desired Conditions for Facilities

Develop and implement a road management system. Construct, reconstruct, and maintain roads to facilitate safe access and management of the Forest. (LRMP Page IV-5).

Activities and Monitoring Questions

Assess the transportation management system and quality of road maintenance: Is adequate road access and maintenance being provided? Are open roads maintained to standard?

Monitoring Indicators

Miles of classified road open for public use and miles of road maintained to standard.

Monitoring Methods and Data

The indicators for this program area were extracted from the Natural Resource Management (NRM) database.

Results

Only 6.1 percent of the roads open for public use were maintained to standard during fiscal year 2019. Table 3 summarizes the data/results.

Table 3. Miles of forest road maintenance for FY19

Operational Maintenance Level	Miles Receiving Maintenance	System Miles	%
5	0.0	7.4	0.0
4	0.8	14.3	5.4
3	48.4	216.7	22.3
2	92.4	1995.3	4.6
1	0.0	99.6	0.0
Level 3-5	49.2	238.4	20.6
Level 2	92.4	1995.3	4.6
Level 1	0.0	99.6	0.0
2019 Subtotal	141.6	2333.4	6.1

Recommendations

Additional funding is necessary to attain the facility's desired condition per the Fishlake LRMP. Available funding was effectively used to successfully maintain the roads that were treated during the fiscal year.

Watershed (Soil and Water Resources)

Land and Resource Management Plan (LRMP) Desired Conditions for Forest Vegetation (Protection)

Maintain water quality to meet State standards for beneficial uses (LRMP Page IV-4).

Manage municipal watersheds to protect quality and water supplies (LRMP Page IV-4).

Maintain productive streams, lakes, and riparian areas and mitigate hazards on floodplains (LRMP Page IV-4).

Maintain or improve current soil productivity and restore areas with watershed problems (LRMP Page IV-5).

R4-Soil Quality Standard and Guideline for Accelerated Soil Loss Forest wide or are management activities impairing soil productivity of the land (no more than 15% of an activity area).

Application of appropriate extent of upland adjacent upland areas (Riparian Protection by buffers) (LRMP Page IV-43).

Best Management Practices (BMP) effectiveness and compliance on land disturbing projects (LRMP Page V-9).

Activities and Monitoring Questions

What streams and waterbodies are listed on the 303(d) list?

Has management in municipal watersheds led to complaints of impaired water quality or shortages in water supply?

What projects or allotments have BMP monitoring completed and what were the results on water and soil from the monitoring on water bodies, riparian areas, floodplains, water quality, and soil resources?

Are there reports or observation of excessive erosion from projects or large areas of detrimental disturbed soils?

Monitoring Indicator

Water Quality uses impaired and listed on the 303(d) list.

Issues with municipal watershed operators regarding Forest management.

BMP monitoring findings and recommendations regarding ground disturbing projects and activities.

Individual projects that have 15% of an activity area with detrimental disturbed soil after all land management activities.

Monitoring Methods, Data, and Results

From 2002 until about 2014, the forest collected stream water quality samples on various streams around the forest in order to set up baseline water quality conditions of most perennial streams around the Forest and on a few lakes (likely around 33 or more sites). The State of Utah-DEQ collects water quality samples around the forest periodically as well on a scheduled basis depending on the year and the basin to be sampled. Some of the sampling sites are the same by both groups, but many are unique as well. The DEQ is the keepers of the water quality data and has done analysis on samples according to State standards to determine if water bodies should be listed as impaired for specific uses and published the list frequently. The forest has records of this sampling, but those are inaccessible due migration from the O drive (Data stored externally in Missouri) to Pinyon Drive at this point in time. The BMP forms and data for 2018 and 2019 are stored in the office of the hydrologist. The State releases the official 303d list of impaired waters following coordination with EPA periodically for the State of Utah.

Reports of issues with municipal watershed operators has occurred very infrequently since 2002 and only a couple of instances are memorable or even mentionable. Coordination with municipal watershed operators has been encouraged whenever ground disturbing treatments occur within Groundwater Source Protection Areas to allow for operators to give input to projects, but I don't remember any concerns arising from any of our proposed treatments at any time. That coordination has occurred at the District level with the local communities involved. One incident from a wildfire and not a proposed project, with the community of Meadow occurred in 2006, and that was that the Sunset Canyon Fire in the opinion of the local water manager had not burned enough vegetation and was asking for more to be burned by local firefighters to allow for easier maintenance of the spring site later by Meadow. And then Teasdale's water systems infrastructure has some limitations and needed improvements, but no Forest Service ground disturbing activities, have impacted their system. A few fires on the Canyon Mountain have led to some municipal pipes being broken due to the pipes being located in roads that were being graded by fire equipment improving fire lines. No water quality impacts were associated with the pipes being broken. Pipes were repaired and services continued as normal.

Since 2013, more formalized BMP monitoring has been occurring on the Fishlake National Forest and included monitoring of numerous range allotments, a few mechanical vegetation treatments, a parking lot improvement project, an active non-placer mineral operation, and an active construction of aquatic ecosystem improvement. The BMP monitoring has been interdisciplinary and included forest hydrologists, the Regional Hydrologist, range specialists, fuels specialists, fisheries biologists, acting ecosystem staff officers (a district ranger and range specialists), an ecosystem staff officer, a minerals specialist, an engineer, and district rangers.

IREG-Level 2 riparian surveys occurred on the Forest Riparian areas from 2002 to 2006 that included about 125 miles of riparian areas on most of the Forest perennial streams. There are 33 binders worth of data in the Hydrologist's office collected by an outside contractor-Shell Valley Consulting. Overall on the average, the plant and soil resources were in good shape and stable or better forest wide, but there were some site specific areas where riparian plant and soil resources were being impacted by forest uses such as grazing and recreation. The data suggests overall the forest is doing well with riparian areas and soil stability, but does suggest localized site specific impacts are occurring and could be improved. Some of the more disturbed areas were fenced off following the surveys (UM Creek for example). Additional, disturbed areas around springs has been occurring by range and District Staffs as time and money has allowed.

The water quality data that the State is in charge of regard for water quality is very good, and they have many quality control measures in place to verify data. The [Utah's Final 2016 Integrated Report](#) does a good job of stating the status of streams of being on the 303(d) list, if attainment is occurring, or if there is insufficient data for specific water bodies. The report does a good job of listing when improvements have occurred and if water bodies are being delisted and the reason for delisting.

Table 4. Final 2016 Integrated Report: Rivers, Streams, springs, Seeps and Canals 305(b) and 303(d) for waterbodies specific to the Fishlake National Forest only.

Watershed Management Unit	Assessment Unit I	Assessment Unit Name	Assessment Unit Description	Assessment Unit Category	Category Description	Impaired Parameter	Impaired Beneficial Uses	TMDL Development Priority	IR Cycle First Listed	Perennial Stream Miles
Cedar/Beaver	UT 16030 007-001-00	Beaver River-3	Beaver River and tributaries from USFS boundary to Headwaters	3	Insufficient Data					
Cedar/Beaver	UT 16030 007-004-00	Pine Creek-Tushar		3	Insufficient Data					
*Colorado River West *most land activity is not on USFS lands but shown for reference	UT 14070 003-005-00	Fremont River-3	Fremont River and tributaries from Bicknell to Mill Meadow Reservoir near USFS Boundary	5	Not Supporting	pH Temperature	1C:2A:4:3A 3A	Low Low	2014 2014	41 41
Colorado River West	UT 14070 003-009-00	Pleasant Creek-1	Pleasant Creek and tributaries from east boundary of Capitol Reef NP to headwaters	5	Not Supporting	Temperature	3A	Low	2016	58
*Colorado River West *most land activities are off USFS but there is some potential from mining and other USFS uses	UT 14070 002-002-00	Quitichpah Creek Upper	Quitichpah Creek from U-10 to headwaters	5	Not Supporting	Dissolved Oxygen OE Bioassessment Temperature	3A 3A 3A	Low Low Low	2014 2010 2014	30 30 30
*Colorado River West *most land activities	UT 14070 002-003-00	Saleratus Creek-Emery	Saleratus Creek and tributaries from U-10 crossing to headwaters	5	Not Supporting	Boron (Total) Temperature	4 3A	Low Low	2014 2016 2014	15 15

Watershed Management Unit	Assessment Unit I	Assessment Unit Name	Assessment Unit Description	Assessment Unit Category	Category Description	Impaired Parameter	Impaired Beneficial Uses	TMDL Development Priority	IR Cycle First Listed	Perennial Stream Miles
are off USFS						Total Dissolved Solids	4	Low		15
Colorado River West	UT 14070 002-003-00	Saleratus Creek-Emery	Saleratus Creek and tributaries from U-10 crossing to headwaters	Dissolved Oxygen	Supporting/attainment	Dissolved Oxygen Delisted			2016	
Colorado River West	UT 14070 003-002-00	UM Creek	UM CK and other tributaries to Forsyth Reservoir	5	Not Supporting	Zinc (dissolved)	3A	Low	2012	28
						Selenium (dissolved)	3B	Low	2014	0
						Temperature	3B	Low	2014	0
						Total Dissolved Solids	4	Low		0
Colorado River West	UT 14070 003-001-00	Johnson Valley	Johnson Valley Reservoir Tributaries	3	Insufficient Data					
Colorado River West	UT 14070 002-005-00	Last Chance Creek	Last Chance CK and tributaries from Ivie Ck to headwaters	3	Insufficient Data					
Colorado River West	UT 14070 003-006-00	Pine Creek (Wayne Co)	Pine Ck and tributaries from confluence with Fremont River to headwaters	3	Insufficient Data					
Colorado River West	UT 14070 003-010-00	Pleasant Creek-2	Pleasant Ck and tributaries from confluence with Fremont River to east boundary of Capitol Reef NP	3	Insufficient Data					
Sevier River	UT 16030 002-004-00	Otter Creek-2	Box Creek and tributaries from	4A	Non-Pollutant	Habitat Dissolved Oxygen	3A		1998	24
									2012	

