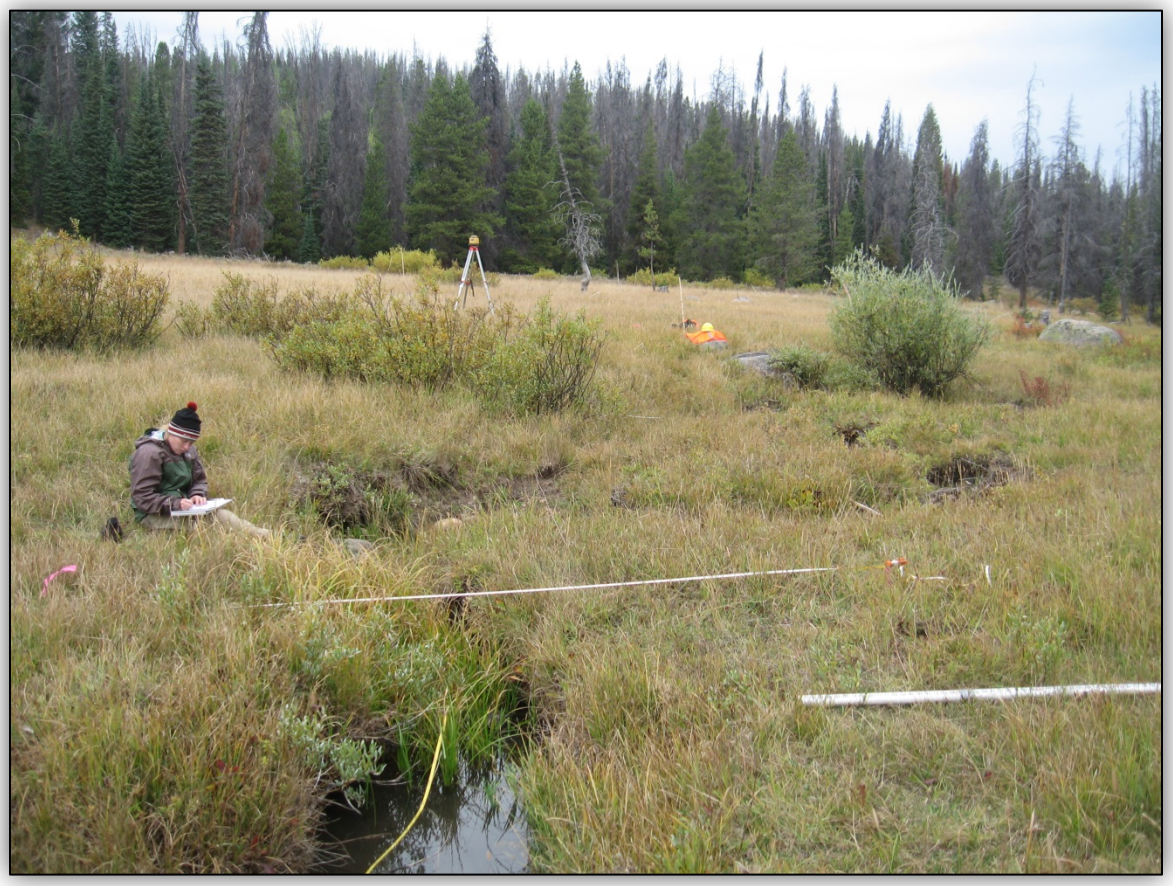
Medicine Bow National Forest
Routt National Forest

2013
10- and 15-Year
Comprehensive Monitoring And Evaluation Report



October 1, 2012 through September 30, 2013

United States Forest Service
Rocky Mountain Region

September, 2014

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Cover photo: Monitoring of rangeland management in the Seedhouse Analysis Area, Hahns Peak/Bear's Ears Ranger District.

Certification

The Record of Decision (ROD) for the Medicine Bow National Forest Land and Resource Management Plan (Medicine Bow Plan) was signed on December 29, 2003. The ROD for the Routt National Forest Land and Resource Management Plan (Routt Plan) was signed on February 17, 1998. The Plans are dynamic documents and may be changed or amended based on information provided in monitoring and evaluation reports. The conclusions and recommendations documented in these reports are intended to provide the information necessary to determine whether the Plans are sufficient to guide management of the Forests for the next year or whether the Plans need to be modified.

I have reviewed the 2013 10 and 15 Year Comprehensive Monitoring and Evaluation Report (Report) for the Medicine Bow and Routt National Forests. The Report was prepared by the Forest's interdisciplinary team (IDT) and indicates that, overall, Forest management is meeting the goals, objectives, standards and guidelines, and management area prescriptions prescribed in the Plans. My review validates that the monitoring and evaluation requirements outlined in Chapter 4 of the Plans have been met and that the Plans are sufficient to continue guiding management of the Forests.

Please contact Melissa Martin at the Medicine Bow-Routt (MBR) National Forests, 2468 Jackson Street, Laramie, Wyoming, 82070, or call (307) 745-2300, if you have any specific concerns, questions, or comments about this report.

/s/ Dennis Jaeger ***10/24/14***

DENNIS JAEGER Date

Forest Supervisor

Introduction

The Medicine Bow - Routt National Forests and Thunder Basin National Grassland (MBRTB) are administrative units of the US Forest Service located in eastern Wyoming and northwestern Colorado. Each forest and grassland is guided by a unique Land and Resource Management Plan (Plan) (available on the Forest web site at http://www.fs.usda.gov/land/mbr/landmanagement) that outlines desired conditions, goals, objectives, standards, and guidelines for the Plan area. Each Plan also provides direction to monitor resources to determine if the Forest or Grassland is moving toward or maintaining the desired conditions of the Plan area.

Since the completion of each Plan through 2013, annual monitoring reports have been required to provide information to the public about monitoring work completed during the previous fiscal year and to the Forest Supervisor to determine whether there is a need to make a change to the Plan. Comprehensive monitoring and evaluation reports have been required every 5 years to evaluate those resources that may change over longer timeframes and to evaluate trends throughout the plan implementation period.

Beginning in 2015, the MBRTB will transition to new planning regulations described in the Code of Federal Regulations (CFR) at 36 CFR 219, "National Forest System [NFS] Land Management Planning" also known as the "2012 Planning Rule" The 2012 Planning Rule differs from current monitoring direction in that it requires the development of new monitoring questions and associated indicators , provides for adaptive management of plan areas, and requires biennial, rather than annual, evaluation of the monitoring program.

This report provides information on the status and trends of resources with a focus on the last 5 years of plan implementation, from 2008 through 2013, for both the Medicine Bow and Routt National Forests (MBR). It provides current responses to the annual, 3-year, 5-year, and 10-year monitoring items outlined in Chapter 4 of the two Plans[1].

Conclusions and Recommendations

Conclusions and recommendations specific to each resource and monitoring item are in the "Monitoring Items" section beginning on page 12. Here we present a synthesis of conclusions and recommendations intended to help guide the MBR in planning and management efforts over the next several years.

Beetle Impacts to Vegetation, Habitat, and Ecological Function

The MBR is in the process of developing a new vegetation inventory layer as part of the project, "Modeling Landscape Change Following Bark Beetles." Forest personnel have led the effort to collect field inventory data and model landscape change in collaboration with the Forest Service Rocky Mountain Regional Office, the Remote Sensing Application Center, the Western Wildland Environmental

[1] Where possible, and to reduce duplicity, we have combined monitoring items from the two Forest Plans.

Threat Assessment Center, and the FS Veg Data Analyzer group. This information is critical to several vegetation management needs on the forest, including: old growth and late successional forest; threatened, endangered, and sensitive species; and management indicator species. .

Until the Forest has updated vegetation information, it is hard to know if current natural ecological conditions will continue to provide for sustainability of ecological functions as described the Forest Plans (e.g., Medicine Bow Forest Plan Subgoal 1a). The appropriateness of desired future conditions for some management and geographical areas may also be in question due to impacts from the beetles. Forest Plan amendments may be necessary to better reflect "changed conditions" since the Plans were written.

While awaiting new vegetation information and potential plan amendments, there are two items that can be addressed:

- First, the Forests should review forest plan standards relating to snag retention in harvest units, in light of the amount of tree mortality from the mountain pine beetle epidemic. Tree mortality from the epidemic has resulted in high sang densities across the forests, yet outdated standards in the plans are still being followed on a project-wide basis (see Restoration, Enhancement, and Commodity Production, p. 38); and
- Second, as Districts analyze new projects, they should look for opportunities to replace poor quality old growth stands with stands exhibiting better characteristics. If Districts propose harvesting in mapped old growth stands, they should ensure that stands of an equal or better quality are mapped to replace the proposed harvest stands. This new information should then be incorporated into the Forest-wide old growth map layer (see Old Growth Conclusions, p. 53).

Watershed Health

Several monitoring items in this report pertain to maintenance and improvement of watershed health. Monitoring remains an important component of the watershed program, and is used to document impacts to watershed health, prioritize watershed improvement projects, and to report progress on regional and national initiatives. Several sections of this report identify potential direct, indirect, and cumulative impacts to watershed health:

- **Roads and trails:** Continued emphasis on travel management, use of Motor Vehicle Use Maps, and an active restoration program are necessary to ensure properly functioning riparian and wetland conditions on the Forest. **Recommendation**: The MBR should continue to work on decommissioning roads and trails that do not align with Forest policies and directives. In addition, IDTs should consider the need for temporary roads more critically during project development and analyze, in full, the needed road system and related decommissioning and restoration activities.
- **Use of riparian areas for grazing by both wild and domestic ungulates**: Use is monitored using standardized proper functioning condition (PFC) surveys. **Recommendation**: The MBR should continue to conduct stream and riparian condition inventories at the project level and summarize data annually; incorporate quantitative monitoring methods where PFC assessment surveys indicate a degraded riparian condition; and implement adaptive management grazing strategies where needed to move degraded areas toward meeting Forest Plan Standards and Design Criteria from the Watershed Conservation Practices Handbook (FSH 2509.25).
- **Dispersed recreation activities, in particular dispersed campsites**: In the past 5 years, the recreation program has made strides in conducting inventories of dispersed campsites and rehabilitating or restoring campsites that are located too close to stream channels or that may

be causing resource damage. **Recommendation**: The MBR should continue to monitor dispersed campsites, harden popular dispersed campsite pads to minimize impacts to resources where appropriate, and relocate or close dispersed campsites that are causing resource damage.

- **High Priority Watersheds**: As part of the Watershed Condition Framework's approach to watershed restoration, the MBR identified Pelton Creek and Little Snake River—Whiskey Creek as the two highest priority watersheds for restoration in 2011. Staff have been working toward completing the actions listed in the watershed restoration action plans (WRAPs) for these watersheds. **Recommendation**: The MBR should identify and create WRAPs for other high priority watersheds to ensure a continuous "pipeline" of projects necessary to restore watershed conditions.

Identified Planning Tasks

Several planning updates and tasks are identified throughout this report. These tasks relate directly to the Forest Plan but have either gone unfunded or have not been identified as priority items since the 2008 Comprehensive Monitoring and Evaluation Report:

- **Aquatics**: Complete a Forest-wide assessment of the watersheds which are at most risk of adverse effects to aquatic systems due to large scale fire.
- **Watershed**: Finalize a comprehensive Environmental Flow Strategy for the Forest to address stream flows and water levels while still recognizing the need for additional consumptive uses of water.
- **Wetlands**: Develop a Forest-wide system to track the acquisition and disposal of wetlands across the Forest to ensure compliance with Executive Order 11990 Protection of Wetlands.
- **Research Natural Areas (RNAs)**: Complete establishment reports for the five RNAs on the Medicine Bow NF, in conjunction with the Rocky Mountain Research Station, and continue to complete species inventories in the RNAs on the MBR.
- **Land Ownership Adjustments**: Develop a land ownership adjustment plan and update it yearly with progress made, cases dismissed, or new opportunities. As a Forest, be more aggressive in pursuing proponent-financed land exchange proposals.
- **Rights of Way**: Identify private lands across which we need legal access. Review old files to determine what progress was made on past right-of-way acquisition plans and if the previously identified needs still exist.
- **Wildland-Urban Interface (WUI)**: Determine the need for updates to WUI layers to include highways and power lines, consistent with State direction, and update WUI layers for the forest so that they are consistent across districts.
- **Heritage Resources**: Develop a heritage plan for unanticipated discoveries. One FY13 project did not include a clause about the need to stop work upon unanticipated discovery of archeological sites or remains. Suspension is a provision that is an option if operations are causing irreparable damage to resources, but not everyone has the authority to suspend operations.
- **Invasive Species Treatments**: The Invasive Plant Management Final Environmental Impact Statement and Record of Decision are scheduled for completion in 2014. Funding available for treatment of noxious weeds has been substantially reduced for the last 6 years in a row. However, weed populations are increasing, especially in roadside and timbered areas affected

by bark beetle infestations and treatments. There will be abundant opportunities to use new tools for invasive species management if future funding allows.

Transition to 2012 Planning Rule Requirements

In the next few years, the MBR will transition from the existing Forest monitoring plans to new monitoring plans consistent with the 2012 Planning Rule. The scope and scale of these monitoring plans will be based on the Forest Supervisor's discretion after consideration of the information needs identified as most critical for informed management of resources on the plan area and the financial and technical capabilities of the Forest Service. Forest monitoring plans will complement broader scale monitoring strategies developed by the Rocky Mountain Region to address those resources best studied at a broader scale. The plans may include a variety of monitoring techniques to address the following indicators:

- The status of select watershed conditions;
- The status of select ecological conditions including key characteristics of terrestrial and aquatic ecosystems;
- The status of focal species to assess the ecological conditions required under § 219.9;
- The status of a select set of the ecological conditions required under § 219.9 to contribute to the recovery of federally listed threatened and endangered species, conserve proposed and candidate species, and maintain a viable population of each species of conservation concern;
- The status of visitor use, visitor satisfaction, and progress toward meeting recreation objectives;
- Measurable changes on the plan area related to climate change and other stressors that may be affecting the plan area;
- Progress toward meeting the desired conditions and objectives in the plan, including for providing multiple use opportunities; and
- The effects of each management system to determine that they do not substantially and permanently impair the productivity of the land (16 U.S.C. 1604(g)(3)(C)).

As part of the transition process, the MBR will have the opportunity to: consider recommendations from this and past monitoring reports; revisit the appropriateness of management indicator species such as snowshoe hare and the species' roles as focal species on the Forest; consider the benefits of using rigorous monitoring protocols, such as the amphibian monitoring protocols developed with State and university partners; and prioritize staff time and funds for select monitoring items.

Forest Plan and Policy Updates

Adjustments to the Forest Plans

Current Plans for the MBR are posted on the Forest web site at http://www.fs.usda.gov/land/mbr/landmanagement.

In the past 10 years, the Medicine Bow NF Plan has been amended three times:

- 2005 amendment for the Westside Energy Corridor;

- 2007 site-specific amendment management area designations for travel management in the eastern Snowy Range; and
- 2008 Southern Rockies Lynx Amendment.

Between 1998 and 2012, the Routt NF Plan was amended five times:

- 1999 amendment to Management Prescription 3.4 National River System – Scenic Rivers, Designated and Eligible;
- 2001 amendment to management areas in the Mount Zirkel Wilderness for the Luna Lake Trail;
- 2005 amendment for Rabbit Ears and Buffalo Pass Winter Recreation;
- 2007 amendment to Management Indicator Species, and
- 2008 Southern Rockies Lynx Amendment.

In 2013, the Routt National Forest Plan was amended a sixth time with a site-specific amendment to allow for the construction of summer trails in Management Area (MA) 5.41 within the Steamboat Ski area boundary. Recreation Standard 2 for MA 5.41 reads "Do not allow construction of new recreation facilities." The site-specific, project amendment waived the standard entirely to accommodate the ski area's summer trail proposal.

The MBR is currently collaborating with the Bureau of Land Management (BLM) to prepare environmental impact statements and plan amendment language to incorporate greater sage-grouse conservation measures into BLM land use plans and MBR Forest Plans. Records of decision and forest plan amendments are expected in FY 2015.

New Laws and Regulations

The 2012 Forest Service Planning Rule (http://www.fs.usda.gov/detail/planningrule/home/) established new regulations for Forest Plan monitoring. According to the Rule, the responsible official shall modify the plan monitoring program within 4 years of the effective date of the Planning Rule, or as soon as practicable, to meet the requirements of the new Rule. Once modified, the monitoring program shall conduct a biennial evaluation of information gathered through the plan monitoring program and issue a written report to the public no later than 2 years from the effective date of the change in the monitoring program and every 2 years thereafter (36 CFR 219.12 (c) and (d)). To meet these new requirements, the MBR will focus monitoring efforts in 2015 on revision of the plan monitoring program. A monitoring report will not be issued for FY 2014.

Projects Completed During FY13

In 2013 the MBR completed environmental analysis for 61 categorical exclusions and decision memos, 7 environmental assessments and decision notices, and 3 environmental impact statements and records of decision. Primary purposes included recreation management; special use management; wildlife, fish, and rare plants; minerals and geology; vegetation management; fuels management; roads management; forest products; grazing; and watershed management (Appendix A).

Monitoring items

The National Forest Management Act identifies specific, legally-required monitoring items for forest plan implementation as well as additional monitoring conducted based on the availability of funding and personnel. The discussion and results of the monitoring items for the MBR are given below.

Goal 1: Ensure Sustainable Ecosystems

Watershed Condition

Medicine Bow Item Objective: 1.a.1 | Frequency of Measurement: 5 Years
Routt Monitoring Item: 1-3 | Reporting Period: 1997-2013

This monitoring item asks the question:

To what extent has watershed condition been maintained or improved?

How well are management activities maintaining watersheds in a healthy condition?

Monitoring Protocol/Data Collected

There are no direct measures of watershed condition. A variety of assessment protocols have been developed and utilized over the life of the Forest Plans to categorize watershed conditions (USDA Forest Service 1997, USDA Forest Service 2003, USDA Forest Service 2010b). Most recently, the Forest classified watersheds following the 2011 Watershed Condition Framework (WCF). WCF is the first "nationally consistent reconnaissance-level approach for classifying watershed condition, using a comprehensive set of 12 indicators that are surrogate variables representing the underlying ecological, hydrological, and geomorphic functions and processes that affect watershed condition" (USDA Forest Service 2011a, USDA Forest Service 2011b). Since methods used to evaluate watershed condition have changed over time, results are not comparable over the life of the Forest Plan.

Therefore, in addition to the current WCF watershed condition classification, Equivalent Clearcut Area (ECA) assessment procedures were used to evaluate how watershed conditions may have changed over time. ECA is a method commonly used in forest hydrology to evaluate the magnitude of forest disturbance (e.g., roads, timber harvest, fire) over time and space in a watershed, normalizing for both intensity of an activity and hydrologic recovery over time (Belt 1980). ECA analyses completed for the Medicine Bow NF in 2000 (USDA Forest Service 2000) and MBR in 2008 and 2013 (USDA Forest Service 2008; USDA Forest Service 2013) provide an indication of watershed conditions over the life of the Forest Plans.

Forest disturbance due to the recent beetle epidemic has been significant and was modelled as part of the Medicine Bow 5-year and Routt 10-year Comprehensive Monitoring Report in 2008 (USDA Forest Service 2008). Forest disturbance due to the beetle epidemic was not modelled again in this ECA effort, as assumptions related to large tree mortality for the previous effort have not significantly changed. The objective of this ECA assessment was to compare forest disturbances other than the recent beetle epidemic (e.g., timber harvest, fire) on watershed conditions over the life of the Forest Plans.

Results/Evaluation

Current Watershed Conditions — Watershed Condition Framework

Results from the WCF for NFS lands are summarized in Table 1 and Figure 1, and are available online (http://www.fs.fed.us/publications/watershed). The majority of watersheds on the MBR have been changed from their natural potential condition in terms of physical, biotic, and/or chemical conditions to a moderate degree, with 71% of the watershed area rated as Functioning at Risk (Class II). The remaining 29% of the watershed area was rated as Functioning (Class I). No watersheds were rated with Impaired Function (Class III), although in many watersheds individual indicators, such as altered flow regimes, were rated in "Poor" condition.

Table 1. Watershed Condition Framework Classification.

Watershed Condition Class	# of Watersheds	Assessment Area – NFS Lands (square miles)	Assessment Area – NFS Lands (%)
Functioning Properly (Class I)	91	1,201	29
Functioning At Risk (Class II)	125	2,924	71
Impaired Function (Class III)	0	0	0
Totals:	216	4,125	100

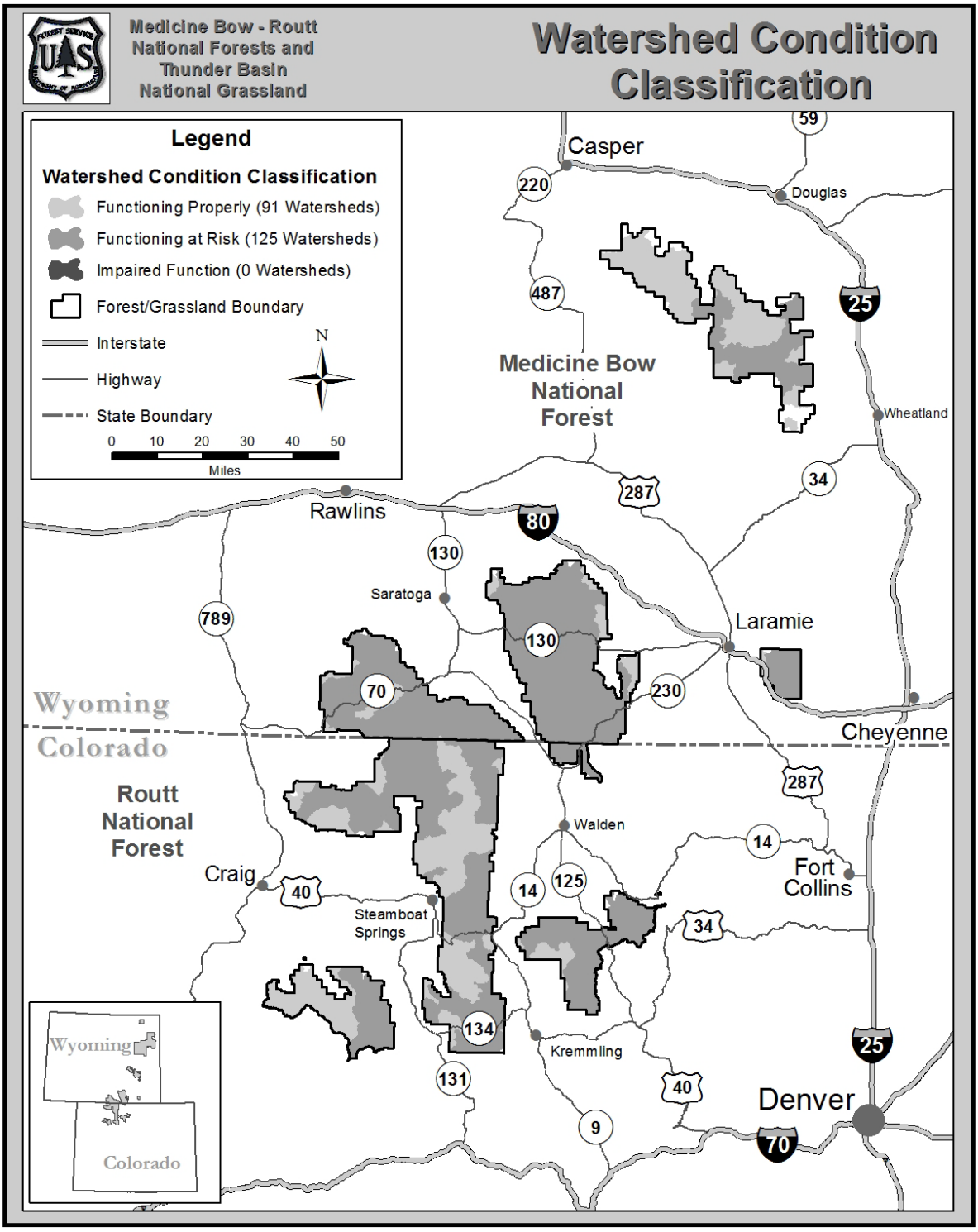

Figure 1. Watershed Condition Framework, Medicine Bow-Routt National Forests.

While a variety of factors influence watershed conditions on the Forest, the primary actions that resulted in Functioning at Risk watershed conditions on the Forest are shown in Table 2. This information can also be used to prioritize and focus watershed restoration efforts on the factors that have the most potential to improve watershed conditions.

Table 2. Primary factors resulting in Functioning at Risk watershed conditions.

Process Category	Actions influencing *indicators* of watershed conditions
Aquatic Physical	• Extensive water development (ditches, reservoirs) has *altered natural streamflow regimes*. • Extensive roads and water development have *fragmented aquatic habitat*. • Historic tie drives and riparian harvest have *reduced large woody debris in streams*. • Historic tie drives, roads, and grazing have *altered stream channel shape and function*.
Aquatic Biological	• Competition from introduced species *has depressed native fish and amphibian communities.*
Terrestrial Physical	• Extensive road development has *altered sediment and hydrologic regimes.*

The watershed classification described above is the first of a six-step comprehensive approach to watershed restoration (USDA Forest Service 2011a). The WCF process also involves: (2) prioritizing watersheds for restoration, (3) developing watershed restoration action plans (WRAPS), (4) implementing WRAPS projects, (5) tracking accomplishments, and (6) monitoring improvement of watershed conditions. The MBR has implemented a program to address all but the last step (monitoring) in this process. Monitoring protocols are still being developed at the national level and will be addressed in the future, as appropriate. Table 3 summarizes the WCF progress on the two priority watersheds on the Forest. Completion of all essential projects identified in the WRAPs is highly dependent on funding as well as staff availability for implementation.

Table 3. Status of priority watershed restoration.

Watershed	Year WRAP* Approved	Essential Projects		Planned Completion Date
		Total #	% of Projects Completed**	
Pelton Creek 101800020106	2011	5	20%	2015
L. Snake R. – Whiskey Cr 140500030101	2011	6	17%	2017

* WRAP: Watershed restoration action plan
**Displays projects completed in full and does not reflect progress toward completion for individual projects, which may be substantial in some cases.

Watershed Conditions over time — Equivalent Clearcut Area

Results from the ECA analysis, which was used to evaluate how watershed condition may have changed over the life of the Forest Plans, are shown in Figures 2–4. The ECA analysis indicates that forest cover is increasing across both management units, but this must be considered with respect to the recent spruce bark beetle and mountain pine beetle epidemics, which are not included as part of this analysis.

The spatial patterns of disturbance and recovery in watersheds over time can be seen in Figure 2.

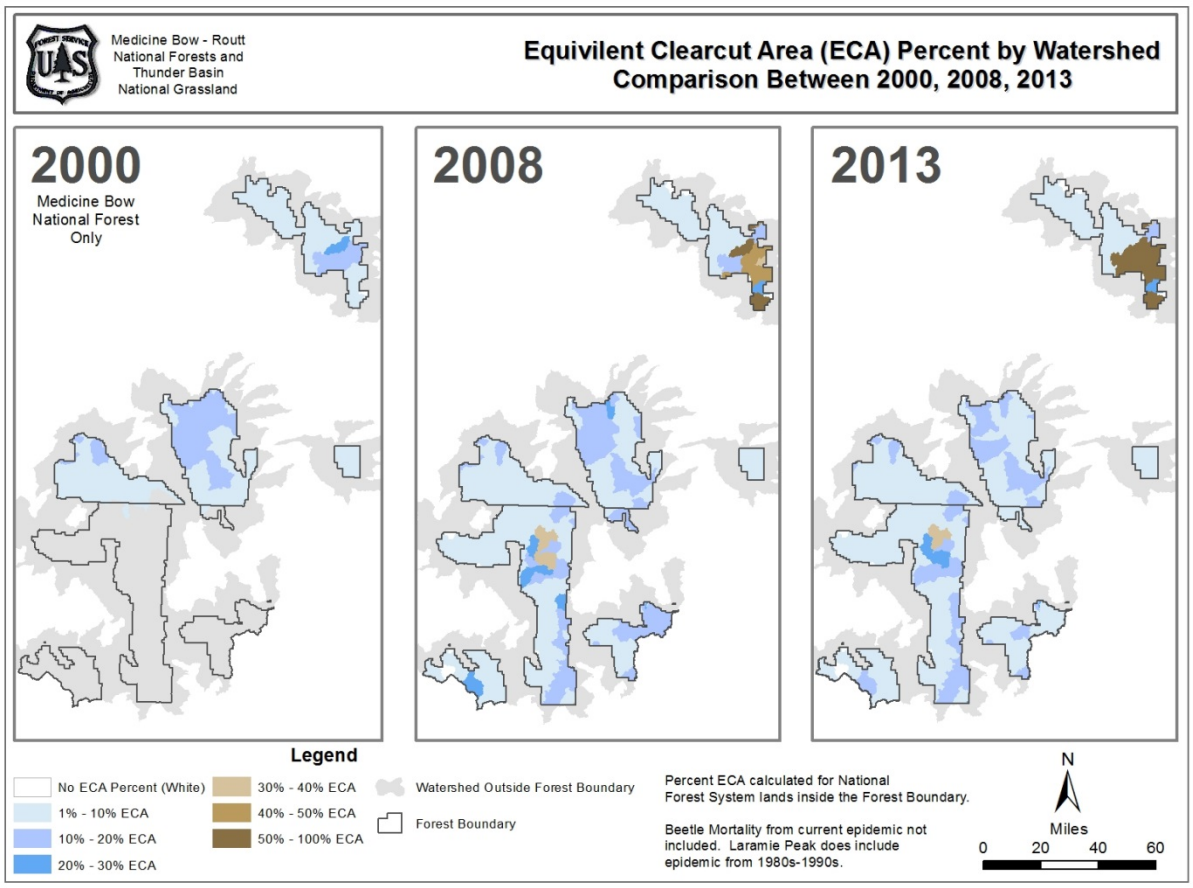

Figure 2. Medicine Bow-Routt National Forests - Percent of Watershed in Equivalent Clearcut Area 2000-2013.

Figures 3 and 4 display trends in watershed condition over time. Each point represents an individual watershed. Points on the line represent watersheds with little change in forest disturbance; points above the line represent watersheds that have increased levels of forest disturbance; points below the line represent watersheds that have hydrologically recovered to some degree over the specified time period.

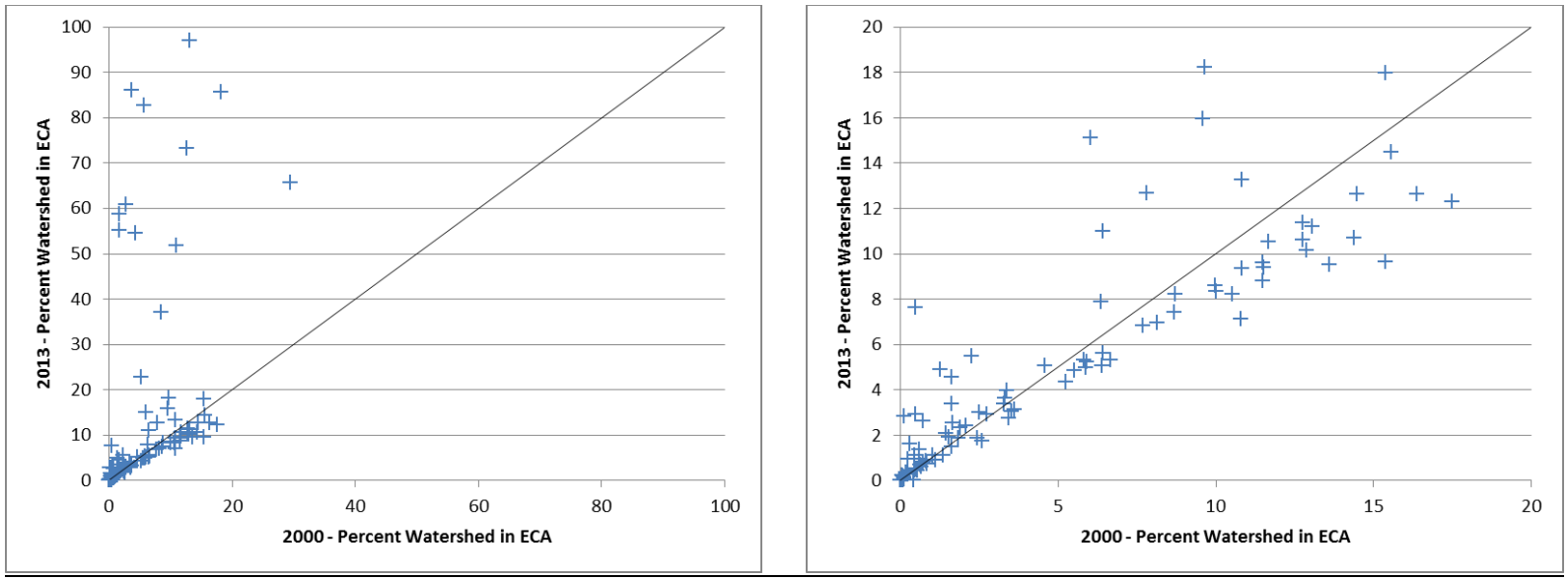

Figure 3. Medicine Bow National Forest - Percent of Watershed in Equivalent Clearcut Area 2000-2013. Chart on left includes all watersheds with data. Chart on right is a subset the watersheds with 2013 ECA less than 20%.

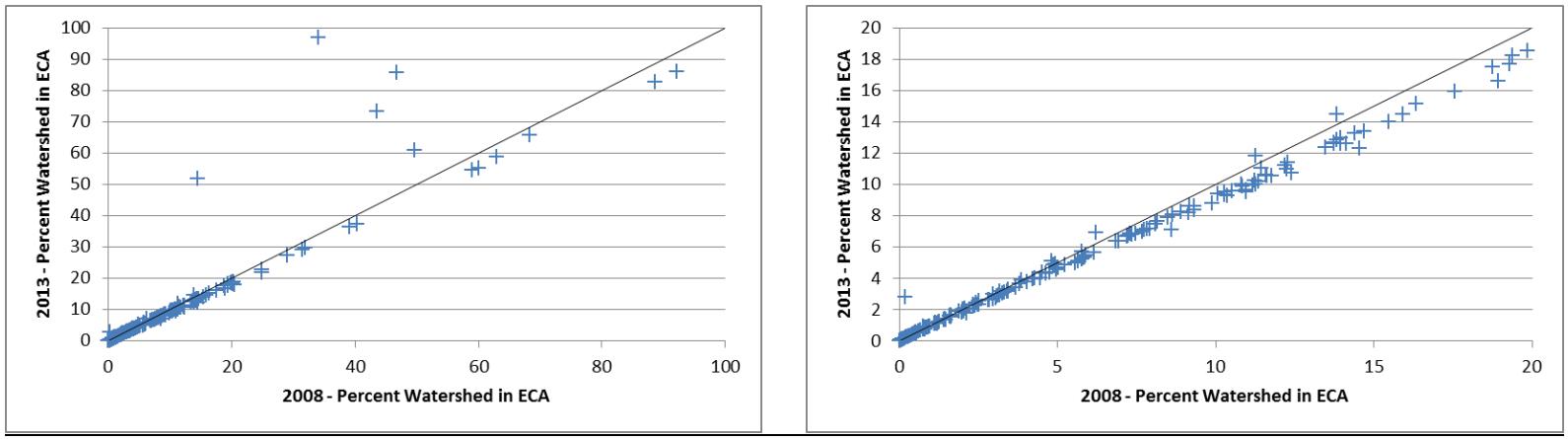

Figure 4. Medicine Bow-Routt National Forests - Percent of Watershed in Equivalent Clearcut Area 2008-2013. Chart on left includes all watersheds with data. Chart on right is a subset the watersheds with 2013 ECA less than 20%.

Conclusions

Over the life of the Forest Plans, watershed conditions on the Forests have been influenced by:

- Insect and disease epidemics, which have altered a significant portion of forest cover in nearly all watersheds on the Forests. Effects described by Carlson (2008) related to water yield (hydrologic function), riparian areas, sediment production (sediment control), soil quality, and water purity can be expected in many of the watersheds across the Forests. Effects vary by watershed, but are expected to be directly related to the amount of tree mortality in a watershed.
- Insect and disease epidemics, which have set the stage for increased rates of recovery for streams devoid of large woody debris due to historic tie drives in the North Platte River Basin.
- Fires (1,000+ acres), which have altered a significant portion of the forest cover in a few watersheds across the Forests.
- Timber harvests, which have altered a small portion of forest cover in some of the watersheds across the Forests.
- The existing transportation system continues to have a significant effect on watershed conditions across most of the MBR. There has been a dramatic increase in off-highway vehicle (OHV) use over the life of the Plans, including illegal off-road use, which has degraded watershed conditions in many areas. Very few new permanent roads have been constructed over the life of the Plans. A significant number of un-authorized, un-needed roads have been decommissioned and restored on the Sierra Madre and Snowy Range, improving watershed conditions.
- Water development on the MBR has changed very little, but existing developments continue to have a significant effect on watershed conditions. Examples include:
    - Significant degradation of water quality and aquatic habitat in Soldier and Pinkham Creeks after permitted irrigation ditches breached.
    - Fish habitat in North French Creek and West Fork Medicine Bow River has been significantly degraded due to dewatering from permitted irrigation ditches.
- The cumulative effects of past management activities, recent fire, blowdown, and insect and disease epidemics, as well as increasing levels of forest management in response to the insect and disease epidemics and significant increases in motorized recreational use, have influenced watershed conditions. Cumulative watershed effects have dramatically increased in many watersheds on the MBR.

Recommendations

- Continue to update and use the WCF and Watershed Improvement Tracking tools to monitor watershed condition trends over time.
- Complete implementation of essential projects identified in the two existing WRAPs.
- Prepare additional WRAPs to ensure a continuous “pipeline” of planning and implementation of essential projects necessary to restore watershed conditions.

Actions Taken on Recommendations Included in Past M&E Reports

- 2008 Recommendation: It is recommended that the Forest complete a Forest-wide assessment of the watersheds which are at most risk of adverse effects to aquatic systems due to large scale fire.
    - Action Taken: The risk of adverse effects to aquatic systems due to large scale fire has been considered during some individual project analyses, but a comprehensive Forest-wide assessment has not been completed.
- 2008 Recommendation: It is recommended that the Forest expand efforts to track soil, watershed, and fisheries improvement projects over time by sixth-level watershed. Currently data is reported in the annual monitoring report, but is not easy to summarize spatially over longer periods of time.
    - Action Taken: The Forest has started to utilize the Natural Resources Manager (NRM) Watershed Improvement Tracking database to spatially track past, present, and future soil, watershed, and fisheries improvement projects. While the completeness of the data varies by time period and spatially across the Forest, there are over 4,000 individual sites that have already been added to the database, and the database is being used to address a variety of management issues.

Riparian and Wetland Condition

Medicine Bow Objective 1.a.3
Routt Monitoring Item 1-9 Reporting Period: Five Year

These monitoring items ask the questions:

To what extent are riparian and wetland areas meeting proper functioning condition?

How are management activities affecting riparian habitats (including wetlands) on the forest?

Monitoring Protocol/Data Collected

Effects to riparian and wetland condition were monitored through qualitative and quantitative observations using established data collection protocols. The primary established protocols used include Proper Functioning Condition surveys (BLM 1998) and Forest Service Region 2 Rangeland Analysis and Management protocols (USDA Forest Service 1996). Most of these are implemented on rangeland sites susceptible to impacts from livestock, although they may also include timbered areas. The vast majority of riparian and wetland condition information is collected during project-level planning and monitoring to identify effects of management activities on these unique resources. Permanent photo point monitoring of riparian, stream, and wetland areas are also conducted on many allotments. Quantitative methods may be repeated on the same reach to track trends over time.

Laws, Regulations, and Forest Plan Goals, Objectives, and Standards

The most pertinent direction from the Medicine Bow and Routt Forest Plans is listed below. Additional direction can be found within the Forest Plans and Watershed Conservation Practices Handbook (FSH 2509.25).

Executive Order 11990: Each agency shall provide leadership and shall take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.

Medicine Bow Subgoal 1.a, Objective 3: Over the life of the plan, maintain or improve condition of riparian or wetland habitat on the Forest. Ensure at least 80% of riparian and wetland areas will meet or move toward proper functioning condition.

Routt and Medicine Bow Forest Plan Standards: Water and Aquatic Standard 4: In the water influence zone next to perennial and intermittent streams, lakes, and wetlands, allow only those land treatments that maintain or improve long-term stream health and riparian ecosystem condition.

Pertinent Design Features implemented to meet Forest Plan Standards (from FSH 2509.25):

- Manage livestock use through control of time/timing, intensity, and duration/frequency of use in riparian areas and wetlands to maintain or improve long-term stream health.
- Develop site-specific riparian stubble height standards or use the following default levels for carex and juncos species: 3-4 inches in spring-use pastures and 4-6 inches in summer or autumn use pastures; to leave adequate residual stubble height to retain effective ground cover.[2]
- Maintain the extent of stable banks in each stream reach at 74% or more of reference conditions. Consider degree of livestock trampling and riparian vegetation utilization on or immediately adjacent to stream banks when timing livestock moves between units.

Wetlands are included in riparian monitoring because wetland complexes often occur in or adjacent to riparian complexes. The Watershed Conservation Practices Handbook (FSH 2509.25), which provides direction for most of the riparian and wetland Forest Plan Standards and Guidelines, provides specific measures to protect wetlands. Projects are planned and designed to avoid impacts to wetlands. The Forest currently does not have any method to track any loss or degradation of wetlands.

Results/Evaluation

Field reconnaissance found that the effects of timber management and road construction are primarily from past activities; current timber and road construction activities are not generally significantly affecting riparian and wetland habitats. Poorly located roads and trails, particularly those which are user built, are impacting isolated riparian and wetland areas. When working on projects across the forest, these areas are identified for watershed improvement, fisheries, or other projects that would improve riparian condition. Visual and photo monitoring of recently completed restoration projects indicate that riparian and wetland conditions are improving in those areas.

From 2009 to 2013, the Forests completed approximately 180 miles of stream riparian assessments that include Proper Functioning Condition surveys (BLM 1998), rangeland analysis metrics (USDA Forest Service 1996), stream surveys (Harrelson et al. 1994), and permanent photo points. Appendix B includes summary information of stream reaches monitored in 2013 and the number of reaches surveyed by method; some of these miles represent repeat monitoring of the same reach to determine trend. Stream and riparian condition inventories completed on the Forest have been summarized annually in the 2009-2012 annual Forest Monitoring and Evaluation Reports.

[2] These values are also included in Range Guideline 2 in both Forest Plans.

Proper Functioning Condition Survey Results (2009 – 2013)

Proper Functioning Condition surveys found that of 91 miles surveyed, 60.4 miles (66%) were in proper functioning condition, and 31 miles (34%) were rated functional at risk (BLM 1998). This is similar to the findings in the previous 5 and 10 year monitoring reports, where 68% of reaches surveyed were in proper functioning condition, and 32% were rated functional at risk (Table 4).