Watershed Management Unit	Assessment Unit I	Assessment Unit Name	Assessment Unit Description	Assessment Unit Category	Category Description	Impaired Parameter	Impaired Beneficial Uses	TMDL Development Priority	IR Cycle First Listed	Perennial Stream Miles
where the stream didn't have much water year round.										
Sevier River	UT 16030 03-026-00	Sevier River-7	Sevier River east side tributaries from the Clear Creek confluence upstream to Manning Creek Confluence	5	Not Supporting	pH Temperature	2B: 4: 3A 3A	Low Low	2014 2014	0 0
Sevier River	UT 16030 005-019-00	Chalk Creek2-Fillmore	Chalk Creek and Pine Creek and tributaries from USFS Boundary to headwaters	3	Insufficient Data					
Sevier River	UT 16030 003-013-00	Monroe Creek	Sevier River east side tributaries above USFS boundary from Mill Creek-Water Creek area upstream to Durkee Creek	3	Insufficient Data					
Sevier River	UT 16030 003-016-00	Pioneer Creek-2	Pioneer Creek and tributaries from USFS boundary to headwaters	3	Insufficient Data					
Sevier River	UT 16030 003-006-00	Salina Creek-2	Salina Creek and tributaries from USFS boundary to headwaters	3	Insufficient Data					
Sevier River	UT 16030 05-012-00	Ivie Creek	Ivie Creek and tributaries from Scipio Dam to headwaters	2	No Evidence of impairment					
Sevier River	UT 16030 005-023-00	Meadow Creek	Meadow Creek and tributaries from mount	2	No Evidence of					

Watershed Management Unit	Assessment Unit I	Assessment Unit Name	Assessment Unit Description	Assessment Unit Category	Category Description	Impaired Parameter	Impaired Beneficial Uses	TMDL Development Priority	IR Cycle First Listed	Perennial Stream Miles
			the headwaters (Juab Co)		impairment					
Sevier River	UT-16030003-020-00	Beaver Creek2-Piute	Beaver Creek and other west side tributaries to Sevier River above USFS boundary from Clear Creek upstream to HUC boundary	2	No Evidence of impairment					
Sevier River	UT-16030003-021	Corn Creek	Corn Creek and tributaries from mouth to headwaters	2	No Evidence of impairment					
Sevier River	UT 16030003-005-00	Lost Creek	Lost Creek and tributaries from confluence with Sevier River upstream approximately 6 miles	Selenium (dissolved)	Supporting/attainment	Selenium (dissolved) delisted with new data			2016	

Table 5. Final 2016 Integrated Report: Lake and Reservoir Assessment specific to the Fishlake National Forest only.

Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Assessment Unit Category	Category Description	Impaired Parameter	Impaired Beneficial Uses	TMDL Development Priority	IR Cycle First Listed	Lake Acres
Cedar/Beaver	UT-L-16030007-020	Kents Lake	Kents Lake	4A	TMDL Approved	Dissolved Oxygen	3A		1998	39
						Total Phosphorus	3A		1998	39
Cedar/Beaver	UT-L-16030007-027	LaBaron Lake	LaBaron Lake	4A	TMDL Approved	Dissolved Oxygen	3A		2014	22
						Total Phosphorus	3A		1998	22
Cedar/Beaver	UT-L-16030007-028	Puffer Lake	Puffer Lake	4A	TMDL Approved	Dissolved Oxygen	3A		1998	58
						pH	3A		2014	58

Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Assessment Unit Category	Category Description	Impaired Parameter	Impaired Beneficial Uses	TMDL Development Priority	IR Cycle First Listed	Lake Acres
Cedar/Beaver	UT-L-1603007-024	Anderson Meadow Reservoir	Anderson Meadow Reservoir	2	No Evidence of Impairment					8
*Cedar/Beaver *This reservoir has been drained and rebuilt since ~2006. Not sure when last sampled.	UT-L-1603007-025	Three Creeks Reservoir	Three Creeks Reservoir	5	Not Supporting	pH	3A	Low	2006	55
Colorado River West	UT-L14070003-019	Forsyth Reservoir	Forsyth Reservoir	4A	TMDL Approved	Dissolved Oxygen	3A		1998	165
						Total Phosphorus	3A		1998	165
Colorado River West	UT-L-14070003-010	Johnson Valley Reservoir	Johnson Valley Reservoir	4A	TMDL Approved	Total Phosphorus	3A		1998	671
Colorado River West	UT-L-1407003-044	Lower Bowns Reservoir	Lower Bowns Reservoir	5	Not Supporting	Dissolved Oxygen	3A	High	2010	108
						pH	3A	Low	2006	108
						Temperature	3A	Low	2012	108
						Total Phosphorus	3A	High	2012	108
Colorado River West	UT-L-14070003-015	Mill Meadow Reservoir	Mill Meadow Reservoir	5	Not Supporting	pH	3A	Low	2012	160
					TMDL Approved	Total Phosphorus	3A		1998	160
Colorado River West	UT-L-14070003-027	Donkey Reservoir	Donkey Reservoir	2	No Evidence of Impairment					24
Colorado River West	UT-L-14070003-006	Fish Lake	Fish Lake	2	No Evidence of Impairment					2,585
Sevier River	UT-L-16030002-011	Kooshare m Reservoir	Kooshare m Reservoir	4A	TMDL Approved	Total Phosphorus	3A		1998	341

Watershed Management Unit	Assessment Unit ID	Assessment Unit Name	Assessment Unit Description	Assessment Unit Category	Category Description	Impaired Parameter	Impaired Beneficial Uses	TMDL Development Priority	IR Cycle First Listed	Lake Acres
Sevier River	UT-L-1603000-2-005	Lower Box Creek Reservoir	Lower Box Creek Reservoir	5	Not Supporting	pH	3A	Low	2010	22
					TMDL Approved	Dissolved Oxygen	3A		2004	22
					TMDL Approved	Total Phosphorus	3A	1998	22	
Sevier River	UT-L-1603000-3-006	Manning Meadow Reservoir	Manning Meadow Reservoir	5	Not Supporting	pH	3A	Low	2016	85
						Total Phosphorus	3A	Low	1994	85
Sevier River	UT-L-1603000-3-006	Manning Meadow Reservoir	Manning Meadow Reservoir		Supporting and attainment	Dissolved Oxygen			2016	85
Sevier River	UT-L-1603000-3-005	Barney Lake	Barney Lake	2	No Evidence of Impairment					21
Sevier River	UT-L-1603000-3-016	Rex Reservoir	Rex Reservoir	2	No Evidence of Impairment					35

BMP Monitoring Results

Best Management Practices (BMP) were monitored on different Forest projects in 2018 and 2019. A short summary is included below, full write ups are available from the Fishlake NF.

2018 Black Flat Bridge. AqEco A. Active Construction of Aquatic Ecosystem Improvement as a new bridge was placed above UM Creek. It states plans were followed and results and effects are within those described in planning.

2018 Forest Road 043. Active Road A. Active road improvement as the road section near the new Black Flat Bridge was improved which included water diversions off of the road to improve drainage and reduce erosion. It states plans were followed and results and effects are within those described in planning.

2018 Dry Creek Allotment. Range A. Grazing Management showed that changes were not needed for long-term indicators and that rangeland improvements, including fencing provided by dedicated hunters, were moving the unit toward desired, water, aquatic, and riparian resource conditions in a few locations. 2018 was a very dry year and the allotment showed light use due to lack of forage. Stream components appeared to be functioning properly.

2018 Kents Lake Road. Stored Roads. Active road improvement around the Kents Lake Campground (D3) mag-chloride was placed on the road which help stabilize the road and reduces erosion. It states plans were followed and results and effects are within those described in planning.

2018 Kents Lake Campground. Developed Recreation Sites. Day use camping site was improved and some gravel was added to the site. It states plans were followed and results and effects are within those described in planning.

2019 Fish lake Boardwalk. Non-motorized trails. A wooden boardwalk was constructed along a heavily used portion of Twin Creeks near Fish Lake. The project educed foot trails along stream a sediment into stream which provides spawning habitat. It states plans were followed and results and effects are within those described in planning.

2019 Roads FR 350, FR1450, and FR319. Road Maintenance. Roads were roto milled specific to an upcoming timber sale called Butterflied Meadows. Road construction looked really good, a culvert could be added to a small stream crossing was one potential improvement noted.

2019 Pelican Point Gravel Pit. Mineral Operations. Gravel pit used for some of the borrow materials used in the Fish Lake improvement projects. Pit was still being used. Some corrective actions were noted as trash was present and a spoil pile of hard clay was noted.

2019 Fish Lake Lodge, Lakeside Marina, and Bowery Haven Marina. Parking Areas. These were three separate BMP monitoring reports, all the projects were designed and implemented at the same time, so they are being combined in this report. All the projects appeared to be designed incorrectly as they all slope into the lake instead of into the shore, this observation was noted in the reports. The parking areas will be graveled and should dissipate some of the energy reducing sediment to the lake. There were also a couple of construction fails that were noted and passed back to the COR for the project.

2019 Fish Lake Lodge, Lakeside Marina, and Bowery Haven boat ramps. Watercraft Launches. These were three separate BMP monitoring reports, all the projects were designed and implemented at the same time, so they are being combined in this report. Boat launches were rebuilt in these projects which should reduce the sediment into the lake. It states plans were followed and results and effects are within those described in planning.

2019 Lost Creek Timber Sale. Ground Based skidding and harvesting. Portions of the Lost Creek Timber Sale were inspected, the timber sale has been in progress for about 8 years. Visit showed that the design feature specific to project implementation were being followed which was having a positive effect on project area.

Conclusion

Forest-Level Monitoring

Under the Fishlake National Forest's LRMP Monitoring Plan, the Forest conducts an evaluation of information gathered by the monitoring program, and publishes a written report of the results. This report is intended to indicate where changes to management activities may be warranted. In the case of watershed management, the monitoring plan calls for an assessment of the impacts associated with water quality, soils resources, municipal watersheds, and BMP monitoring.