Table 4. Summary of riparian and wetland monitoring data 2009-2013.

Monitoring Metric	Reference	74% of reference	2009-2013	2009-2010	2011	2012	2013
% stream miles in Proper Functioning Condition			66%	73%	56%	No surveys	75%
% stream miles Functional at risk			34%	27%	44%	No surveys	25%
% sedge >6"	94%		83%	85%	70%	44%	100%
Average % Bank Alteration	8%	10%	10%	11%	9%	10%	9%
% of reaches meeting 74% alteration reference condition			48%	29%	53%	50%	85%
% Bank Alteration <10%	89%	65%	55%	18%	58%	53%	89%
% Bank alteration 10-25%	11%	8%	30%	53%	32%	28%	11%
% Bank Alteration >25%	0	0	16%	29%	10%	16%	0%
Average % stable banks	70%	52%					
% of reaches meeting 74% reference bank stability condition			79%	76%	75%	76%	100%

The percent of stream reach miles rated as proper functioning condition falls short of Medicine Bow Subgoal 1.a, Objective 3 of having 80% or more of stream reaches in proper functioning condition. However, these results reflect some bias: riparian areas in good condition are often not assessed because there is not a need to identify specific concerns. Nonetheless, the fact that the percent of reaches rated "functional at risk" since the last 5 and 10 year review has remained consistent indicates that there are opportunities to further improve management actions to move more stream reaches towards proper functioning condition.

Region 2 Rangeland Analysis and Management Results (2009 – 2013)

Monitoring using the Forest Service Region 2 Rangeland Analysis and Management metrics focused on reaches where Proper Functioning Condition surveys identified riparian concerns. These reaches were monitored to determine how current livestock management practices are affecting riparian conditions. Generally, a reference reach that represented acceptable conditions and rated as Proper Functioning Condition was identified within the allotment being monitored. Metrics were measured on reference reaches to determine reasonable expectations of the level of improvement for reaches of concern.

Stubble height monitoring during and at the end of the grazing season found that 83% of reaches met the Forest Plan range management guideline of residual riparian vegetation of 6 inches, while 17% of surveyed reaches did not meet this guideline (Table 4). Residual stubble height ensures adequate plant vigor to stabilize streambanks and helps to retain sediment to rebuild unstable streambanks (USDA Forest Service 1996). In 2012, only 44% of reaches met this guideline. The lower rate of compliance with this guideline may be due in part to drought conditions that persisted throughout the year.

Short-term monitoring to address streambank alteration before, during, and after the grazing season found that pre-livestock grazing bank alteration ranged from 0% to 35%, with the highest rating on lower Elkhead Creek. Pre-livestock grazing can be attributed to wildlife such as elk and deer. Spring elk use in Lower Elkhead Creek and First Creek in California Park is extensive, which is reflected in the high percent of bank alteration prior to livestock grazing. All other pre-livestock bank alteration readings were between 0% and 9%.

Results from during and post livestock grazing found an average bank trampling of 8% in reference reaches. In reaches monitored with livestock grazing concerns, overall bank trampling averaged 10%, which is 74% of reference conditions. However, when looked at individually, only 48% of reaches monitored met 74% of reference conditions, indicating that 52% of reaches were not meeting Forest Plan direction (Table 4).

Generally, streams can receive a maximum of 20% to 25% annual bank alteration while maintaining stream health and integrity (USDA Forest Service 1996). Monitoring from 2009 to 2013 found that approximately 16% of reaches monitored had bank alteration of 25% or more, which is not conducive to maintaining or improving long-term stream health and ecosystem function per Water and Aquatic Standard 4. One of these reaches (Lower Elkhead Creek) was associated with wildlife use, but the remaining reaches are likely due to livestock use, or a combination of livestock and wildlife use.

Average streambank stability for reference reaches was 70%, meaning that 74% of reference conditions would be 52% stable banks. Between 2009 and 2013, 79% of surveyed reaches had 52% stable banks (Table 4). These data indicate that approximately 20% of surveyed reaches are not meeting the design criteria, “Maintain the extent of stable banks in each stream reach at 74% or more of reference conditions. Consider degree of livestock trampling and riparian vegetation utilization on or immediately adjacent to stream banks when timing livestock moves between units.”

Oftentimes the higher streambank stability ratings correlated with lower percent bank alteration. However, this trend was not always consistent. In some cases, low streambank stability did not necessarily correlate with high bank alteration, and vice-versa. The short-term monitoring indicators are used to determine annual effects; if annual effects indicate more impact (i.e., bank alteration), then it would be expected that the long-term indicators would decline. This combination of short and long term indicators helps to determine if ungulate grazing is causing stream health and riparian problems, or if other factors are also contributing.

Effects of Management Activities on Rare Wetland Plants and Habitats

On the MBR, wetlands occupy 2% of the landscape but support approximately 14% of the inventoried flora, including more than 50% of the MBR’s rare plant species. Rare species found in wetlands on the MBR include two carnivorous plants and several orchids, as well as willows, sedges, sphagnum moss, and rushes. When wetland habitats are damaged or degraded due to management activities, rare plant habitat is reduced forest-wide.

Much of the degradation to riparian areas and wetlands observed in recent years is a result of recreational activities and livestock grazing. Illegal motorized vehicle use in riparian areas and wetlands, or legal use where system roads cross wetland features, results in the direct destruction of wetland plants and damage to soils and water tables that can have additional downstream effects. Effects to wetland plant habitats from livestock grazing (as well wildlife grazing to some extent) include direct utilization of wetland plant material and trampling or hoof-punching (Figure 5). Excessive trampling and hoof punching occurs when livestock congregate in wetlands or riparian areas for food, water, or shade. This behavior crushes plants, but also degrades stream bank stability, causes erosion, damages substrates and alters water tables, which wetland plant species depend on for survival. Some damaged wetlands have been restored or had mitigation measures put in place, such as fencing or spring developments, but many damaged areas remain in a degraded state.

Timber cutting, prescribed burning, recreational motorized use, livestock grazing, and other activities can also introduce non-native invasive weeds into wetlands. Common non-native invasive wetland weeds on the MBR are Canada thistle (*Cirsium arvense*) and non-native pasture grasses such as Kentucky bluegrass (*Poa pratensis*) and meadow foxtail (*Alopecurus pratensis*). Seeds from weed species are transported by animals and vehicles, including heavy equipment, and are often encouraged by fire. The spread of weeds throughout all habitat of the MBR has increased over time, despite aggressive treatment. New tools such as aerial herbicide spraying may help control populations in the future, but herbicide spraying in wetlands is limited to preserve water quality, and preventing initial introduction of weeds into wetlands is the best method for protecting rare wetland plant habitats.

Figure 5. Electric fencing installed to keep cattle out of the wetland habitat of the carnivorous lesser bladder pod (*Utricularia minor*). Hummocking (lumpy soil surface) visible in the photo is a result of excessive hoof-punching by cattle prior to fence installation.

Conclusions

Effects to riparian habitats result from regulated activities such as livestock grazing, as well as unregulated activities such as wildlife grazing. Ungulate grazing (livestock and wildlife) has the highest potential to affect riparian condition and stream stability through bank trampling and impacts to streambank stabilizing riparian vegetation, and alteration of the composition of riparian vegetation both on the streambanks and across the riparian area. This was most evident in the last three years of monitoring in California Park where monitoring was conducted prior to livestock grazing, as well as while livestock where on the allotment, and following removal of livestock from the allotment. This

monitoring found that both elk and livestock were affecting riparian condition. The lack of control over wildlife grazing may complicate attainment of Forest Plan Objectives.

Of reaches assessed through the Proper Functioning Condition methodology, two-thirds of riparian areas are meeting the Forest Plan monitoring objective of proper functioning condition, while one-third are rated functional at risk. This indicates a need for improved riparian conditions to meet Forest Plan Goals and Objectives of 80% of reaches meeting or moving toward proper functioning condition. Similarly, monitoring using different metrics from the 1996 Region 2 Rangeland Analysis and Management Training Guide including stubble height, bank alteration, and bank stability all showed that opportunities exist to reduce the impacts of livestock grazing on riparian resources.

Qualitative assessments indicate that current standard timber management and road construction practices generally are not significantly affecting riparian and wetland condition. Project planning locates these activities away from wetlands or riparian areas except for isolated locations where roads must cross streams and/or riparian areas/wetlands to meet the purpose and need for the project. There have been an increasing number of projects on the Forest where management of vegetation in riparian and wetland areas occurred to meet the purpose and need of the project, such as fuels reduction adjacent to homes. While best management practices (BMPs) are used to minimize impacts to riparian and wetland areas for these projects, observations indicate that effects to riparian and wetland areas are more prevalent with these types of projects than standard timber harvest projects on the Forest. Past effects of poor road location and timber harvest are being addressed through soil, water, and fisheries improvement projects.

Much of the degradation to riparian areas and wetlands observed in recent years is a result of illegal motorized vehicle use in riparian areas and wetlands. Many of these impacts are observed and restoration efforts are taken, but many impacts are likely not observed and no restoration has taken place. Continued emphasis on travel management, use of the Motor Vehicle Use Maps, and an active restoration program are necessary to ensure properly functioning riparian and wetland conditions on the Forest.

Recommendations

- Continue to conduct stream and riparian condition inventories at the project level and summarize annually.
    - Incorporate quantitative monitoring methods where PFC assessment surveys indicate a degraded riparian condition
    - Implement adaptive management grazing strategies where needed to move degraded areas towards meeting Forest Plan Standards and Design Criteria from the Watershed Conservation Practices Handbook (FSH 2509.25).
- Maintain and annually update the Forest-wide Proper Functioning Condition database developed in 2009.
- Proper Functioning Condition assessments should address all reaches considered susceptible to livestock grazing during project level range analysis to present an unbiased sample of reaches in proper functioning condition, as well as those that are functional at risk.
- Continued emphasis on travel management, use of Motor Vehicle Use Maps, and an active restoration program are necessary to ensure properly functioning riparian and wetland conditions on the Forest.

- Develop a Forest-wide system to track the acquisition and disposal of wetlands across the Forest to ensure compliance with Executive Order 11990 Protection of Wetlands.

Stream Flows

Medicine Bow Item Objective: 1.a.4 Frequency of Measurement: 5 Years
Reporting Period: 2003-2013

This monitoring item asks the question:

To what extent have stream flows been protected or enhanced?

Monitoring Protocol/Data Collected

Section 505 of the Forest Land Policy Management Act, Medicine Bow and Routt Forest Plan Standard 8, and the Region 2 Watershed Conservation Practices Handbook Management Measure 7 all direct that stream flows be managed under appropriate authorities to minimize damage to scenic and aesthetic values, fish and wildlife habitat, and otherwise protect the environment. Stream flows can be protected through (1) administrative or regulatory authority such as placing conditions on land use authorizations for water developments (easements or special use permits), or (2) Federal or State ownership of instream flow water rights.

The number of land use authorizations for water developments on the Forest was determined from the Special Uses Database System (SUDS). Authorizations were reviewed to determine which contained provisions for stream or water body level protection. Spatial data for State instream flow water rights were obtained and summarized for areas within the Forest boundary. Information from the 2008 5 and 10 Year Forest Plan Monitoring and Evaluation Report was compared to current information to evaluate trends.

Results/Evaluation

Administrative/Regulatory Authority

The Forest has 318 land use authorizations for water facilities on the Forest (DOI easements, ditch bill, etc.); 65 of these are for reservoirs and dams, with the remaining 253 for ditches, pipelines, wells, or spring developments. Of these 318 authorizations, 4 (1%) include some measure to protect or enhance stream flows on 23 streams, and 11 (3%) include some measure to protect lake levels on 13 lakes or reservoirs. Quantitative permit conditions to protect stream flows have been added for two streams and maintained in permit renewals for many streams since 2003.

Water facilities with conditions to protect stream flows included in land use authorizations on the Forest have been monitored during this Forest Planning cycle (e.g., USDA Forest Service 2003–2010). Results indicate that streamflow and lake level protection conditions in the land use authorizations are being achieved on most streams and lakes. While the effectiveness of the existing conditions has not been evaluated, overall implementation of the permit conditions appears to be successful in the limited number of permits on the Forest that contain quantitative measures to protect stream flows and water levels.

Instream flow water rights

The Forest has not claimed or obtained any Federal instream flow water rights under the Organic Act or for any Multiple-Use Sustained-Yield Act purposes.

Within the State of Colorado, the only entity that can hold an instream flow water right is the Colorado Water Conservation Board; the Forest Service or other entities are not allowed to hold an instream flow water right at this time. The Colorado Water Conservation Board holds extensive water rights within the Routt NF with 180 instream flow water rights on 693 miles of perennial stream; this equates to approximately 34% of the total perennial stream miles (~1,941 miles) on the Routt NF. State instream flow protection has been added to 10 additional streams (33 miles on Forest) since the last report in 2008.

Within the State of Wyoming, the only entity that can hold an instream flow water permit is the Wyoming Water Development Commission. The Wyoming Water Development Commission holds instream flow water permits within the Medicine Bow NF with 26 instream flow water permits on 98 miles of perennial stream; this equates to approximately 6% of the total perennial stream miles (~1,583 miles) on the Medicine Bow NF. State instream flow protection has been added to one additional stream (Rock Creek, 3 miles on Forest) since the last report in 2008.

While State instream flow protection programs provide some level of protection, many provide only the minimum flow needed to maintain basic aquatic life. These flows may not be sufficient to maintain ecological processes including channel maintenance flows that help to maintain the diversity of aquatic habitats, transport the sediment and bedload naturally supplied to the stream system, maintain channel capacity to transport flood flows, and maintain groundwater recharge to adjacent floodplains and riparian/wetland areas. Much of the State instream flow protection is also junior to existing water rights. State instream flow protection programs are under the jurisdiction of the State legislatures.

Conclusions

The Forest has utilized its regulatory authority to provide quantitative stream flow and lake level protection on a small percentage (4%) of water facility land use authorizations across the Forest. The Forest has not claimed or obtained any Federal instream flow water rights under the Organic Act or any Multiple-Use Sustained-Yield Act purposes. During the last 5 years, quantitative permit conditions to protect stream flows have been added for two new streams and maintained in permit renewals for many streams. State instream flow programs provide some level of stream flow protection on approximately 22% of the perennial streams across the Forests. During the last 5 years, the States of Wyoming and Colorado have increased instream flow protection on approximately 36 miles of stream on the Forest. While some existing stream flow protection is in place on the Forests, continued evaluation is recommended to determine if the existing protection is sufficient to meet the intent of Section 505 of Forest Land Policy Management Act, the Medicine Bow or Routt Forest Plans, and the Watershed Condition Practices Handbook.

Recommendations

- Future water facility authorizations or reauthorizations should ensure stream flow protection consistent with Forest Land Policy Management Act Section 505, other Federal and State laws, the MBR Forest Plans, and Forest Service Handbook Direction.
- In order to better respond to reissuance of authorizations as well as requests for new water developments, there is a need to finalize a comprehensive Environmental Flow Strategy for the Forest to address stream flows and water levels while still recognizing the need for additional consumptive uses of water.

Actions Taken on Recommendations Included in Past M&E Reports

- 2008 Recommendation: Where possible, re-issuance of existing and new water facility authorizations should ensure stream flow protection consistent with Forest Land Policy Management Act sec 505, other Federal and State laws, the Medicine Bow and Routt Forest Plans, and Forest Service Handbook Direction.
    - Action Taken: During the last 5 years, quantitative permit conditions to protect stream flows have been added for two new streams and maintained in permit renewals for many streams. For example, in 2012 a streamflow provision as part of the permit reissuance was implemented on the Bear River downstream of Yamcolo Reservoir to meet terms from reservoir expansion NEPA.
- 2008 Recommendation: In order to better respond to reissuance of authorizations as well as requests for new water developments, there is a need to develop a comprehensive strategy to address stream flows while still recognizing the need for additional consumptive uses of water.
    - Action Taken: The Forest is in the final phases of completing an Environmental Flow Strategy. The strategy should position the Forest to respond to water development proposals in a consistent manner. Without such a strategy, each stream reach/watershed is evaluated individually without a Forest context. While this strategy will identify where additional water development would significantly affect high value resources, it also identifies areas where there is potential to accommodate water developments to meet consumptive use needs. Stream reaches identified for possible water developments would still incorporate site-specific design criteria or mitigation measures identified through the project planning stage to meet the desired condition for that stream segment. The products of this strategy include: (a) GIS layer identifying "high" and "standard" value stream segments/watersheds, and (b) desired condition statements for each of the six flow components (geomorphic, habitat, biologic, water quality, riparian/vegetation, and recreation) for the high and standard value stream segments.

Soil Productivity

Medicine Bow Item Subgoal 1.a 36 CFR 219.12(k)(2) — Frequency of Measurement: Annual
Routt Monitoring Item 1-1 — Reporting Period: Annual

This monitoring item asks the question:

Are long-term soil health and productivity being maintained?

Monitoring Protocol/Data Collected

Maintaining and protecting land productivity and, where feasible, improving the quality of soil and water resources is important for watershed management and ecosystem health. Soil disturbing activities that result in the loss of ecological capacity or hydrologic function that lasts beyond the scope, scale, or duration of a project must be avoided as these activities can have far-reaching and often negative resource implications. Based on available research and current technology, a guideline of 15% reduction in inherent soil productivity potential is used as a threshold value for measurable or observable soil properties or conditions. No more than 15% of an activity area may be left in a detrimentally compacted, displaced, puddled, severely burned, and/or eroded condition. The threshold value serves as an early warning signal of reduced productive capability.

This guideline is assessed using field observations of soil characteristics that indicate detrimental conditions related to soil productivity and health.

Results/Evaluation

Several projects were monitored between 2009 and 2012 to assess compliance with the 15% soil disturbance guideline. Projects included roadside hazard tree removal, wildland urban interface (fuels reduction), and timber harvests. Monitoring between 2009 and 2012 indicates that long-term soil health and productivity are being maintained.

In 2013, several recently completed Roadside Hazard Tree Removal projects were monitored:

- Laramie Ranger District: Forest Service Roads 898 and 517.
- Brush Creek Hayden Ranger District: Highway 130

These areas were under the 15% detrimental soil disturbance limit. Soil disturbance was less than 5% of the areas. Most of the disturbance was faint "wheel" tracks less than 1 inch deep. Organic layer (duff, forest floor) was present and intact, and surface soil was not displaced. Where soil was displaced in an area greater than 100 square feet, slash was placed over the area to control erosion. Soil compaction was evident but was discontinuous and only slightly greater than observed under natural conditions.

Conclusions

Monitoring indicates long-term soil health and productivity is being maintained.

Recommendations

- Continue to monitor past projects for indicators of soil health so better conclusions can be made.

Air Quality

Routt Monitoring Item 1-2 Reporting Period: Annual

This monitoring item asks the question:

Are management activities maintaining or improving air quality including in the Mount Zirkel Wilderness?

Monitoring Protocol/ Data Collected

There are two air-quality monitoring sites located in the Routt NF near the southern boundary of the Mount Zirkel Wilderness Area: Buffalo Pass, Dry Lake (CO93) and Buffalo Pass, Summit Lake (CO95). Both monitoring sites are part of the National Atmospheric Deposition Program (NADP) and are components of the National Trend Network (NTN). Each site monitors precipitation (rain and snow); data are collected from the sites four times per month for each month of the year. Atmospheric metrics (mg/L) collected at both sites are: Ca, Mg, K, Na, NH4, NO3, Cl, SO4, PO4; conductivity (µSiemens/cm); and pH. Additionally, CO97 is part of the Mercury Deposition Network and collects data about atmospheric mercury concentrations (ng/L) and deposition (ng/m^2). The Buffalo Pass, Dry Lake site has continuously collected data since October 1986. The Buffalo Pass, Summit Lake site has continuously collected data since July 1984. All data are analyzed and reported by Central Analytical Laboratory, Illinois State Water Survey, University of Illinois, Urbana-Champaign.

Results/Evaluation

Data from both sites are publicly available on the worldwide web: http://nadp.sws.uiuc.edu/sites/siteinfo.asp?net=NTN$id=CO93; substitute CO97 at the end of the URL to access data from the Buffalo Pass, Summit Lake site. Overall, the data indicate that the Class 1 airshed in the vicinity of the Mount Zirkel Wilderness Area has been in compliance with State and Federal air-quality standards from 2009 to 2013. Consequently, Forest-wide standards and guidelines have been met during the third 5-year interval (2009-2013) of the 15-year reporting period.

Equipment upgrades: Precipitation gages were replaced and upgraded at CO97 and CO93 in the fall of 2009; solar panels and storage batteries were replaced and upgraded in 2013. Site Operator, Nic Bencke, received a *Letter of Commendation* for operation and maintenance from the NADP Program Office, Central Analytical Lab, and Mercury Analytical Lab in 2011.

Recommendations

- Continue to collect atmospheric-precipitation and mercury-deposition data from CO93 and CO95. In addition, continue to implement prescribed-fire treatments within prescription and take other management actions to reduce combustion products (i.e., slash burning) and dust dispersion associated with soil-disturbing, multiple-use management activities.

Water Quality

Medicine Bow Item Objective: 1.a.2 — Frequency of Measurement: Annually
Routt Monitoring Item: 3 — Reporting Period: 2004 - 2013

This monitoring item asks the question:

To what extent has water quality been restored, maintained, or improved?

Monitoring Protocol/Data Collected

Water quality data on the MBR are collected by various Federal, State and local governments as well as non-governmental entities and individuals. The States of Colorado and Wyoming produce biennial comprehensive summaries of water quality conditions.

Water quality is restored, maintained, or improved largely through soil and water improvement projects and stream and lake enhancement projects. Implementation of these projects focuses primarily on reducing sedimentation to streams and lakes to protect the State designated beneficial use of aquatic life. Some projects also help to protect water quality by reducing input of pathogens such as *E. coli*, or inorganic compounds such as metals. Watershed restoration action plans (WRAPS), cooperative watershed plans with conservation districts and State agencies, provide a strategic approach to maintaining and improving water quality, usually with a focus on streams where specific water quality concerns have been identified.

Forest Plan Goals, Objectives, and Standards

The most pertinent direction from the Medicine Bow and Routt Forest Plans is listed below. Additional direction can be found within the Forest Plans and Watershed Conservation Practices Handbook (FSH 2509.25).

- Medicine Bow Subgoal 1.a: Improve and protect watershed conditions to provide the water quality and quantity and soil productivity necessary to support ecological functions and intended beneficial uses.
    - Objective 2: Over the life of the plan, maintain or improve water quality by achieving an 80% reduction in the miles of State of Wyoming designated streams not fully supporting designated beneficial uses and by maintaining existing fully supporting designated beneficial uses in all streams, lakes, reservoirs and open water bodies.
- Routt Goal 1, Objective 3: Improve water quality, channel stability, and aquatic habitat in areas not meeting State water quality standards and in watersheds of concern and meet the anti-degradation clause of the Clean Water Act across the Forest.
- Forest Plan Standards: All of the Soil, and Water and Aquatic Standards address this question.

Results/Evaluation

Water Quality Restoration and Improvement

Watershed, soil, and fisheries improvement project accomplishments are shown in Table 5 and are summarized over time in Figure 6(a)–(d). The Forest accomplished 1,868 acres of Soil and Watershed Improvement (S&W-RSRC-IMP); 29 miles of stream habitat improvement (HBT-ENH-STRM) and 0 acres of Lake Habitat Improvement (HBT-ENH-LAK) in FY13. The majority of the soil and watershed improvement acres were associated with protection and maintenance projects (80%) whereas the remaining acres came from improvement/restoration projects (20%). The MBR was assigned the following targets in FY 2013: 1,334 acres of Soil and Watershed improvement; 22 miles of stream habitat improvement; and 0 acres of lake acres.

The amount of Soil and Watershed Improvement acres accomplished annually varies based on the complexity and cost of a project, available funding, and staffing to implement the project. Limited program funds were available to accomplish soil and watershed improvement projects in 2013; the majority of funding for on-the-ground improvement projects came from grants and integrated Forest Service funds. Core watershed improvement accomplishments were primarily due to projects at road/stream crossings to improve aquatic organism passage, road decommissioning, and wetland restoration.

Table 5. 2013 Soil & Watershed Improvement (S&W-RSRC-IMP), Stream Habitat Enhancement (HBT-ENH-STRM), and Lake Habitat Enhancement Accomplishments (HBT-ENH-LAK).

Project	District	Soil & Water Core (Acres)	Soil & Water Protect & Maintain (Acres)	Soil & Water Total (Acres)	Lake (Acres)	Stream Habitat Improved (Miles)
CPL Wetland Restoration (RAC)	LRD	4	152	156	0	1
CPL Wetland Restoration (RAC)	BCH	17	22	39	0	1
CPL Line Re-route near Centennial Work Center	LRD	1	0	1	0	1
CPL Access Control/553&LakeCk.	LRD	1	0	1	0	0
NFSR 588.04 Boulders/Buck &	LRD	1	0	1	0	0

Project	District	Soil & Water Core (Acres)	Soil & Water Protect & Maintain (Acres)	Soil & Water Total (Acres)	Lake (Acres)	Stream Habitat Improved (Miles)
Rail/Slash						
NFSR 500.1 Slash/Sign	LRD	1	0	1	0	0
NFSR 552A.01&.15/Slash/Sign	LRD	1	0	1	0	0
CBPU Access Control - Buck & Rails	LRD	10	0	10	0	0
NFSR 311.A/Move gate/Buck & Rail	LRD	1	0	1	0	1
NFSR 550.2G/Soldier Cr Ditch Bypasses	BCH	1	0	1	0	1
Pelton Creek Culvert #2 Replacement	LRD	1	0	1	0	2
Nugget Creek Culvert Replacement	BCH	1	0	1	0	3
Enl. Trent Ditch - Headgate installation	BCH	0	0	0	0	1
Jim Draw Sawmill Pile Rehab	BCH	2	0	2	0	0.5
Stemp Springs Exclosure	BCH	1	0	1	0	0
Curtis Gulch CG - Streamside Buck & Rail	DRD	1	0	1	0	1
Pole Mountain Access Control - Buck & Rail	LRD	45	0	45	0	0
550.1J Log Culvert Removal - Boreal Toads	BCH	1	0	1	0	1
Eastern Snowy Range Road Decommissioning.	LRD	3	0	3	0	0
Haggarty Creek - CRCT stocking	BCH	0	0	0	0	3
Plugged 3 abandoned wells - GW protection	LRD	3	0	3	0	0
Elkhead Cr Exclosure	HPBE	53	0	53	0	0
Armstrong Cr Restoration	HPBE	4	0	4	0	0.7
Four County Ditch	HPBE	5	0	5	0	0
NFSR 500 Culvert	HPBE	1	0	1	0	3.5
Willow Cr NFSR 106	PKS	2	0	2	0	1.5
Bear River road decommissioning	Yampa	9	0	9	0	0
Circle Cr Chem. Treatment	HPBE	0	0	0	0	4
Trout Creek Fish Barrier	Yampa	0	0	0	0	2.8
Noxious Weed Treatments	MBR	0	1,524	0	0	0
FY2013 TOTALS:		**170**	**1,698**	**1,868**	**0**	**29**

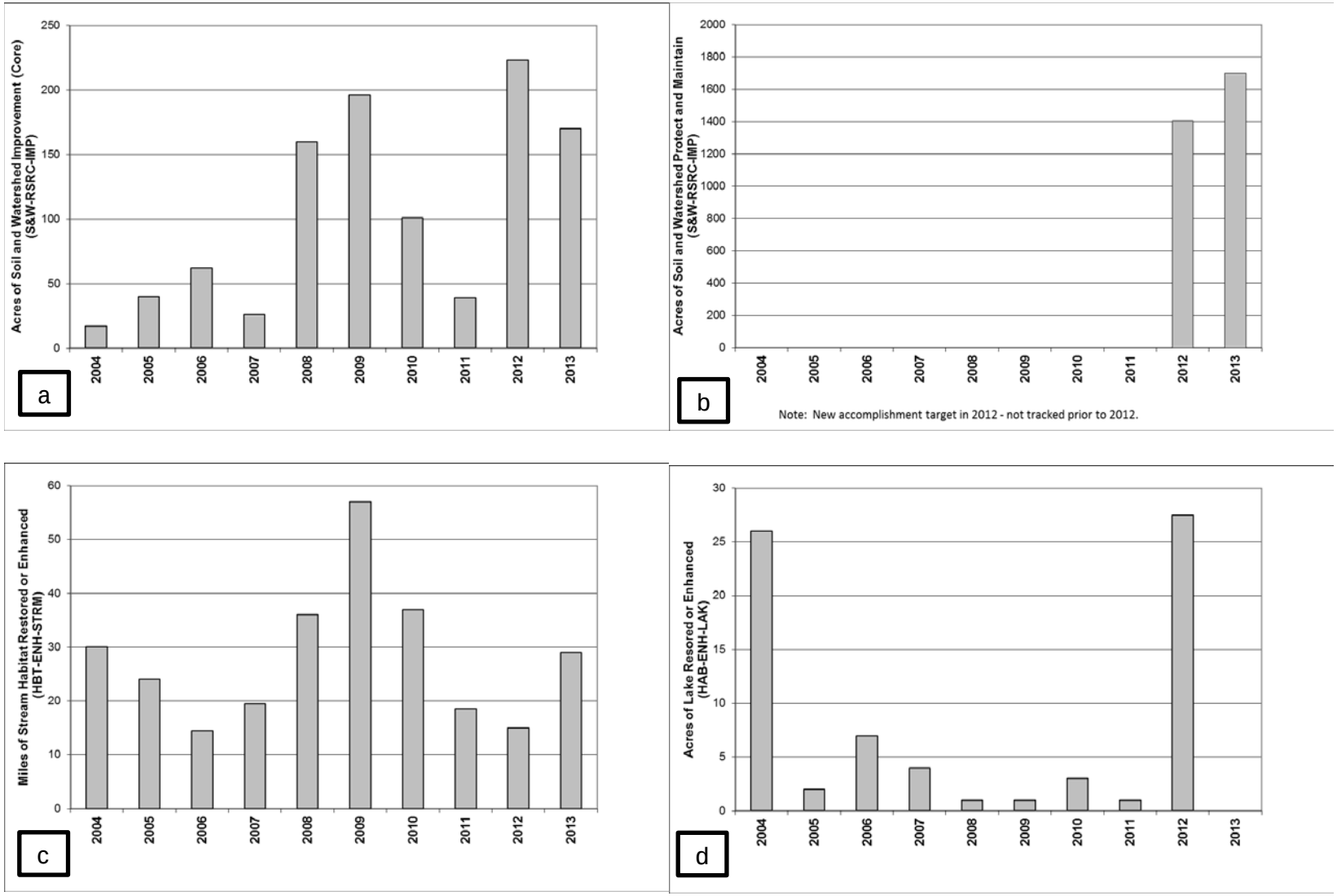

Figure 6. Watershed, Soil, and Fisheries improvement project accomplishments.
(a) Acres of soil & watershed improvement (core), (b) Acres of soil & watershed protected and maintained,
(c) Miles of stream habitat restored or enhanced, (d) Acres of lake habitat restored or enhanced.

Soil, Water, and Fisheries Improvement Highlights

Four Counties Ditch Reclamation: The Four Counties ditch was originally constructed in 1964 as part of a larger trans-basin collection and diversion project that was designed to divert water from stream tributaries to the Yampa River, and deliver that water to the North Platte basin and the Colorado River basin. While the ditch was constructed, the total diversion plan was never implemented. This cooperative project with Tri-State Electric Co-op will rehabilitate the now defunct Four Counties ditch to restore the hillslope hydrology while maintaining wetlands created in the ditch in a manner which will prevent future ditch failures. Work was completed on the western half of the ditch in the Colorado River basin in FY12, with the remaining work in the North Platte River basin completed in FY13.

Elkhead Exclosure: The Elkhead exclosure benefits multiple resources including soils, stream and riparian health, fisheries, and amphibians. The Elkhead Creek sixth-level watershed is one of the highest priority watersheds on the south zone due to its biological diversity, including boreal toads, Colorado River cutthroat trout, sandhill cranes, and sharptail grouse. Historically, this watershed has had extensive livestock grazing, which has affected long-term soil productivity and caused significant stream downcutting and loss of riparian habitat. This project not only protects the boreal toad breeding site, but also allows for upland soil recovery and improved riparian conditions adjacent to Elkhead Creek, which will benefit Colorado River cutthroat trout habitat.

NFSR 550.2G/Soldier Creek Ditch: This project was a cooperative effort between a water user with an easement for an irrigation ditch on NFS lands and the Forest Service. The Soldier Creek Ditch had intercepted water from two small tributary streams since it was originally constructed more than 100 years ago. There was no control structure in the ditch to allow the water to pass below the ditch when it was not being put to beneficial use. For much of the year, this water was intercepted by and infiltrated into the ditch (conveyance loss), neither providing a beneficial use, nor supporting riparian and stream habitat below the ditch. The stream and riparian habitat below the ditch had been significantly altered due to 100+ years without water. This project involved installation of control structures in the ditch that allow the tributary water to pass through the ditch when the water is not being put to beneficial use. Allowing water to return to the riparian area and stream channels below the ditch will allow restoration of the aquatic and riparian habitat in those areas over time. Improvements were also made to NFS Road (NFSR) 550.2G to convey the water across the road and also to reduce the risk of water overtopping the ditch at a road/ditch crossing.

Status of Water Quality

Most surface waters on the Forests are believed to be meeting all designated water quality uses; but, due to sampling requirements, only a small subset of the waters have comprehensive data to support this conclusion. See Appendix C for a summary of water quality assessments and water quality impairments for Colorado and Wyoming.

Most water quality monitoring has been conducted on streams where designated uses are known or suspected to be impaired; limited monitoring has occurred on streams likely to meet all designated uses. Figure 7 summarizes the water bodies on the MBR that have been determined by the States of Colorado and Wyoming to have or are suspected to have water quality concerns.

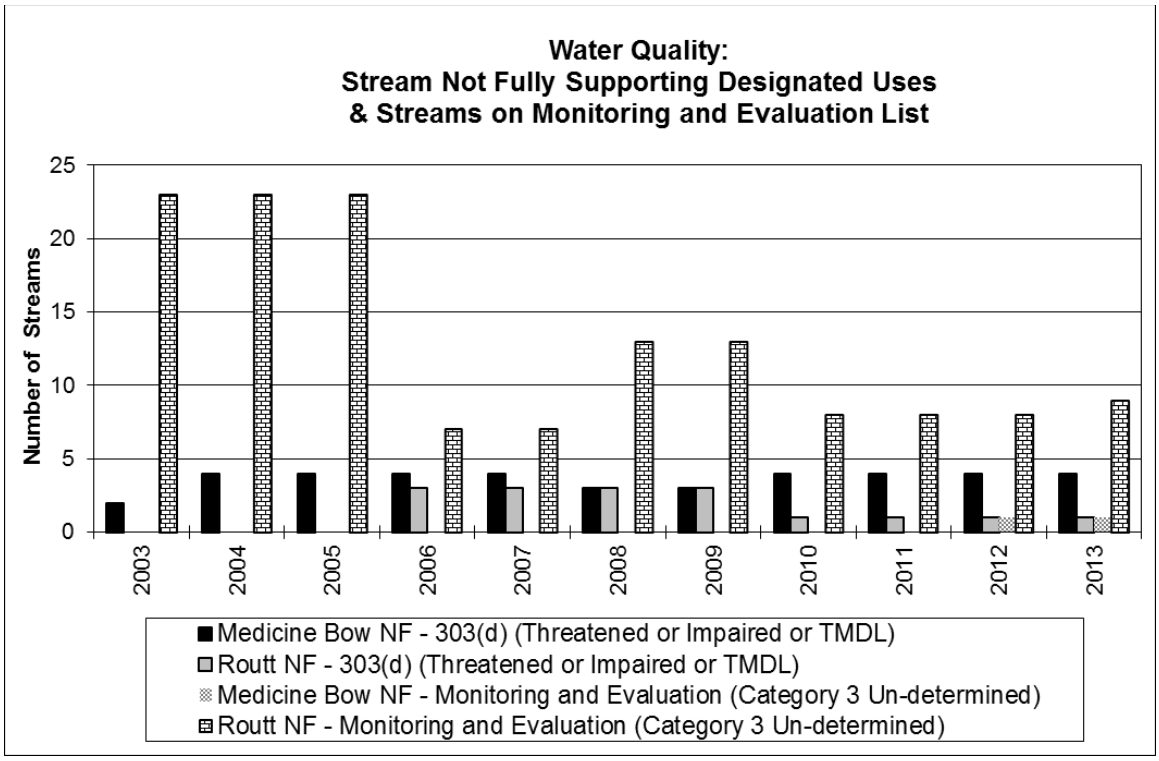

Figure 7. Forest water quality impairments for Colorado and Wyoming.

Streams on the Colorado 303(d) list

Bushy Creek had been on the monitoring and evaluation list for sediment from 1998–2010. It was recommended for placement on the 303(d) list by the Colorado Water Quality Control Division ("the Division") during the 2010 rulemaking and approved by the Water Quality Control Commission in February 2010. Bushy Creek is considered a low priority by the State for development of a total maximum daily load (TMDL). This is largely due to the fact that sediment is not considered a health and safety issue for humans; higher priority is given to streams listed for *E. coli* or other parameters that may affect drinking water quality. Forest watershed personnel will work with the State to determine sources of sediment and potential remedies.

Streams on the Colorado Monitoring and Evaluation List

Colorado's Monitoring and Evaluation (M&E) List identifies water bodies where there is reason to suspect water quality problems, but there is also uncertainty regarding one or more factors, such as the representative nature of the data. The addition of Little Bear Creek, Slater Creek, South Fork Big Creek, Little Grizzly Creek, Grizzly Creek, Walton Creek, Little Morrison Creek, and Lost Dog Creek to the M&E list is based on data collected by the Division. These data suggest potential water quality concerns that warrant further investigation. The Forest cooperated with the Division in 2009 and 2010 to collect additional data on these stream segments and to help determine if water quality concerns extend onto the Forest. Forest personnel collected the water quality samples, including macro-invertebrates, to address sediment concerns, and then sent the samples to the State for analysis. These data are being analyzed and no results were available for the 2010 Rulemaking Hearing. Another Rulemaking Hearing will be held in 2014. *E. coli* samples collected on the South Fork Big Creek and Little Grizzly Creek and analyzed by the

Forest were all meeting State water quality standards. Forest watershed personnel will continue to cooperate with the Division to collect additional data and identify if these water quality concerns apply to the Forest.

Haggerty Creek and West Fork of Battle Creek, Wyoming

These streams are not fully supporting designated uses due to metals contamination from the inactive Ferris-Haggerty/Osceola Tunnel mine, which dates from 1898 and is located on private lands within the Forest boundary. The Wyoming Department of Environmental Quality (WYDEQ) developed a TMDL for these streams, solicited public comment, and EPA approved the TMDL in December 2011. Since the source of contamination is located on private lands, WYDEQ–Abandoned Mine Lands (AML) has been the primary entity with the authority for reclamation efforts. The Forest Service plays a minor role in this reclamation effort, but has cooperated with WYDEQ–AML for reclamation facilities and access across NFS lands. The affected streams are located primarily on public lands. Since a TMDL has been developed for these two streams, they have been removed from Wyoming's 2012 303(d) List of Impaired Waters Requiring TMDLs, but the water quality impairment remains.

North Branch of the North Fork Crow Creek and Middle Crow Creek, Wyoming

Since 2004, these streams have not consistently met their contact recreation uses due to elevated levels of bacteria. Middle Crow Creek did attain the contact recreational use criteria from 2004 to 2007 and it was removed from Wyoming's 2008 303(d) List of Waters Requiring Total Maximum Daily Loads. However, data collected on Middle Crow Creek in 2008–2010 indicated impairment and the stream was added back onto Wyoming's 2010 303(d) List of Waters Requiring Total Maximum Daily Loads. The Laramie County Conservation District continued to collect water quality samples (*E. coli*) at one monitoring station on Middle Crow Creek and two stations on North Branch North Fork Crow Creek during 2013. BMPs continue to be evaluated in these watersheds to address elevated levels of bacteria.

Conclusions

The listing of Bushy Creek on the Colorado 303(d) list as impaired for sediment in 2010 is based on monitoring data submitted by the Forest. Photos and data from 1998 and 2006 indicate a decline in stream health and increase in sediment. Causes of this are uncertain, although heavy elk use may be a contributor as well as livestock use. Listing of this stream segment (Figure 7) moves the Forest away from the Routt Forest Plan goal of "improve water quality… in areas not meeting State water quality standards… and meet the anti-degradation clause of the Clean Water Act across the Forest" (Routt NF Plan p.1-2). The State is currently revising the sediment guidance to determine if impairments exist. Once this guidance is finalized, Forest personnel will work with the State to determine the extent of impairment on Bushy Creek and recommended actions to reduce sediment impairments and bring Bushy Creek into compliance with State water quality standards.

The number of impaired streams on the Medicine Bow NF increased from two to four since the Medicine Bow Forest Plan was signed in 2003 (Figure 7). This has moved the Forest away from the objective in the Forest Plan stating "achieve an 80% reduction in the miles of State of Wyoming designated streams not fully supporting designated uses" (Medicine Bow Forest Plan, page 1-2). Monitoring data had shown an improving trend (lower bacteria) on Middle Fork Crow Creek from 2004-07, but elevated levels were seen again in 2008-13. There continue to be

exceedances of numeric water quality criteria on North Branch North Fork Crow Creek, West Fork Battle Creek, and Haggerty Creek. The Forest continued cooperative monitoring efforts and implementation of BMPs to address water quality issues in the Crow Creek drainage in 2013.

Recommendations

- Continue to implement watershed improvement projects that reduce sediment and connected disturbed areas so as to meet the anti-degradation clause of the Clean Water Act.
- Once Colorado completes the updated sediment guidance for determining sediment water quality impacts, the Forest should work with the State to determine the extent of sediment impairment on Bushy Creek and identify opportunities to reduce sediment impacts such that Bushy Creek could be removed from the 303(d) list.
- Cooperate with the Colorado Water Quality Control Division to obtain water quality data on streams placed on the Monitoring and Evaluation list for metals, pH, *E. coli* and aquatic life. Cooperate with the State on additional data collection on these streams.
- Continue to participate in the Watershed Plan effort for the Upper Crow Creek Watershed, including cooperating with the Laramie County Conservation District on bacteria monitoring and range utilization monitoring in the Upper Crow Creek watershed and adjusting management of grazing and recreational activities to improve water quality in upper Crow Creek.
- Work with WYDEQ, as appropriate, to implement the TMDL for Haggerty and West Fork Battle Creeks.
- Continue to analyze each proposed project and suggest BMPs to protect water quality. A sample of the soil and water mitigation measures should be monitored during and after implementation to determine the effectiveness for protecting water quality as part of the national BMP monitoring program.