What the 2002 to 2019 data show is that the Forest does have some waterbodies with impaired beneficial uses on the State of Utah 2016 Integrated Report, this is still the most current report. Some of the waterbodies have TMDLs completed for the impairments, some are a low priority for TMDL development. Some segments or waterbodies are only on Forest lands, but some segments are lumped based off where sampling locations have or have not occurred and in some of those

cases additional sampling would likely exclude the Forests' portions of those stream systems from being impaired.

Some future sampling locations might include sampling for example, at the mouth of Manning Creek higher in elevation than where the previous sampling was down on a losing stream reach on an alluvium feature that would likely show the portion of Manning Creek on the Forest does not have dissolved oxygen impairment. The existing location likely excluded all other parameters from being listed, but the location was a poor site for sampling dissolved oxygen and that parameter did show up since the site was chosen for year round sampling at a lower location rather than higher that was much more difficult to get to year round. An additional sampling location might include Pole Canyon near Angle, Utah that would likely lead to the Forest tributaries not being lumped and included with the portion of Otter Creek between Otter Creek and Koosharem Reservoirs (Otter Creek-1 from Table 4). Pole Canyon conditions are in vast contrast much better than those found lower on the Otter Creek on private lands and so actually sampling this stream would likely lead to this stream not being lumped with Otter Creek-1 following sampling. Other examples similar to this likely apply to some of the streams in Table 4.

In the list of impaired waters on the Fishlake in Tables 4 and 5, only two listings are only specifically related to areas or drainages that are one-hundred percent Forest Service Ownership and management (Anderson Meadow Reservoir and Kents Lake) of the entire contributing upper watersheds. So on lands where the USFS solely manages and owns the lands the Forest is not having as many impaired waters as lands that have multiple ownerships; especially the streams. Many of the segments that include USFS lands currently, if we were to sample near Forest boundaries then most of the impaired reaches would not likely include USFS lands.

There has not been concern within municipal watersheds from forest activities affecting water quality or yields.

Generally, on allotments conditions are generally good, but vegetation, soil, and water quality impacts are present and are similar to what are described in the IREG-Level 2 Riparian Surveys. Soil standards are not likely being exceeded by current activities on the forest. Some erosion does occur, and some sedimentation too leading to the water quality conditions around the forest described in Tables 4 and 5. IREG-Level 2 riparian surveys occurred on the Forest Riparian areas from 2002 to 2006 that included about 125 miles of riparian areas on most of the Forest perennial streams. Overall on the average, the plant and soil resources were in good shape and stable or better forest wide, but there were some site specific areas where riparian plant and soil resources were being impacted by forest uses such as grazing and recreation. The data suggests overall the forest is doing well with riparian areas and soil stability, but does suggest localized site specific impacts are occurring and could be improved. There is no evidence or reports of individual projects that exceed fifteen percent of an activity area having detrimentally disturbed soil after the management activities.

Range Management

LRMP Desired Conditions for Range Management (Permitted AUM)
Provide livestock grazing consistent with range capacity and other uses (LRMP Page IV-4).

Activities and Monitoring Questions

Are goods and services being provided in accordance with Forest Plan goals and objectives?

Monitoring Indicator

Level of permitted livestock grazing.

Monitoring Methods and Data

The level of grazing is allocated based on Term Grazing Permits (FS-2200-10) that have been issued to permittees on various allotment within the Forest. Each year, after the permittee has validated their permit and prior to the beginning of the grazing season, the Forest Service will send the permittee a Bill for Collection specifying for the current year the kind, number, and class of livestock allowed to graze, the period of use, the grazing allotment, and the grazing fees. This bill, when paid, authorizes use for that year and becomes part of their permit. Data for the 2019 grazing season were queried from IWEB RIMS database for annual grazing statistics.

Results

For the 2019 grazing season are displayed in Table 6.

Table 6. Grazing Statistics for 2019

	Number of Permittee	Cattle NO.	HMS AUMS	Horses/Burros NO.	HMS AUMS	Sheep/Goats NO.	HMS AUMS	Total NO.	HMS AUMS
Fillmore RD	52	6,533	25,249 33,301	23	102 122	1,500	2,663 799	8,056	28,014 34,222
Fremont River RD	53	7,511	32,055 42,595	5	22 26	5,492	14,631 4,389	13,010	46,708 45,649
Beaver RD	21	4,073	14,998 19,797	10	25 30	0	0 0	3,976	14,793 19,524
Richfield RD	64	10,770	42589 53,823	0	0 0	5,430	12,051 3,615	15,744	52,840 55,062
Totals	184	28,887	115,922 149,516	36	149 179	10,385	25,158 7,547	39,310	141,229 157,242

Recommendations

Range Specialists will continue to monitor grazing utilization so that forage can be provide and utilized by permittees with valid Term Grazing Permits.

LRMP Desired Conditions for Range Management (Forage Utilization)

Maintain range lands being used by livestock in at least fair condition with stable or upward trend through the use of proper management and restoration measures (LRMP Page IV-4).

Establish proper grazing capacity for each allotment (LRMP Page IV-4).

Activities and Monitoring Questions

Are goods and services being provided in accordance with Forest Plan goals and objectives?

Monitoring Indicator

Forage Utilization.

Monitoring Methods and Data

The 1986 Forest Plan set out “management requirements” for forage use throughout the Fishlake National Forest. Those requirements included general direction statements specifying “the actions, measures, or treatments (management practices) to be done when implementing ...management activit[ies]...” General Direction Statement No. 2 for forest-wide, range-resource management was to “[m]anage livestock and wild herbivores forage use by implementing proper use guides.” These “proper use guides” included numeric forage-utilization limits for different grazing systems. For example, the 1986 Plan established a maximum forage-utilization standard for rest-rotation systems of 55 percent of total forage (80 percent of key species) on late-use pastures and 45 percent of total forage (70 percent of key species) on early-use pastures. A separate set of forage-use standards applied in riparian areas.

In 2001, the Forest amended the Forest Plan through an environmental assessment (EA) under the National Environmental Policy Act (NEPA) with a “Decision Notice and Finding of No Significant Impact: Forest Plan Amendment of Forage Utilization Standards & Guidelines” which evaluated alternatives for forage-use management requirements. The Forest chose to amend the Plan by adopting “Alternative 3” described in the EA. The amendments prescribed in Alternative 3 made two main changes. First, the forest-wide range-resource General Direction Statement No. 2 was replaced with a new statement: “Manage ungulate forage use by implementing maximum allowable forage use criteria and modifying these criteria where necessary to obtain ‘proper use.’” Second, the forest-wide range-resource and riparian-area standards and guidelines for forage use were replaced with the following “maximum allowable use standards” (See Table 7).

The glossary in the EA elaborates on what the terms “allowable use” and “proper use” mean. “Allowable use” is: the degree of utilization considered desirable and attainable on various specific parts of an allotment considering the present nature and condition of the resource, management objectives, and level of management. Allowable use is based on the

morphological and physical characteristics of forage species and is the amount of use that can occur for a specified period of time while meeting basic resource needs and associated resource management goals.

“Proper use,” in contrast, “is determined from allowable use and is the level of grazing utilization that can be permitted on an area considering the need to maintain or reach desired conditions while at the same time considering all limiting factors.” The “limiting factor” is that which “becomes critical first,” whether seral condition, key hydric species, damage to fisheries, critical wildlife habitat, or any other measurable factor. Under this limiting-factor approach, “the site-specific development and application of Proper Use criteria may prescribe lower utilization levels than those presented as maximum allowable use standards.”

Table 7. Forest Utilization Standards

Maximum Allowable Forage Use Criteria		
Vegetation Type	Stubble Height/Use	Comments
Riparian Hydric Species	4"	Triggers the time to move livestock between units or off the allotment
Riparian Emphasis Management Areas	6"	Triggers the time to move livestock between units or off the allotment
Non-hydric Sod-Forming Grass Species in Riparian Areas	1 ½"	Primarily Kentucky bluegrass-- Triggers the time to move livestock between units or off the Allotment
Wheatgrass Seedings	60%	Management option to exceed 60% use to maintain healthy seedings
Riparian/Upland Browse Sprouts and Young-Aged Plants	≤40%	# of current year's available twigs removed
Riparian/Upland Mature Browse	≤50%	# of current year's available twigs removed
Upland Grass/Forb	40–60% of key species; varies by grazing system and desired condition	% of current year's growth
Riparian Ground Cover	Maintain ground cover of at least 70% within riparian areas	

Results

The above utilization use standard are incorporated into the respective Term Grazing Permits unless different standards have been identified in an Allotment Management Plan (AMP). Forest Range Specialists monitored approximately 308,809 acres and 616,522 acres to the defined standard in 2018 and 2019, respectively. This requires that the specialists monitor the grazing utilization on their respective allotments the monitoring is tracked in the Rangeland Information Management System (RIMS) database.

Recommendations

Range Specialists will continue to monitor grazing utilization so that forage can be provide and utilized by permittees with valid Term Grazing Permits.

LRMP Desired Conditions for Range Management (Range Trend)

Maintain range lands being used by livestock in at least fair condition with stable or upward trend through the use of proper management and restoration measures (LRMP Page IV-4).

Establish proper grazing capacity for each allotment (LRMP Page IV-4).

Provide livestock grazing consistent with range capacity and other uses (LRMP Page IV-4).

Control noxious weed infestations (LRMP Page IV-4).

Activities and Monitoring Questions

Do rangeland plant communities have desired species composition and is ground cover adequate?

Monitoring Indicator

Range condition and trend.

Monitoring Methods and Data

Long term trend data are gathered using a variety of different methods which include: established photo plots and nested frequency sites. Noxious weed locations have been identified and are treated using a variety of chemical, mechanical, and biological methods.