Actions Taken on Recommendations Included in Past M&E Reports

- Recommendation: Continue to implement watershed improvement projects that reduce sediment and connected disturbed areas so as to meet the anti-degradation clause of the Clean Water Act.
    - FY13 Action Taken: See Table 5, "2013 Soil & Watershed Improvement (S&W-RSRC-IMP), Stream Habitat Enhancement (HBT-ENH-STRM) and Lake Habitat Enhancement Accomplishments (HBT-ENH-LAK)" for acres of watershed improvement, all of which directly or indirectly reduced stream sedimentation.
- Recommendation: Work with the Colorado Water Quality Control Division to assess all sources of sediment impacts to Bushy Creek, and develop an action plan to address and ultimately delist this stream reach.
    - FY 13 Action Taken: The State of Colorado is currently updating the sediment guidance for evaluating sediment impacts to water quality. The Forest is waiting for this guidance to be finalized, and then will work with State personnel on an action plan to address sediment concerns that is consistent with the new guidance.

- Recommendation: Monitor compliance with Forest Plan Standards and Guidelines and range BMP implementation to ensure compliance with water quality standards for bacteria.
    - FY13 Action Taken: Range BMPs were monitored on 18 stream reaches. For several stream reaches this included pre and post livestock grazing, as well as some monitoring during the livestock grazing season. The Forest continued to cooperate with Laramie County and Laramie Rivers Conservation Districts on bacteria monitoring and range utilization monitoring in upper Crow Creek watershed.
- Recommendation: Cooperate with the Colorado Water Quality Control Division to obtain water quality data on streams placed on the Monitoring and Evaluation list for metals, pH, *E. coli* and aquatic life. Cooperate with the State on additional data collection on these streams.
    - FY13 Action Taken: No actions were taken in FY13 due to limited personnel and funding for this activity
- Recommendation: Continue to cooperate with Laramie County and Laramie Rivers Conservation Districts on bacteria monitoring and range utilization monitoring in upper Crow Creek watershed.
    - FY13 Action Taken: Existing BMPs were continued in these watersheds to address elevated levels of bacteria. Water quality and range utilization monitoring continued in FY13.
- Recommendation: Continue adjusting management of grazing and recreational activities to improve water quality in upper Crow Creek.
    - FY13 Action Taken: Existing BMPs were continued in these watersheds to address elevated levels of bacteria. Water quality and range utilization monitoring continued in FY13. Extensive efforts were made to manage unauthorized off-road vehicle use.
- Recommendation: Continue to participate in the Watershed Plan effort for the Upper Crow Creek Watershed.
    - FY13 Action Taken: Existing BMPs were continued in these watersheds to address elevated levels of bacteria. Water quality and range utilization monitoring continued in FY13.
- Recommendation: Work with WYDEQ, as appropriate, to implement the TMDL for Haggerty and West Fork Battle Creeks.
    - FY13 Action Taken: No action was taken.
- Recommendation: Continue to analyze each proposed project and suggest BMPs to protect water quality.
    - FY13 Action Taken: Forest staff continued to incorporate BMPs and Design Features to protect water quality for all resource planning projects.
- Recommendation: Continue to monitor BMP implementation and effectiveness on a variety of projects and identify opportunities for improvement to protect water quality.

- FY13 Action Taken: Three projects were monitored using the national BMP protocol for BMP implementation and effectiveness for protecting water resources. Summary results and conclusions are on file in the corporate filing system.

- Recommendation: A sample of the soil and water mitigation measures should be monitored during and after implementation to determine the effectiveness for protecting water quality.
    - FY13 Action Taken: Three projects were monitored using the national BMP protocol for implementation and effectiveness in protecting water resources. Summary results and conclusions are on file in the corporate filing system.

Vegetation Composition and Structure

Medicine Bow Item Objective 1.b.1 Reporting Period: Annual
Routt Monitoring Item 1-7

These monitoring items ask the questions:

To what extent are management actions maintaining and/or restoring composition and structure of the forest and other vegetation?

Are forest cover types and habitat structural stages (coarse filter scale as described in the Routt FEIS) being provided for across the Forest?

Monitoring Protocol/Data Collected

Vegetation structure and the predicted changes from the mountain pine beetle epidemic were analyzed using a GIS Model. This modeling was completed in 2010 and is still considered to be valid.

Results/Evaluation

Habitat structure stages (HSS) are used to describe the ecological function of stands based on tree size and canopy cover. These classifications represent stand components such as tree height, diameter, crown layers and stems of trees, shrub and herbaceous understory, snags, and down woody pieces (Thomas et al. 1979). Different arrangements of these components provide different habitats for wildlife (DeVos and Mosby 1971, Edgerton and Thomas 1978). HSS are described in Table 6.

Hoover and Wills (1987) developed HSS classes based on combinations of tree diameter and canopy cover (Table 6). These definitions were incorporated into the R2Veg database. These definitions are based upon even-aged stands. There are no provisions for multiple canopy layers or numerous age classes within the same stand of trees (Hoover and Wills 1987).

The analysis used GIS information to predict how stand mortality from mountain pine beetle would affect stand structure. Modeling stand mortality from mountain pine beetle resulted in a reduction in acres in late seral forest (HSS 3 and 4) and an increase in the early seral forest (HSS 1 and 2) (Figures 8 and 9).

Table 6. Habitat structure stage descriptions.

Habitat Structure Stage (HSS)	HSS Code	DBH Range for Most Trees
Grass Forb	1	Any
Seedling	2	< 1.5 inches
Sapling – Pole	3	> 1.5 inches
Mature	4	> 9 inches

The full effect of the mountain pine beetle epidemic on HSS changes will occur 3-10 years after the epidemic has reached full force. The Medicine Bow NF had a full force epidemic between 2005 and 2006; by 2013, these areas were 7-8 years into effects on HSS. The Routt NF had a full-force epidemic between 2002 and 2003; by 2013, these areas were 10-11 years into effects on HSS.

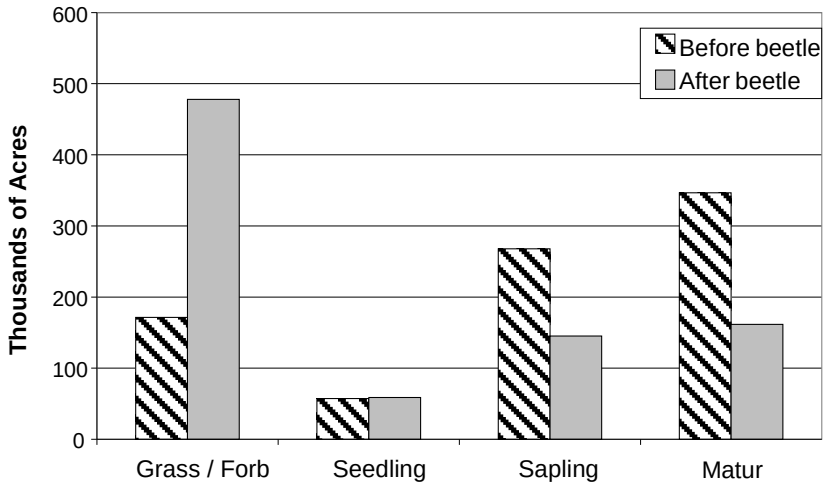

Figure 8. Predicted changes to habitat structure stages from mountain pine beetle on the Medicine Bow NF.

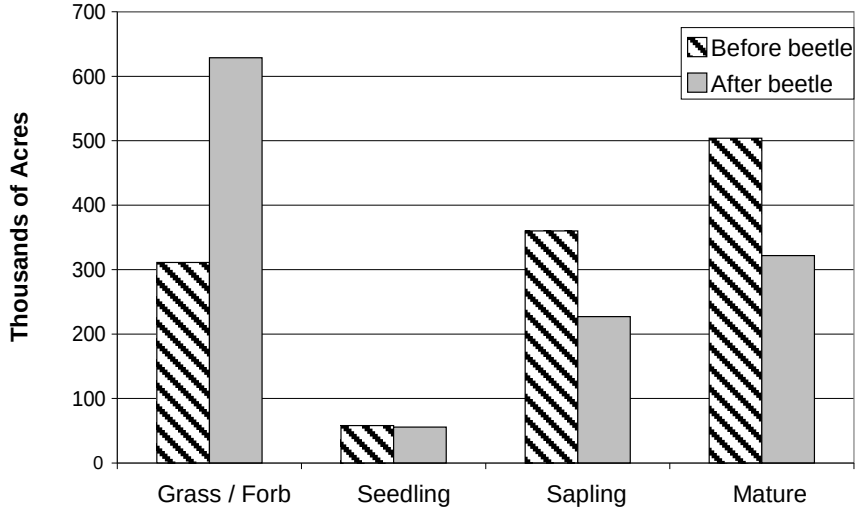

Figure 9. Predicted changes to habitat structure stages from mountain pine beetle on the Routt NF.

Conclusions

The GIS model predicted that there may be a reduction in the late seral forest HSS 3 and HSS 4 and an increase in the early seral forest HSS 1 and HSS 2 on the MBR. The changes that have occurred have been from the mountain pine beetle. Even though management on the MBR has increased, the change from late seral to early seral can be attributed to the mountain pine beetle.

The MBR has begun the process to collect new vegetation data to help determine the actual effects of the mountain pine beetle on vegetation composition and structure. Analysis and results from this data should be available in the near future.

Recommendations

- Continue to collect and analyze new vegetation data in preparation for the next forest planning process.

Actions Taken on Recommendations Included in Past M&E Reports

- Recommendation: Evaluate specific forest direction (desired conditions, goals, objectives, standards and guidelines) related to old growth (Medicine Bow NF) and late successional forest (Routt NF).
    - Action Taken: See the Old Growth and Late Successional Forest Structure monitoring items for a response.

Restoration, Enhancement, and Commodity Production

Medicine Bow Item Objective: 1.b.2

Frequency of Measurement: Annual
Reporting Period: Five Year

This monitoring item asks the question:

To what extent have current conditions and opportunities been identified for restoration, enhancement and commodity production?

The restoration and enhancement portions of this monitoring are addressed in the Habitat Improvement Monitoring Item.

Monitoring Protocol/Data Collected

Historical reports from the Timber Information Manager database were used to determine past timber sale accomplishments, and the current 5-year timber sale action plan was used to determine project outputs.

Results/Evaluation

As a ceiling on timber sold from suitable timber lands, allowable sale quantity (ASQ) is not a reliable predictor of actual harvest levels or annual timber programs. Annual budgets, project appeals, litigation, market conditions, natural disasters, the needs of other resources, and changes in national policies affecting resource management all have an effect on the MBR timber sale program. During the late 1990s and early 2000s, the issues influencing the level of timber sold were project appeals and litigation, both on site-specific projects and on the Medicine Bow NF Plan. While most of the timber sale projects were eventually offered, the timing of the offers' environmental assessments were delayed or the quantity of volume sold was reduced. In the early 2000s, budgets were reduced to a level less than 50% of what was necessary to meet average annual ASQ levels for the MBR. In recent years, the budgets have improved and the Forest is experiencing fewer project-level appeals.

Project-level planning has increased substantially since the start of the mountain pine beetle infestation with approximately 50-100 MMBF of NEPA approved salvage projects completed annually. The purpose and need for these projects identify and prescribe vegetation treatments for salvage and restoration of beetle-killed timber stands, removal of hazard trees from recreation sites and roadsides, and creation of fuel breaks designed to protect government and private improvements within national forests.

The average annual ASQ for the Medicine Bow Plan is 22.8 MMBF/year. ASQ is defined as the quantity of timber that may be sold from the area of suitable land covered by the forest plan for a time period specified by the plan. This allowable sale quantity (ASQ) is usually expressed on an annual basis as the "average annual allowable sale quantity" (FSM 1900). Table 7 illustrates the annual timber program for the Medicine Bow NF since the implementation of the 2003 Revised Plan.

Table 7. Medicine Bow NF Timber Sale Program.

Year	Sold (MMBF)*	ASQ (MMBF)	ASQ Percent Sold
2004	7.7	22.8	33.77%
2005	10.1	22.8	44.30%
2006	6.2	22.8	27.19%
2007	7.2	22.8	31.58%
2008	8.0	22.8	35.09%
2009	16.3	22.8	71.49%
2010	14.6	22.8	64.04%
2011	9.0	22.8	39.47%
2012	6.3	22.8	27.63%
2013	16.5	22.8	72.37%
Total	**101.9**	**228.0**	**44.69%**

The average annual ASQ for the Routt Plan is 14.8 MMBF/year. The ASQ applies to each decade over the planning horizon and includes only chargeable volume. Table 8 illustrates the annual timber program for the Routt NF for the 1st decade since the implementation of the 1997 Plan. Table 9 illustrates the annual timber program for the Routt NF for the 1st half of the 2nd decade since the implementation of the 1997 Plan.

Table 8. Routt NF Timber Sale Program (1st decade). The ASQ applies to each decade over the planning horizon and includes only chargeable volume.

Year	Sold (MMBF)*	ASQ (MMBF)	ASQ Percent Sold
1998	15.6	14.8	105.41%
1999	12.0	14.8	81.08%
2000	10.3	14.8	69.59%
2001	0.5	14.8	3.38%
2002	4.6	14.8	31.08%
2003	9.1	14.8	61.49%
2004	16.1	14.8	108.78%
2005	12.9	14.8	87.16%
2006	24.5	14.8	165.54%
2007	28.3	14.8	191.22%
Total	**133.9**	**148.0**	**90.47%**

Table 9. Routt NF Timber Sale Program (2nd decade)

Year	Sold (MMBF)*	ASQ (MMBF)	ASQ Percent Sold
2008	38.8	14.8	262.16%
2009	23.9	14.8	161.49%
2010	27.4	14.8	185.14%
2011	8.9	14.8	60.14%
2012	12.4	14.8	83.78%
2013	15.8	14.8	106.76%
Total	**127.2**	**74**	**171.89%**

*Not all of the volume sold in the above tables is from suitable lands. Timber sales are implemented to meet the needs of the various resources. This includes harvesting on non- suitable lands to meet non-timber resource management needs.

On the Medicine Bow NF the mountain pine beetle epidemic reached its peak between 2005 and 2006 and on the Routt NF the epidemic reached its peak between 2002 and 2003. Both forests increased their timber sale and fuels planning and, approximately 2 to 3 years after these dates, began to implement projects to address the impacts of the mountain pine beetle. This can be seen by the increase of volume sold. In 2011 and 2012 there was a drop in the market and the forests experienced numerous no bid sales. The markets have improved in 2013.

The proposed out-year offer is dependent on budgets and market conditions. There is much uncertainty regarding future budgets and market conditions. Fluctuations can and will occur that will have a direct effect on how much the forests can offer. Table 10 displays the planned timber sale offers for FY 2014–2018.

Table 10. MBR Planned Timber Sale Offer for 2014-2018.

Year	Medicine Bow NF	Routt NF
2014	10.5	25.2
2015	17.7	13.0
2016	19.3	19.3
2017	15.0	20.0
2018	17.5	17.5

Conclusions

The MBR will continue to plan and implement strategies and actions that will reduce fire hazard, fuel loadings, and safety hazards in WUI, recreation sites, administrative sites, infrastructure, and travel routes. The MBR will also continue to implement actions to restore the forest from the impacts of the bark beetle.

Recommendations

- Continue to plan and implement strategies and actions to address the effects of the bark beetle, and begin to place more emphasis on forest restoration.

Actions Taken on Recommendations Included in Past M&E Reports

- 2008 Recommendation: Review forest plan standards, in both forest plans, relating to snag retention in harvest units, in light of the amount of tree mortality from mountain pine beetle epidemic which will result in high densities of snags across the forests.
    - Action Taken: The Forest will begin to review this direction in FY14. The standards in the plans are still being followed on a project-wide basis.

Habitat Improvement

Medicine Bow Objective 1.b.3 — Frequency of Measurement: Annual
Routt Monitoring Item 1-6 — Reporting Period: Annual

These monitoring items ask the questions:

To what extent have habitat improvement needs been identified and implemented using structural and non-structural habitat improvement treatments?

Are habitats for threatened, endangered, and Forest Service Region 2 Sensitive species being maintained or enhanced?

Monitoring Protocol/Data Collected

Annually document the number of projects identified and/or implemented that improved habitat for Threatened, Endangered, and Sensitive (TES) species.

Terrestrial Wildlife

Habitat improvement projects consist of many different treatments including prescribed burns, fence installations/removals, road decommissioning, structural improvements, spring developments, noxious weed treatments, and vegetation plantings.

Results/Evaluation

The MBR restored or enhanced approximately 12,690 acres of wildlife habitat in 2013. This was accomplished by a variety of treatments, both structural and non-structural.

Brush Creek – Hayden Ranger District

- Spraying of noxious weeds: 192 acres
- Release of weevils to feed on noxious weeds: 8 acres
- Installation of bear resistant trash containers in campgrounds: 10 acres
- Elk “friendly” fence installation of 1.7 miles: equates to 1,500 acres

Laramie Ranger District

- Wilderness weed spraying: 120 acres
- Buck and rail fence installation: 2,809 acres
- Wetland fencing in riparian areas: 132 acres

- Spring development and fencing of riparian areas on Pole Mountain improved about 5 acres of wildlife habitat, some of which was habitat for the Preble's meadows jumping mouse, a threatened species.

Hahns Peak – Bears Ear Ranger District

- Installation of 1 mile of fence along riparian areas to protect breeding habitat of the Boreal toad, a R2 sensitive species: 58 acres
- Vent cap screens installed on several outhouse across the Routt NF to prevent entrapment of birds: 4,285 acres

Parks Ranger District

- Bat box installations: 600 acres
- Osprey nesting platforms: 600 acres
- Teal Lake campground restoration through the vegetation plantings: 15 acres

Yampa Ranger District

- Decommissioned 6 miles of road: 2,000 acres
- Indian Run prescribed burn: 350 acres
- Wildlife "friendly" fence installation: 120 acres

The MBR inventoried approximately 13,150 acres in 2013. Surveys were completed by forest personnel and with several partners. Inventories covered an array of species and habitats including threatened species (lynx), Region 2 sensitive species (boreal toad, northern leopard frog, wood frog and American marten), management indicator species (MIS) (goshawk, snowshoe hare), and species of local concern (sage-grouse).

Brush Creek – Hayden Ranger District

- Snowshoe hare inventory: 3,000 acres
- Goshawk inventory: 6,993 acres
- Sage-grouse inventory: 627 acres
- Bald eagle inventory: 179 acres
- American marten inventory: 1,165 acres

Laramie Ranger District

- Goshawk inventory: 390 acres

In partnership with the Wyoming Natural Diversity Database (WYNDD), the Colorado Natural Heritage Program (CNHP), and Colorado Parks and Wildlife (CPW), 25 acres of forested wetlands were inventoried for amphibians, including three Region 2 sensitive species: boreal toad, northern leopard frog, and wood frog.

Conclusions

Inventories are conducted in support of many proposed projects, for species assessments, and to develop, refine, and maintain monitoring programs. Information is used to assess habitat and population trends. Habitat restoration, enhancement, and maintenance opportunities are identified through these inventories.

Threatened, endangered, and sensitive species habitats are maintained and enhanced. Fencing of riparian habitat provides protection to the threatened Preble's meadow jumping mouse and R2 sensitive amphibians and plants by excluding livestock or vehicle traffic. Installing vent caps on outhouses prevents potential entrapment of sensitive species such as the Townsend's big-eared bat and boreal owl.

Wildlife "friendly" fences decrease the risk of big game becoming entangled in the strands. Reflective tabs are installed on fence wires in sage-grouse habitat so sage-grouse can see and avoid fence wires during flight.

In 2013, a new boreal toad breeding site was discovered on the Medicine Bow Forest. This is the third boreal toad breeding site documented on the Medicine Bow by WYNDD.

Recommendations

- Maintain existing partnerships and develop new partnerships.
- Continue to refine monitoring protocols when needed.
- Continue to support updates to the Region 2 Sensitive Species list.
- Continue to coordinate with the CNHP, WYNDD, and Federal and State agencies.

Actions Taken on Recommendations Included in Past M&E Reports

- 2012 Recommendations: Maintain existing partnerships and develop new partnerships; continue to refine monitoring protocols when needed.
    - FY 13 Action Taken: Partnerships have been maintained and monitoring protocols continue to be refined and tested.

Plant Habitat

Habitat improvement projects implemented in 2009–2013 that benefitted Region 2 sensitive plant habitats, identified sensitive plant habitat restoration needs, or improved degraded native plant communities are listed below. Projects are relevant to R2 sensitive species only; there are no populations or suitable habitat identified for federally listed threatened or endangered plant species on the MBR. Projects below were funded primarily through partnerships, grant monies, and other FS BLIs; few NFWF dollars were contributed.

Results/Evaluation

- Native Plant Materials Program (Forest-wide). Over the past 5 years, the MBR Native Species program made over 50 collections of native plant materials for restoration projects on the MBR. Most of the seed collection efforts have been funded by Resource Advisory Committee (RAC) and NFN money. These collections were completed through force accounts and partners.

- Road Decommissioning and Revegetation (Forest-wide): In 2009–2013, 193 miles of plant habitat were improved as a result of road decommissioning projects that involved soil scarification, soil re-contouring, and/or seeding.
- Brush Creek Electric Fence (Laramie RD): In 2013, an electric fence was installed to protect 132 acres of lesser bladderpod (*Utricularia minor*) wetland habitat from extensive livestock use along Brush Creek on Pole Mountain. The electric fence has effectively kept livestock out of the soft, saturated wetland soils, reduced hoof-punching, and increased habitat quality for this R2 sensitive species.
- Tree Planting (Laramie and Brush Creek-Hayden RDs): In 2012 and 2013, conifer tree seedlings were planted at recreation sites and campgrounds across Medicine Bow NF to help re-vegetation following the pine bark beetle epidemic and associated hazard tree clearance. Trees planted in 2012 in the Sierra Madre and the west side of the Snowy Range had very low survivorship due to extended drought conditions, but trees planted on the east side of the Snowy Range in 2013 had >98% survivorship. The summer of 2013 experienced greater than average precipitation and tree seedlings were given supplementary water once a week.
- Pole Mountain Wetland Inventory (Laramie RD): In 2011–2013, the Forest Service collaborated with WYNDD to catalog sensitive wetland plants, uncommon wetland habitats, and associated human and livestock disturbance/damage on Pole Mountain (Cooperative Agreement No. 12-CS-11020600-010). This project yielded new and expanded occurrence records for three sensitive plant species and identified two areas where habitat improvement projects may improve sensitive wetland plant habitats and protect newly discovered populations from grazing pressure and disturbance.
- Interpretive Pollinator Garden (Laramie RD): In 2012-2013, an Interpretive Pollinator and Native Plant Garden was installed at the Centennial Visitor Center. This project created 30 acres of native pollinator habitat. Native pollinators are essential to the reproductive success of most native plants on the MBR.
- Wetland Restoration (Laramie RD): In 2012, 35 acres of wetland plant habitat were improved as a result of RAC-funded volunteer projects that restored habitat that was damaged from unauthorized vehicle use under power line right of ways. An additional 3 acres of wetland habitat were improved by spring developments that lowered livestock use and damage to three different wetlands.
- Hahns Peak Campground (HPBE RD): Planted approximately 50 willows (from locally genetic materials) along shoreline to help improve wildlife habitat by increasing structural diversity at the site (2012, 2013).
- Teal Lake Campground Restoration (Parks RD): During 2012 and 2013 we planted approximately 1,000 native shrubs from locally genetic materials across 10 acres to help improve and enhance wildlife habitat and improve visitor experience following the bark beetle hazard tree mitigation efforts (Figure 10). The Parks RD Timber Program was a significant partner in the 2013 planting. This project was made possible with RAC funding.

Figure 10. Field crew planting shrubs at Teal Lake CG.

- Newcomb Creek Restoration (Parks RD): During 2012 and 2013 we planted approximately 300 willows (from locally genetic materials) along Newcomb Creek to help restore approximately 1 acre of wildlife habitat along an engineered (now abandoned) channel. This project was made possible with RAC funding.
- Sawmill Gravel Pit Restoration (Parks RD): Planted approximately 100 willows (from locally genetic materials) to help restore an abandoned gravel pit. The 1.6 acre pit was re-contoured in 2012 to help improve habitat. Recreation, timber and fire also helped with this very difficult planting. This project was made possible with RAC funding.
- Big Creek Lakes Campground Tree Planting (Parks RD): Worked cooperatively with timber, recreation, and fuels to plant approximately 750 tree seedlings to help improve visitor experience following the bark beetle hazard tree mitigation efforts.
- Historic Grizzly Guard Station Planting (Parks RD): In 2013 we completed the final year native species restoration plantings project at the historic Grizzly Guard Station (Parks RD). This project was done with RAC funding and a partnership with the North Park School District (Cooperative Agreement No. 11-CA-11020604-010).

Conclusions

There is opportunity for restoration and habitat enhancement benefitting rare plants and habitats across the forest, but opportunities must be identified and cataloged before efforts can proceed. Some restoration activities such as road closures and tree planting benefit multiple resources including improving habitat for native plant communities and rare plant species and habitats. Greater NFWF allocations towards the botany program could be used to increase the size, effectiveness, and diversity of botany habitat restoration projects and the native plant materials program.

Recommendations

- Continue current efforts to identify restoration and enhancement opportunities that benefit plants and habitats on the forest. Continue to pursue ancillary funding to maintain and expand on restoration projects, including those that utilize native plant

materials. Collaborate with partners to work across landownerships and resource concerns.

Aquatic Species Habitat

Results/Evaluation

Both fisheries zones, in cooperation with relevant resource specialties and external partners, have implemented aquatic organism passage (AOP) treatments to improve and expand access to important habitats for fish, amphibians, and other organisms that use streams as movement corridors. The typical AOP treatment involves replacing perched, corrugated metal-pipe culverts with bottomless-arch culverts. Between 2009 and 2013, 17 corrugated metal-pipe culverts were replaced with bottomless arches. Although these culvert replacements primarily improved habitat conditions for common trout species, some treatments were beneficial to R2 Sensitive Species such as Colorado River cutthroat trout (CRCT) and possibly boreal toads.

Routt NF: Between 2009 and 2013, the Routt NF identified and implemented several structural and non-structural habitat treatments designed to benefit CRCT habitats and populations, including: fish-barrier construction and chemical treatments in Circle Creek and Willow Creek; channel reconstruction and riparian fencing in Armstrong Creek; efforts to mechanically remove (i.e., electrofishing) brook trout from CRCT habitats in five streams where brook trout and CRCT occur together; monitor fish passage through a concrete box culvert in Poose Creek; and implement and monitor several culvert replacements (from corrugated metal-pipe to bottomless arch). Many CRCT habitats and populations are stable to improving, while a few others have experienced varying degrees of habitat degradation (e.g., Lost Dog Creek) or are at risk of habitat degradation due to multiple-use activities and water developments.

Between 2009 and 2013 about 2.2 miles of riparian-habitat fencing was reconstructed in California Park to protect boreal toad breeding habitats in and adjacent to Elkhead Creek; the fence protects 0.9 mile of stream and 54 acres of toad habitat. The delineated section of Elkhead Creek protected by the riparian fence is a known and active breeding habitat. Several boreal toad breeding sites were also monitored annually for breeding activity during this same time period . Breeding was confirmed, but it remains uncertain what the survival and recruitment rates are for juvenile toads (“toadlets”). Finally, the FS, CPW, and other partners implemented a pilot amphibian monitoring protocol in 2011 and implemented the full protocol during 2012 and 2013. Amphibian surveys were conducted in the Routt NF during 2009 to 2013.

Medicine Bow NF: Between 2009 and 2013, the Medicine Bow NF implemented several structural improvement projects and non-structural improvement projects to improve and protect Aquatic MIS and CRCT populations and habitats, including: three AOP projects in the Pelton Creek drainage; the mechanical removal (electrofishing) of rainbow trout from downstream and upstream of the waterfall in the lower North Fork, Little Snake River; and the removal of a large, reinforced concrete weir in the East Fork, Encampment River.

Recommendations

- Continue to improve habitats for aquatic and amphibian R2 Sensitive Species and MIS trout using a variety of well-chosen structural and non-structural improvement treatments.

Old Growth and Late Successional Forest Structure

Medicine Bow Item Objective 1.b.4 — Frequency of Measurement: Annual
Routt Monitoring Item 1-8 — Reporting Period: Annual/5 year

These monitoring items ask the questions:

Is old growth forest mapped and managed at least to minimum amounts and distribution stated in the plan?

How are management activities affecting late successional forest structure in Management areas 5.11 and 5.13?

Introduction

The Medicine Bow and Routt Forest Plans address old forests differently. The Medicine Bow Forest Plan has desired conditions, objectives, and standards relating to the amount and distribution of *Old Growth*. The Routt Forest Plan describes desired conditions for *Late Successional Forest*.

Monitoring Protocol/Data Collected

Vegetation structure and the predicted changes from the mountain pine beetle epidemic were analyzed using a GIS Model. This modeling was completed in 2010 and is still considered to be valid.

Medicine Bow NF

Old growth encompasses the later stages of stand development and typically differs from earlier stages in a variety of characteristics that may include tree size, age of larges trees, accumulations of large dead woody material, number of tree top layers, species composition, and ecosystem function. It can require 80–200 years for forest stands within different cover types to develop the characteristics of old growth (Mehl 1992).

Old growth mapping was completed in 2008 using the cover type descriptions of old growth by Mehl (1992) (also see Kay 2008, prepared for Mary H. Peterson). Table 11 displays three criteria of old growth by cover type.

Table 11. Old growth description by cover types.

Cover Type	Age of Largest Trees	Diameter of Largest Trees	Canopy Description
Lodgepole	150	10 tpa* > 10 inches	≥ 1 canopy layer
Spruce-fir	200	10 tpa > 16 inches	>1 canopy layer
Ponderosa pine	200	10 tpa > 16 inches	≥ 1 canopy layer
Aspen	100	20 tpa > 14 inches	≥ 1 canopy layer >50% cover

*tpa = trees per acre. Source (Mehl 1992)

The forest identified an implementation strategy that mapped more than the minimum percentage of old growth for each cover type, as shown in Table 12 (Tolbert 2013). In the 2010 GIS modeling, the Pole Mountain and Laramie Peak mountain units were not specifically addressed; they are included here for reference only.

The Old Growth Strategy GIS data is still based on the forest's former existing vegetation database (R2Veg). This database does not include mortality from the mountain pine beetle

epidemic or recent spruce beetle outbreak. While figures indicate that the forest is meeting the required minimum percentages by mountain range and cover type, in reality many of these areas may no longer qualify as old growth due to mortality of the larger trees. This affects all of the cover types, not just lodgepole pine; ponderosa pine has also been killed by bark beetle, the spruce component of spruce/fir reduced by spruce beetle, and aspen reduced in areas by sudden aspen decline.

The Old Growth Strategy spatial layer has been updated to reflect changes in recommended old growth configuration due to most major harvest types, hazard tree removals, and wildlife. The base cover types were not updated on the assumption that most harvested or wildfire impacted tree stands would be expected to re-vegetate and would still be recorded as tree stands, just currently non-stocked. The forest's current vegetation layer (FSVeg Spatial) would have different total cover type figures due to re-delineation in some areas.

Table 12. 2013 Inventoried and mapped old growth by mountain unit.

Mountain Unit	Cover Type	Total Cover (Acres)	Old Growth Strategy (Acres)	Required Minimum Forest Plan Standard (Percent)	Old Growth Strategy (Percent)
Sierra Madre	Aspen	48,639	10,663	20	22
Sierra Madre	Lodgepole	136,514	24,729	15	18
Sierra Madre	Ponderosa	0		25	0
Sierra Madre	Spruce/Fir	56,024	16,725	25	30
Snowy Range	Aspen	15,843	3,299	20	21
Snowy Range	Lodgepole	289,728	54,951	15	19
Snowy Range	Ponderosa	187	132	25	71
Snowy Range	Spruce/Fir	115,409	34,703	25	30
Laramie Peak	Aspen	5,441	1,310	20	24
Laramie Peak	Lodgepole	41,540	7,403	15	18
Laramie Peak	Ponderosa	29,855	7,443	25	25
Laramie Peak	Spruce/Fir	4,105	1,259	25	31
Pole Mountain	Aspen	3,886	792	20	20
Pole Mountain	Lodgepole	4,748	784	15	17
Pole Mountain	Ponderosa	5,037	1,272	25	25
Pole Mountain	Spruce/Fir	0	0	25	0

Results

The full effect of the mountain pine beetle epidemic on cover type changes is expected to occur 3-10 years after the epidemic reached full force. The Medicine Bow NF had a full force epidemic between 2005 and 2006. By 2013, these areas were 7 to 8 years into effects on HSS. Table 13 gives the predicted change in crown cover for the different old growth cover types.

Table 13. Change in tree cover from simulated mountain pine beetle effects averaged across mountain ranges.

Mountain Unit	Cover Type	Old Growth Strategy (Acres)	Old Growth with Changed Crown Cover from Mountain Pine Beetle Epidemic (Acres)	Average Crown Cover Before Mountain Pine Beetle (Percent)	Average Crown Cover After Mountain Pine Beetle (Percent)
Sierra Madre	Aspen	10,577	4,064	54	42
Sierra Madre	Lodgepole	24,773	24,751	54	12
Sierra Madre	Ponderosa	0	0	0	0
Sierra Madre	Spruce/Fir	16,716	5,617	51	38
Snowy Range	Aspen	3,303	2,216	54	37
Snowy Range	Lodgepole	55,201	54,849	54	12
Snowy Range	Ponderosa	132	117	44	24
Snowy Range	Spruce/Fir	34,701	13,894	60	46

For Aspen and Ponderosa Pine Cover Types

Lodgepole pine may sometimes be a minor component in the aspen and ponderosa pine old growth cover types. These lodgepole pine trees may die as a result of the mountain pine beetle; however, there is no anticipated impact to aspen old growth status from expected lodgepole pine stand mortality.

For Spruce/Fir Cover Type

Large old lodgepole pine trees intermixed with spruce/fir contributed to the quality of old growth in the spruce/fir cover type. However, the mountain pine beetle has likely killed many of these large old lodgepole pine trees, reducing the number of live old trees greater than or equal to 16 inches in diameter, a required attribute for old growth. Tree mortality will also reduce canopy cover, another required attribute. This will change some old growth attributes within these stands, but may not eliminate these stands as components of the inventoried and mapped old growth.

The death of large, old lodgepole pine will also contribute to other attributes such as standing dead and down dead. When these dead trees fall, they create dead wood structures valuable for wildlife; this aspect of old growth habitat may improve.

Lodgepole Pine Cover Type

Stands of old growth within the lodgepole pine cover type may have a pure canopy of lodgepole pine or may have a mix of lodgepole pine and other species (mostly Engelmann spruce and subalpine fir but also possibly aspen and Douglas-fir). When the large, old lodgepole pine are killed by mountain pine beetle, the stand may no longer have the components to meet the required live tree attributes of old growth (10 or more live trees greater than 10 inches in diameter and at least 150 years old).

It is probable that there are no remaining stands within the inventoried and mapped lodgepole pine cover type that retain the standard attributes of old growth and still qualify within the lodgepole pine cover type after mortality. This represents a dramatic change in distribution and abundance of lodgepole pine old growth.

Cover Type Changes

Tables 14 and 15 display the changes to cover type for stands with lodgepole pine mortality from mountain pine beetle (cover types with very minor changes are not displayed in the tables below). Most of the lodgepole pine cover type that was predicted to die from the beetle epidemic was classified in the model as grass due to the lack of information about the forest understory vegetation. However, it is expected that aspen and spruce-fir cover type may increase as a result of the beetle epidemic.

Table 14. Predicted changes to cover type on Sierra Madre from mountain pine beetle-caused death of lodgepole pine.

Cover type	Before Mountain Pine Beetle	After Mountain Pine Beetle	Difference
Aspen	47,554	51,705	4,151
Lodgepole pine	138,213	16,927	-121,285
Spruce Fir	53,170	59,879	6,710

Table 15. Predicted changes to cover type on Snowy Range from mountain pine beetle-caused death of lodgepole pine.

Cover type	Before Mountain Pine Beetle	After Mountain Pine Beetle	Difference
Aspen	15,498	18,145	2,647
Lodgepole pine	281,633	61,411	-220,222
Spruce Fir	107,006	126,999	19,993

Table 16 displays the number of acres of inventoried and mapped old growth within the lodgepole pine cover type that have some amount of spruce/fir and may transition to the spruce/fir cover type where there is generally 20 percent or greater cover from spruce/fir. 17,174 acres of lodgepole pine cover type have the potential to shift to the old growth spruce/fir cover type.

Table 16. Predicted shift from lodgepole pine to spruce/fir cover type from mountain pine beetle-caused death of lodgepole pine.

Amount of spruce-fir in LPP old growth	Acres
Greater than or equal to 5%	39,101
Greater than or equal to 10%	29,108
Greater than or equal to 20%	11,952
Greater than or equal to 25%	5,225

Old Growth Recruitment

The Medicine Bow NF Biological Diversity Standard states:

> "If stands meeting the old growth definition do not exist at these percentages, manage additional stands that are closest to meeting old growth criteria as recruitment old growth to meet these desired percentages."

The stands that are closest to meeting old growth criteria would likely be within the mature habitat structure stages and have sufficient canopy cover to be classified as HSS 4B and 4C (trees over 9 inches in diameter and crown cover over 41 percent).

With changes in cover type, it is difficult to estimate how much of a reduction there has been for old growth for each cover type. However, with the mortality occurring to lodgepole pine, the lodgepole pine cover type will represent the largest amount of the cover type affected. Looking at all cover types:

HSS 4B+4C before mountain pine beetle = 272,434 acres

HSS 4B+4C after mountain pine beetle = 96,091 acres

This represents a 35% reduction in the amount of mature HSS after the mountain pine beetle epidemic and is expected to represent 11 percent of the forested acres across the forest. This does not represent much of a pool from which to replace the current inventoried and mapped old growth.

Routt NF

Desired condition information contained in the Routt Forest Plan (p. 3) predicted that the majority of the forest would be in late successional stands, and that over time more of the forest would move from younger and smaller age classes into older, late successional forest:

> The Forest in 10 Years: The majority of the forest will be in late successional habitats, with a portion in early to mid-successional habitats.
>
> The Forest in 50 Years: The vast majority of the forested areas will be in late successional habitats.

The Routt Plan grouped HSS 4b, 4c, and 5 together as late successional forest. Amounts of late successional component reported in the Routt Plan FEIS are given in the Table 17.

Table 17. Routt Habitat structural stage descriptions and percentages*

Structural Stage Name and Number	Percent of Forested Total
Grass/forb – 1	1.3
Seedling/sapling – 2	2.5
Pole (Total) - 3a 3b 3c	35.4
Mature (Total) - 4a 4b 4c 5	60.9
Late Successional Component - 4b 4c 5	49.1

*From Routt Plan FEIS table 3-25.

By cover type, the Routt NF reported the following amounts of late successional forest in 1997[3] (Table 18). This is a total of 539,000 acres or 43% of forested cover types.

Table 18. Acreage and percent structural stage by cover type from Routt Forest Plan FEIS Table 3-34.

Cover Type (HSS)	1		2		3		4		Late Successional (4a 4b 5)	
	Ac	%	Ac	%	Ac	%	Ac	%	Ac	%
Spruce-fir	4,595	1.0	6,183	1.4	123,045	27.1	320,154	70.5	254,317	56.0
Lodgepole pine	5,507	1.5	15,688	4.1	138,642	36.6	219,260	57.8	180,132	47.5
Aspen	4,378	1.7	5,077	2.0	125,439	48.2	125,470	48.2	101,616	39.0
Douglas-fir			69	1.3	1,406	26.3	3,861	72.4	2,939	55.1

The R2Veg database does not include HSS 5, which is referred to in the Routt Plan. Many of the acres of HSS 5 would now be counted as HSS 4B or C; however, HSS 5 stands with widely spaced, larger diameter trees (canopy cover < 40) would now fall into other habitat structure stages, or could be considered a non-forested stand. For these reasons, the acres of late successional forest estimated for the Routt NF 5-Year Review (2003) do not match the pre-mountain pine beetle epidemic late successional acres calculated for this analysis.

Results

The different areas of the Routt NF had a full-force epidemic between 2002 and 2003. By 2013, these areas were 10 to 11 years into effects on late successional forest.

After the mountain pine beetle epidemic, the Routt NF will have only 21% of the forest in late successional habitat (Table 19); this represents a 28% reduction from the 49 percent of the forest calculated at the time of the forest plan revision in 1998.

Table 19. Predicted change in late successional forest on Routt NF due to mountain pine beetle-caused mortality.

HSS	NFS Acres Before Mountain Pine Beetle	NFS Acres After Mountain Pine Beetle
4B	244,811	176,101
4C	235,662	87,507
Total	480,473	263,608

Aspen Cover Type

Lodgepole pine may sometimes be a minor component of late successional aspen stands. However, there is no anticipated impact to late successional status from lodgepole pine tree mortality.

[3] The analysis for the 1998 revision of the Routt Forest Plan was calculated using 1997 data.

Spruce/Fir Cover Type

Large old lodgepole pine trees (>9 inches) intermixed with spruce/fir contributed to the quality of old growth in the spruce/fir cover type. However, the mountain pine beetle has likely killed many of these large old lodgepole pine trees, which has reduced the number of live old trees and canopy cover. This will change some attributes within these late successional stands, but may not eliminate these stands as components of the late successional forest on the Routt NF.

The death of large, old lodgepole pine will also contribute to other attributes such as standing dead and down dead. When these dead trees fall, they create dead wood structures valuable for wildlife, this aspect of late successional habitat may improve.

Lodgepole Pine Cover Type

Stands of late successional forest within the lodgepole pine cover type may have a pure canopy of lodgepole pine or may have mix of lodgepole pine and other species (mostly Engelmann spruce and subalpine fir but also possibly aspen and Douglas-fir). When the large, old lodgepole pine are killed by mountain pine beetle, the stand may no longer have the components to meet the standards for late successional forest, such as the majority of trees >9 inches DBH and $\geq$41 percent cover.

Where there are trees of other species that remain alive in these stands, the cover type may have changed (cover type is based on majority of stocking by tree species). These stands may no longer qualify as late successional forest within the lodgepole pine cover type, but may or may not qualify as late successional forest under a different cover type such as spruce/fir. It is probable that there will be no remaining stands within the lodgepole pine cover type that retain late successional attributes after the predicted lodgepole pine stand mortality. This represents a dramatic change in distribution as well as abundance of late successional lodgepole pine stands.

The Routt Plan describes desired conditions related to late successional forest for these two management areas (Table 20):

- Management Area 5.11[4]:
    - Abundant late successional forest structure will be provided throughout the area by extending the rotation ages.
- Management Area 5.13:
    - A variety of habitat structural stages will be present, although late successional forests are less common than in most other management areas.

There is additional direction for Geographic Areas, which is included in the conclusions below. Figure 11 displays the projected change in late successional forest in these two Geographic Areas.