Results

There were 42 long-term trend studies monitored in 2019. No long-term trend studies were visited in 2018. There were 28 studies completed in 2018 using the sage-grouse Habitat Assessment Framework (HAF) protocol for stubble height, and 38 for the mesic meadow studies. The HAF studies are initial studies so no long term trend data will be available until the studies are re-read in the future. Data that is gathered from these studies is and will be used to determine effects from ungulate grazing and to make sure that utilization is at proper use so that rangelands continue in a stable or upwards trend. In 2018 133 acres were treated for noxious weeds. In 2019 the number of treated acres was 389.

Recommendations

Continue to acquire long term trend data and utilize the data to make informed decision on grazing management. Continue to treat noxious weed populations.

Wildlife and Fish

LRMP Desired Conditions for Wildlife and Fish

Protect aquatic habitats which are in good or excellent condition and improve habitats where ecological conditions are below biological potential (LRMP Page IV-3).

Identify and improve habitat for sensitive, threatened, and endangered species including participation in recovery efforts for both plants and animals (LRMP Page IV-4).

Improve or maintain the quality of habitat on big game winter ranges (LRMP Page IV-4).

Determine current status and monitor trends in management indicator species and their habitats (LRMP Page IV-4).

Activity: Wildlife Habitat Diversity

Monitoring Question

Is the diversity of wildlife habitat being maintained?

Monitoring Indicator

Diversity of forest and rangeland vegetation.

Monitoring Methods and Data

The Forest has been monitoring habitat diversity at various scales from the landscape level to site-specific project level scales using several different sources. Some of these sources include a review of UDWR long-term range trend data, old growth evaluation data at the project and landscape level, soil surveys, visual reconnaissance, Forest stand exam data, Vegetational Structural Stages (VSS), GAP, old growth evaluation, soil surveys, and visual reconnaissance. This information has been documented and reviewed from the site-specific level to the planning unit level, and is catalogued in core GIS layers. Wildlife habitat diversity for wildlife is being maintained and enhanced across the Forest using a variety of tools. These tools include mechanical methods as well as prescribed fire, there are numerous projects that have happened the last few years and many more projects are occurring on the ground. In 2018 there were approximately 25,000 acres of vegetation treatment projects and in 2019 there were approximately 40,000 acres treated. All these treatments are done with the goal of maintaining and improving the diversity of wildlife habitat. These projects are occurring on all Ranger Districts.

In reviewing Forest standards, direction, project level information and monitoring information, 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 Fishlake National Forest, sample projects have been looked at and edge is present in abundance with good distribution. Based on this evaluation, the diversity of wildlife habitat is being maintained across the Forest in sufficient amounts with good distribution.

Results

As discussed in the Fishlake National Forest Life History report (2018 draft) viability of Threatened, Endangered, Regionally Sensitive and Management Indicator Species is generally strong across the Forest with the exception of the Northern Goshawk. These species represent a variety of habitats across the Forest and are a reasonable indicator of habitat diversity and effectiveness on the Forest. It should be noted that it is possible to have populations that struggle while habitat diversity and quality are effective and diverse. Many variables can contribute to strong persistent populations, however, population numbers are a reasonable indicator and are used for this summary. Within the Northern goshawk forest plan amendment direction is in place to manage for sustainable VSS, which has been demonstrated to provide for a sustainable landscape of wildlife habitat. VSS management is part of each vegetation management project where the Northern goshawk has habitat and used as a desired condition. Projects that contain suitable habitat for the goshawk contain recommendations to move landscapes towards the percentages of these VSS classes across forested landscapes.

Activity: Modification of Ecosystem

Monitoring Question

Are forest management activities and/or natural events affecting the structure and function of upland and riparian ecosystems?

Monitoring Indicator

Structure and function of forest and riparian ecosystems.

Monitoring Methods, Data, and Results

See Fisheries report

Activity: Big game habitat condition

Monitoring Question

Is big game habitat maintained to meet Forest Plan desired conditions?

Monitoring Indicator

Big game habitat condition.

Monitoring Methods and Data

The Forest has been monitoring big game habitat at various scales from the landscape level to site-specific project level scales using several different sources. Some of these sources include review of UDWR long-term range trend data, old growth evaluation at the project and landscape level, visual reconnaissance, Forest stand exam data, VSS, and GAP. This information has been documented and reviewed from the site-specific level to the planning unit level, and is catalogued in core GIS layers.

Big game habitat diversity is being maintained and enhanced across the Forest using a variety of tools. These tools include mechanical methods as well as prescribed fire. In reviewing Forest standards and guidelines direction, project level information and monitoring information, edge habitat for terrestrial species is not lacking and is adequate in abundance and distribution to support the species that use edge. It was not logistically or economically feasible to assess every project that modified wildlife habitat diversity across the Fishlake National Forest, sample projects have been looked at and edge is present in abundance with good distribution. Based on this evaluation, the diversity of big game habitat and its condition is being maintained across the Forest in sufficient amounts with good distribution.

Results

The following table represents mule deer and elk (both management indicator species [MIS]) population data with the percent of the suitable habitat that occurs on the Forest, and management plan objectives. These data demonstrate that big game are viable and persistent across the Fishlake Forest and beyond the administrative boundary of the Fishlake Forest as hunt unit boundaries are larger than the National Forest level. The reductions in numbers in the Beaver deer unit between 2016 and 2017 are a result of State management to bring herd unit objectives into compliance with management plan requirements. The additional deer and elk units are within the range of variation and they fluctuate with hunting success and weather conditions.

Table 8. Mule Deer Winter Population Estimates by WMU.

WMU	% Suitable habitat in Fishlake NF	Management Plan Objective	2016	2017
Beaver	70%	13,000	14,700	13,950
Monroe	75%	7,500	6,700	6,000
Fillmore B	85%	12,000	8,900	8,800
Fishlake Plateau		10,000	6,800	6,600
Thousand Lake Plateau		3,000	1,250	1,150

Data for the table above remains the most current as the Annual Big Game Reports for 2018 and 2019 aren't available on the Utah Division of Wildlife Resources website.

Table 9. Elk Winter Population Estimates by WMU

WMU	% Suitable habitat in Fishlake NF	Management Plan Objective	2008	2009	2010	2011	2012	2013	2014	2016	2017	2018	2019
Fillmore, Pahvant/Oak Creek	93%	1,600	1,500	1,500	1,550	1,450	1,400	1,350	1,350	1,450	1,500	1,400	
Beaver East/Beaver West	90%	1,050	800	850	1,100	1,100	1,150	1,175	1,100	1,500	1,450	1,050	
*Plateau, Fishlake/Thousand Lakes, Monroe, Boulder, Mt. Dutton.	87%	10,400	5,700	5,200	5,100	4,800	5,100	5,600	5,400	8,300	8,750		8,000

*The Plateau WMU listed has been combined into a Greater Plateau Elk Complex containing 5 WMU's. It should be noted that Mt. Dutton is managed by Dixie National Forest. Aerial population surveys were completed for Fillmore and Beaver East Units in 2018-2019. Aerial surveys for the Plateau Unit were completed in 2019-2020, the data was not finalized and didn't include elk north of I-70

Activity: Threatened Plant Species

Monitoring Question

Are Threatened, Endangered, Proposed, and Candidate (TEPC) plant habitats being protected from forest plan implementation activities?

Monitoring Indicator

Number of TEPC plant locations adversely impacted.

Results

Recently there have been a variety of vegetation treatment projects in TEPC plant habitat. Specifically, the Last Chance and Governor Creek projects are located in habitat for *Townsendia*

aprica. Prior to these projects being implemented surveys for this species occurred, following surveys a determination of effects will be made in a Biological Assessment and concurrence to this determination will be sought from the US Fish and Wildlife Service.

Activity: Threatened, Endangered, and Sensitive Animals

Monitoring Question

Are TEPC animal habitats being protected from forest plan implementation activities?

Monitoring Indicator

TEPC habitat conditions retained across the planning area.

Monitoring Methods, Data, and Results

Forest plan standards and guidelines are implemented across the Forest in varying degrees based on the project. Based on data represented in the Fishlake Life History Report (draft 2018) TEPC species are static across the Forest. These species include the Utah prairie dog, California condor, and the Mexican spotted owl. Utah prairie dogs are not only managed under the Forest Land and Management (Fishlake LRMP 1986) but under several other management documents such as the General Conservation Plan (2018). Recent efforts the last couple of years for Utah Prairie Dogs have seen an increase in the spring counts in the Awapa and Paunsaugaunt units to programs goals. Biologists on the Dixie and Fishlake NF's have also conducted dusting procedures on the prairie dogs and their burrows which has greatly reduced losses from the plague to this species. In the last few years The California condor may occasionally occur in areas on the Forest. Because no nesting occurs on the Forest use by condors is only incidental if any. Habitat is retained across the Forest, is well distributed and abundant. The Mexican spotted owl is limited in habitat to selection steep walled canyon complexes on the Fremont River Ranger District. The Fishlake Forest plan provides protection along with the Mexican Spotted Owl Recovery Plan (2012). Little to no use occurs in the 2 protected activity centers on the Fishlake.

Activity: Nongame Species

Monitoring Question

Are forest management activities and natural events affecting the ecological conditions indicated by the status of focal species?

Monitoring Indicator

Habitat across the planning area.

Monitoring Methods, Data, and Results

Monitoring data for Bonneville cutthroat trout (BCT) (*Oncorhynchus clarkii utah*) in 2014 in the upper Sevier River, 2016 in the Beaver River, 2017 in the Middle Sevier River, and 2019 in the Upper Sevier River Drainages are examined below to assess management activities and natural events affecting ecological conditions on Fishlake National Forest (FNF). BCT monitoring is usually conducted cooperatively with the Utah Division of Wildlife (UDWR) on a seven year rotation on the Fishlake National Forest (FNF).

Activity: Snag management

Monitoring Question

Are snags in condition to meet needs of cavity nesters?

Monitoring Indicator

Snag condition.

Monitoring Methods, Data, and Results

Spruce landscapes throughout the Forest have been impacted from endemic and epidemic events of spruce bark beetle. There is no shortage of snags across the Forest due to the bark beetle events, fires, and succession of the native vegetative communities such as aspen. Other species, such as ponderosa pine, are not as plentiful nor as widespread. Ponderosa pine is a sought after species by fuelwood cutters and snags are less plentiful. The Fishlake Forest Plan provides strong protection for the management of snags of all tree species across the Forest. Based on observations while conducting Northern goshawk and general wildlife surveys during project clearance analyses, snags are adequate to support healthy well distributed populations of cavity-dependent species and secondary obligates across the Forest.

Fisheries

Activity: Fish-Bonneville Cutthroat Trout (BCT)

Monitoring Question

Are Forest management activities and natural events affecting the ecological conditions indicated by the status of the focal species?

Monitoring Indicators

BCT population estimates.

Monitoring Methods, Data, and Results

Monitoring data for Bonneville cutthroat trout (BCT) (*Oncorhynchus clarkii utah*) in 2014 in the upper Sevier River, 2016 in the Beaver River, 2017 in the Middle Sevier River, and 2019 in the Upper Sevier River Drainages are examined below to assess management activities and natural events affecting ecological conditions on Fishlake National Forest (FNF). BCT monitoring is usually conducted cooperatively with the Utah Division of Wildlife (UDWR) on a seven year rotation on the Fishlake National Forest (FNF).

Beaver River Drainage 2016

FNF and UDWR personnel monitored 14 BCT stations on five streams on Beaver Ranger District in 2016. Results from 2016 show a decrease or stable trend in fish biomass in 2016 compared to previous surveys. Decreasing trends were attributed to fire effects and naturally variable habitat (Table 10).

Birch Creek holds an important pure BCT remnant population, at one time the only known BCT on the FNF. The low elevation of the stream with naturally variable flow is known to affect the

BCT population. It is also impacted by livestock grazing on the FNF. Portions are within grazing exclosures, but these are not always functional. Birch Creek BCT are quick to respond when habitat conditions improve, but also decrease rapidly when habitat quality declines. A highly variable population is more at risk of extirpation. The 2007 sampling followed excellent spawning conditions in 2005, so it showed a higher population level. Conditions in 2016 were more typical, resulting in a trend towards the long-term average. Long-term average biomass levels on Birch Creek (~40lbs/acre) are below the FNF average biomass levels (50-60lbs/acre), in part due to grazing impacts on this stream.

Briggs Creek BCT appeared to have decreased slightly, but this may also reflect less efficient sampling due to a salvage operation to move many of the Briggs Creek BCT to upper South Fork of North Creek to avoid fire effects. It is known that this population was lost after sampling due to post-Briggs Fire flooding. Briggs Creek fish transferred to the South Fork of North Creek were also impacted by post-fire flooding from a fire in South Fork of North Creek but some fish are believed to have survived and are likely slowly expanding population numbers in the middle upper portion of South Fork of North Creek. Fish present in the lower South Fork of North Creek was also severely affected by post-fire flooding from the Briggs fire, but habitat was not as severely affected as was Briggs Creek. Thus fish numbers in lower South Fork of North Creek are believed to be very low. These stream is scheduled for resampling in 2023, which will help determine the level of recovery.

Stream habitat was dramatically changed in North Fork North Creek and Pole Creek following the 2010 Twitchell Canyon Fire, particularly in upper and lower North Fork of North Creek and in Pole Creek. Effects from the fire to ecological conditions will continue for some time. Management activities to improve stream habitat for BCT were undertaken in upper and lower North Fork of North Creek. Portions of the BCT population in North Fork of North Creek had hybridization issues, so the limited numbers of remaining hybridized fish were removed and pure Birch Creek stock BCT were restocked into North Fork of North Creek from Threemile Creek. A limited number of pure remnant BCT have survived in the headwaters. Sterile mixed-stock BCT have also been stocked for sport-fishing purposes. Habitat is still a concern in North Fork of North Creek due to the 11 road fords, livestock grazing, and large tree removal along the stream. Pole Creek was marginal even pre-fire, and will likely remain unsuitable for BCT for some time.

The stable trend reported in Pine Creek is consistent with the increase to the population biomass experienced in 2008 following land management improvements, which included well dispersed prescribed burning in 10-15% of the drainage, which may have pulled some of the livestock grazing away from the stream.

Table 10. 2016 population status of Bonneville cutthroat trout in the upper Beaver River drainage of the Beaver Ranger District by individual stream compared to previous known conditions.

Ranger District	Stream/tributary (indentation denotes tributaries)	# of stations surveyed in 2016	Year	Occupied Habitat		Biomass		Comments
				Miles	Trend	Lbs./acre	Trend	
Beaver	Birch Creek	4	1980	2.5	--	26	--	Remnant population Habitat improvement Drought impacted Improved conditions Biomass naturally variable
			1994	4.2	Increase	63	Increase	
			2002	3.4	Decrease	12	Decrease	
			2007	3.4	Stable	62	Increase	
			2016	3.3 ¹	Stable	36	Decrease	

Beaver	Briggs Creek	1	1980	0	--	0	--	No fish present Restored in 1988 Population stable Population improving Threatened by Briggs Fire
			1995	0.6	Increase	32	Increase	
			2002	0.6	Stable	33	Stable	
			2009	0.6	Stable	62	Increase	
			2016	0.4 ¹	Stable	49	Decrease ²	
Beaver	North Fork North Creek	3	1980	>0	--	>0	--	Unconfirmed remnant BCT restored in lower stream Population expansion Impacted by fire 2010 Impacted by fire, piscicide ³
			1994	2	Increase	32	Increase	
			2002	6.2	Increase	31	Stable	
			2009	6.2	Stable	30	Stable	
			2016	2.1	Decrease	31	Stable	
Beaver	Pole Creek	2	1980	0	--	0	--	Nonnative trout present BCT restoration in progress Drought impacted Marginal habitat Eradicated by fire effects
			1994	>0	--	>0	--	
			2002	1.6	Increase	>0	Increase	
			2009	1.6	Stable	13	Increase	
			2016	0	Decrease	0	Decrease	
Beaver	Pine Creek	4	1980	>0	--	>0	--	BCT restoration in progress BCT restored 1980, 1987 No increase ¹ Improved land mgmt. Population stable
			1994	3.1	Increase	24	Increase	
			2001	3.1	Stable	24	Stable	
			2008	3.1	Stable	55	Increase	
			2016	2.9 ¹	Stable	54	Stable	

¹ – Habitat estimate more accurate in 2016 due to refined mapping.

² – 2016 biomass measure is a minimum estimate based on salvage collection.

³ – Occupied habitat reduced by effect of Twitchell Canyon fire (2010) and piscicide application to remove hybridized BCT (2014). Biomass stable in occupied habitat, though that habitat has been decreased by 70%.

Trends noted as an increase or decrease if values changed by more than 10%; >0 indicates that trout were present but biomass or range was not measured. Biomass presented is a mean of all sampling stations within the stream where BCT were detected.

Lower Sevier River Drainage 2019

Lower Sevier River Drainage streams within Fillmore Ranger District were surveyed in 2019 by FNF and UDWR personnel. Six BCT stations were sampled and reported on two streams during the course of the monitoring. 2019 monitoring results show an absence of BCT in North Fork Corn Creek and an increase in BCT biomass in Oak Creek. The streams and BCT biomass trends are described by drainage below.

No BCT were found in sampling of North Fork of Corn Creek, although it is possible that very low numbers of fish in localized stream reaches could have been missed. The absence of BCT in North Fork of Corn Creek is likely a result of initial stocking efforts in 2012 being unsuccessful. BCT were transferred from Skunk Creek, a Clear Creek tributary (Fillmore Ranger District) to North Fork of Corn Creek by FNF, UDWR and Interagency Fire personnel. It is likely that BCT were not stocked high enough in North Fork Corn Creek as the stream experiences intermittent flows in the middle portion of the stream while having better habitat in the middle-upper stream reaches. After 2019 Lower Sevier River Drainage BCT monitoring revealed the absence of fish in North Fork Corn Creek, 4,000 fingerling Manning Meadows brood BCT were stocked from the lower barriers up to the lower end of Hell Hole Canyon, which is the lower end of the better habitat. Additional stocking will resume in 2020 and 2021 to ensure multiple age classes of BCT and may extend even further upstream (Hadley et. al. 2020).

Oak Creek has suffered from flash floods and fires over the years. BCT were first introduced into Oak Creek in 2005 following flood impacts. Post-fire flooding after the 2006 Devils Den fire severely impacted the stream and eliminated all fish below Limekiln Canyon. The canyon burned again in the 2012 Clay Springs fire. Only a few brown trout survived post-fire flooding in the

headwaters spring source. An attempt was made to mechanically remove these fish after which Oak Creek was stocked with Manning Meadows Reservoir brood stock BCT, triploid (sterile) hatchery rainbow trout, and sterile tiger trout. It was anticipated that this would provide a better sportfishing mix for the public. Sampling in Oak Creek has determined some brown trout were missed and not removed (likely young fish in the dense aquatic weeds of the spring source). The cool more constant spring flow in Oak Creek may be favoring fall spawning brown trout and not all sterile rainbow are being removed by fisherman, thus the BCT are not doing as well as was anticipated. Management adjustments in the stocking of sterile rainbows or removal of brown trout may be needed if improved conditions for BCT are desired in this stream (Hadley et al. 2020).

Table 11. Current (2019) population status of Bonneville cutthroat trout in the Lower Sevier River drainage by individual stream on Fishlake National Forest compared to previous known conditions.

Ranger District	Stream/tributary (indentation denotes tributaries)	# of stations surveyed in 2017	Year	Occupied Habitat		Biomass		Comments
				Miles	Trend	Lbs./acre	Trend	
Fillmore	North Fork Corn Creek	3	2019	0	--	0	--	Restoration attempted in 2012
Fillmore	Oak Creek	3	2007	1.9	--	0	--	BCT introduced in 2005 Repeated flooding Dominated by other species
			2014	1.9	Stable	0	--	
			2019	1.9	Stable	21.4	Increase	

Trends noted as an increase or decrease if values changed by more than 10%; >0 indicates that trout were present but biomass or range was not measured. Biomass presented is a mean of all sampling stations within the stream where BCT were detected.