[4] The Routt Plan has a 5-year monitoring item relating to late successional forest in MA 5.11 and 5.13 which is addressed in the Medicine Bow-Routt 5 and 10 year Review.

Table 20. Late Successional Forest in Routt NF Management Areas 5.11. and 5.13.

Management Area	Habitat Structural Stage	Before Mountain Pine Beetle (Acres)	After Mountain Pine Beetle (Acres)
5.11	4B	57,675	41,221
5.11	4C	61,925	31,882
5.11	5	--	--
5.11	SubTotal	119,599	73,103
5.13	4B	36,620	23,438
5.13	4C	55,528	12,686
5.13	5	--	--
5.13	SubTotal	92,148	36,123
Total		211,747	109,226

The Geographic Areas with the largest amount of lodgepole late successional forest have the greatest predicted change from the mountain pine beetle epidemic (Figure 11).

Recruitment for Late Successional Forest

Stands that might recruit into HSS 4B the soonest would be stands within HSS 4A or 3B. Stands within HSS 4A would need to increase in cover and stands within HSS 3B would need to increase in the diameter of the majority of the trees.

HSS 4A after mountain pine beetle: 58,197 acres

HSS 3B after mountain pine beetle: 120,518 acres

Total: 178,715 acres

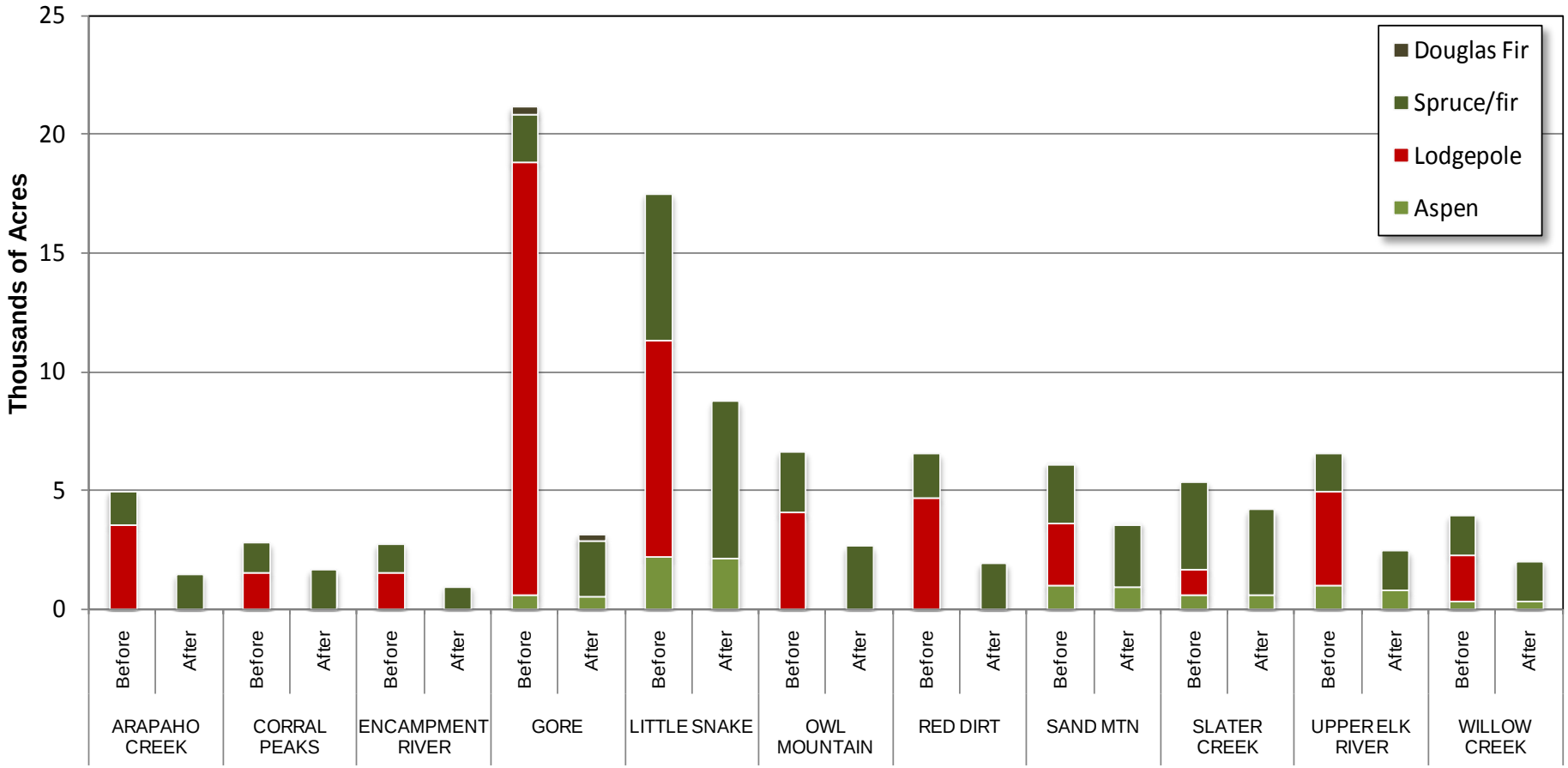

Figure 11. Predicted change in late successional forest by Geographic Area, due to mountain pine beetle-caused mortality (reported in thousands of acres).

Conclusions

Medicine Bow NF

A decrease in standing large lodgepole pine is expected with an increase in snags and dead and down wood from dead lodgepole pine within the spruce/fir cover type, but it is not expected that these stands will lose old growth characteristics. A loss of virtually all old growth is projected in the lodgepole pine cover type.

HSS 4b and 4c are the most likely stands to manage as recruitment old growth; however, the mountain pine beetle epidemic will reduce HSS 4b and 4c to 11% of the forested acres across the forest. Even if all HSS 4B&4C was managed as recruitment old growth, it still would not meet the current standard for a minimum percent by mountain range.

Current natural ecological conditions may not provide for sustainability of ecological functions from the reduction of old growth due to mountain pine beetle epidemic.

Routt NF

Many of the provisions for sustainability of ecological functions of the forest were based upon the abundance of late successional forest prior to the mountain pine beetle epidemic. Since the mountain pine beetle epidemic altered the representation of late successional stands throughout the Routt NF, it is no longer possible to have confidence that the changed conditions will provide sustainability of pre-existing habitats.

Recommendations

- Continue to manage the forests per the current Forest Plan direction. Either the Forest Plan revision process or an intermediate assessment and amendment should be used to address changes to the current direction.
- As Districts analyze new projects they should look for opportunities to replace poor quality old growth stands with stands exhibiting better old growth characteristics.

Actions Taken on Recommendations Included in Past M&E Reports

- 2012 Recommendation: Evaluate specific forest direction (desired conditions, goals, objectives, standards and guidelines) related to old growth (Medicine Bow NF), and late successional forest (Routt NF). Management direction concerning management of old growth (Medicine Bow NF) and late successional (Routt NF), and identification and management of potential recruitment stands, would be beneficial to guide management of the two forests until the forest plans are revised in the future.
    - Action Taken: No formal evaluation of forest direction has occurred. It is recommended that the current forest direction continue to be followed until the Forest Plans are revised or until it is determined that an assessment and amendment are the best course of action. As Districts analyze new projects, they should look for opportunities to replace poor quality old growth stands with stands exhibiting better characteristics.

Threatened, Endangered, Sensitive Species and Management Indicator Species (MIS) Habitat and Populations

Medicine Bow Objective 1.b.5 | Frequency of Measurement: Annual
Routt Monitoring Item 1-12 | Reporting Period: Five Year

These monitoring items ask the questions:

What is the relationship between changes in habitat and population trends of MIS?

To what extent are listed species, sensitive species and species of local concern and MIS species habitat availability, habitat quality and populations maintaining stable or positive trends?

Canada Lynx

Monitoring Protocol/Data Collected

In November 2008, the Southern Rockies Lynx Amendment (SRLA) Final Environmental Impact Statement and Record of Decision amended seven Land and Resource Management Plans (forest plans) in Colorado and southern Wyoming. This amendment provides the management direction for lynx conservation while preserving multiple-use direction in existing forest plans. The MBR follows direction set forth in the SRLA.

Results/Evaluation

The SRLA and the Biological Opinion on the SRLA directs the Forest Service and US Fish and Wildlife Service (USFWS) to jointly update lynx habitat maps. The original SRLA Biological Opinion identified 1,192,466 acres of total lynx habitat. The MBR remapped lynx habitat in 2011, identifying an additional 10,150 acres of lynx habitat for a total of 1,202,616 acres.

Areas of suitable and unsuitable habitat are ground verified for vegetation projects proposed in lynx habitat. Information on habitat collected through field visits are compared to the lynx map. Adjustments are made according to ground verification results. Proposed vegetation projects are tracked to ensure treated acres within lynx habitat are within SRLA standards and guidelines.

Snow compaction studies are being conducted on the MBR. The studies look at snowmobile trails and ski trails to analyze effects of competing predators accessing lynx habitat, thus competing with lynx for snowshoe hares. Results are forthcoming.

Conclusions

The MBR tracks and provides quarterly reports to the USFWS of projects within lynx habitat. Although the Forest documents activities, tracks acres modified through vegetation treatment projects, consults with USFWS, and monitors hare habitat within lynx analysis units, there is no information regarding lynx populations. Therefore, we cannot state if the population on the MBF is stable or increasing. However, CPW has confirmed presence of lynx on the Routt.

Recommendations

- Continue to verify suitable and unsuitable lynx habitat.

- Continue to conduct snow compaction analysis and monitor recreational active use within Lynx Analysis Units (LAUs).
- Continue to monitor snowshoe hare horizontal cover in LAUs.

Actions Taken on Recommendations Included in Past M&E Reports

- 2012 Recommendations: Continue to verify suitable and unsuitable lynx habitat; continue to monitor snowshoe hare horizontal cover in LAUs.
    - Actions Taken: The MBR continues to map and verify suitable and unsuitable lynx habitat including monitoring snowshoe hare horizontal cover in LAUs.

Snowshoe Hare

Monitoring Protocol/Data Collected

The snowshoe hare is a MIS for the Medicine Bow NF. Selection of the snowshoe as an MIS addresses the management question of adequacy of habitat to support forest TES prey species (lynx, goshawk, and marten).

A monitoring protocol was developed in 2005. The protocol describes how to monitor hare populations based on establishing pellet plots in spruce, lodgepole, and aspen stands. Pellet counts provide an indication of snowshoe hare population trends, which may be tied to habitat quality. Analysis of trend is done every 5 years on the plot means. The first year's data (from un-cleared plots) is omitted from the trend analysis.

Results/Evaluation

Figure 12 displays monitoring results from 2006 to 2013.

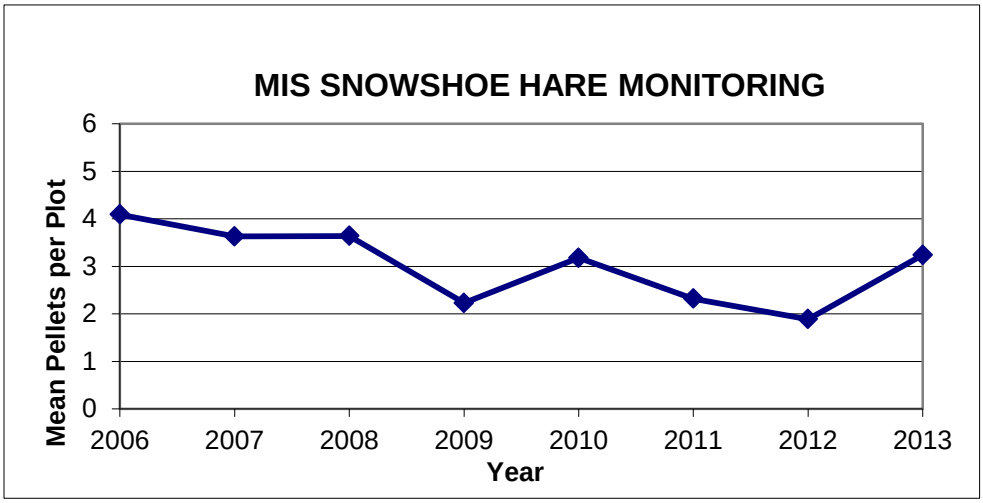

Figure 12. Snowshoe hare monitoring, mean pellets per plot.

Conclusion

More data are needed before a relationship between pellet counts, hare populations, and habitat quality can be made. Forest biologists speculate, however, that a change in habitat due to mountain pine beetle and spruce beetle may lead to a decline in snowshoe hare populations.

The Medicine Bow NF continues to monitor, refine plot selections, and validate if the snowshoe hare is an appropriate MIS. The hare may not be a good MIS due to the species' dramatic population fluctuation cycles every 8 to 11 years.

Recommendations

- Complete an annual snowshoe hare MIS report.
- Seek partnerships for cooperation in conducting monitoring with other agencies and with outside groups interested in the species.
- Assess whether continuing to monitor 2006–2007 sites (with a likely value of zero pellets for at least a decade) will meet the desired objectives of MIS monitoring.
- Assess whether the snowshoe hare is a good MIS to monitor.

Actions Taken on Recommendations Included in Past M&E Reports

- 2012 Recommendation: Seek partnerships for cooperation in conducting monitoring with other agencies and with outside groups interested in the species.
    - Action Taken: WYNDD will partner with the Medicine Bow Forest in 2014 to conduct snowshoe hare pellet plot inventories.

Northern Goshawk

Monitoring Protocol/Data Collected

The northern goshawk is a Region 2 Sensitive Species and MIS for the MBR. The goshawk serves to indicate the condition and biodiversity of late-seral lodgepole and aspen forests.

The established protocol to monitor this species is to survey known goshawk territories and determine occupancy and nesting activity within those territories. The protocol is designed to evaluate trends in territory occupancy. Results presented are not a formal statistical analysis of trends, but rather a basic summary of the data. The Routt NF has been using this protocol since 1991 and the Medicine Bow NF since 2004.

Results/Evaluation

Figure 13 is a graphical display of the average annual territory occupancy and activity level for the Routt NF. Years 1991–1992 were not representative of average territory occupancy or activity levels due to limited sample size, so the years were omitted. Results from 2013 on the Routt NF were not available at the time this monitoring report was drafted. Figure 14 is a display of data from the Medicine Bow NF for surveys conducted from 2004 to 2013. In order to better understand the graphs, "Occupancy" is defined as birds were observed, heard or sign located (e.g., feathers found), in the territory; however, nesting apparently did not occur. "Active" means the nest fledged at least one young.

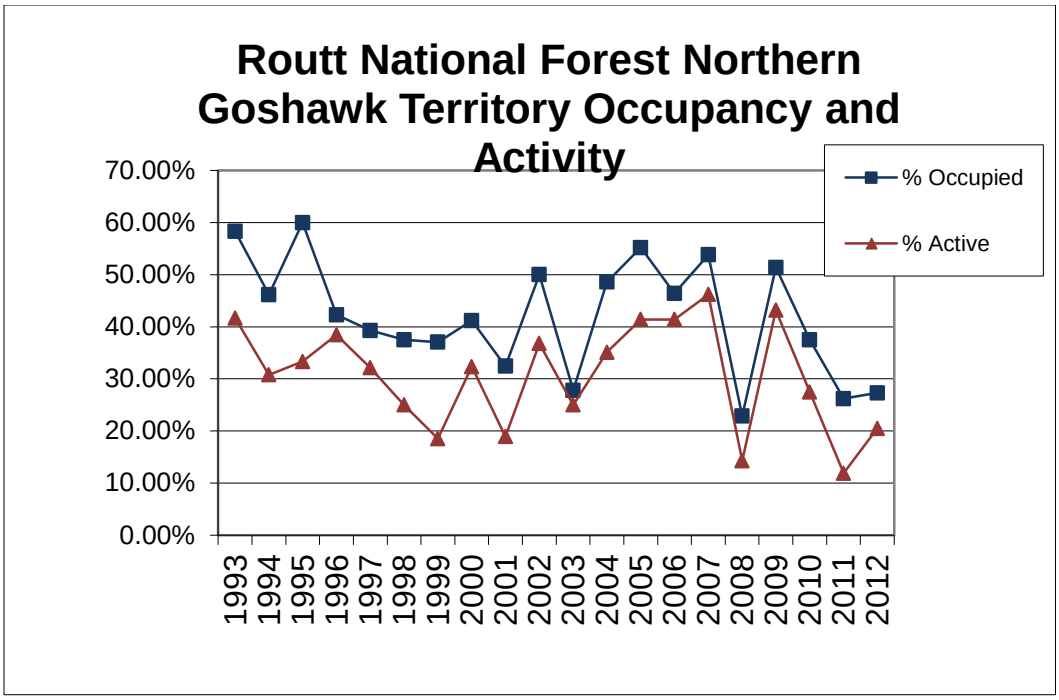

Figure 13. Routt National Forest average annual MIS goshawk territory occupancy and activity level from 2004 through 2012

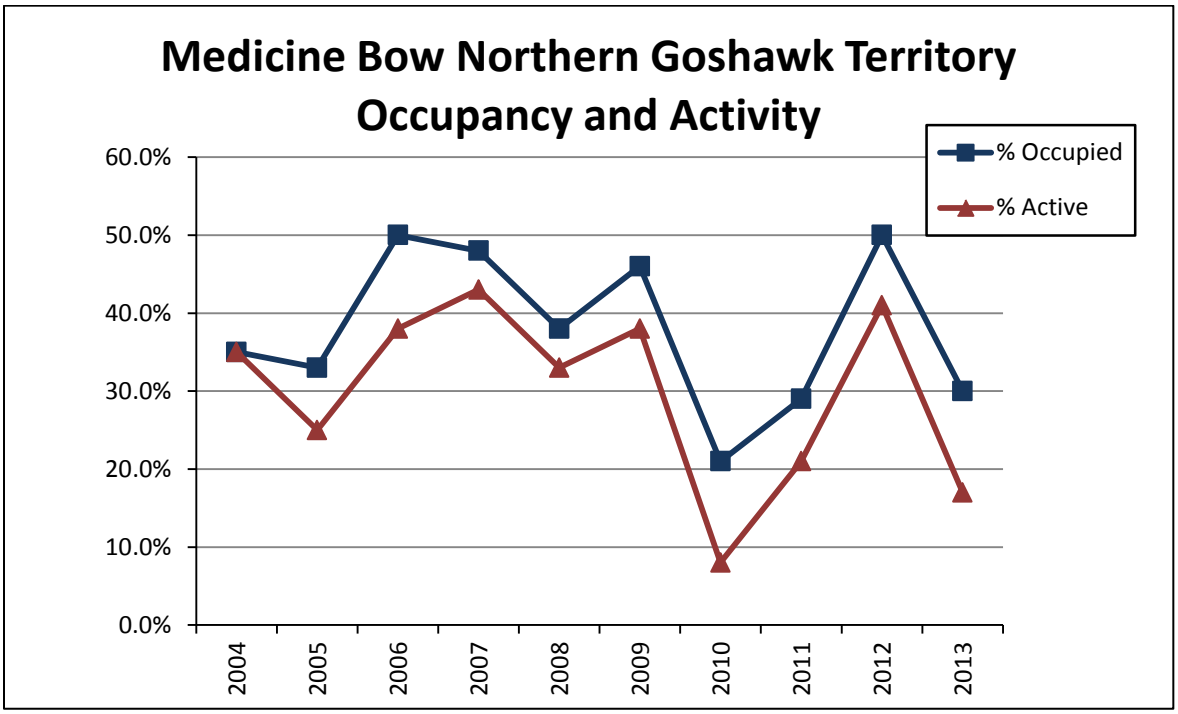

Figure 14. Medicine Bow Forest average annual MIS goshawk territory occupancy and activity level from 2004 through 2013.

In 2012, activity was up from 2011 on both forests, possibly due to a mild winter and spring. Occupancy was also up on the Medicine Bow but was about the same for the Routt between 2011 and 2012. In 2013 on the Medicine Bow Forest, declines were seen in both occupancy and activity.

Generally, monitoring indicated that since 2010, goshawk occupancy and activity was down from previous years on the Routt NF. On the Medicine Bow NF, occupancy and activity have increased since 2010. In 2012, occupancy was at 50%, well above the nine year average; and activity was at 33%, right around the nine year average. However, data from 2013 is 20% below the previous year occupancy rate and 22% below the previous year active rate.

Conclusion

Since 2010, goshawk occupancy and activity on the Routt NF, has generally been down from previous years. This may be due to the bark beetle epidemic on the Forest, causing massive die-off of lodgepole pine, an important element of northern goshawk habitat. As these trees die and start to fall, large forest openings are created. With less canopy as well as trees to nest in, perhaps some territories are being abandoned.

Occupancy/activity percentages have fluctuated considerably on the Medicine Bow NF over the last 10 years (Figure 14). This fluctuation could be due to numerous factors including, but not limited to: timber harvest activities, highly variable weather (drought, late spring snow conditions), the bark beetle epidemic (changes in prey availability), and demographics (reproduction, survival, immigration and emigration).

While late spring snow fall would seem to be a predictor of nesting activity, an investigation of the Divide Peak SNOTEL Site (Sierra Madres – 8,880 feet elevation), water equivalency records for April 28 (approximate average egg laying date for area goshawks) from 2004 through 2013, show variable results. Lower water equivalency records for 2004–2007 corresponds with higher occupancy, and higher water equivalency corresponds with lower occupancy in 2008, 2010, and 2011, but opposite results occur for 2009 (high water and high occupancy) and 2012 (no water and low occupancy) and the lowest occupancy occurred in 2013 with a moderate water equivalency. Without an in-depth research-level study, influences such as these are poorly understood.

Recommendations

- Continue to implement the northern goshawk territory (occupancy) monitoring protocol to strengthen trend analysis.
- Conduct a formal statistical evaluation of trends in territory occupancy with the help of a biometrician.
- Territory occupancy monitoring is valuable for clarifying fledging dates for goshawks. This will be important to validate/develop disturbance mitigation criteria.
- Long-term territory occupancy monitoring can clarify primary and secondary nesting habitat on the Forest.

Actions Taken on Recommendations Included in Past M&E Reports

- 2012 Recommendations: Continue to implement the northern goshawk territory (occupancy) monitoring protocol to strengthen trend analysis. Long-term territory occupancy monitoring can clarify primary and secondary nesting habitat on the MBR.
    - Actions Taken: The MBR continues to monitor for northern goshawk using the established protocol with the intent to strengthen trend analysis. Continued monitoring will also help to clarify primary and secondary nesting habitat, fledging dates, and validate disturbance mitigation criteria.

American Marten

Monitoring Protocol/Data Collected

The American martin is a Region 2 Sensitive Species and a MIS for the Medicine Bow NF. The Routt NF also conducts marten monitoring, although the species is not a MIS for the Forest. The marten is an indicator of intact mature spruce/fir and (to a lesser extent) lodgepole forest with complex structure.

Species monitoring has been accomplished through hair collection and DNA analysis to identify sex and individuals. There were 31 hair snare sets established on the Sierra Madre Range and 31 established on the Snowy Range. Hair collection occurred from 2004 to 2011 with 48 individual martens identified over these years. Initial results were promising for tracking population trend as 70 samples were collected in 2004.

Results/Evaluation

Results indicate that fewer marten hair samples were collected over time (Table 21).

Table 21. Marten MIS survey results on the Medicine Bow National Forest.

Year	Total Marten Samples	# New Individuals	# Previously Identified Individuals	# Poor DNA Samples[1]
2004	14	7	na	23
2005	31	15	3	7
2006	15	5	2	2
2007	21	9	5	4
2008	5	1	2	4
2009	4	2	1	3
2010	10	6	1	5
2011	5	3	0	3

Only five martens were detected in 2011. Additionally, a total of 51 samples were contaminated or not useful for DNA analysis to determine species. The lack of marten detections prompted the search for a revised sampling method.

During the 2011 field season, remote cameras were set up on four of the hair collection sites. Marten were recorded on cameras at two of the four hair collection sites, but these sites did not contribute hair samples for DNA analysis. This result confirmed the need for a re-evaluation of the marten monitoring program and prompted a subsequent recommendation to incorporate

remote cameras into the survey effort. In 2012, field trials were conducted to improve remote camera operation and animal detection on MBR. The field trials proved promising, so in 2013 cameras were installed throughout the forests. Data from the 2013 field season were still being processed and were not available at the time of this report.

Conclusion

Prior DNA analysis of marten hair analysis proved to be expensive and unreliable. It is difficult to answer the monitoring questions posed until a reliable protocol is developed and more data is collected.

Cameras are a viable method to monitor for multiple sensitive species including the American marten. Results from the 2012 field trials on the MBR are being analyzed and an evaluation of the protocol continued in 2013.

Recommendations

- Continue to build a database for the marten monitoring protocol.
- Continue to evaluate the remote camera protocol by monitoring marten populations in 2014.
- Produce an annual American marten report.
- Continue to develop partnerships to assist in the monitoring program.

Actions Taken on Recommendations Included in Past M&E Reports

- 2012 Recommendation: Finalized the photo monitoring protocol for American marten and continue to build a database.
    - Action Taken: The monitoring protocol for American marten was finalized and is being used to build a database.
- 2012 Recommendation: Continue to evaluate the remote camera protocol by monitoring marten populations in 2013.
    - Action Taken: The protocol was used in 2013 and results are still being evaluated to determine effectiveness of the protocol.
- 2012 Recommendation: Develop partnerships to assist in the monitoring program.
    - Action Taken: A partnership has been developed with WYNDD to monitor marten in 2014.

R2 Sensitive Amphibians

Monitoring Protocol/Data Collected

Visual, sinuous-transverse methods are used to observe and evaluate populations and habitats of R2 sensitive and other native amphibians. Surveys are conducted annually and habitat and population trend data are disclosed in the monitoring and evaluation report every 5 years. In 2011, the MBR, in partnership with WYNDD, the Wyoming Game and Fish Department (WGFD), CNHP, and CPW participated in an amphibian-monitoring protocol to improve the efficacy of

monitoring efforts in the Forest. Region 2 sensitive amphibians found on the MRB are the boreal toad (*Anaxyrus boreas boreas)*, northern leopard frog *(Lithobates pipiens)*, and wood frog *(Lithobates sylvatica).*

WNDD and CNHP proposed implementing a long-term (3 + years), amphibian-monitoring protocol on the MBR based on occupancy-trend data collection and analysis. The pilot study was implemented in 2011, and results led to the implementation of the refined protocol in 2012 and 2013. Visual-observation surveys were conducted at 36 sites, twice per field season. Two independent observers visited each site to search for amphibians and recorded species and age-class category (e.g., adult) in addition to environmental-condition indicators. Results from 2012 are shown in Table 22.

Because of the distribution of chytrid fungus on the MBR, annual sampling to detect the spread of chytrid fungus will continue. Tissue (skin or toenail) samples and skin swabs are submitted to a genetics laboratory (Pisces Molecular, LLC) for analysis.

Chytrid fungus (*Batrachochytrium dendrobatidis*) is a deadly amphibian pathogen, and it appears to persist in some amphibian habitats on the Forest. In FY07, nine tissue samples were submitted to Pisces Molecular LLC for polymerase chain reaction assay to test for the presence of chytrid fungus. One sample, collected in the vicinity of Commissary Park (Sierra Madre, west of the Continental Divide) tested positive. Additional chytrid fungus samples were collected between 2009 and 2013. Essentially all of the amphibian-tissue samples collected in 2011–2013 tested positive for chytrid fungus.

Results/Evaluation

Medicine Bow NF: Table 23 clearly indicates the disparities in observed relative abundance among the three R2 sensitive amphibians existing in the Medicine Bow NF. Wood frogs have been the most commonly observed sensitive amphibians in the Medicine Bow Mountains between 2009 and 2013. The Medicine Bow Mountains contain abundant kettle ponds which, among the habitat types that support wood frogs, appear to be preferred and productive habitat. Both the northern leopard frog and the boreal toad have experienced population declines in the Medicine Bows, although the northern leopard frog is much more abundant in the Laramie Range and in the Thunder Basin National Grassland.

Although boreal toad populations (abundance and distribution) have experience substantial declines forest-wide and the decline in active-breeding sites has been precipitous during the past three decades or so, a few new toad observations occurred during the 2009–2013 period. WYNDD implemented a habitat-sampling protocol that located two ponds that appear to support boreal toads, though few in number. Unfortunately, only one known boreal-toad breeding site has been active during the past 5 years.

Generally, northern leopard frog and wood frog populations appear to be naturally-reproducing and self-sustaining in the Medicine Bow NF. By inference, amphibian habitats appear to be both abundant and suitable to sustaining boreal chorus frog, leopard frog, and wood frog populations. Alternatively, the reasons for boreal toad population declines are ecologically complex and not well understood, excepting declines associated with chytrid fungus infestations. Thirty years ago, boreal toads were commonly found with other Forest amphibians, such as boreal chorus frogs and wood frogs. The presence and persistence of chytrid fungus in some Forest amphibian habitats likely plays a role in overall boreal toad declines.

Table 22. **Results from the 2012 amphibian survey conducted in the Medicine Bow National Forest.**

Amphibian Common Name	Occurrence Probability	Detection Probability
Boreal chorus frog	0.75	-
Boreal toad	0.07	-
Northern Leopard frog	0.13	0.30
Tiger salamander	0.07	0.11
Wood frog	0.26	0.10

Table 23. R2 Sensitive amphibians observed (estimates) in the Medicine Bow National Forest, 2009–2013.

Mountain Range	Species Observed	Total Numbers Observed	Embryonic/Juvenile Life Stages Observed
Laramie	Northern Leopard frog	>100	yes
Medicine Bow	Wood Frog	>100	yes
Medicine Bow	Western Boreal Toad	>5	yes

Routt NF: There are five known boreal toad breeding sites existing in the Routt NF, four of which are monitored annually in cooperation with Forest Service terrestrial wildlife crews and CPW: Elkhead Creek, Buck Mountain, North Fork Morrison Creek, Spike Lake, and Muddy Pass. Diamond Park is another known boreal toad breeding site, but this site is located on a private inholding in the Forest. This site was monitored twice during 2009–2013 and appears to support several age classes of boreal toads and, by inference, successful reproduction. Reproduction was documented each year during 2009–2013 at the Elkhead Creek, Buck Mountain, and North Fork Morrison Creek sites; the Muddy Pass site exhibited reproduction 4 years out of 5. The Spike Lake breeding site was monitored twice during 2009–2013; adult toads were observed during both monitoring efforts, but reproduction was observed only once at this site. Finally, a new boreal toad breeding site was found near Silver Creek, in the Parks Ranger District.

Table 24. Results from the 2012 amphibian survey conducted in the Routt National Forest.

Amphibian Common Name	Occurrence Probability	Detection Probability
Boreal chorus frog	0.56	0.92
Boreal toad	-	-
Northern Leopard frog	0.30	0.19
Tiger salamander	0.11	0.80
Wood frog	0.10	0.63

Table 25. **R2 Sensitive amphibians observed in the Routt National Forest, 2009–2013**.

Mountain Range	Species Observed	Total Numbers Observed	Embryonic/Juvenile Life Stages Observed
Elkhead, Gore, Park	Boreal Toad	<50	5
Park and Gore	Northern Leopard Frog	>50	201
Park	Wood Frog	>100	446

Table 26. Boreal toad breeding sites monitored in the Routt National Forest, 2009–2013.

Site	Adults Observed Every Year	Juveniles Observed	Metamorphs Observed	Embryonic/Larval Forms Observed
Buck Mountain	yes			yes
Diamond Park	yes	yes	yes	yes
Elkhead Creek	yes			yes
Muddy Pass	yes			4 of 5 years
North Fork Morrison Creek	yes			yes
Silver Creek	Yes; new site			once
Spike Lake	Yes – 2 years			once

Table 25 indicates a pattern of amphibian abundance and distribution in the Routt NF similar to that observed on the Medicine Bow NF. By far, wood frogs have been the most abundant R2 sensitive amphibian observed in the Parks Ranger District during the past 5 years; the Parks Ranger District is the only district in the Routt NF where wood frogs are found. The Parks Ranger District has abundant kettle-pond habitat located in the southern terminus of the Medicine Bow Mountains and in the Parks Range (includes the Mount Zirkel wilderness area). Interestingly, the Parks Ranger District has an abundance of northern leopard frog observations; northern leopard frogs are the most abundant R2 sensitive amphibian found on the Routt NF.

Table 26 indicates that there are many more known active and intermittent boreal-toad breeding sites in the Routt NF than in the Medicine Bow NF. Two breeding sites, Buck Mountain and North Fork Morrison Creek, have been exceptionally productive sites during the past 5 years. Three other active-breeding sites on the Routt NF have been productive to some degree between 2009 and 2013.

Conclusion

Among the three R2 sensitive amphibians existing in the Medicine Bow NF, the wood frog appears to be the most abundant species in the Medicine Bow Mountains. Northern leopard frogs are faring well in the Laramie Range, but this species is much less abundant in the Medicine Bow Mountains and in the Sierra Madre. Boreal toad numbers and active breeding sites are in precipitous decline Forest-wide and this trend is likely to persist.

With the exception of boreal toads, Routt NF amphibian populations and habitats appear to be abundant and well distributed. Amphibians are breeding and surviving in most of the riparian and wetland habitats extant in the Routt NF, especially in kettle-pond habitats in the Parks Ranger District. Boreal toad reproduction, survival, and recruitment rates appear to be relatively low in most of the active breeding sites based on survey results, although the average, annual rates are unknown. Low observations of egg masses, and in some cases tadpoles, are likely due to the timing of field surveys. Interestingly, boreal toad breeding activity appears to me much greater in the Routt NF than in the Medicine Bow NF.

Recommendations

- Continue to conduct annual amphibian monitoring surveys in cooperation with internal and external partners collect data about species abundance, distribution, population structure, and reproduction, especially for R2 sensitive species. In addition, continue to monitor active boreal toad breeding sites for signs of successful reproduction and to

search for additional breeding sites. Periodic sampling for chytrid fungus is necessary to monitor for the prevalence of this pathogen among amphibian populations. Finally, breeding sites that have been inactive for many years should be periodically monitored for signs of resumed breeding.

Lineage Greenback Cutthroat Trout, Colorado River Cutthroat Trout, and Brook Trout

Monitoring Protocol/Data Collected

Three-pass depletion electrofishing techniques were used to estimate population abundance (number of trout per mile) for lineage greenback cutthroat trout, brook trout, and Colorado River cutthroat trout (CRCT) on the Routt NF and MIS trout (brook trout, brown trout, and rainbow trout) on the Medicine Bow NF. Data collected include: species identification, weights (grams), and total lengths (millimeters).

In addition, the movements of rainbow trout stocked by Three Forks Ranch in the North Fork Little Snake River, downstream of the natural waterfall are monitored. Electrofishing upstream of the natural waterfall is used to locate and remove rainbow trout and cuttbows (hybrids) that may remain in the North Fork Little Snake River.

Results/Evaluation

Routt NF: Because the aquatic MIS monitoring data set (e.g., repeat population samples) collected during 2009–2013 on the Routt NF is relatively small, no reliable population-trend analyses can be inferred from these data. The data do, however, show the relative differences in the repeat-population sampling efforts from 2009–2013 (Figures 15 and 16). Unfortunately, it is not yet clear to what cause or causes one can attribute these differences. Examples of some likely causes for the differences observed are as follows: differences in electrofishing efficiencies between sample years; differences in sampling dates, though relatively small; differences in environmental conditions between sample years (e.g., water temperatures); and natural variation in trout distribution within sample reaches between sample years.

Cursory efforts have been implemented to monitor the three populations of lineage greenback cutthroat trout extant on the Routt NF; these three populations were once considered to be CRCT, but genetic analyses suggest that they may be greenbacks (stream names not disclosed). The three populations in question appear to be naturally-reproducing and self-sustaining.

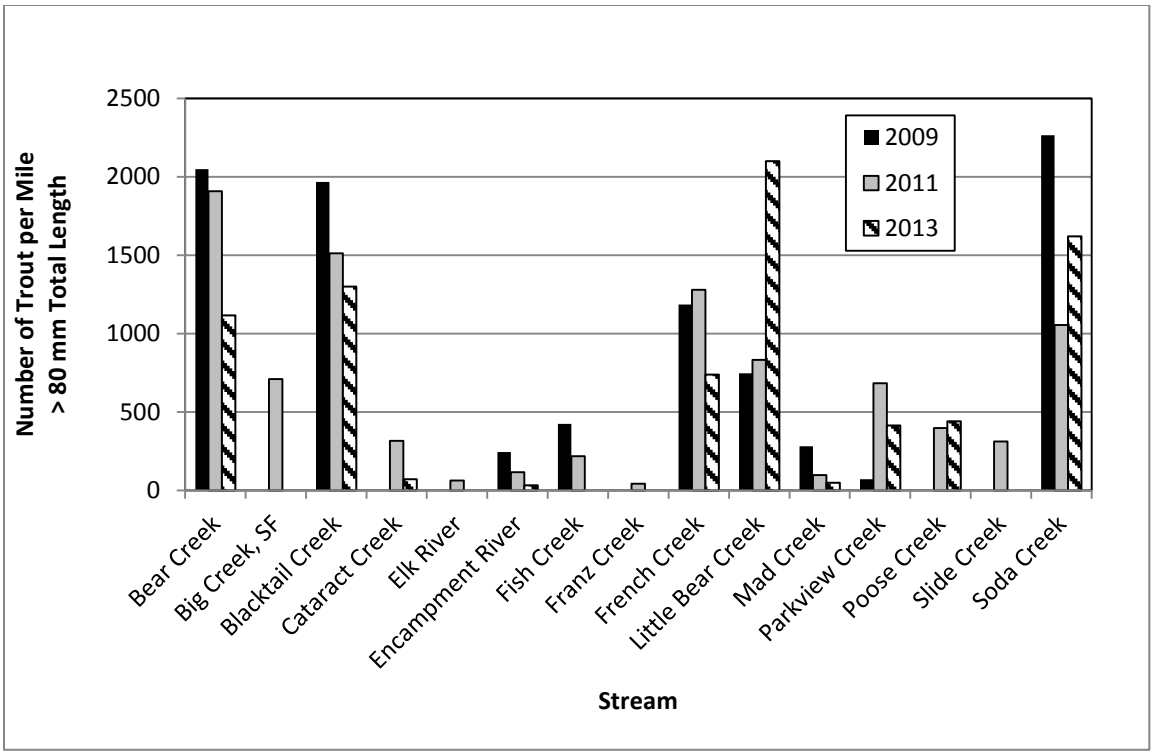

Figure 15. Trout per mile in sampled streatms of the Routt National Forest, 2009, 2011, and 2013.

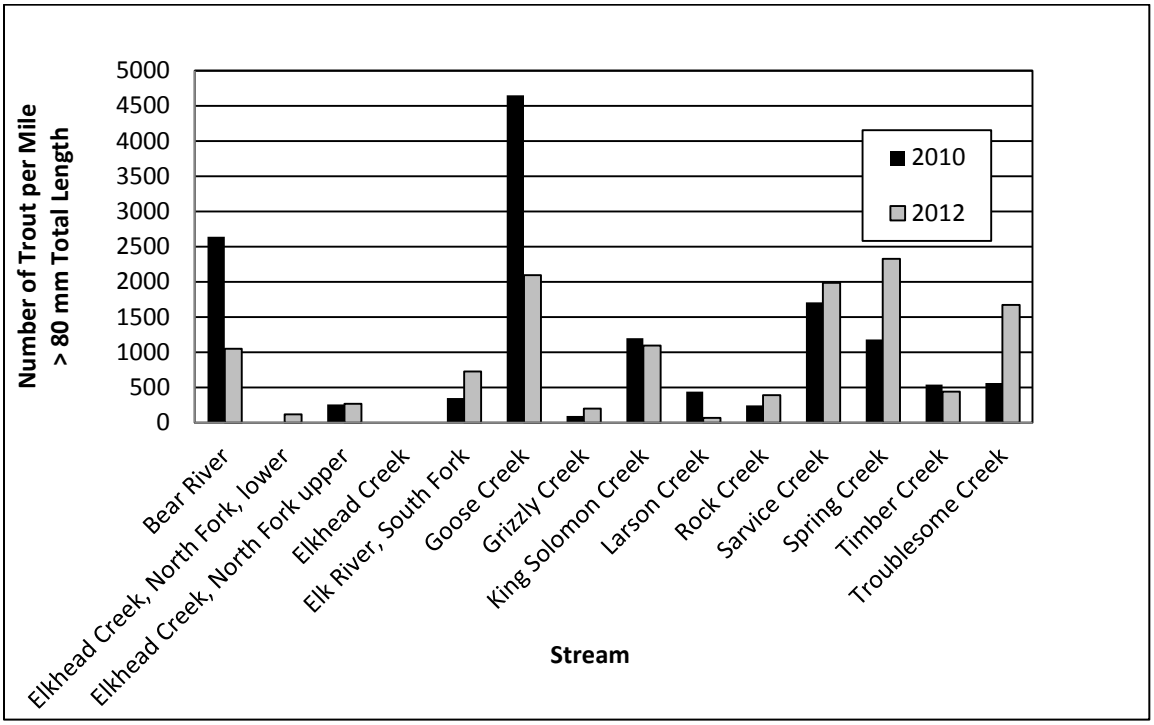

Figure 16. Trout per mile in sampled streatms of the Routt National Forest, 2010 and 2012.

Medicine Bow NF: The results of the MIS monitoring on the Medicine Bow NF during 2010–2013 (Figures 17 and 18) are similar to those observed on the Routt NF. Results suggest that trout populations observed in the sample reaches are naturally-reproducing and self-sustaining, though there are clear differences in the abundance of trout based on the sample year. As for the Routt, Medicine Bow data are insufficient to identify a specific cause for the differences in abundance in some of the sample reaches.

Because only two repeat surveys were conducted to assess MIS trout populations in the Medicine Bow NF during 2009–2013, the associations between population trends and habitat conditions cannot yet be reasonably estimated. What can be demonstrated, however, is the geographical extent of the sampling efforts made during the past 5 years (Figures 17 and 18 and Table 35). During this reporting period, habitats in every mountain range in the Medicine Bow NF were sampled, primarily for MIS trout. CRCT habitats located in the Sierra Madre, west of the Continental Divide were sampled, but less extensively than those of MIS trout; CRCT habitats are less abundant and widely distributed than are habitats that support MIS trout. Most CRCT and MIS trout populations appear to be either in stable condition or are expanding. As of 2013, all of the CRCT and MIS trout populations appear to be naturally-reproducing and self-sustaining.

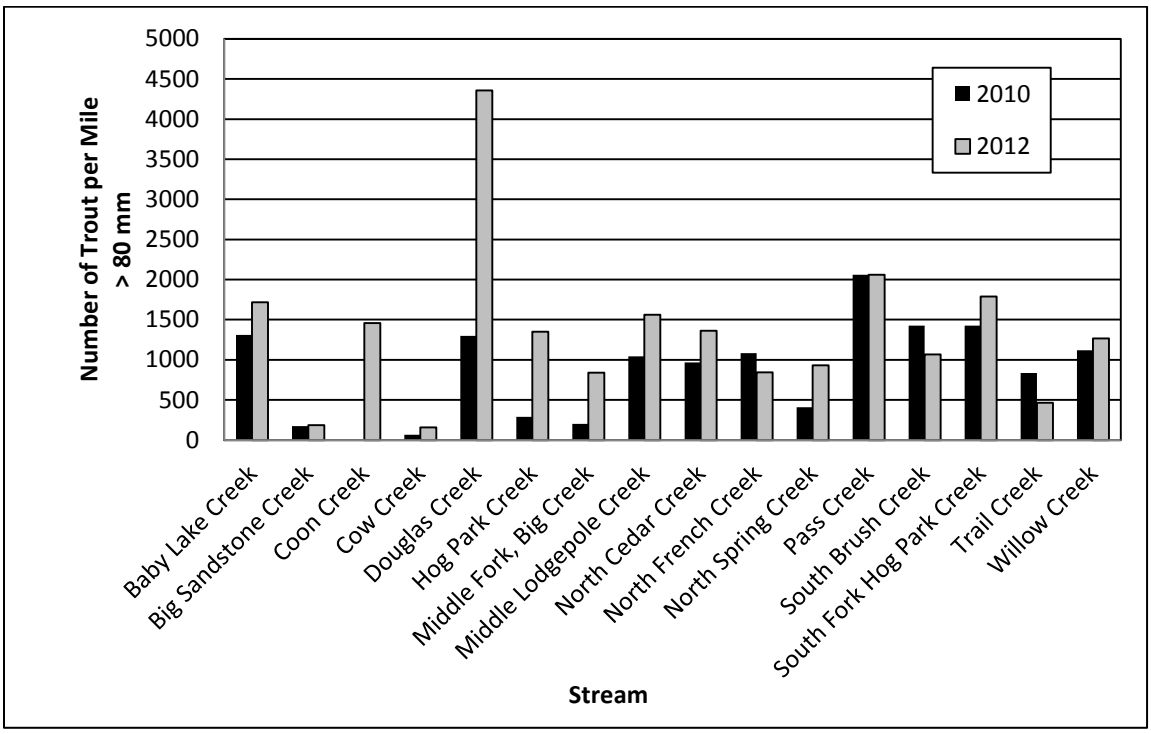

Figure 17. Trout per mile in sampled streams of the Medicine Bow National Forest, 2010 and 2012.

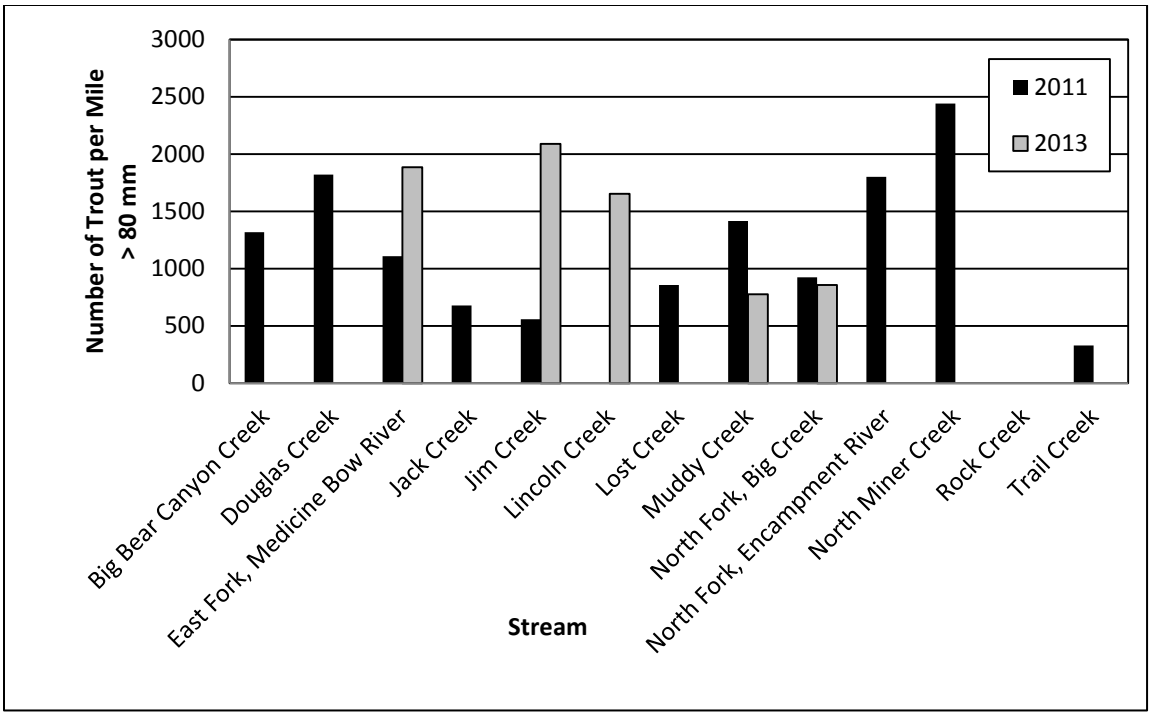

Figure 18. Trout per mile in sampled streams of the Medicine Bow National Forest, 2011 and 2013.

The MBR continues to comply with all of the requirements to consult with the USFWS when projects that could deplete water from the upper-Colorado/Yampa River basins and the Platte River basin (i.e., North Platte River sub basin) are proposed for implementation. Proposed projects that may indirectly affect the abundance, distribution, and quality of aquatic habitats for the federally-listed species listed in Table 27 will undergo consultation with the USFWS.

Table 27.Federally-listed fish in the Colorado River and Platte River basins.

Species	Scientific Name	River System	Federal Status
Bonytail	*Gila elegans*	Colorado	Endangered
Colorado Pikeminnow	*Ptychocheilus lucius*	Colorado	Endangered
Humpback Chub	*Gila cypha*	Colorado	Endangered
Pallid Sturgeon	*Scaphirhynchus albus*	Platte	Endangered
Razorback Sucker	*Xyrauchen texanus*	Colorado	Endangered
Lineage Greenback cutthroat trout	*Onchorynchus clarki stomias*	Colorado	Threatened

The federally-listed fish species in Table 27 are typically found scores of miles downstream from the Routt and Medicine Bow National Forest boundaries. However, some natural resource management projects that occur within the Forest could affect the timing and/or magnitude of streamflow for many miles downstream; water depletions have been found to adversely affect habitats and populations of these species in the Colorado River, Platte River, and Yampa River basins. In addition, between 2009 and 2013, as in years past, there has been a concerted effort by Forest personnel to process Ditch Bill easements pertinent to water-depletion facilities in the North Platte, Upper Colorado, and Yampa River basins.

Conclusion

Based on the results observed during the past 5 years of sampling, MIS trout and CRCT populations and habitats existing on the MBR appear, for the most part, to be in stable condition. Populations continue to appear to be naturally-reproducing and self-sustaining. CRCT habitats and populations continue to be at risk of degradation and extirpation due to multiple-use activities on public lands and development on private lands; water developments are especially problematic. It is essential to preserve the viability of CRCT and MIS trout and essential that these populations and their associated habitats continue to be properly managed and monitored.

Recommendations

- Continue to implement the statistically-valid sampling protocol to build the available data pertinent to Forest-wide trout abundance, distribution, and demographics. Compete for adequate funding (~ $30K per year) to implement the protocol.
- Also, periodically conduct surveys to monitor habitats and populations of other R2 sensitive fishes extant or thought to be extant in the Forest such as the horneyhead chub.
- For FY14, continue to consult with the USFWS about the potential impacts of proposed projects that could deplete water from the Upper-Colorado, Yampa, and Platte River basins.

TES and MIS Plants

Monitoring Protocol/Data Collected

The botany program on the MBR predominately functions as project support. Botany personnel are primarily funded with project monies, and therefore have little time or programmatic botany funds to allocate towards monitoring rare plants and habitats. Rare plant monitoring data was not collected in sufficient quantity from 2009 to 2013 to analytically address the questions posed in this monitoring item. Of the nearly 2,200 rare plant occurrence sites known on the MBR, only about 40 have been ever been revisited and less than 20 of these have been revisited in the last 5 years. Many sites do not have sufficient population data from which to infer trends for the populations. Most revisits occur opportunistically when projects occur in the vicinity of documented populations.

Results/Evaluation

The quality and quantity of field data needed to address questions regarding sensitive and local concern plant habitat availability, habitat quality, or population trends is unavailable at this time. The following summary is based on a total of 20 occurrences that have been revisited (usually only once) in the last 5 years.

- Over the past 5 years, some large populations of Rabbit Ears gilia (*Ipomopsis aggregata* var. *weberi*) on the Routt NF have declined significantly and are almost extinct. Causes of the decline are uncertain, but may be due to changes in habitat or climate. Monitoring that would help guide management is planned but currently unfunded.

- Four years ago, we began monitoring co-occurring populations of two Species of Local Concern (SOLC): western moonwort (*Botrychium hesperium*) and lance-leaved moonwort *(B. lanceolatum*) in the Jack Creek area (Routt NF). Because the populations were in proximity to hazard tree clearance work, a protective structure was installed. For the first 3 years, the populations appeared to be expanding, but between 2012 and 2013 the population count for western moonwort dropped by 47% and lanceleaf moonwort declined by 42%. It is unclear whether this is part of a normal fluctuation in the populations, or if it is a response to the dramatic change in the surrounding habitat.
- Three years ago we began monitoring a population of leathery grapefern (*B. multifidum*), an SOLC in the Newcomb Creek area (Routt NF). During this period, the population has increased from 3 individuals to 5.
- Clustered lady slipper orchid (*Cypripedium fasciculatum*) and white-veined wintergreen (*Pyrola picta*) are both SOLC. On the MBR they most commonly occur in lodgepole pine forests, which are declining. Populations of clustered lady slipper orchid do not show any clear trend. Some large populations are nearly extinct (1,000 individuals down to 7), while some small populations have doubled. Of the 3 white-veined wintergreen populations revisited, two appear to be extinct, but the third has more than doubled and had 15 plants in 2012.
- In 2006 a population of arctic raspberry (*Rubus arcticus ssp. acaulis),* and R2 sensitive species, was discovered on the Medicine Bow NF. At that time the population consisted of several small individuals. When revisited in 2013, this population had grown to cover a half acre in size and was producing fruit and flowers. In the near future the forest around this area will be thinned as part of the North WUI timber project. Additional monitoring will be needed to determine the effects of thinning on this population.
- The 2012 Squirrel Creek fire had negative effects on larchleaf penstemon (*Penstemon laricifolius var. exilifolius)* populations on Sheep Mountain. Due to the intensity of the fire, several populations were reduced in size while other areas of habitat are now threatened by post-fire cheatgrass (*Bromus tectorum)* invasion.

Additional information on the habitats of sensitive and local concern species is gathered from partners, through projects completed with grant monies, and by running GIS habitat models. For the previous 5-year monitoring report (2004–2008) the MBR created a habitat availability model that predicted changes in habitat types and availability for rare plants as a result of the ongoing, widespread lodgepole pine mortality caused by the mountain pine beetle. The model looked at late successional forests, sagebrush shrublands and meadows, and wetlands. The results of the model suggested rare plants associated with late successional forest would have decreased amounts of available habitat, rare plants associated with sagebrush shrublands and meadows would have increased habitat available, and rare plants associated with wetland and fen habitats would have various responses, due to site-specific changes in habitat availability.

In the 5 years since the creation of the model, no extensive quantitative data collection has occurred, but we have observed the decrease of late successional forests and, in years of average or high snow pack and/or precipitation, increased saturation of wetlands. To date we have yet to observe changes in the distribution or abundance of rare plants due to changes the in habitat availability predicted by the GIS model. As stated above, some forest dwelling populations have declined (potentially due to death of the canopy) but others have increased in number. Five years may not be adequate time to assess potential changes in species distribution

or abundance and the accuracy of the implications of the model. A more rigorous study may be warranted.

With the mountain pine beetle epidemic in decline and many lodgepole pine forests regenerating, it may be that model-predicted beneficial and adverse effects to rare plants may not be as significant as once thought. One important conclusion drawn in the 2004–2008 monitoring report is that late successional forests are likely to become rare and persistent forest habitats and may be important refugia for biodiversity. This conclusion is supported by current observations; late successional forests are now far less common and should be preserved for the important species they support.

The effects of snow compaction (from recreational activities) to sensitive habitats have been measured in several recent studies. Snow compaction across the forest was aerially mapped by WYNDD in 2007 and results were presented in the 2004–2008 monitoring report. This mapping project found that 1/3 of the MBR was has some level of snow compaction caused by anthropogenic activities, including 14,000 acres of riparian, wetland and fen habitats. In 2013, Gage and Cooper completed a study (Agreement No. 08-CS-11020603-032) on the Routt NF that evaluated the effects of snow compaction to fen wetlands and sub-nivean plant communities. They found no significant effects to fen soils, vegetation, or temperatures due to snow compaction activities ranging from cross-country skiing to snowmobiling and snow cat use in the study areas on Rabbit Ears pass and Buffalo pass. However, the study suggests the effects of snow compaction maybe be dependent on the depth of the snow pack and the frequency and intensity of compaction events. If average snow pack on the MBR were to decrease as a result of climate change or other factors, and/or recreational over-the-snow use increases in future years, adverse effects to sub-nivean plant communities and fen wetlands may begin to occur.

Annually, the MBR botany program conducts surveys for 25 to 40 projects forest-wide. Typically, annual surveys cover approximately 10,000 to 14,000 acres across six districts. Once located, rare plant species populations are protected from the effects of project activities (typically through avoidance) whenever possible. As part of project work, the MBR botany program also authors or reviews an average of 8 to 12 Biological Assessments/Biological Evaluations (BA/BEs) for Threatened or Endangered (T&E) and Region 2 Sensitive plant species per year. A majority of biological determinations for rare plants in these reports are *No impact* and *May adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing*.

Conclusions

Because rare plant monitoring data cannot be collected on a regular basis due to time and funding, and most revisits occur opportunistically when projects occur in the vicinity of documented populations, many sites do not have sufficient population data from which to infer trends for the populations.

Recommendations

- Continue to monitor known sensitive and local concern plant populations when possible, and remove selected species from the SOLC list as indicated and with documentation. Continue to pursue inventory and monitoring projects with grant monies and partnerships.

Fire Management Plans

Medicine Bow Item Objective 1.c.1 Frequency of Measurement: Annual
Reporting Period: Annual

This monitoring item asks the question:

Has the Forest developed a fire management plan, which allows for implementing wild land fire use plans to work towards desired conditions?

The MBR has updated the Fire Management Plan (FMP) to reflect the latest national policy. The FMP is updated on an annual basis. The term "wildland fire use" has been replaced by "managing for multiple objectives." The MBRTB FMP allows for management of lightning-caused fires solely for resource benefit objectives or a combination of objectives including full suppression. If the fire is human-caused, it will always be a full suppression fire regardless of location.

Monitoring Protocol/Data Collected

Annual fire statistics are reported in the Fire Stat database. The fire reports are divided by individual forests, thus there are separate reports for both the Medicine Bow and Routt NFs.

Results/Evaluation

The 2013 fire season was mild compared to 2012. There were only 48 wildfires accounting for 345.5 acres. The winter snowpack was adequate and above average monsoonal rains kept the fire activity at a minimal level. All but two fires were easily caught in the initial attack stage. Those two fires were managed as short-term type 3 incidents.

Recommendations

- Continue to evaluate each fire for the possibility of using strategies other than full suppression. Given the current mountain pine beetle situation, with thousands of acres in the red needle and gray stages of the epidemic, it becomes very challenging for fire managers and line officers to select strategies other than full suppression, especially during times of high fire danger. However, if weather conditions become hot and dry for extended periods of time, and we have multiple ignitions, the odds increase for multiple large extended attack fires and there will logically be a need to focus on point protection and let fires follow more of a natural course. Logically, as the forest continues to evolve after the bark beetle epidemic, the dead trees will eventually start to fall, hang up and eventually drop to the ground. At the same time, the accumulation of dead fuels will become intermixed with the rapidly growing new trees and the arrangement of fuels will lead to an infinite variety of fire behavior scenarios.

Fuels Treatments

Medicine Bow Item Objective 1.c.2

Frequency of Measurement: Annual
Reporting Period: Annual

This monitoring item asks the question:

How many acres in high hazard/high risk and residential interface areas were treated with mechanical treatments or prescribed fire in an effort to move affected landscapes toward their desired vegetation composition and structure as described in the Geographic Area direction?

Monitoring Protocol/Data Collected

Annual accomplishment reports can be generated, listing acres treated by wildland-urban interface (WUI) vs. non-WUI, and mechanical vs. prescribed fire. These reports can be found in the Forest Service Activity Tracking System (FACTS) database, reference Key Points 3 and 6.

Results/Evaluation

The Forest continues to focus efforts at reducing hazardous fuels in the WUI. WUI includes communities within or adjacent to the forest, remote structures, power lines, roads, administrative sites and resorts. Efforts include mechanical treatments, and prescribed fire and managing large fires for multiple resource benefits.

Table 28. Fuels treatments on the Medicine Bow–Routt NFs, 2004–2013.

Treatment Type	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Mechanical Treatments										
WUI	4,818	346	1,429	1,290	3,036	3,550	2,175	3,099	3,861.5	4,757
Non-WUI	115	409	592	452	1,214	552	6,065	1,020.9	105	200
Mechanical Treatment Total	4,933	755	2,021	1,742	4,250	4102	8,240	4,069.9	3,906.5	4,957
Prescribed Fire										
WUI	1,097	3,586	1,563	200	289	205	71	200	151	1,830
Non-WUI	2,310	1,780	3,070	1,861	1,535	2,000	2,719	5,937.8	4,122.3	105
Prescribed Fire Total	3,407	5,366	4,633	2,461	1,824	2,205	2,750	6,137.8	4,273.3	764
Treatment Total	8,340	6,121	6,654	4,303	6,074	6,307	10,990	10,207.7	8,179.8	6,892

Insects and Disease

Medicine Bow Item Objective: 1.c.3
Routt Monitoring Item: 1-4

Frequency of Measurement: Annual
Reporting Period: Five Years

This monitoring item asks the question:

Are insect and disease populations compatible with attainment of management area desired conditions and themes?

Monitoring Protocol/Data Collected

Aerial surveys conducted over the MBR since 1998 provide a broad indication of tree mortality resulting from forest insects and disease. More information and products from the R2 Forest Health Monitoring Program can be found on the following website: http://www.fe.fed.us/r2/fhm/.

Results/Evaluation

The bark beetle epidemic is on the decline on the MBR. The mountain pine beetle peaked in 2008 on both forests and the spruce beetle peaked on the Routt NF in 2003 and on the Medicine Bow NF in 2011. Tables 29 and 30 show the progression of bark beetle activity on the forests through 2012.

Table 29. Acres impacted by the mountain pine beetle.

Year	Gross Acres Impacted by Mtn Pine Beetle, Medicine Bow NF	Gross Acres Impacted by Mtn Pine Beetle, Routt NF	Gross Acres Impacted by Mtn Pine Beetle, Total on Both Forests
1998	136	2,109	2,245
1999	1,423	5,158	6,581
2000	818	8,216	9,034
2001	5,726	17,342	23,068
2002	10,222	22,916	33,138
2003	10,952	53,628	64,580
2004	23,271	140,413	163,684
2005	39,543	137,291	176,834
2006	75,456	228,500	303,956
2007	178,216	349,758	527,974
2008	347,745	433,034	780,779
2009	314,413	149,884	464,297
2010	300,057	65,167	365,224
2011	312,337	8,341	320,678
2012	12,610	660	13,270

Table 30. Acres impacted by the spruce beetle.

Year	Gross Acres Impacted by Spruce Beetle, Medicine Bow NF	Gross Acres Impacted by Spruce Beetle, Routt NF	Gross Acres Impacted by Spruce Beetle, Total on Both Forests
1998	0	47	47
1999	0	24	24
2000	0	60	60
2001	86	4,035	4,121
2002	795	48,946	49,741
2003	864	70,093	70,957
2004	1,351	52,426	53,777
2005	3,488	10,952	14,440
2006	37,212	14,135	51,347
2007	18,622	19,641	38,263
2008	4,064	2,672	6,736
2009	9,682	5,877	15,559
2010	15,877	6,750	22,637
2011	40,720	13,536	54,256
2012	8,746	9,957	18,703

On the MBR in 2013, the Forest Service applied direct control (spraying) to protect select trees from mountain pine beetle and spruce beetle on 233 acres (five campgrounds and six administrative sites) and sold 17 timber sales that will treat 4,337 acres affected by bark beetle.

Subalpine fir decline, caused by a combination of western balsam bark beetle and various root disease pathogens, is still causing mortality in subalpine fir stands. In 2012 the Routt NF had approximately 13,812 acres affected by subalpine fir decline, and the Medicine Bow NF had approximately 2,130 acres diagnosed with subalpine fir decline. Generally subalpine fir decline causes smaller amounts of mortality in stands as compared to that of the bark beetle epidemics.

White pine blister rust, a canker causing disease that is spread by a non-native fungus (*Cronartium ribicola*), is affecting limber pine stands across the MBR. The primary infection area is the Pole Mountain area of the Medicine Bow NF. In 2012, the Routt NF survey showed 0 acres infected, while the Medicine Bow NF had 1,076 acres affected. Currently, the MBR is working cooperatively with the Rocky Mountain Research Station, Region 2 Forest Health Management, and Colorado State University (CSU) to locate and develop genetically resistant strains of limber pine for future limber pine restoration. In 2013, the Southern Rockies Rust Resistance Trial test site was established at the Pole Mountain Work Center. This is a multi-year project to increase White Pine Blister Rust resistance within five-needle pines.

Another mortality-causing disease is sudden aspen decline (SAD) in quacking aspen. SAD is believed to be the result of the extended drought, and the large amount of aspen in mature age classes. SAD is currently on the decline, and in 2012 SAD had only affected approximately 19 acres on the Routt NF, and 0 acres on the Medicine Bow NF. SAD can be detected by declining vigor in aspen (reduced leaf coverage and pale green foliage). Currently there is nothing that can be done to prevent continued dieback and mortality of affected trees. Where clones still retain

some vigor and energy, but are deteriorating, regeneration may be stimulated by burning, cutting, or other stand manipulation before root systems are too weak to respond.

Conclusions

The bark beetle epidemic has run its course and is now on the decline on the MBR. Mortality is still occurring but to a much smaller extent than in the past few years. On the Routt NF, approximately 772,000 acres and on the Medicine Bow NF approximately 752,000 acres have suffered some degree of tree mortality as a result of the bark beetle infestation. Subalpine fir decline and SAD continue to occur but are minor in nature. White pine blister rust continues to spread southward across the forests and probably has the most potential to continue to infect trees on the forests. Five-needle pine populations are not widespread on the forests and therefore the impact of the disease on those populations could be significant.

Recommendations

- Continue to support the Southern Rockies Rust Resistance Trial project on Pole Mountain. Continue to do preventive spraying as necessary to protect high value trees in campgrounds and administrative sites. Begin to look at restoration of the forest now that the bark beetle epidemic is over.

Actions Taken on Recommendations Included in Past M&E Reports

- 2008 Recommendation: "When recommending vegetative treatments in moderate to high risk stands for beetle infestation, the forest manager should anticipate extensive mortality and strongly consider salvage treatment and reforestation of the affected stands."
    - Action Taken: All timber sale projects on the MBR are using an adaptive management approach with treatments designed to address the current and expected conditions in the stands to be treated. The main emphasis is public safety, fuels reduction, salvage of the timber and restoration of the site.

Invasive Species

Medicine Bow Item Objective 1.c.4

Frequency of Measurement: Annual
Reporting Period: Annual

This monitoring item asks the question:

To what extent have noxious weed populations been managed (Forest-wide and within wilderness)?

This monitoring item tracks the extent and treatment of invasive species.

Terrestrial

Monitoring Protocol/Data Collected

The MBR tracks acres treated chemically and with mechanical and manual treatments, including insect releases. Data come from the targets reported in the U.S. Forest Service FACTS database.

Results/Evaluation

In 2013, 66 acres of cheatgrass and musk thistle were treated in the 2012 Squirrel Creek burn area on the Laramie Ranger District with Burned Area Emergency Rehabilitation funds. Only 46 acres of cheatgrass, houndstongue, and Canada thistle were treated in the burned areas on Laramie Peak from the three large fires in 2012; weed spread was less than anticipated, but other high priority work reduced funding available to treat additional acres.

The Yampa weed spraying contract was cancelled in 2013 due to inadequate funding, so no acres of yellow toadflax were treated in the Flattops Wilderness on the Routt NF. Approximately 30 acres of musk thistle, yellow toadflax, and Canada thistle were treated within the Platte River and Savage Run Wilderness Areas on the Medicine Bow NF.

Table 31. Invasive weed treatment on the MBR, 2010 to 2013.

Year	Medicine Bow NF Acres Treated	Routt NF Acres Treated	Total MBR Acres Treated
Forest Plan Acres to be Treated Each Year	850	385	1235
2010	892	1662	2554
2011	809	704	1513
2012	592	508	1100
2013	668	568	1236

Funding available for treatment of noxious weeds has been substantially reduced for the last 6 years in a row; re-delegation of appropriated funds at the Regional level to cope with the bark beetle infestation and stewardship contracting has severely depleted rangeland vegetation dollars. However, weed populations are increasing in roadside and timbered areas affected by those same bark beetle infestations.

Only a percentage of all noxious weed species are treated each year due to funding levels. A large increase in funding would be required in order to treat all noxious weed acres on the MBR.

Recommendations

- Continue to report acres of noxious weeds treated each year, along with reasons for annual fluctuations in amounts and species of weeds treated.

Aquatic

Monitoring Protocol/Data Collected

In 2007, the Medicine Bow NF confirmed the presence of Didymo (*Didymosphenia geminata)* on the Forest. Didymo, also known as “rock sludge,” is a diatom that can alter stream ecology by forming dense algal mats on stream bottoms. Didymo is considered by many investigators to be a native species, but it may become a nuisance to other aquatic organisms under favorable environmental conditions. The first observation of this diatom was made near the confluence of the Encampment River and Purgatory Gulch (Sierra Madre, east of the Continental Divide). No formal surveys have been conducted within the past 5 years to monitor for aquatic-nuisance species.

Results/Evaluation

Didymo has been observed in Hog Park Creek, downstream from the Hog Park Reservoir dam. Another occurrence of Didymo was found in Douglas Creek (Medicine Bow Mountains). The initial sample collected in the Encampment River was identified as Didymo by WGFD, Fish Pathology Laboratory, at the University of Wyoming.

The Medicine Bow NF has created and disseminated aquatic-nuisance species posters to inform Forest employees and the public about how to recognize and prevent the spread of these species in aquatic ecosystems.

Recommendations

- As budget allows, monitor for Didymo and other aquatic-nuisance species such as the New Zealand mud snail and the quagga mussel that may be introduced into the MBR.
- Begin to monitor for the presence of aquatic-nuisance species on the Routt NF. Begin public- outreach efforts to educate Routt NF employees and the public about issues related to the introduction and environmental impacts of these species.

Landscape Pattern

Medicine Bow Item Objective: Subgoal 1c 36 CFR 219.12(k)(iii)
Routt Monitoring Item: 1-5 Reporting Period: 5-year

This monitoring item asks the question:

How is harvest unit size affecting landscape patterns across the forest?

Monitoring Protocol/Data Collected

The National Forest Management Act specifies that:

> *"In developing, maintaining, and revising plans for units of the National Forest System pursuant to this section, the Secretary shall assure that such plans-*
>
> *(2) Specify guidelines which-*
>
> *(iv) are established according to geographic areas, forest types, or other suitable classifications the maximum size limits for areas to be cut in one harvest operation, including provision to exceed the established limits after appropriate public notice and review by the responsible Forest Service officer one level above the Forest Service officer who normally would approve the harvest proposal: Provided, that such limits shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm."*

The Medicine Bow Forest Plan identified the following desired conditions:

> *"Created openings vary in size from less than 40 acres to hundreds of acres in size, or are staged to create larger patterns that would simulate natural landscape patterns caused by windthrows, insects and disease, and wildfires over time. On 26% of the Forest (MA 5.15), the emphasis of harvest activities is to emulate the patterns, structures, and function of natural processes*."

Both the Medicine Bow and Routt Forest Plans state that 40 acres is the maximum harvest unit size with the following exceptions:

- Proposals for larger openings approved by the Regional Forester after a 60 day public review.
- Where larger openings are the result of natural catastrophic conditions of fire, insect or disease attack, or windstorm.
- Where the area that is cut does not meet the definition of created openings.[5]

Results/Evaluation

In 2013, created openings on the Medicine Bow and Routt NF varied in size from 0.1 – 119 acres; average unit size was 12.4 acres and the combined total was 1,028 acres. From 2003 to 2013, openings created through harvest on the Medicine Bow NF varied from 0.1 acres to 201 acres (Table 32). The average size of the created openings from 2003 to 2013 for the Medicine Bow NF was 7 acres. From 1998 to 2013, openings created through harvest on the Routt NF varied in size from 0.1 acre to 295 acres (Table 33). The average size of created openings from 1998 to 2013 on the Routt NF was 10 acres.

The numbers in Tables 32 and 33 are from GIS (as opposed to the FACTS attribute database. Created openings were dissolved by forest and calendar year completed before the statistics were calculated. This results in larger overall polygon size if two or more created openings from the same forest and year were touching each other, and results in small overall polygon size if multi-part polygons existed and were exploded out to individual pieces during the dissolve process. An example of the latter would be roadside hazard tree clearing, where all the small polygons scattered along a road side are 'lumped' into one multi-part unit in GIS and reported as one summed figure in the FACTS database.

Table 32. Created opening size for 2003–2013 for Medicine Bow National Forest.

Year	No. of Units	Minimum Size (Acres)	Maximum Size (Acres)	Average Size (Acres)	Total (Acres)
2003	9	2	55	20	176
2004	9	6	55	23	209
2005	10	6	58	23	228
2006	15	4	58	22	325
2007	2	8	74	41	82
2008	32	1	40	14	442
2009	36	1	201	20	703
2010	169	0.1	52	4	645
2011	216	0.1	83	5	1,139
2012	243	0.1	79	4	915

[5] Not all harvest types are considered to create openings. The Medicine Bow Forest Plan has the following definition of a created opening: A treated forest area with 10 basal area or less. The Routt Forest Plan did not specifically define a created opening. R2 supplement to FSM 2470 indicates that openings are created through the use of even-aged regeneration harvest methods.

Year	No. of Units	Minimum Size (Acres)	Maximum Size (Acres)	Average Size (Acres)	Total (Acres)
2013	54	0.1	119	12	633
Totals	**795**			**7**	**5,496**

Table 33. Created opening size for 1998-2013 for Routt National Forest.

Year	No. of Units	Minimum Size (Acres)	Maximum Size (Acres)	Average Size (Acres)	Total (Acres)
1998	27	2	40	15	417
1999	25	2	74	17	418
2000	32	0.1	145	20	638
2001	29	3	283	35	1,027
2002	15	3	49	20	304
2003	3	22	293	120	360
2004	7	1	70	16	109
2005	3	13	94	44	133
2006	6	8	82	31	185
2007	9	4	166	37	330
2008	51	0.1	130	26	1,314
2009	479	0.1	209	8	4,064
2010	174	0.1	217	11	1,884
2011	70	0.1	295	16	1,102
2012	483	0.1	85	2	1,037
2013	29	1	51	14	395
Totals	**1,442**			**10**	**13,718**

Created openings planned since each Forest Plan was revised have been designed to meet several management objectives for the forested landscape such as maintaining forest health, reducing losses to insects and disease, reducing risk of wildfires, and providing wood fiber. Figure 19 displays the pattern of both natural and management created openings on the MBR.

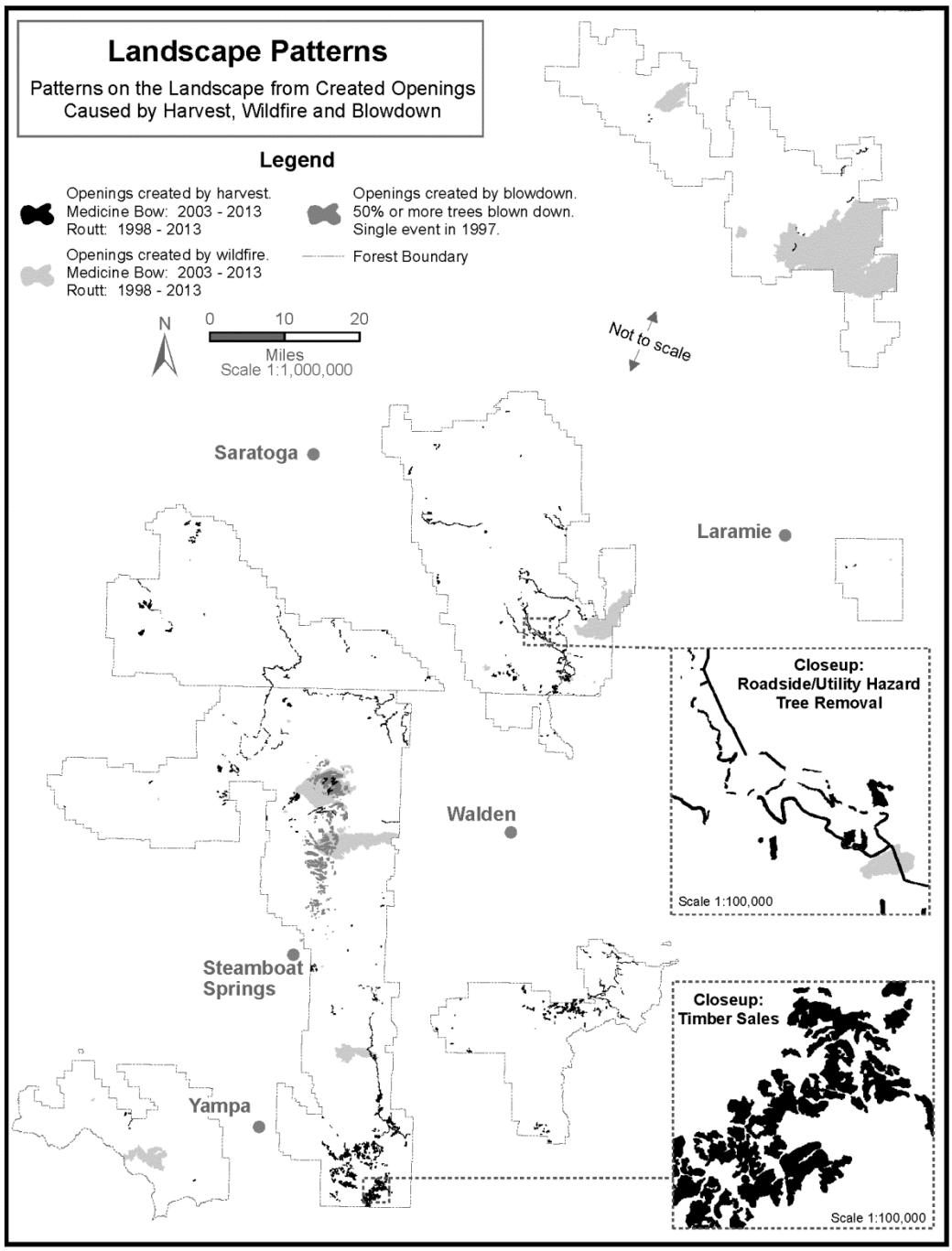

Figure 19. Patterns on the Medicine Bow-Routt National Forests landscape from created openings caused by timber harvest, wildfire, and blowdown.

The bark beetle epidemic began impacting the Routt NF in 2000 and the Medicine Bow NF in 2002. Since this time the forests have been planning and implementing projects to deal with the effects of the beetle. Salvage, fuels reduction, and public safety have been the emphasis for the projects.

Timber sales since the beginning of the beetle epidemic have had units larger than 40 acres. Regional Forester approval is not required if units larger than 40 acres were the result of bark beetle infestation because these units are not considered to be even-aged management but rather to be salvage of already existing mortality.

Review of the Routt NF information on harvest sizes indicated that the size of harvest units emulates the patterns displayed in the analysis of patch patterns from the Revised Routt Forest Plan. There are few large harvest units and many more small harvest units. Although this may not be creating the exact pattern that was evident historically when natural processes (fire, insects, and diseases) were the major forces creating landscape patterns, smaller patches can coalesce into larger patches over time and under the operation of natural processes.

This same pattern would be true for the first 10 years of the Medicine Bow Forest Plan implementation.

In 2009, the MBR began implementing roadside hazard tree removal projects to address public safety along open roads. A couple of years later the MBR began implementing hazard tree removal along utility corridors with aboveground lines. These types of projects will continue over the next several years. These corridors already existed but were widened by the harvesting, resulting in a much more evident linear pattern on the landscape. Over the last 5 years the maximum size of created openings has increased, probably due to multiple harvest units being adjacent to each other and considered as one opening. The average size has gone down due to multiple small units scattered along road sides.

Harvesting will continue into the future where it is feasible and economical, but the landscape view is expected to be a sea of gray for years until most of the lodgepole pine has fallen.

It is anticipated that the number harvest units larger than 40 acres will continue to increase due to salvaging of beetle-killed timber. The larger harvest units would be designed to emulate landscape patterns of natural disturbance as directed by the Forest Plans.

Because harvest opportunities are limited by topographic conditions and other resource concerns, the patch size and pattern created across the landscape by the mountain pine beetle epidemic will be dominant over that created by harvest units in the near future.

Conclusion

The current direction on harvest size provides adequate direction and flexibility in guiding the size of harvest unit treatments.

Goal 2: Multiple Benefits to People

Effects of Recreation Activities

Medicine Bow Objective 2.a.1 Reporting Period: Five Year
Routt Monitoring Item 2-3

This monitoring item asks the questions:

To what extent have recreation sites been rehabilitated?

How are recreational activities affecting the physical and biological resources of the Forest?

Monitoring Protocol/Data Collected

This monitoring item is answered using field observation, inventory data, and actions taken to reduce negative effects of recreation on forest resources.

Results/Evaluation

Medicine Bow National Forest

- In 2013, the Forest Supervisor signed an order reducing the limit of dispersed camping from 21 days to 16 in an effort to allow access to dispersed sites for multiple forest users throughout the camping season while also improving the physical and biological resources of the Forest.

Brush Creek/Hayden Ranger District

- Completed public involvement activities for the Long Park trail stock reroute in the Huston Park Wilderness. The reroute will avoid a wet area and reduce seasonal impacts from hunting-stock use. A Decision Memo is expected in FY14.
- Completed purpose and need and received grant funds for the west-side Snowy Range travel management project.
- Received WY State Trail grant funds for OHV patrolling and continued to concentrate on enforcing the travel management rule (no motorized travel more than 300 feet off routes). This measure helped to reduce the spread of dispersed camping along many forest roads.
- Completed campsite inventories in Wilderness areas. This measure gives us a baseline to determine if dispersed camping is a growing recreation concern or is stable with little or no growth.

Douglas Ranger District (Laramie Peak Unit)

- In 2012, a two-track road that was closed in the Laramie Peak Travel Analysis was fenced and gated off on State of Wyoming land with the use of Legacy Road and Trails funds; a parking area was also delineated. The original closure was difficult to maintain as the road crossed a large section of state land and the boundary with the Forest Service is on a steep slope. This area was both difficult to gate and there was no room for vehicles to turn around. In addition, this section of road sits just above Horseshoe

Creek where erosion from the road dumps directly into the creek. OHV riders were driving around the closure, furthering the braiding and erosion on this steep, rocky, and unstable slope. The State Land Board agreed to close their section of road and to provide the space for parking. Their crew built the fence and gate and placed the signs. The Forest Service bought the supplies and materials. The new closure was constructed on Memorial Day Weekend and proved highly successful in encouraging OHV riders to stay out of the closure area. During hunting season, hunters used the parking provided and walked into the area. As is typical when areas are closed to motorized vehicles, hunters experienced a rise in their success.

Laramie Ranger District

- Removal of hazard trees from developed recreation sites has limited the time available to address other concerns, such as dispersed campsite rehabilitation.
- Continued implementation of the District's 2007 Travel Management decision has significantly reduced the number of new roads being developed across the District.
- Seasonal closures for wet roads were ordered and enforced to reduce the physical impact to the physical and biological resources of the District.

Hahns Peak/Bears Ears Ranger District

- Illegal off-road and off-trail motorized use continues to affect physical and biological resources on the District. Closing and rehabilitating these non-system routes is ongoing and relatively successful at reducing resource impacts.
- Roadside clearing of hazard trees has allowed the District to implement the Forest Plan Standard for dispersed campsites and proximity to water (page 1-18 Recreation – Dispersed Recreation, #3).
- An increased presence in the Mount Zirkel Wilderness by seasonal rangers helped to share the Leave No Trace message. They also monitored and enforced camping closures in heavily-used areas.

Parks Ranger District

- Dispersed campsite cleanup work is an on-going project on the district. During the summer and fall seasons, recreation crews made a number of contacts in dispersed camping areas.
- Proliferation of illegal off-road and off-trail motorized use continues to affect the physical and biological resources on the District. Identifying, closing, enforcing, and rehabilitating these non-system routes is an ongoing effort aided by partnerships, seasonal employees, and close work with Forest law enforcement officers.
- After a tremendous extended effort by many parties, the Grizzly-Helena Bridge was completed and the associated multiple-use trail was re-opened.
- Work continued to move permitted outfitter/guide camps away from hazard tree areas. This task is challenging because alternate sites are often in riparian areas or sites with archaeological resources.

Yampa Ranger District

- Analysis of campsite inventories in the Flat Tops and Sarvis Creek Wilderness areas show improved conditions over the past 20 years.
- The Gore Restoration EIS identifies the closure of poorly located dispersed sites in the proposed action.
- "Leave No Trace" ethics are promoted to backcountry users in order to minimize impacts of their use. An ongoing Leave No Trace program for elementary school children targets the next generation of recreation users.

Recommendations

Brush Creek/Hayden Ranger District

- Continue to monitor dispersed campsites. Relocate or close dispersed campsites that are causing resource damage.

Douglas Ranger District (Laramie Peak Unit)

- Continue to monitor dispersed campsites. Harden popular dispersed campsite pads to minimize impacts to resources. Relocate or close dispersed campsites that are causing resource damage.
- Continue to work on decommissioning roads and trails that do not align with Forest policies and directives.

Laramie Ranger District

- Explore options and processes to develop a designated dispersed campsite program on Pole Mountain to address resource concerns.

Hahns Peak/Bears Ears Ranger District

- Prioritize and fund dispersed site inventory, monitoring, and rehabilitation.

Parks Ranger District

- Close and rehabilitate any campsites that are causing resource damage from being too close to bodies of water.

Yampa Ranger District

- Continue to monitor effectiveness of closure work, ID new sites to disperse use.

Recreational Opportunities

Medicine Bow Objective 2.a.2 Reporting Period: Annual

This monitoring item asks the questions:

Where can we plan for and improve recreation sites?