Middle Sevier River Drainage 2017

Middle Sevier River Drainage streams within Fillmore, Beaver, and Richfield Ranger Districts were surveyed in 2017 by FNF and UDWR personnel. 47 BCT stations were sampled and reported on sixteen streams during the course of the monitoring. 2017 monitoring results show stability or an increase in BCT biomass in nine out of 16 streams. The streams and BCT biomass trends are described by drainage below.

Increase in BCT biomass in Clear Creek and its tributaries is directly correlated with management efforts to restore this cutthroat subspecies to the drainage through removal, in most part, of the dramatically reduced numbers of nonnative trout following the Twitchell Canyon fire, and subsequent native BCT stocking. Streams that experienced an increase in BCT biomass in the Clear Creek drainage include Clear Creek, Fish Creek, Picnic Creek, Mill Creek, Shingle Creek and Skunk Creek. Most of these streams were stocked with BCT from the UDWR Manning Meadow Reservoir broodstock, which allowed stocking of large numbers of BCT fry throughout the drainage. The only two streams that experienced a decrease in biomass in the Clear Creek drainage were Pole Creek and Sam Stowe Creek. Since Pole Creek held a unique genetic remnant population of BCT in its headwaters, it was considered desirable to allow this remnant to expand throughout the drainage. The limited numbers of remnant stock pure BCT for reintroduction has reduced the rate of recovery in Pole Creek and East Fork of Fish Creek (also stocked with Pole

Creek fish but not sampled in 2017). Decrease in BCT biomass in Sam Stowe Creek is likely due to naturally variable streamflow and habitat conditions (Table 12).

Note that the increase in BCT noted above for the Clear Creek drainage is not necessarily an increase in fish biomass or productivity. Most of these streams were non-native trout pre fire, and fish numbers and biomass decreased to zero or very low numbers post-fire. Habitat work was undertaken on Fish Creek and Shingle Creek to help restore fish habitat after the Twitchell Fire. Most of the work was conducted in 2014 and 2015 and was concluded in 2017 on Shingle Creek. This work undoubtedly helped restore fish biomass levels in many of the Shingle and Fish Creek stations to near pre-fire levels. Some areas that were not treated have recovered on their own, while others are still recovering. Post-fire flood events are most likely within the first five years after a large fire, but can still occur even 1 or 2 decades later.

Manning Creek and its tributary Barney Creek have stable populations of BCT. The reason for the decreases in fish biomass in Vale Creek, a tributary to Manning Creek, is unknown. Vale Creek is slated for prescribed burning in 2018 and will be sampled to determine post-fire effects. Decreases in another Manning Creek tributary, East Fork Manning Creek, were attributed to seasonal use of BCT in limited habitat. East Fork Manning Creek has low flow and may provide marginal habitat for BCT in some conditions (Table 12).

Ten Mile Creek and Pine Creek (Bullion Canyon) flow east out of the Tushar Mountain range on Beaver Ranger District. Pine Creek BCT population is on the rise following restoration in 2007. Ten Mile Creek has experienced an overall decrease in BCT biomass (Table 12). The uppermost station was stable, while the middle station had a 33% decline for unknown reasons. The lowermost station experienced an 85% decline due to monsoonal flooding in the lower drainage from a side tributary drainage.

Salina Creek and its tributary Beaver Creek, both have decreased in BCT biomass. This decrease is attributed to the expansion of non-native brown trout in both streams (Table 12).

Table 12. 2017 population status of Bonneville cutthroat trout in the Middle Sevier River drainage by individual stream on Fishlake National Forest compared to previous known conditions.

Ranger District	Stream/ tributary (indentation denotes tributaries)	# of stations surveyed in 2017	Year	Occupied Habitat		Biomass		Comments
				Miles	Trend	Lbs./acre	Trend	
Beaver	Clear Creek	5	1995	0	--	0	--	Nonnative trout present
			2002	0	--	0	--	Nonnative trout present
			2009	0	--	0	--	Nonnative trout present
			2017	11.9	Increase	39	Increase	BCT restored 2011-16
Beaver	Fish Creek	5	1995	0	--	0	--	Nonnative trout present
			2002	0	--	0	--	Nonnative trout present
			2009	0	--	0	--	Nonnative trout present
			2017	10.7	Increase	42	Increase	BCT restored 2012-16
Beaver	Picnic Creek	2	1995	0	--	0	--	Nonnative trout present
			2002	0	--	0	--	Nonnative trout present
			2009	0	--	0	--	Nonnative trout present
			2017	2.9	Increase	71	Increase	BCT restored 2013-15

Ranger District	Stream/tributary (indentation denotes tributaries)	# of stations surveyed in 2017	Year	Occupied Habitat		Biomass		Comments
				Miles	Trend	Lbs./acre	Trend	
Beaver	Mill Creek	4	1995	0	--	0	--	Nonnative trout present
			2002	0	--	0	--	Nonnative trout present
			2009	0	--	0	--	Nonnative trout present
			2017	1.6	Increase	45	Increase	BCT restored 2013-16
Fillmore	Pole Creek	4	1995	>0	--	>0	--	Unconfirmed remnant
			2002	>0	--	>0	--	Unconfirmed remnant
			2009	0.5	Increase	70	Increase	100% BCT
			2017	6.6	Increase	16	Decrease ^{e1}	Population expanded
Fillmore	Skunk Creek	2	1995	>0	--	>0	--	Unconfirmed remnant
			2002	>0	--	>0	--	Unconfirmed remnant
			2009	>0	--	>0	--	97% BCT confirmed
			2017	1.2	Increase	159	Increase	2011 Nonnative trout removed 11-12
Fillmore	Sam Stowe Creek	3	1995	0	--	0	--	Hybrids found
			2002	2.9	Increase	46	Increase	Restored in 1995
			2010	2.9	Stable	45	Stable	Population stable
			2017	3.2	Stable ²	28	Decrease ^e	Marginal habitat
Beaver	Shingle Creek	4	1995	0	--	0	--	Nonnative trout present
			2002	0	--	0	--	Nonnative trout present
			2009	0	--	0	--	Nonnative trout present
			2017	6.5	Increase	87	Increase	BCT restored 2011-16
Richfield	Manning Creek	3	1995	0	--	0	--	Restoration in progress
			2001	10.7	Increase	62	Increase	Population expansion
			2008	10.7	Stable	70	Increase	Population stable
			2017	9.8	Stable ²	68	Stable	Population stable
Richfield	Barney Creek	1	1995	0	--	0	--	Restoration in progress
			2001	0.6	Increase	5	Increase	Population expansion
			2008	0.6	Stable	19	Increase	Population stable
			2017	0.6	Stable ²	46	Increase	Population stable
Richfield	East Fork Manning Creek	1	1995	0	--	0	--	Restoration in progress
			2001	0.6	Increase	13	Increase	Population expansion
			2008	0.6	Stable	14	Stable	Seasonal use in limited habitat
			2017	0.6	Stable ²	7	Decrease ^e	Seasonal use in limited habitat
Richfield	Vale Creek	1	1995	0	--	0	--	Restoration in progress
			2001	1.1	Increase	75	Increase	Population expansion
			2008	1.1	Stable	91	Increase	Population stable
			2017	1	Stable ²	42	Decrease ^e	Unknown reasons
Beaver	Pine Creek (Bullion Canyon)	3	1995	0	--	0	--	Nonnative trout present
			2002	0	--	0	--	Nonnative trout present
			2009	>0	--	>0	--	Restoration in progress
			2017	3.2	Increase	93	Increase	BCT restored 2007-163

Ranger District	Stream/tributary (indentation denotes tributaries)	# of stations surveyed in 2017	Year	Occupied Habitat		Biomass		Comments
				Miles	Trend	Lbs./acre	Trend	
Richfield	Salina Creek	4	1995	>0	--	>0	--	Unconfirmed remnant
			2002	>0	--	>0	--	Unconfirmed remnant
			2009	12.9	Increase	38	Increase	100% BCT
			2017	11.2	Stable ²	29	Decrease	Brown trout expanding
Beaver	Beaver Creek	2	1995	>0	--	>0	--	Unconfirmed remnant
			2002	>0	--	>0	--	Unconfirmed remnant
			2009	1.6	Increase	37	Increase	100% BCT
			2017	1.4	Stable ²	12	Decrease	Brown trout expanding
Beaver	Tenmile Creek	3	1995	0	--	0	--	Nonnative trout present
			2002	>0	Increase	>0	Increase	Restored 2002
			2008	5.8	Increase	55	Increase	Population expansion
			2015	5.5	Stable ²	34	Decrease	Flash flooding, unknown

¹ – Mean biomass reduced by low BCT density in lower reaches of Pole Creek where the population is still establishing.

² – Habitat estimate more accurate in 2017 due to refined mapping.

³ – Nonnative trout removed in 2007-08; BCT transferred from Tenmile Cr in 2009; Manning Meadow BCT stocked in 2015-16.

Trends noted as an increase or decrease if values changed by more than 10%; >0 indicates that trout were present but biomass or range was not measured. Biomass presented is a mean of all sampling stations within the stream where BCT were detected.

Upper Sevier River Drainage 2014

Birch Creek (upper Sevier drainage) was treated with rotenone after post-fire flooding from the 1996 Pole Creek fire was believed to have extirpated RBT. This one-time rotenone treatment in 2001 confirmed that Birch Creek was fishless. BCT produced from the Manning Meadow Reservoir brood stock were stocked in Birch Creek in 2001, following the rotenone treatment (Hadley et. al. 2015). Birch Creek BCT biomass levels have been consistent following restoration, but at a relatively low level of about half of what might be considered average for southern Utah, likely due to a combination of grazing impacts and marginal stream conditions related to low flow. These factors limit pool quality on the stream.