Do recreational opportunities respond to Forest users' desires, needs and expectations?

Results/Evaluation

Brush Creek/Hayden Ranger District

The District has continued to move beyond treating hazard trees and toward other aspects of deferred maintenance, vegetation management, and site design at developed recreation sites. Work this year included:

- Operations and general maintenance at 12 campgrounds and 2 picnic areas.
- Planting and watering 7,200 seedlings at campgrounds and administrative sites.
- Continued spraying approximately 785 high-value trees to defend against bark beetles.
- Completed fill and grade work at seven campground toilets that were installed in 2012.
- Completed numerous improvements at the Brush Creek Visitor Center, including installation of a new toilet, water faucets, paving, RV pullouts, and construction of a new picnic shelter.

Douglas Ranger District

The last piece of the Sunset Ridge Trail and Trailhead Construction Project Decision, closure of the Esterbrook Campground to OHV use, was implemented in 2011. Problems at the campground, where OHV riders used to camp and/or stage to access the area, spurred the project to build a new OHV trailhead and trail system outside of the campground.

The special order used to close the campground to OHVs stipulates that OHVs may not be on the ground and must stay trailered inside the campground. Although there has been some confusion over the interpretation of the order, it proved effective in reducing conflicts and resource damage. Additional education and interpretation occurred in 2012 and 2013.

Laramie Ranger District

Much like the Brush Creek-Hayden District, addressing the mountain pine beetle/spruce beetle epidemics has been the focus of much effort. Although there are several developed sites that still need to be treated for hazard trees, work this year included: reducing deferred maintenance backlogs and re-opening popular campgrounds, completing remodel/repair work at popular rental facilities, planning for the new Centennial Visitor Center, and other improvements along the Snowy Range Scenic Byway. One of the recent benefits of the Snowy Range Scenic Byway grant funds is that we will be able to make much needed improvements along the Snowy Range Scenic Byway. However, that work will mean that labor will be diverted from other areas on the District.

Nash Fork and Spruce Campgrounds on the Scenic Byway are both closed and likely will not be logged for 2 more years. The North Fork Campground, which is one of the largest at a lower elevation, was closed for logging in the spring of 2013, followed by logging at Rob Roy Campground. All of these campgrounds are integral to the program, and still need attention. Beyond hazard tree removal, the remaining furniture and roads are the next hazard; there are more projects than the District has funds for.

Hahns Peak/Bears Ears Ranger District

Hazard tree removal in campgrounds, resulting from the mountain pine beetle epidemic, is slowing on HPBE and work has shifted to rehabilitation and restoration.

- The third and final year of seedling plantings was accomplished in campgrounds – 6,580 trees were planted in 7 campgrounds.
- Clean-up of slash and other debris left from tree removal/logging was completed in five campgrounds.
- The Freeman Campground continues to be operated by Moffat County under a Granger/Thye Permit.
- Hahns Peak Lake Campground and Day Use Area was fully operational in 2012 after years of partial and full closure for hazard tree removal and renovations. Work was substantially completed on the wheelchair accessible "Shoreline Trail" in partnership with CPW, Trout Unlimited, and several donor partners.
- New CXT toilets were installed in four campgrounds.
- The Steamboat Ski Area submitted an Amended Master Development Plan for review and USFS acceptance. Master Development Plans are amended periodically to address changing market conditions and recreational needs of ski resort customers. The Forest Supervisor accepted the Amended Master Plan in early 2013. The District worked with the ski area on downhill bike trails, a use allowed under new legislation.

Parks Ranger District

- For the most part it seems that recreational opportunities respond to Forest users' desires, needs, and expectations. We still have a substantial amount of illegal OHV use of non-system roads and trails, which may be indicating that there is a need for additional miles and variety of open system trails for these user groups.
- Visitors are looking for a natural experience on national forest land. They are looking for areas where they are not over-regulated and have a variety of recreation opportunities such as fishing, hiking, ATV riding and general relaxation. They do like the added comfort and security of campgrounds. They value quality facilities which are taken care of on a regular basis. We find that sweet smelling toilets are most appreciated.
- One aspect of campground design that could better accommodate Forest users' expectations is the development of campsites to accommodate trucks pulling large camp trailers. Sites with pull-through access of up to 50' long are much-appreciated by Forest users' with this kind or equipment. Additional opportunities exist in upgrading our existing water facilities to meet State standards and better serve the public.
- A number of Forest users have commented on the desire to get away from the noise of ATVs. They do not like hearing the noise these machines generate in campgrounds. All

the campgrounds on the district allow the use of ATVs with the stipulation that they can only be used to leave and enter campgrounds.

Yampa Ranger District

- 2010 campsite inventories in the Sarvis Creek Wilderness have shown improvement in site conditions from the previous surveys in 2003 and 1993.
- Leave No Trace ethics are promoted to backcountry users in order to minimize impacts of their use.
- Stopping illegal off-road and off-trail motorized use continues to be a management priority for the district. Closing and monitoring these unauthorized travel routes have shown success in reducing resource impacts.

Recommendations

Brush Creek/Hayden Ranger District

- Improve marketing of the recreation rental cabins on the District to increase revenue and subsequently improve forest visitor experiences at these sites.
- Review business plan for the Mirror Lake area.

Laramie Ranger District

- Finish campsite rehabilitation at sites still closed due to bark beetle outbreak.
- Review practicality of designated dispersed camping at Pole Mountain.

Hahns Peak/Bears Ears Ranger District

- Continue to develop a new trails master plan in coordination with the City of Steamboat, local user groups, and nationwide recreation groups.

Parks Ranger District

- Look into opportunities for campground design that could accommodate pull-through access of up to 50' long. Upgrade existing water facilities to meet State standards and better serve the public.

Yampa Ranger District

- Develop a site renovation plan for Sherriff's Reservoir.

Outdoor Recreation

Medicine Bow Objective 2.a.3 Reporting Period: Annual

This monitoring item asks the question:

How many miles of trail meet agency standards?

Monitoring Protocol/Data Collected

This item is answered using trail maintenance data collected by the districts.

Table 34 gives the miles of trails meeting agency standards in FY13. Changes in trail miles from prior years' reports are due to updates to the database (INFRA) plus new trails that were constructed.

Table 34. Miles of trails meeting agency standards.

District	Trails on District (Miles)	Trails meeting agency Standards (Miles)	Percent (%)
Brush Creek/Hayden	464	351	76
Douglas (Laramie Peak)	199	43	22
Laramie	351	51	15
Hahns Peak-Bears Ears	836	271	32
Parks	437	203	46
Yampa	237	184	77

Brush Creek/Hayden Ranger District

- District personnel groomed the Battle Highway (A trail) and the Hog Park Road (B trail); grooming was completed in cooperation with Wyoming State Parks.
- District personnel groomed two cross-country ski trail systems, one at the Bottle Creek Campground area and one at the Brush Creek Work Center. A grant was awarded from the Wyoming State Trails to purchase a grooming attachment and new snowmobile to groom the District cross-country ski trials.
- A joint BCH-Laramie District trail crew cleared fallen trees from 35 miles of wilderness system trails and 43 miles of non-wilderness trails.
- Volunteers repaired and maintained a short section of the Continental Divide National Scenic Trail (CDNST).
- Coordinated with Wyoming State Trails to repair resource damage along the Campbell Lake Trail.

Douglas Ranger District (Laramie Peak Unit)

- The Wyoming State Trail Crew worked on switchback reroutes and OHV pullouts on the Laramie Peak Trail. The rerouting of the switchbacks made the trail more maneuverable for ATVs, and the pullouts will enable riders to turn around safely if continuing up the trail is not feasible for their ability.
- The Rocky Mountain Conservation Crew completed trail rehabilitation work on Trail 609 (Friend Park Trail) as a means to help the area recover from the Arapaho Fire in 2012.

- The trail crew's focus has been on tree removal and clearing.

Laramie Ranger District

- The State continues to groom all the snowmobile trails on the District.
- The District has an agreement with the Medicine Bow Nordic Association to groom more than 19 miles of cross-country ski trails at least 3 times/week.
- 15 miles of cross-country ski trails are groomed by the District at least once per week.
- Trail work that was accomplished was mostly done by additional volunteer crews like the Montana Conservation Corps.
- Substantial deadfall/blowdown on wilderness trails was removed by an additional trail crew dedicated to wilderness areas on Laramie and Brush Creek-Hayden Ranger Districts.

Parks Ranger District

- The majority of trail maintenance and construction work on the Continental Divide National Scenic Trail have been accomplished with outside funding from grants or agency earmarks.
- Winter Trails – With the help of the North Park Snow Snakes we have been able to keep 71 miles of marked and groomed winter trails cleared and groomed. An additional 8 miles of marked but un-groomed trails have also been kept clear of deadfall. A total of 79 out of 82 miles of winter trails meet agency standards.

Hahns Peak/Bears Ears Ranger District

- The district has permits with three snow clubs and one snowmobile outfitter to provide grooming on all snowmobile trails on the district.
- Volunteers maintain 25 miles of marked ski trails.
- Summer trails were maintained by a combination of district crews and volunteers. The large amount of deadfall on trails this year reduced the number of miles that were cleared.
- Motorized trails were cleared by volunteer groups and by funding from the State for a district motorized trail group.

Yampa Ranger District

- All system trails, motorized and non-motorized, were maintained to standard.

Recommendations

- Continue to emphasize partnership programs to help keep our trails open and maintained.
- Provide on-forest or on-district trail crew trainings so crews can learn new techniques and refresh their general education on trail construction, reconstruction, and maintenance.

- Increase education and enforcement efforts to reduce illegal motorized use on non-motorized trails and off-road.
- Work with the Region and the Continental Divide Trail Association (CDTA) to resolve trail connections across private land.
- Implement summer motorized trail system plans for the Laramie Peak and Snowy Range Travel Management decisions, including trail construction, adoption, and decommission components.

Actions Taken on Recommendations Included in Past M&E Reports

- 2012 Recommendation: Continue to emphasize and utilize partnership programs.
    - Action Taken: Partnership programs with State and private groups continue to play an important role in our trail program.
    - Action Taken: Implemented increased education and enforcement efforts to reduce illegal motorized use, both on non-motorized trails and off-road.

Recreation Infrastructure

Medicine Bow Item Objective: 2.a.4
Routt Monitoring Item: 2-1 Reporting Period: 5-year

This monitoring item asks the question:

How many trailheads have been rehabilitated or reconstructed over the life of the plan?

Does the Forest infrastructure (travelways, roads, trails) facilitate attainment of desired recreational experiences, including access for a wild range of abilities?

Results/Evaluation

Forest-wide

- For the past several years the MBR has partnered with several groups to complete hazard tree mitigation work in recreation sites across the unit, including campgrounds, picnic areas, trailheads, and trails. Crews included the Rocky Mountain Youth Corps, Wyoming Conservation Corps, Colorado Department of Corrections, and the "Green Veterans." These programs provided dozens of young men and women the opportunity to work in our natural environment while learning more about our mission and building job skills. The MBR benefited from multiple tours from each of these crews across each Ranger District.
- Forest infrastructure (travelways, roads, trails) provide a wide array of recreational opportunities on the Forest. The MBR provides ample opportunities for both motorized and non-motorized users including ATV enthusiasts, snowmobilers, hikers, mountain bikers, cross-country skiers, and stock users. Additionally, developed river ingress/egress points allow for access to the North Platte River.

Brush Creek/Hayden Ranger District

- Constructed, repaired, and painted wilderness trailhead information boards.

Laramie Ranger District

- Installation of new trailhead signs and trailhead improvements at the Platte River and Savage Run Wilderness areas.
- Two seasonal employees are planned and will be instrumental in installing buck-and-rail fence at the Laramie Peak Trailhead to ensure that vehicles over 50" do not access the trail. They are also scheduled to install: buck-and-rail fence around the entrance to the La Bonte Trail at the Curtis Gulch Campground; signs on trails indicating ability level; and other signs to increase safety. Finally, they will increase presence on the trails throughout the 2014 season.

Douglas Ranger District

- The last piece of the Sunset Ridge Trail and Trailhead Construction Project Decision was implemented in 2011. This was the closing of Esterbrook Campground to OHV use. The special order stipulates that OHVs may not be on the ground and must stay trailered inside the campground.

Parks Ranger District

- Numerous trailheads have been rehabilitated over the life of the plan. This rehabilitation has been limited to maintaining or replacing trailhead information boards as needed, and posting pertinent information. As stated previously, with the number of dead trees that have been removed from all of the trailheads, there is an opportunity to redesign and reconstruct many of these trailheads to better meet the needs of the Forest Service and forest visitors.
- Forest infrastructure does an adequate job of providing access for a wide range of abilities and recreational experiences. Some user groups continue to advocate for more miles and variety of trails provided on the district.

Recommendations

- Prioritize rehabilitation of older trailheads.
- Continue monitoring use to identify needs.

Effects of Off-Road Vehicles

Legally Required Monitoring Item
Medicine Bow Item Subgoal 2.a. Reporting Period: Annual

This monitoring item asks the question:

What are the effects of vehicle use off roads?

Monitoring Protocol/Data Collected

This item is assessed using field observations, Forest patrol responses, and official law enforcement statistics.

Continued emphasis patrols during key periods (holiday weekends, hunting season) have proven effective in educating the OHV riding public and thereby leveling and sometimes reducing the

number of off-roading incidents. Increased incidents in 2013 are the result of more intensive effort by law enforcement.

Results/Evaluation

Table 35. Off-road vehicle violations FY2009-FY2013.

Based on 36 CFR 261.13, 261.54a, 261.54d, 261.54e, 261.55b, & 261.56	2009		2010		2011		2012		2013	
	MBNF	RNF	MBNF	RNF	MBNF	RNF	MBNF	RNF	MBNF	RNF
Warnings	78	64	119	26	73	9	106	46	75	64
Incidents	32	102	27	91	26	47	44	42	102	110
Violation tickets	32	13	39	7	18	54	25	32	25	36
Total	142	179	185	124	117	110	175	120	202	210
MBR Total	**321**		**309**		**227**		**295**		**412**	

Medicine Bow National Forest

- Developed partnership with Tread Lightly to establish "Ride on Wyoming," an educational program for OHV users in the state.

Brush Creek/Hayden Ranger District

- The extent of illegal OHV use off of designated travel routes and on non-motorized routes is evident across the District. Illegal use can be broken down into two general categories: recreational use and hunting use. Illegal use associated with general recreation tends to be primarily limited to those areas frequented by ATV users in developed/dispersed camping settings or areas near designated ATV trails. Illegal use associated with hunting is widespread across the district since big game hunting occurs on most parts of the District.
- Recreation personnel spent a significant portion of time checking for ATV registration compliance throughout the summer and fall seasons.
- Recreation personnel targeted the Cedar Pass/Pennock Mountain area for off road ATV patrols during the fall big game hunting season. Repeated patrols in the area resulted in a dramatic decrease in illegal ATV use. However, illegal use was still evident in some locations.
- Continued to work cooperatively with the State of Wyoming for enforcement of OHV regulations on Forest Service roads and ATV trails using state funding.

Douglas Ranger District (Laramie Peak)

- Recreation riders (as opposed to hunters) continue to be a growing user group, with more frequent off-roading activity. This is especially true in the Big Bear Canyon motorized trail area where recreational riders have expanded the trail system well beyond the designated portions. This is a difficult area to get into and requires an OHV to be effective. As a result, no patrolling has occurred in this area, so there has been extensive damage in a boggy aspen stand and several other sensitive areas.

- Our relationship with the WGFD wardens continues to be an effective tool in education and enforcement for off-road issues.

Laramie Ranger District

- The District keeps map boxes containing MVUMs full at portals on Pole Mountain, but there are still numerous unsanctioned OHV trail systems.
- Resource damage has been occurring in all locations with illegal use, especially when that use occurs during the wet periods of the spring and late summer.
- The ground-opening effects of the Squirrel Creek Fire south and west of the Medicine Bow Rail Trail meant more opportunities to drive into areas previously obstructed naturally. Signs along the rail corridor helped remind off-road drivers that they had to remain out of the area. This did not stop everyone, but it was mostly effective.
- There are more encroachments into non-motorized areas by motorized vehicles, and newly installed signs have disappeared. There is a need for more weighty barriers to be set in places where tracks indicate encroachment.

Parks Ranger District

- The motor vehicle use map (MVUM) for the Parks District has been available for about 7 years now, providing information to the public where open motorized routes are located. User-created trails will still be a fixture on the landscape until they can be physically eliminated.
- Off-road OHV use occurs district-wide throughout the summer and during the fall hunting seasons.
- The trail crews are working in some key use areas, but it is often difficult to catch anyone in the act of illegal OHV use. The District has done saturation patrols on the busy weekends in problem areas, in addition to hunter patrols in the fall to inform and educate motorized recreation users.
- The Colorado Off-highway Vehicle Coalition, Front Range Trail Riders and Northern Colorado Trail Riders are all good partners and have been helpful with peer pressure.
- Resource concerns include the proliferation of illegal user created routes, which can lead to erosion, damage to sensitive plants, and disturbance of wildlife.

OHV Use Effects on Plants and Rare Plant Habitat

OHVs are restricted to roads and trails on the MBR. Law enforcement reports indicate that while OHV use off of roads occurs across the forest, it is more of a consistent problem in some areas (e.g., Pole Mountain). When OHVs travel off of designated routes, the vegetation (common or rare) is crushed, shredded or removed. In addition, soil erosion and sediment is transported and can bury plants. Motorized use can compact soils and lower the infiltration of precipitation, thus altering the growing environment for plants or eliminating habitat altogether.

OHVs are documented to transport noxious weeds and non-native invasive plant species into new areas where these unwanted species are likely to find suitable disturbed habitat to establish new populations. This can change plant community composition and fire regimes and out-compete native vegetation, including rare plants. One of the primary threats to many rare

plants on the MBR is the invasion of non-native plants, most notably cheatgrass (*Bromus tectorum),* which is commonly spread along transportation corridors.

OHV use can also affect the presence of pollinators that are needed by rare plants to complete reproductive cycles. Some pollinators, such as bumblebees, have been shown to be negatively influenced by the habitat fragmentation and flight-path barriers created by motorized use (Bhattacharya et al. 2003).

In wetlands and fens, soil is saturated and soft with high organic matter content that provides very little support for OHVs. Machines easily sink into wetland soils and create deep ruts and wide swaths of bare ground. This type of damage can change the water flow patterns in the wetland and affect surface vegetation. The ruts can cause the wetland or fen to drain or just create localized hydrologic changes like pooling (Figure 20). Fens are very slow to recover and soil damage typically persists for decades or longer.

Figure 20. Examples of OHV damage to vegetation and plant habitats. In the photo on the left the two-tracks left by off-road activity now actively drain this wetland. In the photo on the right, excessive braiding and widening of this system road has led to pooling water, damaged vegetation, and exposed soil.

Recommendations

Brush Creek/Hayden Ranger District

- Develop ATV routes that would reduce conflicts with other recreation users and prevent resource damage.
- Continue to work with the Wyoming State Trails Program on funding and education plan.

Laramie Ranger District

- Purchase and install signs at portals.
- Develop sign plans for various “hot spots.”
- Complete and enforce closure of illegal routes.

Douglas Ranger District

- Develop plans to work with the Wyoming State Trail Crew to block off and reclaim areas.
- Develop a recreation management plan for LaBonte Canyon which is the access point for Big Bear Canyon.
- Enforce the Motor Vehicle Use Map with more education outreaches, patrols, and better signage.
- Work with the Wyoming State Trails Program to better educate the public about OHV Safety.
- Utilize seasonal trail crews to actively patrol trails on foot and via OHV.
- Continue to reduce conflicts between hunters and ATV riders through patrols, and have WGFD wardens share information with the Douglas District recreation staff.
- Continue to work with the Wyoming State Trails Program on funding and education plans.

Hahns Peak/Bears Ears Ranger District

- Adequately fund travel management/motorized recreation monitoring.

Actions Taken on Recommendations Included in Past M&E Reports

- 2012 Recommendation: Continue to work with the State to increase education of OHV riders when they register their vehicles.
    - Action Taken: A new program with Wyoming State called "Hot on the Trail" is being implemented to provide a message to OHV riders of the impacts from use.
- 2012 Recommendation: Conduct patrols in OHV problem areas throughout the season of use.
    - Action Taken: Patrols have been stepped up on the problem areas of the forest and grasslands during the spring and summer rather than just in the fall.
- 2012 Recommendation: Look for opportunities to increase funding for physical closure of illegal routes and damaged areas.
    - Actions Taken: Funding from the State of Wyoming has been used to repair damaged areas.
    - Closure of OHV routes on Pole Mountain occurred over the past year to improve riparian areas and water damaged roads.
- 2012 Recommendation: Continue to use funds from the Wyoming State Trails program for increased monitoring and enforcement on ATV trails.
    - Action Taken: The Douglas District has doubled their grants from the State of Wyoming for OHV enforcement.

Scenery

Routt Monitoring Item 2-4 Reporting Period: Annual

This monitoring item asks the question:

How are projects and programs affecting visual quality?

Monitoring Protocol/Data Collected

The effects of management on scenic/visual resources are assessed through field evaluation of Forest Service activities.

Results/Evaluation

The La Fever sale site, located on the Parks District, was reviewed for meeting visual quality objectives in FY13. The site is located within MA 5.11 and the visual quality objectives are Partial Retention in foreground of arterial/collector roads and primary trails and Modification in all other areas. Partial Retention VQO provides for management activities to remain visually subordinate to the characteristic landscape. Modification VQO allows management activities to visually dominate the characteristic landscape as long as the form, line, color and texture of the existing vegetative and landform are borrowed so completely and at such scale to appear visually compatible within the surrounding project area.

Review on visual resources was conducted on timber activities completed along NFSR 740 corridor. NFSR 740 is an arterial road located within the foreground zone and the visual quality objective (VQO) is Partial Retention. The design criteria for visual resources (North Owl Mountain EA) include: Minimize damage to rock outcrops, young healthy trees, understory trees of lodgepole pine, aspen and spruce/fir and shrubs from mechanized equipment; cut stumps low to the ground as feasible; remove heavy slash; locate slash piles and landings away from the immediate foreground (approximately 25 to 200 feet from edges of road and trail) of NFSR 740 and within Pines Campground.

The design criteria on visual resources were included in the timber contract. The project will meet Partial Retention VQO when all slash piles visible from NFSR 740 are burned.

Summary on Visual Quality for the Last 10 Years on the Routt National Forest

Most projects and programs met the Routt Forest Plan adopted visual quality objectives, however, beginning in FY 2004, projects that included removing beetle killed trees resulted in some sites located in the foreground zone of travel ways not meeting Partial Retention VQO due to the removal of all beetle killed trees for public health and safety. These sites appear as Modification VQO. In many of these sites, new seedlings were already established through natural regeneration and will provide high quality scenery in 10 to 20 years.

Wilderness Opportunities

Medicine Bow Item Objective: 2.b.1 Reporting Period: 5-year

This monitoring item asks the question:

How many areas recommended for wilderness provide SPNM opportunities?

Results/Evaluation

Areas recommended for wilderness are managed according to the direction in Management Area 1.2, "Recommended for Wilderness." Recreation guidelines for this management area require a recreation opportunity spectrum (ROS) class of semi-primitive nonmotorized during the summer season. The Rock Creek area has a winter ROS class of semi-primitive motorized, while the Huston Park and Encampment River additions have a winter ROS class of semi-primitive nonmotorized. Opportunities for SPNM experiences include the Verde Mine (858) and Roaring Fork (860) non-motorized trails in the Huston Park addition and the Crater Lake (105), Rock Creek (106), Lookout Mtn. (107), and Stud Creek (104) trails in the Rock Creek area.

Wilderness Monitoring Plans

Medicine Bow Item Objective: 2.b.2 Reporting Period: 5-year

This monitoring item asks the question:

To what extent have monitoring plans been developed and implemented for elements critical to maintaining ecological conditions?

Results/Evaluation

The MBR will meet and exceed the Forest Service's 10 year Wilderness Challenge program. The Agency-wide program is an attempt to standardize wilderness monitoring efforts and data across the nation while improving the management practices of each wilderness area. It includes extensive management plans for solitude, campsite rehabilitation, fire management, and wilderness education.

Recommendations

- Continue to meet and exceed the Agency-wide Wilderness Challenge Program and implement future guidelines related to the new Challenge process developed by the Washington Office for FY15 and beyond.

Wilderness Rehabilitation

Medicine Bow Item Objective: 2.b.3 Reporting Period: 5-year

This monitoring item asks the question:

What is the Forest doing to ensure the rehabilitation of heavily impacted campsites?

Results/Evaluation

Brush Creek/Hayden Ranger District

- The campsites observed in the Encampment River Wilderness have very limited impacts. The campsites in the Platte River Wilderness see limited use due to typically short river seasons and very limited overnight use.

Parks Ranger District

- Heavily impacted campsites have been rehabilitated in the Wilderness, but most of the time these are illegal sites that are either too close to the trail, a body of water, or both. Rehabilitation techniques include removing fire rings, planting grass plugs, planting seedling trees, and planting rocks in an effort to naturalize the area and discourage future use of the area.

Yampa Ranger District

- Illegal campsites were rehabilitated. Rehabilitation techniques include removing fire rings, planting grass plugs, planting seedling trees, and planting rocks in an effort to naturalize the area and discourage future use of the area.

Recommendations

- Continue to inventory and complete dispersed campsite rehabilitation as needed.

Protected Areas

Medicine Bow Objective 2.b.4 &5 Reporting Period: 5-year

This monitoring item asks the question:

To what extent have heritage resource sites been inventoried, interpreted and protected?

Monitoring Protocol/Data Collected

Confirm the development of a heritage inventory strategy with Tribal and State collaboration.

Determine the number of sites identified for listing on the National Register of Historic Places (NRHP) and the number of those sites with implemented interpretive plans.

Results/Evaluation

Multiple programmatic agreements have been developed between both the Colorado and Wyoming State Historic Preservation Offices, with collaboration from Tribes, providing effective

and efficient inventory and reporting strategies. Monitoring has shown that identified resources are being inventoried and significant properties protected.

The Forest continues to evaluate sites within project areas and identify those that are eligible for NRHP listing. Two additional sites were listed since 2009 (one on the Medicine Bow and one on the Routt), and two draft interpretive plans have been developed on the Routt since 2009, one for Windy Ridge Quarry and one for Kings Canyon Historic Area.

Livestock Use

Medicine Bow Item Objective 2.c.2

Frequency of Measurement: Annual
Reporting Period: Annual

This monitoring item asks the question:

What levels of grazing use are permitted while still meeting or moving toward desired vegetative condition?

Monitoring Protocol/Data Collected

Animal Unit Months (AUMs), grazing use for the year, and Head Months (HMs) grazing use for the year are determined for cattle, sheep, and total livestock.

Results/Evaluation

Routt NF

2013 was a year of average precipitation. The previous 3 years were generally above average. The monsoonal flows began as normal in mid-July; however, they were unusually heavy and prolonged – they lasted well into September, and brought good rains to nearly all the area on a weekly basis.

Some operators chose to take non-use due to climatic conditions or because they had not yet fully replaced permitted animals after de-stocking because of previous drought reductions. Mid-summer rains prevented more severe impacts to operators. Overall, many cattle and sheep operators were not able to run their permitted numbers. The voluntary reduction in livestock numbers and leaving the Forest early are good examples of proper rangeland vegetation management techniques – reducing livestock commensurate with the level of site-specific forage production and water availability. Cattle and sheep allotments were stocked at only 87% of capacity based on AUMs, mostly because of the dry spring and early summer.

Medicine Bow NF

Conditions throughout southeastern Wyoming were generally about the same as for northern Colorado. Summer monsoon rains were a little more scattered and limited; however, amounts, while highly variable across the entire Forest, provided far more moisture than normal over the prolonged two-month flow.

As a result of early dry conditions, and many producers on Laramie Peak remaining de-stocked or not able to yet graze after the devastating fires of 2012, the amount of grazing use (AUMs) on the Medicine Bow NF was only about 80% of the permitted level for sheep allotments and only about 84% for cattle allotments. Many landowners and operators rebuilt destroyed fences and

repaired damaged spring developments, with limited available funding. Several livestock operations were consolidated in order to take advantage of available grass production and to avoid areas that had not yet fully re-vegetated.

Table 36. Planned and actual livestock use during 2013*.

	Unit of Measure (in thousands)	Permitted Level	2013 Level	Percent of Permitted Level
Routt				
Active Allotments	Allotments	127	120	94%
Sheep Grazing	Head-Months	143.5	115.7	81%
	AUMs	42.7	34.7	81%
Cattle Grazing	Head-Months	31.7	28.9	91%
	AUMs	38.7	36.1	93%
Total Grazing	Head-Months	175.2	144.6	83%
	AUMs	81.4	70.8	87%
Medicine Bow				
Active Allotments		109	102	94%
Sheep Grazing	Head-Months	21.4	17.0	80%
	AUMs	6.4	4.6	72%
Cattle Grazing	Head-Months	52.6	44.2	84%
	AUMs	56.0	47.9	86%
Total Grazing	Head-Months	74.0	61.2	83%
	AUMs	62.4	52.5	84%

*Does not include livestock numbers issued under a term private land permit.

Recommendations

- Continue to report actual grazing use each year in relation to the permitted level, and explain in the narrative section the annual climatic fluctuations that account for the differences.

Big Game

Medicine Bow Item Objective: 2.c.3 Reporting Period: 5-year

This monitoring item asks the question:

What levels of big game use can be provided for while still meeting or moving toward desired vegetative conditions?

Monitoring Protocol/Data Collected

This question is currently being evaluated by the Medicine Bow Forest in cooperation with the WGFD. Two projects are being implemented, “Monitoring Elk Movement in Beetle Killed Forests” and the “Platte Valley Habitat Partnership.”

Monitoring Elk Movement in Beetle Killed Forests

The Forest and WGFD are studying the potential impacts of the mountain pine beetle epidemic on the Sierra Madre elk herd. The Sierra Madre herd is one of the keystone elk herds in Wyoming. The current herd population is estimated to be approximately 8,000 animals, double the population objective of 4,200. Twenty-six elk have been captured and fitted with Global Positioning System collars. Elk movements will be tracked over several years to determine what if any impact the beetle epidemic may have on the elk population and habitat. Potential impacts to consider include: (1) the ability of elk to move through the landscape due to fallen logs, increased vegetation regeneration, or beetle kill management activities, (2) loss of hiding cover and, (3) increased degradation of forest ecosystem health and wildlife habitat due to a high elk population and a loss of hunter participation in beetle killed areas.

Platte Valley Habitat Partnership

The Medicine Bow NF and WGFD, along with the community of Saratoga, Wyoming, have developed a mule deer habitat plan for the Platte Valley mule deer herd. This collaborative effort will focus on improving vegetation and habitat attributes, specifically: shrub nutritive quality, vegetation production and utilization, vegetation diversity, vegetation species density, aspen regeneration, and riparian habitat.

Results/Evaluation

The Elk Movement in Beetle Killed Forests project is only in its second year of implementation, thus results or evaluation of the project are inconclusive at this time. However, a video series titled Our Future Forests: Beyond Bark Beetles has been produced for educational purposes and includes a segment on the Elk Movement project. The video series is available for public viewing at <http://www.beyondbarkbeetles.org>.

The Platte Valley Habitat Partnership plan was drafted to address the decreased mule deer population in the Platte Valley. Projects are being implemented and results and evaluations of the plan will be presented in the future.

Miscellaneous Products

Medicine Bow Objective 2.c.4 Reporting Period: Three Year

This monitoring item asks the question:

How do we provide for the environmentally responsible harvest of "special products" such as mushrooms, floral products, and medicinal plants and be responsive to the cultural plant needs of American Indian Tribes?

Monitoring Protocol/Data Collected

Project level analysis and monitoring of the number of special forest product permits issued per year are used to ensure environmentally sustainable harvest and use of special forest products. Non-market products are issued as personal use permits to the public by districts, the Supervisor's Office, and in special cases, by the Regional Office. These products are primarily issued for personal use, rather than commercial re-sale. The MBR Forest Plans identified that an objective of management was to provide appropriate opportunities to satisfy demand for

miscellaneous products (special forest and grassland products, such as mushrooms, floral products and medicinal plants) through environmentally responsible harvest and collection methods on NFS Lands.

The majority of permits issued on the MBR are for personal-use fern collection (herb product plan) and free personal-use mushroom collection (mushroom product plan) (Table 37). In the last 3 years, several changes were made in regard to these two products to help control and track the amount of product being taken off of the forest. Fern permits are sold in large quantities, primarily on the Routt NF, but prior to 2013 collection amounts, limited to 1 bushel per permit (multiple permits are available per person), were controlled almost exclusively by the honor system. Abuse of the system was commonly observed, so in 2013 participating districts began distributing free bushel-sized collection bags with each permit. This has helped regulate the amount of material collected and facilitate law enforcement officers' and forest protection officers' ability to enforce the collectors' adherence to the terms of the collection permit. The increase in permits sold during 2013 is most likely due to this administrative change.

Additionally, prior to 2013, there was no mushroom product plan. Free-use mushroom permits were issued as requested to the public, but were not required to collect this product. Therefore, a majority of personal collection done on the forest was done in an unregulated fashion and there was no permit for commercial mushroom collectors who wished to harvest large quantities for re-sale. In order to quantify and monitor the amount of mushroom being taken annually, a product plan was developed that allowed free but quantity-limited collection of mushrooms for personal use and created a commercial or large-quantity permit for sale for the Medicine Bow NF. Commercial harvest of mushrooms is not consistent with the Routt Forest Plan and therefore not permitted. The cost and harvest restrictions associated with these permits are consistent with mushroom product plans already in use in other forests in Regions 2, 6, and 4. The number of permits issued for mushroom collection in 2013 more accurately reflects the product removed from the forest than data from previous years.

Table 37. Special forest products permits issued forest-wide in 2009–2013, permit numbers include free-use, personal-use, and commercial permits.

Botanical Product	Number of Permits Issued per Calendar Year Forest-Wide				
	2009	2010	2011	2012	2013
Limbs/boughs	--	1	1	2	2
Mushrooms	4	4	--	--	101
Herbs (ferns)	150	125	155	129	217
Wildflowers	--	--	1	1	4
Seeds	1	--	1	--	1

Additional permit requests for special products include occasional requests for wildflowers, seeds, limbs/boughs, and medicinal plants. These products do not have product plans. Each miscellaneous request is addressed and analyzed for effects on sustainability of populations and collection methods. Where conditions were met, appropriate permits for collection were issued. Each permit contains information on which plants can't be collected and limits on the amount that can be collected. The Rocky Mountain Regional Office also issues permits that cover all R2 forests and grasslands. These permits include a list of threatened, endangered, and sensitive

plants that can't be collected. When needed, the MBR contacts these permittees and with information about plant species of local concern that are also prohibited for collection.

Occasionally the MBR receives requests from members of American Indian Tribes to collect special products for traditional and/or cultural uses. These permits are also addressed individually and are issued as free-use and with standard restrictions on quantity and the collection of threatened, endangered, and sensitive plant species. The Forest has not had any recent requests.

Results/Evaluation

The ongoing collection of special forest products are analyzed every 3 years for effects on sustainability of populations and collection methods. Where conditions are met, permits for collection are issued. The demand for special forest products is being accommodated.

Snowy Range Scenic Byway

Medicine Bow Item Objective: 2.c.5 Reporting Period: By year 10

This monitoring item asks the question:

How do we protect the values for which the Snowy Range Scenic Byway was designated?

Monitoring Protocol/Data Collected

The Snowy Range Scenic Byway Corridor Management Plan was developed in 2009, with a decision signed in 2010, to protect the values of the Snowy Range Scenic Byway. It includes a vision, goals, objectives, and management recommendations for enhancing and retaining the qualities of the scenic byway.

Results/Evaluation

Since 2010, the following projects have been completed to protect and enhance the values related to the Snowy Range Scenic Byway:

1) Replace the Centennial Visitor Information Center with a new facility:

- Build a new Visitor Information Center on or nearly on the site of the existing Center - total footprint will be approximately 1,100 sq. feet.
- Replace portal and interpretive signage.
- Remove the existing pit toilet and install a new, two hole CXT toilet east of the new Visitor Center.
- Repave the existing parking lot with new asphalt.
- Use xeriscape landscaping.
- Construct a deceleration lane in the westbound lane of Highway 130 heading west from Centennial.

2) Improve the Brush Creek Visitor Information Center:

- Parking:
    - Add five paved parking spaces behind the Visitor Center (1,200 sq. ft.).

- Add a parking lot adjacent to the new picnic area (12,800 sq. ft).
- Remove asphalt from the front of the Visitor Center (400 sq. ft) but retain three parking spaces.

- Roads:
  - Pave or gravel the existing road behind the Visitor Center to the picnic area lot (8,000 sq. ft.).
  - Pave or gravel a new exit road from the picnic area (4,400 sq. ft).
  - Widen the road radius at Visitor Center entrance/Highway 130 interface.
  - Install a gate on the new exit road to restrict traffic between the picnic area and the shop. The gate would be open during the winter months to facilitate winter operations.
- Toilet:
  - Install a new toilet between the Visitor Center and the picnic area.
- Picnic Area:
  - Develop a picnic area (20,000 Sq. ft.) with picnic tables and a trail (640 Sq. ft.).
  - Harden the trail and the area under the picnic tables with gravel or cement.
  - Construct a covered shelter (1,200 Sq. ft.) inside of the picnic area that will serve as a recreation area for gatherings as large as 48 people. Design and materials will match existing CCC era structures at the site.
- Signage:
  - Install road, interpretive, informational, and regulatory signs as needed throughout the site (approximately 15 signs).

3) Pave first 0.6 miles of the Sand Lake Road

- Pave the first 0.6 miles of the road because of problems with wash-boarding of the road surface and visitor safety.
- Improve drainage along the road.

Research Natural Areas

Medicine Bow Item Objective: 2.c.6 Reporting Period: 5-year

This monitoring item asks the question:

To what extent have establishment reports been developed?

Monitoring Protocol/Data Collected

Number of establishment reports developed.

Results/Evaluation

There are five Research Natural Areas (RNAs) on the Medicine Bow NF (Table 38). Establishment reports have not been completed for these areas.

Table 38. Research Natural Areas on the Medicine Bow National Forest.

RNAs and District	Acres	Plant Series or Gaps Filled
Platte Canyon Laramie RD	8,982	Wide range of grassland, shrubland, riparian and montane forest ecosystem types (lodgepole pine, Douglas-fir), within the Platte River Wilderness Area.
Battle Mountain Brush Creek/Hayden RD	1,204	Only RNA that occurs in the North-Central Highlands and Rocky Mountain Section. (aspen, lodgepole pine, and sagebrush).
Savage Run Laramie RD	1,061	Lodgepole pine that has never been logged or tie-hacked and is within the Savage Run Wilderness area.
LaBonte Canyon Douglas RD	3,023	Provides a representative range of ponderosa pine forests in the Region.
Brown's Peak (known as Snowy Range in WYNDD database) Laramie RD	472	Area recommended by public. Alpine community of skree and high elevation mosses and lichens with interspersed Engelmann spruce and subalpine fir.

There are three RNAs on the Routt NF (Table 39). Establishment reports were completed for these areas in 2000.

Table 39. Research Natural Areas on the Routt National Forest.

Name	Acres	Vegetation Zone
Kettle Lakes	6,464	Subalpine, montane
Mad Creek	12,580	Alpine, subalpine, montane, foothills
Silver Creek	12,421	Subalpine, montane

Recommendations

- As recommended in past reports, pursue completion of establishment reports for RNAs that do not have establishment reports in conjunction with the Rocky Mountain Research Station, and continue to complete species inventories in the RNAs.

Land Ownership

Medicine Bow Item Objective: 2.c.7 Reporting Period: 5-year

This monitoring item asks the question:

How do we respond to public need in the area of land ownership adjustment (exchanges, etc.)?

Monitoring Protocol/Data Collected

Land ownership adjustments are tracked in a database called Landownership Adjustment Data System (LADS). LADS is an Automated Lands Program (ALP) application that captures

landownership adjustment case processing and accomplishments. Cases can be tracked and monitored in this system to measure progress and target accomplishment.

Results/Evaluation

Public need (or benefit) is based on several items. Acquisition of isolated inholdings and protection of habitat for TES species are two of the biggest drivers of land exchanges. We also look at straightening property boundaries, acquiring wetlands, disposing of our own isolated parcels to gain a parcel that will provide more public benefit, and acquiring public access. Parcels that provide buffers from private land activities are also beneficial. Wilderness inholdings are top priority.

Conclusions

There are many opportunities to enter into land exchanges, outright purchases, or right-of-way acquisitions, but we are missing out on these opportunities due to lack of funds and staff to commit to them. We also do not keep an evolving plan or register where proposed projects can be tracked. When we have staff changes, ideas get lost and not followed through on.

Recommendations

- Develop a land ownership adjustment plan and update it yearly with progress made, cases dismissed, or new opportunities. This may be able to be accomplished in the ALP application.
- As a Forest, be more aggressive in pursuing proponent financed land exchange proposals. Forest land staff should establish a system for tracking proposals or ideas, and keep an ongoing file in 5460, and LADS if appropriate.
- Provide more training on LADS for Forest employees.

Rights-of-Way Acquisition

Medicine Bow Item Objective: 2.c.8 Reporting Period: 5-year

This monitoring item asks the question:

To what extent has a rights-of-way acquisition program been developed in consideration of all program areas?

Monitoring Protocol/Data Collected

We have an annual right-of-way reporting system through the regional office. In recent years, only one perpetual right-of-way has been acquired. Many temporary rights-of-way have been acquired for timber sale work**.**

Results/Evaluation

We do not currently have a proactive right-of-way acquisition program. It is opportunity driven: usually if somebody comes to us and offers one or wants to do a reciprocal ROW exchange, we respond. If we need access across private property for logging, we pursue that but generally only receive a temporary right-of-way from land owners. We have not developed a ROW program based on consideration of program areas.

Conclusions

We still have many private lands with no secured rights-of-way across them to NFS lands.

Recommendations

- As time and staffing permits, identify private lands across which we need legal access. There are some old plans in files from 10 or 20 years ago. These should be reviewed to determine what progress was made and if the previously identified needs still exist.

Harvested Land Adequately Restocked

Medicine Bow Item Objective: 2.c — Frequency of Measurement: Annual
Routt Monitoring Item: 1-10 — Reporting Period: Annual

This monitoring item asks the question:

Are stands adequately restocked within 5 years of final harvest treatment?

36 CFR 219.27 requires a determination of compliance with the Forest and Rangeland Renewable Resources Planning Act of 1974. The CFR requires that harvested lands be adequately restocked within 5 years after final harvest, as specified in the Routt and Medicine Bow NF Plans.

Monitoring Protocol/Data Collected

Annual monitoring reports rely on the FACTS database to list stands and acreages that had final harvest 5 years prior and to identify which stands and acres have a regeneration certification code. If a harvested stand is adequately restocked, but lacks the regeneration certification code in the database, the stand is considered not adequately stocked.