Table 13. 2014 population status of Bonneville cutthroat trout in the Upper Sevier River drainage by individual stream on Fishlake National Forest compared to previous known conditions.

Ranger District	Stream/tributary (indentation denotes tributaries)	# of stations surveyed in 2014	Year	Occupied Habitat		Biomass		Comments
				Miles	Trend	Lbs./acre	Trend	
Beaver	Birch Creek (East)	4	2002	>0	--	>0	--	Restored in 2001
			2008	3.9	Increase	26.7	Increase	Population expansion
			2014	3.9	Stable	26.7	Stable	Population stable

Table 14. Miles of stream occupied by BCT per district on Fishlake National Forest, 2014-2019.

District	Occupied length of stream (miles)
Fillmore	12.9
Richfield	23.2
Beaver	47.6
Total	83.7

Trends noted as an increase or decrease if values changed by more than 10%; >0 indicates that trout were present but biomass or range was not measured. Biomass presented is a mean of all sampling stations within the stream where BCT were detected.

Activity: Macro-invertebrate

Monitoring Question

Are Forest management activities and/or natural events affecting aquatic habitats?

Monitoring Indicator

Aquatic habitat condition.

Monitoring Methods, Data, and Results

Macroinvertebrate sampling results (BCI: Biotic Control Index).

In 2016 and 2017 a total of 12 stations were sampled on 10 streams. This meets the Forest Plan Monitoring Plan of sampling 5 streams/year. In 2018 one station was sampled on 1 stream. In 2019 sampling of streams on Monroe Mountain was planned but a shift in management priorities in late summer precluded that sampling.

In the 2016 sampling four out of five streams were below the recommended Forest Standard and Guideline of a BCI of 75 or greater. Note that Mill Creek was treated with piscicide several years earlier, but by 2016 recovered to a BCI level above the Standard and Guideline. Its trend is up from 2014. The South Fork North Creek macroinvertebrate sample may have been affected by the previous two years piscicide applications. This is a new station, so no trend information is available. It was expected that its BCI may rise with additional time post-treatment, although this area has been affected by post-fire flooding after the 2016 sampling which will likely delay the recovery. Second Creek is new station. It is known to have some siltation issues, in part from an adjacent road and livestock grazing. While below Standard and Guidelines, both Lake Creek and Gooseberry stations were up slightly from previous sampling (6 and 4 points, respectively). Both are known to have some sediment input from grazing, but the Lake Creek rating may also be affected by its location relative to extensive valley sediments.

Table 15. Biotic Control Index (BCI) scores for macro-invertebrates sampled in streams on ranger districts of Fishlake National Forest in 2016.

District	Stream (Fish population station)	BCI score
Beaver	Mill Creek (S03)	88
Beaver	South Fork North Creek (S01)	69
Fillmore	Second Creek (S01)	62
Fremont River	Lake Creek (S01)	58

Richfield	Gooseberry (upper road crossing)	69
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In the 2017 sampling two out of five streams were below the recommended Forest Standard and Guideline of a BCI of 75 or greater. Salina Creek was below the Standard and Guideline. Long term trend at Station 01 was down from the 1987-89 samples (6-11 points), down slightly from the 1990 and 1999 samples (1-3 points) but stable from the 2003 sample. Station 02 was down from the 1987-1990 and 1999 samples (3-13 points with 1 high outlier), but up slightly from the 2003 sample (4 points). Beaver Creek was below the Standard and Guideline. Station 01 had an upward trend from 2003 (3 points). Station 02 trend was considerably down from 1999 to 2003 but back up to just below the 1999 level in 2017 (-2 points). The samples in Shingle Creek, Fish Creek, and Clear Creek were all above the Standard and Guideline. Fish Creek Station 03 and Clear Creek Station 03 were new macroinvertebrate stations. Shingle Creek Station 03 was first sampled in 2010 just before the Twitchell Canyon fire burned through the station. Its pre-fire level was 73 just below the Standard and Guideline, probably reflecting long-term moderate plus livestock use of the area. Note that this station was probably severely negatively impacted by the October 2010 ash flow off of the Twitchell Canyon fire with the first major fall rains. Station 03 was resampled August 22, 2011 just over 2 weeks after the August 3, 2011 post-fire flood, which was the first major flood and largest flood to occur after the fire. This sample date had a BCI of 46, which is effectively the lowest BCI score possible. By 2017 after the fire, flood, and rotenone treatment the BCI had improved to 88. Part of this increase is probably due to the switch from the older individuals sample methodology to a composite sample (the large/rare taxa search seems to raise BCI scores several points) and part is likely from the 5 years of generally complied with grazing rest post-fire. Visual observation of grazing levels were moderate plus (high side of 40-60%) when the sample was taken in late fall.

Table 16. This table shows the macro-invertebrate stations sampled in streams on ranger districts of Fishlake National Forest in 2017. These samples have not yet been processed.

District	Stream (Fish population station)	BCI score
Richfield	Salina Creek (S01)	64
Richfield	Salina Creek (S02)	68
Richfield	Beaver Creek (S01)	58
Richfield	Beaver Creek (S02)	66
Beaver	Shingle Creek (S03)	88
Beaver	Fish Creek (S03)	82
Beaver	Clear Creek (S03)	90

Table 17. This table shows the macroinvertebrate stations sampled in streams on ranger districts of Fishlake National Forest in 2018. These samples have not yet been processed.

District	Stream (Fish population station)	BCI score
Richfield	Fish Creek (S02)	Not yet analyzed

Activity: Habitat Condition Inventory

Monitoring Question

Is aquatic habitat maintained to meet Forest Plan Desired Conditions?

Monitoring Indicators

Aquatic and riparian condition; in-stream channel condition.

Monitoring Methods, Data, and Results

The monitoring indicators for determining whether aquatic habitat is being maintained to meet Forest Plan Desired Conditions include aquatic and riparian condition as well as in-stream channel condition. Monitoring efforts by FNF Fisheries personnel in 2016/17 resulted in data collected that reflect Forest Plan Desired Conditions which are as follows:

- A. Maintain 40% overhanging grasses, forbs, sedges and shrubs along banks of streams
- B. Maintain 50% or more of total streambank length in stable condition where natural conditions allow
- C. No more than 25% stream substrate should be covered by inorganic sediment less than 3.2mm (1/8 inch)
- D. Maintain a Biologic Condition Index (BCI) of 75 or greater (FNF Forest Plan 1986)

Items A and B are visually observed and qualitatively measured by FNF fisheries biologists. General condition of streams met or exceeded Forest Plan Desired Condition items A and B during 2016/17 surveying. Streams affected by the Twitchell Fire are recovering, however, and in many areas have exposed stream banks that lack overhanging vegetation and deeply rooted plants which are not meeting items A and B. Post-fire restoration efforts and natural riparian restoration will allow these areas to recover over time if not overly impacted by other land uses. Recovery is generally believed to be taking place but localized stream reaches are known to still be impacted. Visual observation also showed that the extended high water runoff in 2019 further impacted these vulnerable stream reaches.

Item D - BCI - has been addressed in this document under question 2 and will not be further discussed. Item D in relation to the Forest Plan Desired Conditions is addressed below and provides information on aquatic, riparian and in-stream channel condition.

Item C – substrate can be approximated using pebble counts. Pebble counts are not as accurate as using sieves. The pebble count – measures of the intermediate size of the stream or river substrate particles – typically 100 particles – was originally developed as a classification tool but is often also used as a monitoring measure as it is relatively quick and convenient. There are some issues with observer variability and it can underrepresent small fines but can still be useful, particularly in concert with visual observations and other stream data and particularly for monitoring project impacts in a selected area over a short period of time with consistent personnel.

Pebble counts were conducted on streams surveyed in 2017 in select fish population stations. The Forest Plan Desired Condition of no more than 25% stream substrate being covered by inorganic sediment less than 3.2mm was used to analyze stream surveyed. The information is summarized

in Table 15. Two streams did not meet Forest Plan criteria in the reaches surveyed. Those streams were Barney Creek and Beaver Creek (Salina Creek tributary).

Table 18. Pebble count data from 2017 fish population stations monitored on Fishlake National Forest.

Stream (Station)	Percent stream substrate less than 3.2 mm	Within Forest Plan Standards and Guides (Y,N)
Barney Creek (01)	26	N
Beaver Creek (01)	23	Y
Beaver Creek (02)	28	N
Clear Creek (03)	9	Y
Clear Creek (04)	6	Y
Clear Creek (05)	15	Y
East Fork Manning Creek (01)	13	Y
Fish Creek (01)	12	Y
Fish Creek (02)	4	Y
Fish Creek (03)	12	Y
Fish Creek (05)	6	Y
Manning Creek (01)	15	Y
Manning Creek (03)	16	Y
Mill Creek (01)	8	Y
Mill Creek (02)	9	Y
Mill Creek (03)	5	Y
Pole Creek (01)	12	Y
Pole Creek (02)	14	Y
Pole Creek (04)	23	Y
Salina Creek (01)	10	Y
Salina Creek (02)	12	Y
Sam Stowe (01)	10	Y
Seven Mile (02)	19	Y
Shingle Creek (01)	8	Y
Shingle Creek (02)	12	Y
Shingle Creek (03)	11	Y
Shingle Creek (05)	10	Y
South Creek (02)	16	Y
Ten Mile Creek (01)	13	Y
Ten Mile Creek (03)	13	Y
Vale Creek (01)	9	Y

Table 19. Pebble count data from 2019 fish population stations monitored on Fishlake National Forest.

Stream (Station)	Percent stream substrate less than 3.2mm	Within Forest Plan Standards and Guides (Y,N)
Oak Creek (01)	6	Y
Oak Creek (02)	3	Y

Oak Creek (03)	4	Y
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The above data show that many streams on the Fishlake N.F. are not over the Forest Plan Standard and Guideline for percent fines. This is particularly true in the Tushar Mountains which have a natural gravel/cobble substrate with limited fines. Percent fines may be more limiting in streams with fine grained soils or where streams are paralleled by a road where the road fill is abutting the stream. Other streams, such as on the north part of the Forest in silty geologic formations, may have a fine silt embeddedness that covers larger stream gravels but isn't effectively measured by pebble counts.