Results/Evaluation

According to CFR 219.27(c)(3), "When trees are cut to achieve timber production objectives, the cuttings shall be made in such a way as to assure that the technology and knowledge exists to adequately restock the lands within 5 years after final harvest." Final harvest is defined as "clearcutting, final overstory removal in shelterwood cutting, seed tree removal in seed tree cutting, and selection cutting for a regeneration purpose." "Research and experience shall be the basis for determining whether the harvest and regeneration practices planned can be expected to result in adequate restocking."

The process for monitoring 5-year restocking success is based on scheduling and recording the results of regeneration (restocking) surveys in the FACTS database. If a regeneration survey indicates a lack of seedlings, the District can schedule planting or seeding with scheduled regeneration surveys to monitor restocking success. Table 40 gives the total final harvested acres between 2004 and 2008 for the Medicine Bow NF and 1998 and 2008 for the Routt NF, which should be restocked as of 2013.

Medicine Bow NF

As of 2013, all but 19 acres of the 656 acres harvested between 2004 and 2008 were adequately restocked (Table 40). Of the 19 acres, 7 acres will be scheduled for planting and 13 acres will be re-surveyed in 2014. Surveys on the 13 acres in 2011 showed small seedlings present. It is

anticipated that these acres will naturally meet stocking. Should the 2014 surveys show inadequate stocking, then fill-in planting will be considered. For those units with final harvest in 2008, all acres were adequately restocked (Table 41).

Routt NF

As of 2013, all but 104 acres of the 3,897 acres harvested between 1998 in 2008 were adequately restocked (Table 40). Of the 104 acres, 86 acres will be scheduled for planting and 18 acres will be re-surveyed in 2015. Surveys on the 18 acres in 2013 showed small seedlings present. It is anticipated that these acres will naturally meet stocking. Should the 2015 surveys show inadequate stocking, then fill-in planting will be considered. For those units with final harvest in 2008, all but 55 acres were adequately restocked (Table 41). Of the 55 acres, 47 acres will be scheduled for planting and 8 acres will be re-surveyed in 2015. Surveys on the 8 acres in 2013 showed small seedlings present. It is anticipated that these acres will naturally meet stocking. Should the 2015 surveys show inadequate stocking, then fill-in planting will be considered.

Table 40. Acres not Adequately Stocked in 2013.

Forest	Final Harvest (Acres)	Acres Not Adequately Restocked in 2013
Medicine Bow (2004-2008)	656	19
Routt (1998-2008)	3897	104

Table 41. Acres not Adequately Stocked in 2013 from 2008 final harvest units.

Forest	Final Harvest in 2008 (Acres)	Acres Not Adequately Restocked in 2013
Medicine Bow	195	0
Routt	208	55

Conclusions

Final harvest acres continue to restock naturally with some failures requiring reforestation planting. Districts are recognizing these failures and planning reforestation treatments where necessary.

Recommendations

- Continue to monitor for stocking failures and look for any trends that may indicate a reoccurring problem.

Costs

Legally Required Monitoring Item
Medicine Bow Subgoal 2.c — Frequency of Measurement: Annual
Routt Monitoring Item 3-2 — Reporting Period: Annual

This monitoring item asks the question:

Are costs of implementing programs occurring as predicted in the Supplemental Table S-3 of the FEIS?

Comparison of Estimated and Actual Costs

Forest costs are tracked for the MBR and Thunder Basin National Grassland as one (Table 42).

Table 42. 2012 and 2013 Expenditures for the Medicine Bow-Routt National Forests and Thunder Basin National Grassland.

Program	2012 Expenditures	2013 Expenditures
Bark Beetle Mitigation	$7,385,300	$0
Recreation Management	$2,108,759	$2,199,407
General Administration	$4,074,791	$4,101,231
Road/Trail Maintenance & Construction	$1,979,264	$2,810,809
Mineral and Mining Management	$902,459	$970,091
Fire Preparedness	$1,950,706	$2,029,492
Fire Suppression	$14,493,905	$2,089,527
Timber & Vegetation Management	$2,334,626	$4,831,701
Fleet/Vehicles/Fuel/Maintenance	$1,811,637	$1,915,378
Facilities Maintenance and Construction	$539,885	$429,731
Lands and Realty	$404,720	$402,403
Wildlife & Botany Management	$944,112	$1,115,232
Range Administration	$1,076,865	$1,201,093
Planning, Inventory, and Monitoring	$887,555	$928,942
Wildland Fuels Reductions	$593,002	$1,326,028
Cost Recovery (permit processing fees)	$37,921	$72,651
TOTAL	$41,525,507	$26,423,716

Comparison of Estimated and Actual Outputs and Services

Legally Required Monitoring Item
Medicine Bow Objective 2.c.1 — Measurement Frequency: Annual
Routt Monitoring Item 3-1 — Reporting Period: Annual

This monitoring item asks the question:

Are outputs of goods and services being produced at a rate consistent with the projections in Supplemental Table S-2 of the FEIS?

Outputs, services, and accomplishments are reported in detail in the MBRTB Annual Accomplishment Report, available online at http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5415036.pdf or from the forest web site under "Quick Links" at http://www.fs.usda.gov/main/mbr/home.

The Forest Service no longer tracks outputs and services as presented in Table S-2 of the Forest Plans. However, outputs are reported in monitoring items as appropriate and feasible, such as in the monitoring item for water quality.

Communities

Medicine Bow Item Objective: 2.c 36 CFR 219.7(f)
Routt Monitoring Item: 3-3 and 3-4 — Reporting Period: 5-year

This monitoring item asks the questions:

How are forest management activities affecting land, resources, and communities adjacent to the National Forest?

How well is the forest interacting and planning in cooperation with communities?

How are forest management activities affecting local employment and income?

Since 2008, the MBR has been concentrating its timber programs on human health and safety to benefit local communities. Roadside hazard tree clearing, utility line clearing, and range/highway right-of-way fenceline clearing have been priorities across the MBR. In addition, the forests have been approving and implementing WUI projects to reduce hazardous fuels adjacent to communities.

In 2013, the Medicine Bow NF sold 12 timber sales. Saratoga Investments purchased four of the sales with the remaining eight sales purchased by seven different purchasers. In 2013, the Routt NF sold five timber sales. Saratoga Investments purchased two sales, Montrose Forest Products purchased two sales, and a private individual purchased the fifth sale. 2013 marked the first year of implementing the Forest's Long Term Stewardship Contract (10-year) with Confluence Energy of Kremmling, Colo., which operates pellet biomass mills in Kremmling and Walden, Colorado. The contract resulted in 27,608 tons of biomass/timber sold.

Many local mills and communities benefit from timber sales each year. Saratoga Investments purchased the mill in Saratoga, WY and opened in January of 2013; the mill has approximately 100 employees. Thompson Logging is leasing the mill in Encampment, WY and opened in April of 2011; the mill has approximately 20–25 employees. Big Horn Forest Products in Laramie, WY opened in February of 2013 and has about 8–10 employees. Colorado Timber Resources opened a mill in Parshal, CO in 2012. The Pellet mills in Kremmling and Walden continue to

operate and were awarded a 10-year stewardship contract on the MBR in November of 2012. Several logging companies and small mills continue to operate in the local communities.

Across the MBRTB, more than 42,000 acres of fuel treatments have been completed since 2008; about half of those were completed in WUI areas. MBRTB crews accomplished 3,196 acres of hazardous fuels treatments in WUI during 2013.

Although much work remains to respond to the bark beetle outbreak, 2013 marked the start of a transition from response to the pine beetle to accelerating ecological restoration and fostering resiliency. In 2013, the MBRTB joined forces with the University of Wyoming, Ruckelshaus Institute on a multi-pronged project to share information about the future of our forest lands as we move beyond the pine beetle epidemic. Project components included:

- Three public workshops conducted in Laramie and Saratoga, Wyoming, and Steamboat Springs, Colorado to increase awareness of the epidemic status, the tools being used to treat impacted resources, and what the future holds.
- An annotated bibliography of peer-reviewed scientific literature to identify, organize, and summarize useful beetle epidemic information resources.
- A series of 10 short videos that document work being conducted on the Forest, recreation opportunities, and other topics relevant to the beetle epidemic.

The MBR continues to provide world-class recreation opportunities in both summer and winter to local recreationists and visitors from out of State and across the world. Local businesses benefit from the recreation opportunities, including more than 120 outfitters and guides that operate on the Forests under special use permits.

An active range program contributes to livestock operations for area ranchers. In 2013, MBR administered 245 active grazing allotments, more than 73,000 head months of cattle and 132,000 head months of sheep.

The MBR returns some revenues to counties, as shown in Table 43.

Table 43. Revenues returned to counties.

County	Revenue returned via 25% Fund distribution/1908 payments (2012 data)	Revenue returned via Secure Rural Schools Title II Funds
Medicine Bow NF (Wyoming)		
Albany	$310,029	$7,322
Carbon	$391,888	$15,904
Converse	$13,008	
Natrona	$2,306	
Platte	$708	
Total	**$717,939**	
Routt NF (Colorado)		
Garfield	$30,704	
Grand	$68,779	
Jackson	$193,210	$4,501
Moffat	$28,976	
Rio Blanco	$75,788	
Routt	$231,764	$11,074
Total	**$629,221**	**$38,801**

Goal 3: Scientific and Technical Assistance

Collaboration

Medicine Bow Item Objective: 3.a.1 Reporting Period: 5-year

This monitoring item asks the question:

How do we address problems with Forest land management, invasive species, animal damage, and noxious weeds in a collaborative way?

Forest personnel continue to work cooperatively with adjacent land owners and local governments on issues/projects such as noxious weeds, aquatic and terrestrial wildlife habitat, emergency preparedness, travel management, recreation, and watershed improvement projects.

The Forest works closely with both State Departments of Agriculture regarding noxious weed management efforts. Cooperative agreements are in place with three Colorado and four Wyoming counties to inventory and treat noxious weeds. Two contracts for weed control work are in effect on the Routt. Numerous partners contribute funding and/or time to assist in treatment efforts, including some grazing permittees.

A national memorandum of understanding (MOU) exists between the Forest Service and the U.S. Animal and Plant Health Inspection Service (APHIS) for animal damage management (ADM). APHIS—ADM has prepared regional or state environmental documents for all management efforts in both Colorado and Wyoming. Each year, an annual ADM plan is prepared and coordinated between the Routt Districts and the Grand Junction ADM regional office and between the Medicine Bow Districts and the Casper ADM regional office.

A national MOU exists between the Public Lands Council and the Forest Service (as well as the BLM) for cooperative rangeland monitoring with grazing permittees. The number of grazing permittees who are assisting in collection of allotment monitoring data is increasing each year. Cooperative Extension Service personnel from both land grant universities are actively involved in conducting training and working with producers. The Wyoming Stock Grower's Association and the Colorado Cattlemen's Association have been instrumental in urging their members to be involved in allotment monitoring efforts and in training and coordination efforts with Forest Service permittees.

The Forest and the Laramie County and Laramie Rivers Conservation Districts have entered into an MOU to address range and water quality issues in the Crow Creek watershed on Pole Mountain.

Employees of the Wyoming Department of Agriculture (and to a lesser degree, the Colorado Department of Agriculture) have been heavily involved in on-the-ground coordinated management efforts, reviews of existing and desired conditions, and in helping to strengthen allotment management coordination for common objectives.

Partnerships

Legally Required Monitoring Item
Routt Monitoring Item 2-5 Reporting Period: Annual

This monitoring item asks the question:

To what extent is public assistance and participation being utilized in implementing monitoring activities?

How are partnerships contributing to maintaining or enhancing resource opportunities?

Partnership Examples from 2013

The MBR engages in private and public partnerships at both the forest and district levels. Many partnerships have existed for several years, and are able to build on past efforts to implement monitoring activities and enhance resource opportunities. These are just a few examples:

- Numerous mills and facilities throughout northwest Colorado and southern Wyoming assist in accelerating ecological restoration and fostering resiliency on the MBR, resulting in job creation and preserving industry infrastructure.
- Formal partnerships with Colorado Corrections Industries, Historicorps, Montana Conservation Corps, Rocky Mountain Youth Corps, University of Wyoming Haub School of the Environment and Natural Resources, Wyoming Conservation Corps, and Yampatika continue to yield thousands of hours of volunteer work each year.
- For the past several years the MBR has partnered with several groups to complete hazard tree mitigation work in recreation sites across the unit, including campgrounds, picnic areas, trailheads, and trails. Crews included the Rocky Mountain Youth Corps, Wyoming Conservation Corps, Colorado Department of Corrections and the "Green Veterans."
- The botany program partners with a variety of Federal, State, and non-profit agencies to enhance opportunities to conduct programmatic botany work such and inventory and monitoring, contribute to the native plant materials program, and perform outreach and education. Active partners in the 2008–2013 included University of Wyoming, CSU, WYNDD, CNHP, Rocky Mountain Herbarium, Wyoming Office of Tourism, Wildland Restoration Volunteers, and numerous local schools and clubs. Some examples of botany projects that utilized funding and in-kind matches from partners are listed below.
    - Wildland Restoration Volunteers – Native seed collection; FS contributed $3,500 and the partner contributed $14,000.
    - North Park High School – On-going development of native seed materials for MBR restoration projects, including planting at Grizzly Guard Station. The FS is contributing $3,500 and the partner is contributing $3,300.
    - Interpretive Pollinator Garden – Funded through the Wyoming Office of Tourism, Snowy Range Scenic Byway funds, and FS contributions. Constructed by Boy Scout Troop 173, The Laramie Master Gardeners, WyoTech students, and University of Wyoming graduate students in botany.

- Status Report on Sensitive Plant Species of Pole Mountain Wetlands – an important inventory funded by a Master Challenge Cost Share Agreement between the FS Inventory and Monitoring program and WYNDD.

- Cooperative watershed plans with Conservation Districts and State agencies provide strategic support to improving and maintaining water quality. The MBR strives to improve watershed condition through ditch and road decommissioning and aquatic organism passage projects, all funded with partner support.
- Recreation resources are being enhanced with partnerships. In 2013, the Laramie Ranger District field verified Mountain Home OHV trails with Wyoming State Trails for 2014 construction and installed an Albany motorcycle trail kiosk and trail signs with the Laramie Motorcycle Club.
- Many partners have contributed to campground restoration and planting at Libby Creek (LAR), North Fork (LAR), Hahns Peak (HBPE), Teal Lake (Parks), Big Creek Lakes (Parks) and Historic Grizzly Guard Station. RAC funding enabled much of the campground tree planting projects.

Interpretation and Watchable Wildlife

Medicine Bow Objective 3.a.3 Reporting Period: Annual

This monitoring item asks the questions:

To what extent have watchable wildlife activities been developed?

Does the Forest provide interpretive experiences that describe ecosystem functions and the Forest Service mission?

Monitoring Protocol/Data Collected

Annually, document the number of watchable wildlife and plant sites, the development and interpretation activities at existing sites, NatureWatch, and interpretive programs and experiences that provide environmental interpretation and awareness.

Results/Evaluation

The MBR sponsored several programs and projects in 2013. This was accomplished with forest personnel and many partnerships. Programs are distributed through schools districts, county fairs, and special events. Programs include Children's Forest: Environmental Literacy, Project Learning Tree, Earth Day, Wyoming Upward Bound and many more. Over 500 students and adults were reached through the various programs.

Wildlife

A video series titled *Our Future Forests: Beyond Bark Beetles* was produced which featured a segment on monitoring elk movement in beetle killed forests. This video was shown throughout several locations in Wyoming and northern Colorado.

Aquatics

Two Forest programs and one cooperative program on the Medicine Bow NF introduce children and their parents to recreational fishing and principles of aquatic ecology. Each year, the Brush

Creek/Hayden Ranger District and the Laramie Ranger District hold environmental education and recreational fishing programs, respectively. Because of water-availability issues (e.g., calls on the river), Family Fishing Day (Laramie Ranger District) has not been held in several years. This issue is being resolved by the water-rights administration, but no event was held in 2013. These programs integrate recreational fishing skills and environmental awareness conducive to understanding and protecting aquatic ecosystems. Occasionally, Medicine Bow NF fisheries specialists participate in external-partner environmental programs sponsored by groups such as Trout Unlimited.

On the Routt NF, aquatics personnel typically participate in second-party environmental education and recreational fishing programs sponsored by groups such as Yampatika. These programs aim to integrate recreational fishing skills and environmental issues related to understanding and protecting aquatic ecosystems.

Plants

In 2009–2013, many Celebrating Wildflowers interpretive talks and activity/information booths were presented in local Colorado and Wyoming communities. Topics included native plant gardening, native pollinators, the science of pollination, and raising wild bees. One new NatureWatch Viewing site, an interpretive native plant and pollinator garden, was developed in 2013, and five new Celebrating Wildflowers wildflower viewing sites were designated on the MBR in 2011 and 2012.

Celebrating Wildflowers

New Celebrating Wildflower Sites:

- Snowy Range Scenic Byway (Wyoming State Highway 130). Medicine Bow NF, Brush Creek-Hayden and Laramie Ranger Districts.
- Vedauwoo Recreation Area on Pole Mountain. Medicine Bow NF, Laramie Ranger District.
- Buffalo Pass. Routt NF, Parks and Hahns Peak/Bears Ears Ranger Districts.
- Lynx Pass. Routt NF, Yampa Ranger District.
- Parkview Mountain. Routt and Arapaho-Roosevelt National Forests, Parks & Sulphur Ranger Districts.

Celebrating Wildflowers Outreach Colorado:

- The Routt NF Botany Program conducted Celebrating Wildflowers interpretive programs for elementary school children and in partnership with the Jackson County Outdoor Education Network. We also began a self-sustaining partnership with Walden Elementary School in which the children develop wildflower artwork for a Celebrating Wildflowers calendar that they sell to raise money for purchasing butterfly larvae.
- Pollinator Education: The Routt NF Botany Program conducts programs each year for elementary school children about the different types of pollinators and their ecological importance.
- Jackson County Outdoor Education Network (JCOEN): The Jackson County Outdoor Education Network is an on-going collaboration between the Forest Service, USFWS, BLM, CSU-Extension, Future Farmers of America, and Owl Mountain Partnership, and is aimed at networking local resources pertaining to education. The Routt NF Botany

Program helps develop botany educational materials that are presented at Jackson County Outdoor Education Network events throughout the school year.

Celebrating Wildflowers Outreach Wyoming:

- Curt Gowdy Field Day (2013) "Forest Ecology and Phenology on Pole Mountain" presentation (35 children reached).
- Laramie Garden Club (2013) "Raising Native Bees in Laramie" presentation (30 adults reached).
- Berry Biodiversity Center Pollinator Party (2013) "Native Bee Condo Construction" booth (20 children and 5 adults reached).
- Upward Bound Natural Resources/Forestry Class: University of Wyoming (2013) "The Science of Pollination" presentation and activity (10 children reached).
- Laramie Local Foods Gathering (2012) "Utilizing Native Bees for Home Garden Pollination" presentation (28 adults reached) and booth (15 adults reached).
- Garden Workshop: Laramie Rivers Conservation District (2012) "Native Bee Workshop" presentation (25 adults reached).
- Boy Scout Bumble Bee Brigade: University of Wyoming (2012) "See Like a Bumblebee" 4 separate presentations (100 children and 15 adults reached).
- Upward Bound Natural Resources/Forestry Class: University of Wyoming (2012) "The Science of Pollination" presentation and activity (10 children reached).
- Wyoming State Park Summer Outdoor Slam (2011) "Wildflower identification and nature artwork" booth (80 children and 20 adults reached).

2009 and 2010: No botanist was employed on the Medicine Bow NF and no Celebrating Wildflower outreach activities were conducted in Wyoming.

New NatureWatch Viewing Site:

- Interpretive Native Plant and Pollinator Garden at the Laramie Ranger District Centennial Visitor Center. Funded in cooperation with the Wyoming Office of Tourism and designed, landscaped, and planted in partnership with the University of Wyoming, Wyoming Technical College, Laramie Master Gardeners, and the Boy Scouts of America.

Figure 21. Interpretive Native Plant and Pollinator Garden in Centennial, WY during rock installation with volunteer Boy Scouts, and after planting was complete, June 2013.

Conclusions

The MBR has a strong and successful environmental educational program.

Recommendations

- Continue to work with partners to deliver environmental educational programs.
- Continue to sponsor and participate in interpretative, environmental education, and recreational fishing programs.
- Celebrating Wildflowers outreach is an effective way to provide interpretive activities and communicate information on species, habitats, and ecosystem functions to the public. Continue offering Celebrating Wildflowers outreach activities forest-wide.

Actions Taken on Recommendations Included in Past M&E Reports

- Recommendation: Continue to work with partners to deliver environmental educational programs.
    - Action Taken: The MBR continues to provide interpretation and watchable wildlife programs through interactions with schools and providing wildlife viewing and interpretation sites in the field for the public enjoyment.

Knowledge Base

Medicine Bow Objective 3.b.1 Reporting Period: Annual

This monitoring item asks the question:

How can we build technical knowledge bases across all land ownerships?

Monitoring Protocol/Data Collected

Annually, document methods used to increase knowledge and share information between the Forest Service and other agencies across all land ownerships.

Results/Evaluation

- The MBR joined forces with the University of Wyoming, Ruckelshaus Institute this year on a multi-pronged project to share information about the future of our forest lands as we move beyond the pine beetle epidemic.
- To ensure a skilled and diverse future workforce, the MBR is in its third year of proactively advertising seasonal positions. Regional colleges, universities, veterans groups and now Tribes have been engaged to recruit and foster the next generation of USFS resource specialists. Colorado State University, New Mexico Highlands, and the University of Wyoming are among the institutions that have been involved.
- The MBR has increased its presence at the world-renowned venues and events of Cheyenne Frontier Days. Efforts have included:
    - Hosting the Forest Service Region 2 Mule Pack String, which won the 2013 award for “Best Mounted Group” in the Grand Parade.
    - Riding on a historic fire engine with Wyoming Division of Forestry staff and Smokey in one of the many parades.

    - Sharing information about the Medicine Bow and other National Forests in Wyoming, while co-staffing the "Land Office" in Frontier Park with the BLM.

- The MBR has continued to foster its long-standing relationship with the City of Cheyenne's Board of Public Utilities, which is permitted to operate three reservoirs and associated water pipelines. In addition to the City being a cooperative permit holder, they have contributed dollars to fisheries research projects on streams associated with their permit and in-kind contributions to pine beetle hazard tree mitigation.
- To help foster a healthy future forest, over 700 limber pine and bristlecone pine seedlings were planted at the Pole Mountain Work Center for the Southern Rockies Rust Resistance Trial. The trial is a multi-year project to increase White Pine Blister Rust resistance within five-needle pine populations. This is a collaborative project with the Rocky Mountain Research Station, CSU, and the Forest Health Protection program.
- Many partnerships with CNHP, WYNDD, and Federal, State, and county agencies make habitat improvement projects possible. These partnerships also contributed to approximately 13,150 acres of species and habitat inventory in 2013, including threatened species (lynx), Region 2 sensitive species (boreal toad, northern leopard frog, wood frog, and American marten), MIS (goshawk, snowshoe hare), and species of local concern (sage-grouse).
- In partnership with the Upper Colorado Environmental Plant Center, CSU, Colorado Department of Transportation, and Wildlands Restoration Volunteers, 941 acres were inventoried for plant species, including 25 R2 sensitive species.
- Air quality is monitored in the Mt. Zirkel Wilderness by the National Atmospheric Deposition Program, the National Trend Network, and the Mercury Deposition Network. Data has been collected since the mid-1980s, and demonstrates that the Class 1 airshed around the Mt. Zirkel Wilderness remains in compliance with national and state air quality standards.
- Rare plant surveys (began in 2004 and following various scientific protocols) have been completed for NEPA purposes on projects covering between 2/3 and 3/4 of the MBR. At this time a majority of the available survey data collected by forest employees has been entered in the Natural Resource Information System (NRIS) threatened, endangered, and sensitive species (TES) database. In 2011, this effort was continued by adding to the database rare plant element occurrences for the Brush Creek/Hayden District collected by range staff from 1994–2011. In 2012, a data merge was initiated with WYNDD that imported the USFS NRIS TES database into the State of Wyoming rare plant database. Exports from this database are available upon request to cooperating State and Federal agencies and the general public. Botanists from the MBR also serve in an advisory capacity for WyoBio, the new University of Wyoming educational database for information sharing on plant and animal sightings across Wyoming, intended for a public audience.
- The Routt NF Botany, Hydrology, and Soils Programs are collaborating with the Rocky Mountain Research Station on a comparative study of different burn pile rehabilitation methods. The study compares no treatment vs. scarification vs. planting with local genetic native seed material vs. scarification and planting with local genetic seed material. Results are anticipated in 2014 and may benefit other bark-beetle forests, as well as help guide future vegetation management treatments with respect to slash pile development and management.

- In 2009–2013, several reports on the flora of the MBR were written by cooperating agencies. WYNDD completed a publication detailing a rare wetland plant and fen inventory on the Pole Mountain unit of the Laramie Ranger District (Heidel et al. 2013) and researchers at the University of Wyoming published a thesis and peer-reviewed publication detailing a floristic inventory of the Medicine Bow NF (Lukas et al. 2012).

Recommendations

- The MBR should continue to use standardized protocols and databases and continue to support and fund cooperative efforts for data collection, data merge, and collaborative research with outside agencies.

Implementation Monitoring

Endangered Species Act

Medicine Bow Item Subgoal 1.b

Frequency of Measurement: Annual
Reporting Period: Annual

This monitoring item asks the question:

Are actions identified in national recovery plans for threatened and endangered species being implemented where opportunities exist on the Forest?

Terrestrial Wildlife

Monitoring Protocol/Data Collected

Review opportunities to implement national recovery plans, and describe any actions taken in support of a national recovery plan.

Results/Evaluation

There is a recovery outline for Canada lynx (threatened status) but no recovery plan has been developed. MBR is meeting objectives in the recovery outline. This includes incorporation of management direction for lynx into the Forest Plan, in this case, through the incorporation of the SRLA. The SRLA includes guidance for maintaining and improving lynx habitat, an objective of the recovery outline. The SRLA was developed from the Lynx Conservation Assessment and Strategy (LCAS) which was published in August 2000. An update to the LCAS will be completed in 2014.

There is no recovery plan for the Preble's Meadow Jumping Mouse (threatened status).

Conclusions

Although there are no national recovery plans for Canada lynx or the Preble's Meadow Jumping Mouse, the MBR does follow direction as outlined in the SRLA and consults with the USFWS on effects to lynx and Preble's jumping mouse and their habitat. The revised or updated LCAS will not change current direction in the SRLA. However, some assumptions that were used in 2000

to draft the LCAS may change. Specifically, the effects/impacts to lynx habitat from some management actions may be less than originally thought.

Recommendations

- Continue to consult with the USFWS.
- Implement recovery plans when they are developed.

Actions Taken on Recommendations Included in Past M&E Reports

- 2012 Recommendations: Continue to consult with the U.S. Fish and Wildlife Service and implement recovery plans when they are developed.
    - Action Taken: The Forests continue to consult with USFWS regarding potential affects to lynx and Preble's meadow jumping mouse, as well as other TEPC species.

Plants

Monitoring Protocol/Data Collected

Review opportunities to implement national recovery plans, and describe any actions taken in support of a national recovery plan.

Results/Evaluation

To date there are no threatened or endangered plant species or suitable habitat documented on the MBR. Three plant species occur in the vicinity or downstream of the MBR, and impacts to these species are considered during the NEPA process. These species are Ute ladies' tresses (*Spiranthes diluvialis,* threatened), western prairie fringed orchid (*Platanthera praeclara,* threatened), and blowout penstemon (*Penstemon haydenii,* endangered). Surveys and GIS reconnaissance were conducted in 2010–2013 to determine that no suitable habitat exists for Ute ladies' tresses on the MBR. Despite extensive surveys, there has been no suitable habitat identified for blowout penstemon, and the USFWS recently revised the range of this species to exclude all NFS lands in Wyoming. No suitable habitat is expected on the MBR for western prairie fringed orchid; however, it occurs along the Platte River in Nebraska and is affected by water depletions.

Habitats for TES plant species on the MBR are being maintained and enhanced. Maintenance and enhancement of TES species habitats are implemented through habitat improvement projects, design criteria in project planning, and monitoring. See monitoring sections on "Habitat Improvement" and "Threatened, Endangered, Sensitive Species and Management Indicator Species Habitat and Populations" in this report.

Conclusions

See monitoring sections on "Habitat Improvement" and "Threatened, Endangered, Sensitive Species and Management Indicator Species Habitat and Populations" in this report. All actions were in compliance with the draft recovery plan for Ute ladies' tresses (USFWS 1995), the Platte River Recovery Implementation Program (USFWS 2006), and the blowout penstemon recovery plan (USFWS 1992).

Recommendations

See monitoring sections on “Habitat Improvement” and “Threatened, Endangered, Sensitive Species and Management Indicator Species Habitat and Populations” in this report. Continue to monitor this item annually over the life of the plan.

Forest Plan Amendments

Routt Monitoring Item: General Question 1 Reporting Period: 5-year

This monitoring item asks the question:

Are there changes that have resulted in unforeseen issues requiring Forest Plan amendment?

In 2013, the Routt NF amended the plan a sixth time with a site specific amendment to Management Area 5.41. Recreation Standard 2 for this Management Area reads “Do not allow construction of new recreation facilities.” This standard was amended by waiving the standard entirely to allow for construction of summer trails within the area covered by the Steamboat Ski Area Summer Trails EA.

The MBR is currently collaborating with the BLM to prepare environmental impact statements and supplemental environmental impact statements to incorporate greater sage-grouse conservation measures into BLM land use plans and the MBR Forest Plans. This analysis is expected to lead to a ROD and Forest Plan amendments in FY 2015.

Implementation of Standards and Guidelines

Legally Required 36 CFR 219.12 (k) Frequency of Measurement: Annual
Routt Monitoring Item 2 Reporting Period: Annual

These monitoring items ask the questions:

Are the standards and guidelines prescribed in the plan being incorporated in NEPA documents and implemented on the ground?

Have site-specific decisions successfully implemented the Forest Plan’s Direction?

Monitoring Protocol/Data Collected

Several implementation monitoring efforts occur each year on the MBR. Many are documented as part of other monitoring items, but each year IDTs from the forest and districts visit projects specifically to monitor implementation of Forest Plan standards and guidelines and project-specific design features. For 2013, not all Districts were able to complete project monitoring field trips due to the lapse of government funding in October 2013. Appendix D describes the 2013 Forest monitoring IDT field trip and the Brush Creek/Hayden, Douglas, Hahns Peak/Bear’s Ears, and Parks Ranger Districts’ monitoring field trips.

Results/Evaluation

Generally, monitoring field trips reveal that standards and guidelines, as well as project-specific design features included in decision documents, are adhered to during project implementation. In some cases, the forest or district IDT will recognize areas in which implementation could be

improved to better meet the intent of standards, guidelines, or design features. These cases are documented and carried forward as actions for future projects.

Recommendations

- Continue to complete annual monitoring field trips to identify strengths and weaknesses of project implementation as well as strategies to better implement Forest Plan standards and guidelines.
- In cases where wildlife standards or guidelines may not be met and the project purpose and need is for human health and safety, consider project-specific plan amendments.
- Sale administration personnel responsible for implementing the decisions in sale contracts need to be more involved during project development. This would likely help identify opportunities and limitations, especially with design features.

Desired Conditions

Routt Monitoring Item: General Question 3 Reporting Period: 5-year

This monitoring item asks the question:

Is the Forest moving closer to the desired condition identified in the Revised Plan at both the geographic area and management area scales?

Results/Evaluation

Throughout the MBR, projects are completed in compliance with Management Area and Geographic Area direction to either maintain current conditions or move toward the desired conditions of the area. Several natural and human-caused conditions exist, however, that may compromise achievement of desired conditions in many areas.

- In areas where timber harvest is part of desired conditions, the following challenges exist:
    - Spruce/fir forest management is very difficult due to implementation of the LCAS and the SRLA.
    - Young or regenerated stands are also difficult to manage for timber purposes as a result of the SRLA.
    - Mountain pine beetle and spruce bark beetle epidemics were not able to be controlled, and the current condition of dead pine and spruce stands was not anticipated within the Forest Plan. In many cases, desired future conditions may not be fully attainable for all resource values, particularly those that are related to forest cover, structure, composition, etc. Other desired future conditions that are not as impacted from the beetle epidemic (e.g., riparian areas, biodiversity, etc.) are probably still applicable.
- In both forests and rangelands:
    - Noxious weeds continue to be a challenge to control. Efforts to treat and control cheat grass, yellow toadflax, dalmation toadflax, hoary cress, spotted knapweed and leafy spurge, among others, continue. Some populations have

been controlled or even eradicated; however, new populations are discovered nearly every field season.

  - Unneeded and user-created roads and trails have been closed and opportunities for road decommissioning continue to be identified. However, lack of compliance with MVUMs continues to cause resource damage across the forest and is contrary to meeting the desired conditions of our geographic and management areas.

- Where scenic values are a priority, the following challenges exist:
  - Mountain pine beetle and spruce beetle have changed the landscape significantly and changed the scenery across the forest.
  - Hazard tree removal along roads, power lines, and fence lines, has created unnatural corridors across the forest while improving safety and delivery of services.
  - In many cases, such as tree clearing in campgrounds and administrative sites, hazard tree removal has short-term impacts that will eventually give way to long-term benefits.

Conclusions

As described elsewhere in this report, it will be necessary to complete a vegetation assessment that documents the current condition of forest vegetation at the end of the mountain pine beetle outbreak. This assessment would inform the need for forest plan amendments, including the need to modify geographic and management area direction.

Recommendations

- Change the small 5.1 MA south of the Seedhouse road and north of the South Fork trail to 1.32. This area contains a high natural lake known as “Island in the Sky”.
- Complete the Environmental Impact Statement for Invasive Plant Management so that the MBR has more tools and opportunities available to treat noxious weeds.

Scientific and Technical Assistance

Medicine Bow Objective 3.a & b 36 CFR 219.12(k) Reporting Period: annual

This monitoring item asks the question:

Are the action plans identified in Goal 3 – Scientific and Technical Assistance – being completed on schedule?

Monitoring Protocol/Data Collected

The action plans identified in Goal 3 of the Medicine Bow Plan are given below:

Goal 3 - Scientific and Technical Assistance: Develop and use the best scientific information available to deliver technical and community assistance and to support ecological, economic, and social sustainability.

- **Subgoal 3.a:** Provide better assistance in building the capacity of Tribal governments, rural communities, and private landowners to adapt to economic, environmental, and

social change related to natural resources (USDA Forest Service Strategic Plan 2000 Revision Objective 3.a).

  - Within 5 years, develop formal cooperation with Federal, State, and county agencies, individuals, and non-government organizations for control of noxious weeds, other invasive species, and animal damage.
  - Annually, provide opportunities for individuals and organizations to assist the Forest Service in implementing and monitoring the Forest Plan.
  - Within 10 years, identify, manage, develop, and interpret appropriate watchable wildlife and plant viewing sites.

- **Subgoal 3.b:** Improve the knowledge base provided through research, inventory, and monitoring to enhance scientific understanding of ecosystems, including humans, to support decision-making and sustainable management of the Nation's forests and rangelands (USDA Forest Service Strategic Plan 2000 Revision Objective 3.c).
  - **Objective:** Over the life of the plan, implement inventory and monitoring systems to provide scientific information and evaluation across landscapes. Inventory habitat and populate databases with information needed to manage terrestrial and aquatic ecosystems.

Results/Evaluation and Conclusions

Results and conclusions related to Goal 3 and Subgoals 3.a and 3.b are discussed in this report under “Communities,” “Partnerships,” “Interpretation and Watchable Wildlife,” and “Knowledge Base.”

Validation Monitoring

Management Indicator Species

Medicine Bow Objective 1.b 36 CFR 219.11(d) Reporting Period: 5-year

This monitoring item asks the question:

Are the selected management indicator species and their response to management activities in habitats on local National Forest System lands adequately representing the management effects on other species in the associated response guilds, and is the species membership identified for each response guild reasonably accurate and complete?

Monitoring Protocol/Data Collected

Extensive monitoring has been conducted for the northern goshawk on the Routt NF since 1993. The Medicine Bow NF began goshawk monitoring in 1994.

Marten sampling began on the Medicine Bow NF in 2004 using hair samples for DNA analysis. This protocol continued until 2011, when it was determined that a more reliable monitoring protocol was needed. A new protocol using cameras was initiated in 2011, thus monitoring data using the new protocol is limited.

Snowshoe hare monitoring, using pellet transect counts, began on the Medicine Bow NF in 2006.

Songbird monitoring is done in conjunction with the Rocky Mountain Bird Observatory and other partners.

Results/Evaluation

Management Indicator Species (MIS) were selected for the Medicine Bow Forest Plan because their population changes are believed to indicate the effects of management activities. Table 44 below presents the best available knowledge for the MIS species on the MBR regarding changes in habitat and population levels.

Table 44. Management Indicator Species

Common Name of MIS	Habitat Associated with MIS	MIS Population Trend	Changes in Habitat
American Marten	Mature coniferous habitat complex.	Population trends are inconclusive at this time. New monitoring protocols are in the infancy stages of development. However, it is suspected that there may be a reduction in the overall Forests potential populations.	Widespread bark beetle mortality has reduced the availability and quality of marten habitat on the Medicine Bow Forest. As these areas recover, marten habitat will improve.
Snowshoe Hare	Conifer stands with dense understory habitat complex.	Habitat has been impacted from the bark beetle epidemic. Populations appear to be decreasing from 2005-2012. Monitoring results for 2013 were not yet available for this report.	Widespread bark beetle mortality has reduced the availability and quality of snowshoe hare habitat on the Medicine Bow Forest.
Northern Goshawk*	Mature coniferous habitat complex.	Monitoring results indicate populations are stable to slightly decreasing from 2005-2013.	Widespread bark beetle mortality has reduced the availability and quality of goshawk habitat on the Forests.
Three-toed Woodpecker	Late-successional coniferous forests, with snags and downed wood, burned forest.	Populations are not apparent for the Medicine Bow Forest but are anticipated to increase as a result of increasing food resources and snag habitats associated with the bark beetle epidemic.	Snag and down woody debris habitats have increased habitat for the three-toed woodpecker over the last 5 years.
Golden-crowned Kinglet*	Late-successional, multi-aged, multi-sized spruce-fir habitat complex.	Populations are not apparent for the Forests but are expected to remain stable or slightly decrease due to the bark beetle epidemic.	Canopy has been reduced due to the bark beetle epidemic.
Wilson's Warbler*	Riparian/wetland habitat complexes.	Population trends are not apparent for the Forests but anticipated to be stable because of stable habitat conditions.	Generally, the availability and quality of riparian habitats for Wilson's warbler has not changed during the period from 2008-2013.
Lincoln Sparrow	Riparian/wetland habitat complexes.	Population trends are not apparent for the Medicine Bow Forest but are anticipated to be stable because of stable habitat conditions.	Generally, the availability and quality of riparian habitats for Lincoln's sparrow has not changed during the period from 2008-2013.
Vesper Sparrow	Grass/forb habitat complex.	Population trends are not apparent for the Routt Forest but anticipated to be stable	Generally, the availability and quality of grass/forb habitats for Vesper sparrow has not

Common Name of MIS	Habitat Associated with MIS	MIS Population Trend	Changes in Habitat
		because of stable habitat conditions.	changed during the period from 2008-2013.

Conclusions

It appears the MIS selected are good indicators of habitat change. The correlation between population trends and habitat alteration will only increase over time. Snowshoe hare has been more difficult to evaluate than other MIS due to the species' dramatic population fluctuation cycles every 8 – 11 years. The MBR continues monitor, refine plot selections, and validate if the snowshoe hare is an appropriate MIS.

Recommendations

- Continue to monitor MIS to improve the database for increased accuracy of population trends.

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Staff from all of the districts contributed much of the content in addition to photographs for this report.

Photographs are by USFS personnel unless otherwise noted.

Acronyms

ADM	Animal Damage Management
ALP	Automated Lands Program application
AML	Abandoned mineland
AMP	Allotment managment plan
AOP	Aquatic organism passage
APHIS	Animal and Plant Health Inspection Service
ASQ	Allowable sale quantity
ATV	All terrain vehicle
AUM	Animal unit months
BA/BE	Biological assessment / Biological evaluation
BCH	Brush Creek / Hayden Ranger District
BLM	Bureau of Land Management
BMPs	Best management practices
CDNST	Continental Divide National Scenic Trail
CDTA	Continental Divide Trail Alliance
CNHP	Colorado Natural Heritage Program
CP&L	Carbon Power & Light
CPW	Colorado Parks and Wildlife
CRCT	Colorado River cutthroat trout
CSU	Colorado State University
DBH	Diameter at breast height
DM	Decision memo
DN	Decision notice
EA	Environmental assessment
EIS	Environmental impact statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FACTS	Forest Service Activity Tracking System
FEIS	Final environmental impact statement
FMP	Fire management plan
FS	Forest Service
FSH	Forest Service Handbook
FSM	Forest Service Manual
FSVeg	Forest Service Vegetation database
FY	Fiscal year
GA	Geographic area
GIS	Geographic information system
HM	Head months
HPBE	Hahns Peak - Bears Ears Ranger District

HSS	Habitat structure stage
IDT	Interdisciplinary team
INFRA	Forest Service Database for Infrastructure
LADS	Landownership Adjustment Data System
LAU	Lynx analysis unit
LCAS	Lynx Conservation Assessment and Strategy
LRD	Laramie Ranger District
MA	Management area
MBR	Medicine Bow – Routt National Forests
MBNF	Medicine Bow National Forest
MBRTB	Medicine Bow – Routt National Forests, Thunder Basin National Grassland
M&E	Monitoring and evaluation
MIS	Management indicator species
MMBF	Million board feet
MOU	Memorandum of understanding
MPB	Mountain pine beetle
MVUM	Motor vehicle use map
NADP	National Atmospheric Deposition Program
NEPA	National Environmental Policy Act
NF	National Forest
NFS	National Forest System
NFSR	National Forest System road
NRHP	National Register of Historic Places
NRIS	National Resource Information System
NTN	National Trend Network
OHV	Off-highway vehicle
PFC	Proper functioning condition
R2	Region 2 (Rocky Mountain Region of USFS)
R2Veg	Region 2 Vegetation database
RAC	Resource Advisory Committee
RD	Ranger District
RMRS	Rocky Mountain Research Station (USFS)
RNA	Research natural area
RNF	Routt National Forest
ROD	Record of decision
ROS	Recreation opportunity spectrum
ROW	Right-of-way
SAD	Sudden aspen decline
SIO	Scenic integrity objective
SOLC	Species of local concern
SOPA	Schedule of Proposed Actions
SRLA	Southern Rockies Lynx Amendment
T&E	Threatened and endangered species
TBNG	Thunder Basin National Grassland
TES	Threatened, endangered and sensitive species

TMDL	Total maximum daily load
TPA	Trees per acre
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VQO	Visual quality objectives
WCP	Watershed conservation practice
WGFD	Wyoming Game and Fish Department
WIZ	Water influence zone
WUI	Wildland-urban interface
WYDEQ	Wyoming Department of Environmental Quality
WYDOT	Wyoming Department of Transportation
WYNDD	Wyoming Natural Diversity Database

Medicine Bow National Forest
Routt National Forest

Appendices for the 2013
10- and 15-Year
Comprehensive Monitoring And Evaluation Report

Appendix A: FY13 Decisions

Tables 1A and 2A list the projects completed on the MBR during FY 2013. The types of decisions under the National Environmental Policy Act (NEPA) include Decision Memos (DMs) for actions that fall under categorical exclusions, Decision Notices (DN) for Environmental Assessments (EAs), and Records of Decision (RODs) for Environmental Impact Statements (EISs). The project lists were generated from the database that produces the Schedule of Proposed Actions (SOPA). The SOPA daily and quarterly reports are available on the web at http://www.fs.fed.us/sopa/forest-level.php?110206.