Goshawk

Activity: Goshawk territory occupancy at the forest level

Monitoring Question

Are known goshawk territories on NFS lands remaining occupied?

Monitoring Indicator

Goshawk territory occupancy.

Results

The table below demonstrates the past 10 years of active Northern goshawk territory occupancy by Ranger District on the Fishlake. Territory occupancy is generally down for the past 10 years. The causal effects are difficult to determine. Based on these data, goshawks are decreasing slightly in numbers and viability with an unknown cause.

Table 20. Active Goshawk data.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fillmore	1	1	1	1	0	0	0	0	0	2
Beaver	3	2	2	1	0	2	2	2	1	1
Fremont River	9	8	10	12	9	8	11	9	3	2
Richfield	2	1	8	6	7	8	4	5	1	3

In 2018 only 5 territories and in 2019 only 6 territories were monitored on the Richfield Ranger District. The 2 new territories on the Fillmore ranger District were located due to additional surveys being completed in 2019.

Activity: Goshawk territory occupancy following vegetative management treatments

Monitoring Question

Are goshawk territories remaining occupied following vegetation management?

Monitoring Indicator

Goshawk territory occupancy.

Results

Forest monitoring has not determined if territory occupancy has been impacted by vegetation management projects. All vegetation management projects are required to comply with the Fishlake LRMP and with other goshawk science that the Goshawk Amendment (Rodriguez et al.) used with it changed the plan. This level of detection will require a long-term dataset with more detailed monitoring than currently collected during forest monitoring efforts. Territory abandonment due to vegetation management projects is difficult to determine as birds may not re-nest in a territory for a number of reasons. The one territory on the Fillmore Ranger District was abandoned in 2013 following the Clay Springs Fire. Based on the slight dip in numbers over 10 years it is difficult to make a determination on vegetation management projects adversely impacting goshawk territory use. However, it should be noted that bark beetle impacts have decreased habitat effectiveness across the Forest as well as impacts from fire and weather events.

Activity: Dispersion and patch size of mature/old forest groups

Monitoring Question

Is mature and old forest habitat connectivity being adequately maintained?

Monitoring Indicator

Percent and distribution of mature and old forest cover.

Results

The Northern goshawk is an indicator of old, or mature forests and is identified in the Fishlake LRMP as such. Based on the data above for goshawk activity across the Forest over the past 10 years, the distribution and effectiveness is adequate to support the goshawk which is as old growth dependent species. One issue we are currently facing is that we are monitoring older and older known territories and missing whatever is changing on the landscape...a decrease over time is thus predictable and makes an increase undetectable as birds move to exploit best areas and conditions. Despite the slight dip in goshawk nesting activity the causal effects are too difficult to determine and therefore the distribution is function at a satisfactory or close to satisfactory level.

Activity: Snag densities/sizes within a 100 acre treatment block

Monitoring Question

Is snag habitat being maintained in desired spatial arrangement?

Monitoring Indicator

Density and distribution of snags.

Results

As discussed above snag numbers in the spruce type are well distributed and abundant across the Forest. Specific snag management recommendations are in the Fishlake LRMP and are being implemented across the Forest in all vegetation management projects, thus providing a desired

spatial arrangement. In addition, the abundance of snags that are occurring due to bark beetle impacts add to the habitat effectiveness of the spatial arrangement of snags on the landscape.

Activity: Down log and woody debris amounts/sizes within a 10 acre treatment block

Monitoring Question

Is downed wood being maintained in sufficient amount, size, and location?

Monitoring Indicator

Quantity of downed logs and woody debris.

Results

With the large number of snags in the landscape a large numbers of tons per acre of downed wood is also present. Spruce is subject to wind events due to shallow root systems and therefore the Forest has an overabundance of don wood material. Within the Fishlake LRMP specific down woody debris recommendations are listed by cover type. These recommendations are required on each vegetation management project that occurs in Northern goshawk habitat across the Forest and is providing downed woody debris in sufficient size, amount and distribution.

Activity: Ungulate grazing practices in identified at-risk locations

Monitoring Question

Are appropriate adjustments to grazing practices being made where grazing is contributing to at-risk conditions?

Monitoring Indicator

Ungulate grazing practices in at-risk locations.

Results

Previously ungulate grazing practices (i.e., utilization, season of use, grazing system) in identified “at risk” locations were looked at in Northern goshawk territories. A review of grazing practices on at least 2 allotments were identified and monitored. Based on monitoring on the Fremont River Ranger District and Richfield District no “at risk” locations were identified. Grazing was not impacting the allotments reviewed or contributing to a decrease in habitat effectiveness for goshawk prey species. Only suitable prey species habitat was reviewed in goshawk territories and unsuitable habitat such as out in open parklands not identified as being part of a goshawk territory.

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Appendix

Monitoring and Evaluation Program

Program	Activity	Monitoring Question	Monitoring Indicator
Recreation	Developed Sites; Actual Use	Are developed recreation sites meeting Forest Plan standards for use, and are visitors satisfied?	Developed site use and visitor satisfaction
	Developed Sites; Condition	Are developed recreation sites meeting Forest Plan standards for condition?	Developed site condition
	Dispersed Actual Use	Are dispersed recreation sites meeting Forest Plan standards for use, and are visitors satisfied?	Dispersed site use and visitor satisfaction
	Dispersed campsite condition	Are dispersed recreation sites meeting Forest Plan standards for condition, and are visitors satisfied?	Dispersed site condition
	Trail condition	Are trails meeting Forest Plan standards for use and condition, and are visitors satisfied?	Trail use, and visitor satisfaction; miles of motorized trail managed to standard; miles of non-motorized trail managed to standard
Cultural Resources	Sites located and protected	Are historical and cultural resources being protected both from forest plan implementation activities and from vandalism or neglect?	Number of historical or cultural sites adversely impacted by projects or the public
Fish and Wildlife	Wildlife Habitat Diversity	Is the diversity of wildlife habitat being maintained?	Diversity of forest and rangeland vegetation
	Modification of Ecosystem	Are forest management activities and/or natural events affecting the structure and function of upland and riparian ecosystems?	Structure and function of forest and riparian ecosystems
	Big game habitat condition	Is big game habitat maintained to meet Forest Plan desired conditions?	Big game habitat condition
	Fish (BCT)	Are forest management activities and natural events affecting the ecological conditions indicated by the status of focal species?	BCT population estimates
	Threatened Plant Species	Are TEPC plant habitats being protected from forest plan implementation activities?	Number of TEPC plant locations adversely impacted
	Nongame Species	Are forest management activities and natural events affecting the ecological conditions indicated by the status of focal species?	Habitat across the planning area
	Macro-invertebrate	Are forest management activities and/or natural events affecting aquatic habitats?	Aquatic habitat condition
	T&E and Sensitive Animals	Are TEPC animal habitats being protected from forest plan implementation activities?	TEPC habitat conditions retained across the planning area
	Habitat Condition Inventory	Is aquatic habitat maintained to meet Forest Plan desired conditions?	Aquatic and riparian condition; in-stream channel condition
	Snag Management	Are snags in condition to meet needs of cavity nesters?	Snag condition

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Range	Permitted AUM	Are goods and services being provided in accordance with Forest Plan goals and objectives?	Level of permitted livestock grazing
	Forage Utilization	Are goods and services being provided in accordance with Forest Plan goals and objectives?	Forage utilization
	Range Trend	Do rangeland plant communities have desired species composition and is ground cover adequate?	Range condition and trend
Timber	Assure that timber manipulation will not favor an increase in forest pests (insects, diseases, etc.).	Are forest vegetation conditions stable or moving toward Forest Plan desired conditions?	Extent of insect and disease infestations
Water	Water Quality	Are beneficial uses, identified by the state of Utah, being maintained for all water bodies?	Impairment or degradation of water quality
	Changes in riparian Areas Due to Management	Are forest management activities affecting riparian ecosystems?	Riparian ecosystem condition
	Best Management practices effectiveness and compliance on land disturbing projects	Which forest management activities may affect riparian ecosystems?	BMP compliance and effectiveness
Soils	Accelerated Soil Loss Forestwide	Are forest management activities impairing soil productivity of the land?	Changes in soil properties (physical, chemical, and/or biological) that result in the loss of the inherent ecological capacity or hydrologic function of the soil resource
Facilities	Transportation System Management	Is adequate road access and maintenance being provided?	Miles of classified road open for public use
	Road Maintenance	Are open roads maintained to standard?	Miles of road maintained to standard
Protection	Fuel Treatment	Are fuel treatment projects protecting property, human health and safety, and reducing the potential for unwanted fire effects?	Effectiveness of fuel treatments in reducing unwanted fire effects
	Insect & Disease	Are forest vegetation conditions stable or moving toward Forest Plan desired conditions?	Extent of insect and disease infestations
Goshawk	Goshawk territory occupancy at the forest level	Are known goshawk territories on NFS lands remaining occupied?	Goshawk territory occupancy
	Goshawk territory occupancy following vegetative management treatments	Are goshawk territories remaining occupied following vegetation management?	Goshawk territory occupancy
	Dispersion & patch size of mature/old forest groups	Is mature and old forest habitat connectivity being adequately maintained?	Percent and distribution of mature and old forest cover

Program	Activity	Monitoring Question	Monitoring Indicator
	Snag densities/sizes within a 100 acre treatment block	Is snag habitat being maintained in desired spatial arrangement?	Density and distribution of snags
	Down log & woody debris amounts/sizes within a 10 acre treatment block	Is downed wood being maintained in sufficient amount, size, and location?	Quantity of downed logs and woody debris
	Ungulate grazing practices in identified at-risk locations	Are appropriate adjustments to grazing practices being made where grazing is contributing to at-risk conditions?	Ungulate grazing practices in at-risk locations