Table A1: Medicine Bow NF Decisions Signed in FY13

Name	Decision Type	Date Signed	Primary Purpose
Projects Covering the Entire Forest			
White-Nose Syndrome: Caves and Abandoned Mines	DN	3/27/2013	Recreation Management Wildlife, Fish, Rare Plants Minerals and Geology
University of Wyoming Research Permit	DM	5/02/2013	Special Use Management
Projects Covering Multiple Districts			
3Cs Guiding-Snowmobile Guiding Service	DM	12/3/2012	Special Use Management
Cheyenne Board of Public Utilities Permit Renewal	DM	10/15/2012	Special Use Management
Jones Outfitting	DM	12/03/2012	Special Use Management
University of Wyoming Outdoor Adventure Program	DM	11/29/2012	Special Use Management
WY Military Department Helicopter Training	DM	10/11/2012	Special Use Management
Brush Creek/Hayden Ranger District (BCH)			
Bridger Peak AML Mine Site Reclamation	DM	10/01/2012	Minerals and Geology
Huston Park AML Mine Site Reclamation	DM	1/16/2013	Minerals and Geology

Johnson-Takala Ditch Permit	DM	3/12/2013	Special Use Management
Ryan Park Tract B Water Company Water Transmission Line	DM	1/23/2013	Special Use Management
US Geological Survey Stream Gages	DM	1/23/2013	Special Use Management
Wyoming State Engineers Office Stream Gages	DM	5/30/2013	Special Use Management
Bud Project	DN	9/25/2013	Wildlife, Fish, Rare Plants, Forest Products, Vegetation Management (other than forest products), Fuels Management, Watershed Management, Road Management
Laramie Ranger District (LRD)			
Laramie Junior High School	DM	11/29/2012	Special Use Management
Laramie Senior High School	DM	11/29/2012	Special Use Management
Rocky Top Guides	DM	12/03/2012	Special Use Management
Southern Rockies Five Needle Pine Restoration - Pole Mountain Blister Rust Resistance Planting	DM	10/02/2012	Research and Development
Bald Mountain Prescribed Burn Addition	DM	2/28/2013	Vegetation Management (other than forest products)
Federal Aviation Administration	DM	1/30/2013	Special Use Management
Happy Jack Endurance Ride	DM	2/05/2013	Special Use Management
Journeyman Adventures	DM	1/29/2013	Special Use Management
Laramie District North WUI Project	DN	2/11/2013	Vegetation management (other than forest products), Fuels management, Watershed management
A Bar A Ranch	DM	5/22/2013	Special Use Management
ABC Kids	DM	6/4/2013	Special Use Management
Albany Lodge	DM	4/19/2013	Special Use Management
Avid 4 Adventures	DM	4/19/2013	Special Use Management
Department of the Army DFMWR	DM	6/4/2013	Special Use Management
Episcopal Diocese of Wyoming	DM	3/29/2013	Special Use Management
GCR Communications, Communication Facility Authorization	DM	4/5/2013	Special Use Management
Keil Outdoor Adventures, LLC	DM	6/4/2013	Special Use Management
Laramie Enduro	DM	5/22/2013	Special Use Management

Solid Rock Outdoor Ministries	DM	4/19/2013	Special Use Management
Table in the Wilderness	DM	6/4/2013	Special Use Management
Verizon Wireless, LLC	DM	5/29/2013	Special Use Management
WYDOT Pole Mountain ROW Fence Hazard Tree Clearing	DM	4/9/2013	Vegetation management (other than forest products), Special use management
Bar-Nunn Hunting	DM	7/17/2013	Special Use Management
Laramie County Community College	DM	7/17/2013	Special Use Management
Snowy Range Ski Area Light Installation	DM	9/20/2013	Special Use Management
Douglas Ranger District (Laramie Peak Unit)			
North Antelope-Rochelle Mine (NARM) Dewatering Project	DN	10/25/2012	Special Use Management
South Tepee Pasture Spring and Water Tank	DM	10/01/2012	Grazing Management
VRE Towers, LLC	DM	1/25/2013	Special Use Management
Inyan Kara Grazing Association Mush Creek Pipeline (livestock)	DM	5/01/2013	Grazing Management
Gateway West 230/500 kv Transmission Line Project	ROD	9/23/2013	Special Use Management
Antelope Mine Rail Spur Expansion	DN	9/25/2013	Minerals and Geology
Lance Oil Antelope FED 4171-10-21 - Road Use & Access Permit	DM	8/30/2013	Special Use Management, Road Management
Mackey Road Relocation	ROD	9/25/2013	Minerals and Geology
Rare Elements Monitoring Well	DM	9/09/2013	Special Use Management
Thunder Basin Coal Company, LLC Clinker Mining Addition	ROD	9/25/2013	Minerals and Geology

Table A2: Routt NF Decisions Signed in FY13

Name	Decision Type	Date Signed	Primary Purpose
Projects on Multiple Districts			
US Pro Cycling Race Special Use Authorization	DM	07/08/2013	Recreation Management
Hahns Peak/Bear's Ears District (HPBE)			
Atmos Energy Pipeline Special Use Permit Reissue	DM	2/21/2013	Special Use Management
Eaton Spring Permit (formerly re-issuance of a Spring Box and Pipeline Permit)	DM	1/03/2013	Special Use Management
Reeves Private Property Access	DM	1/03/2013	Special Use Management

Name	Decision Type	Date Signed	Primary Purpose
Emery Spring Development Proposal	DM	4/22/2013	Special Use Management
Mt. Werner Water and Sanitation Water Tank	DM	6/03/2013	Special Use Management
Reconstruction of the Elkhead Creek Boreal Toad Exclosure Fence.	DM	6/13/2013	Special Area Management, Wildlife, Fish, Rare Plants, Grazing Management, Watershed Management
Buffalo Pass Reroutes & Relocations	DM	7/22/2013	Recreation Management, Special Use Management
Steamboat Ski Area Four Points Lodge	DM	7/1/2013	Recreation Management, Special Area Management
Steamboat Ski Area Maintenance Projects FY2013	DM	7/1/2013	Recreation Management, Special Use Management
Yampa Valley Electric Assn Special Use Permit Amendment	DM	7/22/2013	Special Use Management
Parks Ranger District			
Jack Creek II	DM	1/7/2013	Fuels Management
Progeny II	DM	3/06/22013	Forest Products, Vegetation Management (other than forest products), Fuels Management
Ellis Trail Relocation	DM	5/01/2013	Recreation Management, Road Management
Northgate Rangeland Analysis	DN	7/31.2013	Grazing Management
Yampa Ranger District			
MAKI Private Property Access	DM	3/04/2013	Special Use Management
Somes Properties, LLC Road Access	DM	2/6/2013	Special Use Management
Summer Home Use Re-Issuance	DM	1/03/2013	Special Use Management
10 Year Outfitter Guide Permit Issuance; Northern Colorado Outfitters	DM	5/03/2013	Recreation Management, Special Use Management
Bear River/Watson Creek AMP	DN	5/9/2013	Grazing Management
Shaffer Reservoir Dam Repair	DM	5/15/2013	Special Use Management
Temporary Outfitter/Guide Permit Renewals	DM	5/03/2013	Recreation Management, Special Use Management

Appendix B: Stream, Riparian, and Wetland Condition

Table B1. 2013 Stream and riparian area condition inventories. See previous annual monitoring reports for stream reaches monitored by year.

Stream Name	Ranger District	Reach length (miles)	Watershed#	Method/Rating
Colorado River Basin				
Egeria Creek	Yampa	0.5		USDA Forest Service 1996
Little Snake River Basin				
Trib to Independence Creek	HPBE	0.3	140500030102	USDA Forest Service 1996
Trib to King Solomon Creek	HPBE	0.3	140500030102	USDA Forest Service 1996
Silver City Creek	HPBE	0.3	140500030101	USDA Forest Service 1996
King Solomon Creek	HPBE	0.5	140500030102	USDA Forest Service 1996
Crane Park	HPBE	0.5	140500030101	USDA Forest Service 1996
Whiskey Creek	HPBE	0.5	140500030101	BLM, 1998; USDA Forest Service 1996
Dudley Creek	HPBE	0.3	140500030103	USDA Forest Service 1996
Box Creek	HPBE	1.3	140500030102	BLM 1998; USDA Forest Service 1996
Smith Creek	HPBE	1.7	140500030102	BLM, 1998
Middle Fork Little Snake River	HPBE	1.5	140500030101	BLM, 1998; USDA Forest Service 1996
Trib to Middle FK Little Snake River	HPBE	0.7	140500030101	BLM, 1998
Pioneer Creek	HPBE	2.1	140500030101	BLM, 1998
Grizzly Creek	HPBE	0.5	140500030301	USDA Forest Service 1996
Crawford Creek	HPBE	0.5	140500030301	USDA Forest Service 1996
Slater Creek	HPBE	1.0	140500030301	USDA Forest Service 1996
Slater Creek Reference	HPBE	0.3	140500030301	USDA Forest Service 1996
Trib. Roaring Fk L Snake – Sec 9	BCH	0.3	140500030106	Permanent Photo Point
Trib. Roaring Fk L Snake – Sec 5	BCH	0.3	140500030106	Permanent Photo Point
Trib. Roaring Fk L Snake – Sec 4	BCH	0.3	140500030106	Permanent Photo Point
Yampa River Basin				
Crowner Creek	Yampa	0.5	140500010106	USDA Forest Service 1996
Mill Creek	HPBE	0.3	140500010208	USDA Forest Service 1996
Rock Creek	HPBE	0.5	140500010209	USDA Forest Service 1996

Stream Name	Ranger District	Reach length (miles)	Watershed#	Method/Rating
North Platte River				
Newcomb Cr upper	Parks	0.3	101800010302	USDA Forest Service 1996
Newcomb Cr lower	Parks	0.3	101800010302	USDA Forest Service 1996
Newcomb Cr Reference	Parks	0.3	101800010302	USDA Forest Service 1996
Republic Cr	Parks	0.3	101800010203	USDA Forest Service 1996
Republic Cr Reference	Parks	0.3	101800010203	USDA Forest Service 1996
Pelton Creek	LRD	1.1	101800020106	BLM, 1998 / Functional at risk
Muddy Creek	LRD	0.5	101800020105	BLM, 1998 / Functional at risk
Lake Creek	LRD	2.3	101800020105	BLM, 1998 / PFC
Lake Creek – tributary – Lincoln Gulch	LRD	1.6	101800020105	BLM, 1998 / PFC
N Fk Squirell Cr – tributary	LRD	0.7	101800100204	BLM, 1998 / PFC
Boswell Cr – trib	LRD	0.7	101800100203	BLM, 1998 / PFC
Boswell Cr	LRD	1.5	101800100203	BLM, 1998 / PFC
Big Creek – trib	BCH	0.5	101800020303	2 Permanent Photo Points
N. Platte R – trib	BCH	1.0	101800020201	Permanent Photo Point
Calf Creek	BCH	0.5	101800020602	2 Permanent Photo Points
North Heather C	BCH	0.5	101800020703	Permanent Photo Point
N. Platte R trib – Sec 9	BCH	0.25	101800020101	Permanent Photo Point
N. Platte R trib – Sec 15	BCH	0.25	101800020101	Permanent Photo Point
N Cedar Cr	BCH	0.5	101800020603	2 Permanent Photo Points
N Cedar Cr	BCH	0.1	101800020603	Permanent Photo Point
Troublesome Cr	BCH	0.5	101800020603	Permanent Photo Point
Quimby Cr	BCH	0.3	101800020302	Permanent Photo Point
Line Cr	BCH	0.3	101800020302	Permanent Photo Point
N Fk Big Cr	BCH	0.25	101800020302	Permanent Photo Point
Ryan Park Cr	BCH	1.0	101800020501	2 Permanent Photo Points
E Fk Encamp.	BCH	0.5	101800020503	7 Permanent Photo Points
Encamp. River	BCH	1.0	101800020502	Permanent Photo Point
Beaver Cr	BCH	0.5	101800020507	Permanent Photo Point
N Brush Cr – Sec 33	BCH	0.25	101800020402	USDA Forest Service 1996
N Brush Cr – Sec 30	BCH	0.5	101800020402	USDA Forest Service 1996

Stream Name	Ranger District	Reach length (miles)	Watershed#	Method/Rating
Fish Creek – Sec 14	BCH	0.5	101800020402	USDA Forest Service 1996
Fish Creek – Sec 23	BCH	0.5	101800020402	USDA Forest Service 1996
Fish Creek trib	BCH	0.3	101800020402	USDA Forest Service 1996
N Brush trib	BCH	0.5	101800020402	USDA Forest Service 1996
Turpin Cr	BCH	0.2	101800040101	USDA Forest Service 1996
Arrastre Cr – Sec 9	BCH	0.25	101800020401	USDA Forest Service 1996
Arrastre Cr – Sec 10	BCH	0.5	101800020401	USDA Forest Service 1996
N Cottonwood Cr	BCH	1.0	101800020204	USDA Forest Service 1996; Permanent Photo Point
Rock Creek	LRD	1.0	101800040201	3 Permanent Photo Points
Ashenfelder Creek	DRD	0.25	101800080902	Permanent Photo Point
Saltlick Creek	DRD	0.25	101800080902	Permanent Photo Point
Roaring Fork	DRD	0.25	101800080902	Permanent Photo Point
North Laramie River	DRD	0.25	101800110701	Permanent Photo Point
Beaver Dam Creek	DRD	0.25	101800110602	Permanent Photo Point
Stratton Creek	DRD	0.25	101800080901	Permanent Photo Point
Horseshoe Creek	DRD	0.25	101800080903	Permanent Photo Point
TOTAL		**41.1miles**		

Table B2. Summary of reaches assessed or monitored for riparian and wetland condition 2009–2013.

River Basin	Ranger District	Monitoring Method	# of Surveys	Stream Miles
Little Snake River	HPBE	USDA Forest Service 1996	48	12
	HPBE	BLM, 1998	13	13.0
	BCH	USDA Forest Service 1996	11	7.3
Colorado River	Yampa	USDA Forest Service 1996	10	2.5
Yampa River	HPBE	USDA Forest Service 1996	41	10.3
	Yampa	USDA Forest Service 1996	14	3.5
	Yampa	BLM, 1998	7	4.8
	HPBE	BLM, 1998	8	5.4
		Permanent Photo Point		
North Platte	Parks	USDA Forest Service 1996	38	9.5
	Parks	BLM, 1998	6	11.4
	LRD	Permanent Photo Point	17	12
	LRD	USDA Forest Service 1996	2	1.0
	BCH	Permanent Photo Point	53	23.25
	BCH	USDA Forest Service 1996	1	1.0
South Platte	LRD	Permanent Photo Point	15	12

Appendix C: Water Quality

Table C1. 2013 Summary of forest water quality assessments for Colorado and Wyoming.

Water Body Name	Reach	Determination	Source
North Platte River Basin - Wyoming			
Bear Creek (Horse Cr)	WYNP10180012	Fully supports all designated uses.	WYDEQ, 2003
South Fork Little Laramie River	WYNP10180010-664	Fully supports all designated uses.	WYDEQ, 2004
Middle Fork Mill Creek	WYNP10180010	Fully supports all designated uses.	WYDEQ, 2004
Miller Lake	WYNP10180010	Fully supports all designated uses, except insufficient data to determine if fish consumption and contact recreation uses are supported.	WYDEQ, 2006
Hanging Lake	WYNP10180010	Fully supports all designated uses, except insufficient data to determine if fish consumption and contact recreation uses are supported.	WYDEQ, 2006
South Fork Hog Park Creek	WYNP10180002	Fully supports all designated uses.	WYDEQ, 2004
Smith North Creek	WYNP10180002-666	Fully supports all designated uses.	WYDEQ, 2004
Encampment River	WYNP10180002-086	Fully supports all designated uses, except insufficient data to determine if contact recreation uses are supported.	WYDEQ, 2008
North Platte River Basin-- Colorado			
North Platte Tributaries within wilderness areas (except South Fork Big Creek)	COUCNP01	Fully supports all designated uses	CDPHE, 2003
South Fork Big Creek	COUCNP01	Fully supports aquatic life	CDPHE, 2003
Encampment River	COUCNP02	Fully supports all designated uses	CDPHE, 2003
North Platte River—Camp Creek to Colo/Wyo border	COUCNP03	Fully supports all designated uses	CDPHE, 2003
North Platte River--Tributaries above Camp Creek	COUCNP04	Fully supports all designated uses	CDPHE, 2003
Illinois River	COUCNP04	Not fully supporting aquatic life	CDPHE, 2003
North Platte River--Tributaries Camp Creek to Colo/Wyo border	COUCNP04	Fully supports all designated uses	CDPHE, 2003
Michigan River	COUCNP05a	Fully supports all designated uses	CDPHE, 2003

Water Body Name	Reach	Determination	Source
Yampa River Basin-- Colorado			
Tributaries to Yampa River—Flattops Wilderness down to Elk River	COUCYA03	Fully supports all designated uses	CDPHE, 2003
East Fork Williams Fork in Flattops Wilderness	COLCLY08	Fully supports all designated uses	CDPHE, 2001
East Fork Williams Fork River	COLCLY09	Not assessed	CDPHE, 2001
Tributaries to Yampa River—in National Fores	COUCYA20	Fully supports all designated uses	CDPHE, 2003; 2006
Elk River—mainstem and tributaries	COUCYA08	Fully supports all designated uses	CDPHE, 2003
Little Snake River Basin-- Colorado			
Little Snake River Tributaries	COUCYA19	Fully supports all designated uses (except where noted in Table 3).	CDPHE, 2003

Table C2. Forest water quality impairments for Colorado and Wyoming.

Water Body Name	Ranger District	Threatened or Impaired*	Year first identified as T or I	Impaired Designated Use	Cause of Impairment
North Platte River Basin - Colorado					
S F Big Creek in Wilderness	Parks	M&E list	2004	Aquatic Life; drinking water	Metals-Cu, *E. coli*
Grizzly Cr	Parks	M&E list	2006	Aquatic Life	Unknown
Little Grizzly Cr	Parks	M&E list	2008	Recreation; drinking water; aquatic life	*E. coli*; Metals--Fe(Trec)
Lake Cr	Parks	M&E list	2008	Drinking Water; aquatic life	pH; Fe (Trec)
North Platte River Basin - Wyoming					
Bear Creek	LRD	M&E list (Un-determined - Category 3)	2010	Aquatic Life; drinking water	Metals-Cu
Yampa River Basin – Colorado					
Bushy Creek	Yampa	Yes - 303(d)	2010	Aquatic Life	Sediment
Little Morrison Cr	Yampa	M&E list	2012	Aquatic Life; Drinking water	Zinc; Iron (dissolved)
Lost Dog Creek	HPBE	M&E list	2008	Aquatic Life; Drinking water	Mercury
Little Bear Creek	HPBE	M&E list	2008	Drinking water; aquatic life	Copper; Zinc

Walton Cr	HPBE	M&E list	2010	Secondary Water Supply	Mn
Little Snake River Basin - Colorado					
Slater Creek	HPBE	M&E list	2008	Aquatic Life	Selenium
Little Snake River Basin - Wyoming					
W Fork Battle Creek	BCH	Yes – Impaired (TMDL*)	2000	Coldwater fisheries; Aquatic life	Metals
Haggerty Creek	BCH	Yes – Impaired (TMDL)	<1988	Coldwater fisheries; Aquatic life	Metals
South Platte River Basin - Wyoming					
N. Branch N Fork Crow Creek	LRD	Yes – 303(d) Impaired	2004	Contact Recreation	*E. coli*
Middle Crow Creek	LRD	Yes – 303(d) Impaired	2010	Contact Recreation	*E. coli*

***** Streams are placed on the Colorado Monitoring and Evaluation List (M&E list) when there is reason to suspect water quality problems, but there is uncertainty regarding one or more factors. TMDL=Total maximum daily load.

Appendix D: Field Trip Summaries for Monitoring Forest Plan Standards and Guidelines

Several implementation monitoring efforts occur each year on the MBR. Many are documented as part of other monitoring items, but each year IDTs from the forest and districts visit projects specifically to monitor implementation of Forest Plan standards and guidelines and project-specific design features. For 2013, not all Districts were able to complete project monitoring field trips due to the lapse of government funding in October 2013.

MBR Forest Monitoring Field Trip

The Forest IDT evaluated hazard tree clearing on the Brush Creek/Hayden side of Highway 130 (Snowy Range Scenic Byway). IDT members independently visited the project from District boundary to junction of 103 road. A face-to-face IDT meeting provided an opportunity for an interdisciplinary discussion of findings. The goal of this approach was to allow resource specialists to look at the aspects of the project most important to them. Specialists rarely are able to evaluate sites of interest when meeting at only a few locations in the field as a large group.

Results/Evaluation

Wildlife:

- No wildlife concerns related to the project. Issues looked at were lynx habitat and old growth forest.

Fire:

- The project is an overall improvement for ingress/egress and access for public and fire resources—this is VERY important. Project also improves firefighter safety.
- Hazard tree clearing along the highway improves chances of stopping a fire, but spotting potential is still high.
- High concentration of residual trees left in riparian areas creates a weak point in fire situations in what is normally a strong point.
- Burn piles have burned well so far, the rest will be burned this spring.

Hydrology:

- A fair amount of the project was winter-logged, which helped to protect water resources.
- Design criteria related to leave trees were incorporated, and trees were left in and near streams to increase the complexity of tie-driven streams. This was an attempt to create a more natural situation. The result of trees on the ground meets aquatics objectives and the IDT agrees that it will look more natural in a couple years.
- Language in the NEPA decision prevented construction of temporary roads except to gain access up and down cut and fill slopes (Design Criteria 21). This was not tracked well through project implementation. A memo to the file approved by the Forest Supervisor allowed temporary roads to landings in special cases.

Visuals:

- View of trees' cut ends from the highway is not natural looking.
- Removal of heavy slash would meet moderate scenic integrity objectives (SIO) as discussed in the Forest Plan. (Grace period of 1 year allowed after project implementation to meet SIOs.)
- Visuals are an excellent reason to deny landing locations, if other options are available.

Soils:

- No wheeled or tracked equipment was allowed within streamside management zones (C-provision: No tractors within 100 feet of a live stream).
- Groundcover is meeting standards and is adequate to control erosion.
- Equipment stayed within boundaries, and main skid trails are not eroding. Contractors are still hand piling slash along skid trails.
- All units had less than 15% disturbance.
- One location seemed to have potential for runoff and erosion. Some areas are still being worked on by contractors before closing the contracts, so Randy will identify this location for John Schneider.
- Can do some seeding on landings for erosion control if necessary.

Heritage:

- There were eight isolates and some previously recorded sites within the project area. Contractors did a great job cutting around and protecting sites.

Timber:

- Recommend improvements for meeting SIOs, especially by using contours and curved edges instead of straight unit edges.
- Too early to evaluate regeneration.
- Contractors followed contracts well.

Botany:

- One population of rare plants was identified and protected.

Engineering:

- The project successfully mitigated hazard trees. There are none left.
- The project improved sight distance along the road, which especially helps at intersections and will probably reduce game mortality. It could also increase travel speeds. These are short-term effects that will likely return to previous conditions in 20-30 years.
- There are no significant changes in runoff during storms.
- It's too early to check for effects on snow drifting.
- Reduced shadowing along the highway reduces freeze/thaw impacts on pavement.

Other:

- Cutting outside of units and last minute surveys do occur, perhaps more than they should. Heritage supports buffering treatments to allow for this kind of use so that surveys and consultation are completed ahead of time. On the Laramie side of Highway 130, surveys are

planned for within a 300 foot buffer on either side of the highway so that all potentially affected areas will be pre-surveyed.

- Concern: who will be responsible for monitoring noxious weeds for this project and the Laramie side? WYDOT/CP&L/USFS?

Conclusions

The project was implemented according to plan, followed Forest Plan standards and guidelines and project design criteria. The project achieved desired results.

Recommendations

Fire/Fuels:

- We've learned that if you don't take everything on the first entry for hazard tree removal, residuals blow down. Best to take the overstory all in one entry.
- Definition of WUI should include highways and powerlines, and WUI determination should be based on State direction.
- We may need to update our WUI layers for the forest so that they are consistent across districts.

Hydrology:

- We should consider the need for temporary roads more critically during project development and analyze the needed road system.

Visuals:

- Could have "yard unmerchantable material" provision in contract to move down and dead material to slash piles instead of being left in place.
- In future, could bring Jeff into the field while marking units and looking for potential landing locations.

Heritage:

- Discussion: Another recent project (unrelated to Highway 130) did not include a clause about the need to stop work upon unanticipated discovery of archeological sites or remains. Oral suspension is a provision that is an option if operations are causing irreparable damage to resources, but not everyone has the authority for oral suspension. This may be a topic to raise with line officers.
- Kolleen is developing a heritage plan for unanticipated discoveries during FY14.

Botany:

- Could keep better track of what protections were taken for different species of rare plants. This would be helpful for reuse in future projects.

Brush Creek/Hayden Monitoring Field Trip, Stop 1

The Brush Creek/Hayden RD visited the French Creek Timber Sale. Design criteria and mitigation measures were examined to determine the effectiveness of measures to protect wildlife trees and ground cover, protect drainages, minimize soil compaction/disturbance, and minimize the spread of invasive species. A representative unit, not the whole project, was visited so only applicable design criteria/standards and guidelines were reviewed.

Results/Evaluation

Standards and guidelines considered to be the most significant by the review team include:

- Standards for snag and live tree retention in harvest units,
- Standards for retention of coarse woody debris,
- Reclaim roads and other disturbed sites when use ends, as needed, to prevent resource damage.

These standards and guidelines were incorporated into the decision along with additional design criteria. Standards, guidelines, and design criteria were incorporated into the contract, project design, and project implementation except for ripping of the temporary road, which was not included in the contract or implemented.

Resources to be protected included snags, down and future downed wood, heritage sites, soils, water quality, and endangered species. During the field trip, specialists noted minimal impacts to drainages, soils, and visual quality, along with adequate protection of wildlife trees and access/haul roads. Since ripping of temporary roads was not incorporated into the contract, it could not be implemented. Not all haul roads had been ripped properly and some may require additional treatment. Historically, this type of work has been completed during mechanical site preparation. Timing when this work should be accomplished, during sale contract or afterwards when mechanical site preparation begins, needs better communication and clarification during contract preparation.

Conclusions

Standards and guidelines were effective. Implementation of the timber sale will, at least initially, meet the desired condition of the area. Additional work may be required to ensure that invasive species do not colonize the area and/or that they are controlled. Long-term health of the stand remains questionable due to widespread mistletoe infestation. Monitoring will continue to confirm that the 5 year regeneration goals are being met and that haul roads have stabilized.

Recommendations

The review team was satisfied with the overall results of the project. As was intended, however, discussion among team members identified several issues that deserve greater attention prior to implementing a similar project:

- Limitations in contract language and market conditions affected silvicultural treatments. The goal for the project area was a clear-cut to remove beetle-killed and mistletoe-infected trees. Not all trees within the harvest units were of sufficient size to be included in the standard timber sale contract, so a large number of younger/smaller trees were left on site. Unfortunately, many of these are already infected with mistletoe, which will perpetuate throughout the rest of the stand. The long-term result will probably either be conversion to a non-mistletoe species or persistent, uncontrolled mistletoe that unnaturally limits tree growth, vigor, and survival. The team recommends individuals responsible for implementing sale contracts become more involved during project planning and development to help identify opportunities and limitations.
- Revenue generated from the timber sale is likely to fall far short of what is needed to remove the remaining and mostly infested trees. In the absence of sufficient project funding, additional treatment is highly unlikely. That situation, however, would not differ from having taken No Action.

- The potential to remove additional timber/slash through biomass sales needs to be examined. Additional treatments would significantly improve the positive results of the project.
- The appropriate number of snags and recruits per acre was met. While most of the snags retained were of sufficient size, some could have been a larger diameter. The Forest Plan minimum requirements for lodgepole pine stands is 1-2 snags per acre over 10" if available.
- A sufficient amount of coarse woody debris was retained but most of the retained logs did not meet the >25 ft. desired length. Most coarse woody debris did meet the >3 inch diameter guidance but did not meet the 80% >6 inch diameter guidance. Some woody debris was crushed into skid trails, so it was not effective for wildlife use.
- Future timber sale contracts need to incorporate language to rip temporary roads. This will reduce compaction and increase infiltration.
- There was also discussion on appropriateness of the desired future conditions for management and geographical areas after the impacts from the beetles. A Forest Plan amendment or new Forest Plan may be necessary to better reflect changed conditions since the plan was written.

Brush Creek/Hayden Monitoring Field Trip, Stop 2

The Brush Creek/Hayden RD visited the Soldier Summit Timber Sale. Design criteria and mitigation measures were examined to determine the impact of winter logging, whole tree skidding versus lopping, and slash treatments. A representative unit, not the whole project, was visited so only applicable design criteria/standards and guidelines were reviewed.

Standards and Guidelines considered the most significant by the review team were:

- Reclaim roads and other disturbed sites when use ends, as needed, to prevent resource damage,
- Standards for snag and live tree retention in harvest units,
- Standards for retention of coarse woody debris.

Results/Evaluation

Standards and guidelines were incorporated by reference into the decision along with design criteria and mitigation measures to reduce impacts to fisheries, heritage, infrastructure, lands, range, recreation, silviculture, soils, watershed, and wildlife objectives. The decision specifically identified the need for monitoring noxious weeds, best management practices for hydrology, and beetle spread and mortality. Standards, guidelines, design criteria, and mitigation measures were incorporated into the contract, although it is not clear if the standards and guidelines or design criteria for hydrology and visual resources were sufficiently incorporated. Ripping of temporary roads was not incorporated into the contract.

Standards and guidelines were implemented but not necessarily to the extent desired. Harvest has not been completed and contract work is not accepted until it is completed. Visual objectives were not met where heavy slash and large logs were left within sight of the highway. The topography and material available for screening was a limiting factor for meeting visual objectives. The overall amount of slash, particularly on the unit east of the access road, will be re-evaluated by the District Fire Management Officer.

Harvest management retained the appropriate number of snags and recruits per acre, but most of the snags were much smaller in diameter than desired or available. Most snags did not meet the "over 10

inches if available" guidance in the standard. The slash piles contained material that would have met the required size guidance. Most live recruitment trees also had small diameter but pine beetles left very few large live trees in the stand.

There was almost no woody debris retained in harvest unit 12 (east facing slope). There was an abundance of woody debris available in the slash piles to meet this standard. Reference to photos in RMRS-GTR-172 indicated that there was several times the amount of woody debris as recommended (5-10 tone/acre) in harvest unit 13. However, almost none of the debris met the guidance of >25 ft. length and "80% over 6 inch diameter." Once again there was a sufficient number of logs in the slash piles that would have met the standard for length and diameter. The woody debris that was present was on or just above ground level which made it effective for wildlife use.

Temporary roads have not yet been ripped since it wasn't incorporated into the contract. It may be possible to cover temporary roads with slash, which will reduce erosion. This will not reduce soil compaction or increase infiltration. There may be a need to install waterbars or other features to control sediment transport in the meantime. The upper east-facing slope may also require the installation of waterbars or other features to control sediment transport.

Conclusions

Standards and guidelines were mostly effective. The amount of slash and residue was considered appropriate by all resources except visuals. Although young trees remain along the highway and effectively screen portions of the cut area, there weren't enough available to screen the entire project. Portions of the review site where heavy slash was left on the ground and could be viewed from the highway didn't meet the "Moderate SIO." The topography and material available for screening was a limiting factor for meeting visual objectives.

There was also an issue with the haul road: it has not yet been properly ripped, seeded, or slashed. It may be possible to do some of this work during site-preparation. It was agreed that additional erosion control measures such as water bars and slash would be implemented prior to the arrival of winter.

There was very little soil disturbance throughout the large project area due to winter logging, so that is recommended as a viable option for other sites sensitive to disturbances. This project may become a concern for recreation. The Soldier Summit will start to harvest in units that the cross-country ski trails go through in the Bottle ski area next year. Coordination of activities will be necessary to limit potential impacts to cross-country ski trails.

Additional discussion is needed to determine if all standards and guidelines are to be implemented during the contract or completed as follow-up work.

Recommendations

Discussion among review team members identified several issues that deserve greater attention prior to implementing a similar project:

- Determine if removal of additional trees, biomass, and slash is feasible through commercial, stewardship, or biomass sales. If so, this would reduce the number and size of piles to be burned.
- Sale administration personnel responsible for implementing the decisions in sale contracts need to be more involved during project development. This would likely help identify opportunities and limitations, especially with design criteria.
- Heavy slash on the ground needs to be removed or reduced to comply with Moderate SIO.

- Location and size of burn/slash piles should be better coordinated to prevent conflicts with visual objectives and impacts to soils. During layout, when locations are being approved, it may be beneficial to include additional resources into the discussion. Use of a few specified piles for public firewood collection AFTER timber sale contract completion will be evaluated.
- Incorporate language into timber sale contracts to rip temporary roads to reduce compaction and increase infiltration.

Douglas Monitoring Field Trip, Stop 1

The Douglas Ranger District IDT visited the Belle Fourche Pipeline to monitor the implementation of the Grassland Plan with the Operating Plan for Belle Fourche Pipeline Anomaly Repairs, specifically to look at implementation of wildlife timings, weed free/native seed mixes, and ROWs.

Standards and guidelines relevant to the review were:

- Pipeline repair locations #2 and #3 (see Pipeline Anomaly Repair Location Map) are located within 2.0 miles of an active sage grouse lek. To reduce disturbances to nesting sage grouse, pipeline repair construction is prohibited from March 1 to June 15.
- The permitted right-of-way (ROW) boundaries are to be clearly established and flagged prior to any construction activities. As stipulated under the terms and conditions in the DGL209 permit, ground disturbance is to be limited to 25 feet in width. Any brushy vegetation located on the ROW **shall not** be removed by scraping with bladed equipment. Brush hogging, mowing, or sawing individual plants is acceptable. Any brush removed during construction will be placed back on the disturbed area after trenching is complete. The width to which the brush may be removed shall not exceed 12.5 feet on each side of the centerline and should be only as wide as needed to accommodate the trenching equipment.
- BFPC will reclaim and re-vegetate all disturbed areas resulting from pipeline construction, maintenance, operation, and removal. Seed mixtures of native grass will be used per National Grassland recommendations. The following seed mixture and fertilization is recommended for reseeding (drilled to ½ inch depth) ***Native species must be used.*** BFPC should try to find local sources for seed wherever possible.

Results/Evaluation

Standards and guidelines are incorporated into the Operating Plan for the anomaly report, along with mitigation measures and procedures that will be implemented while the company conducts surface operations. Specialists on the review thought standards and guidelines were incorporated well during implementation.

Conclusions

The standards and guidelines for this pipeline repair are effective. The Operating Plan is a great tool for these companies to use. The Operating Plan spells out exactly what must be done and when.

Recommendations

Need to come up with an updated standardized Standard Operating Plan that could be used as a go-to when these types of emergencies arise. Adding wording to include a more detailed definition of "emergency" would help in cutting down on the confusion of when an emergency actually exists.

Douglas Monitoring Field Trip, Stop 2

The Douglas Ranger District IDT visited sites related to the Travel Management Decision. The team focused specifically on signage and on implementation on the following standards and guidelines:

- Limit roads and other disturbed sites to the minimum feasible number, width, and total length consistent with the purpose of specific operations, local topography, and climate (standard),
- Reclaim roads and other disturbed sites when use ends, as needed, to prevent resource damage (standard),
- On sites where dispersed recreation activities have contributed to bare mineral soil and accelerated erosion, mitigate the impacts by redirecting the use, rehabilitating, or hardening the site to minimize erosion and off-site movement of soil(page 1-25) (standard),
- Consider existing roads and trails open and allow motorized vehicle use on them unless the following occurs:
    - A decision restricts motorized use,
    - The area is designated non-motorized,
    - Motorized use is specifically prohibited in management area direction or existing orders (guideline),
- Perform site-specific roads analysis, including public involvement, prior to making any decisions on road construction, reconstruction, and decommissioning (guideline).

Results/Evaluation

The standards and guidelines were included in the decision and project design. They are being implemented on the ground, although some are still being incorporated.

Conclusions

The standards and guidelines are somewhat effective, but could be more effective with more diligent enforcement and maintenance monitoring.

Recommendations

The District needs a plan to keep road signs up and functional. Possibly need to use wooden/metal posts or put the signs in during the spring when ground is wetter. The MVUM, signs on the ground, and visitor maps do not match up very well. The MVUM should match what is on the ground.

Hahns Peak Bears Ears Monitoring Field Trip, Stop 1

The Hahns Peak Bears Ears Ranger District IDT visited Roadside Hazard Tree Clearing project sites to determine if project implementation was consistent with the NEPA analysis for raptor nest site protection.

The Forest Plan standard under review was:

- TES Standard #6: Protect known active and inactive raptor nest areas. The extent of protection will be based on proposed management activities, human activities existing before nest establishment, species, topography, vegetative cover, and other factors. A no-disturbance

buffer around active nest sites will be required from nest site selection to fledging. Exceptions may occur when animals are adapted to human activity."

Results/Evaluation

The standard is incorporated into the decision by reference; however, the standard was not implemented. The project failed to meet this standard with 2 of 3 goshawk nest territories. Project implementation resulted in very high nest stand impacts to two goshawk territories, resulting in the loss and abandonment of these sites.

Conclusions

The raptor nest protection standard has been an effective tool in protecting raptor nests with timber management projects. This project analysis failed to adequately consider the protection of raptor nest sites and the balance of human safety concerns.

Recommendations

The NEPA and subsequent project decision could have included a site-specific Forest Plan amendment which outlined, due to human safety concerns, that the forest may be inconsistent with this standard in some instances. Additionally, more careful site specific project implementation could have been utilized to accomplish the project while avoiding impacts if contracts had been developed to allow this flexibility. Project monitoring from 2009 could have been utilized to adapt implementation for subsequent implementation.

- Do our best to find and protect known active/inactive raptor nest sites through timing stipulations and adjustments to implementation strategies.
- Carefully consider any real public safety hazards and consider other options like closing portions of roads to public use.
- When impacts cannot be avoided, disclose that there may be site-specific situations where this standard cannot be upheld and prepare a site-specific amendment to the Forest Plan.
- Address this issue in the Supplemental Information Report.

Hahns Peak Bears Ears Monitoring Field Trip, Stop 2

The Hahns Peak Bears Ears Ranger District IDT visited the Stewardship Allotment to determine if the Columbian sharp-tailed grouse and greater sage-grouse habitat is meeting Forest Plan Standards for retention of adequate residual cover within the area of known lek sites.

Per the Forest Plan standard and as further specified in the subsequent Allotment Management Plan NEPA analysis: in areas where tall dense cover is desired for ground-nesting birds, retain adequate residual cover from previous growing seasons since some species begin nesting in April and May before spring growth. The Stewardship Allotment NEPA decision specified that for this area, the average height-density with the Robel pole readings should be greater than or equal to 2.5 decimeters to provide adequate residual cover for grouse nesting. Annual monitoring would be used to determine if this standard is being met. If monitoring indicates a decline in resource condition, adaptive management actions including reduction in season of use and/or number of livestock would be required to improve resource conditions and meet the Forest Plan Standard.

Results/Evaluation

The standard is included in the decision, along with an adaptive management framework that specifies that following 3 years of monitoring, the average height-density with the Robel pole readings should be greater than or equal to 2.5 decimeters to provide adequate residual cover for grouse nesting. Current management has not achieved objectives and the allotment is not meeting the Forest Plan Standard as defined in the Stewardship NEPA.

Conclusions

Although the existing standard is effective, this project as implemented does not meet the standard.

Recommendations

Of the 4 transects monitored for 3 years, only transect #2 in 2011 (1 out of 12 transect readings) was considered as having "adequate residual cover." The other 11 readings fall below the 2.5 dm cutoff for each of the 3 monitoring years. Therefore, per the forest plan standard and the wildlife design criteria outlined in the Stewardship AMP Decision, livestock numbers need to be reduced so desired conditions for Columbian sharp-tailed grouse can be achieved.

Hahns Peak Bears Ears Monitoring Field Trip, Stop 3

The Hahns Peak Bears Ears Ranger District IDT visited the Seedhouse Analysis Area to document if monitoring methods described in the DN/Finding of No Significant Impact have been implemented and are effective in evaluating the impacts from livestock to the riparian area in Rock Creek on the Barbey Allotment, which showed the most impacts from livestock grazing of the three allotments in the analysis area.

Standards and guidelines relevant to the review were:

- RNF Guideline 1: Incorporate appropriate practices and design criteria from the Watershed Conservation Practices Handbook (FSH 2509.25) into all project design, analysis, and decision documents.
- WCP Management Measure 3; RNF Standard 4: In the water influence zone (WIZ)[1] next to perennial and intermittent streams, lakes, and wetlands, allow only those actions that maintain or improve long-term stream health and riparian ecosystem condition.
- WCP Management Measure 5; RNF Standard 6: Conduct actions so that stream pattern, geometry, and habitats are maintained or improved toward robust stream health.
- Range Standard: Remove livestock from the grazing unit or allotment when further utilization on key areas will exceed allowable-use criteria in the Forest Plan or allotment management plan.
- Range Guideline: Develop site-specific vegetation utilization and residue guidelines during rangeland planning, and document them in allotment management plans. In the absence of updated planning or an approved allotment management plan, apply the utilization and residue guidelines in Table… 1-3.

[1] WIZ is defined as the land next to water bodies where vegetation plays a major role in sustaining long-term integrity of aquatic systems. It includes the geomorphic floodplain (valley bottom), riparian ecosystem, and inner gorge. Its minimum horizontal width (from top of each bank) is 100 feet or the mean height of mature dominant late-seral vegetation, whichever is most (FSH 2509.25).

Results/Evaluation

Monitoring is critical to ensuring maintenance of riparian vegetation to protect streambanks during high flows and maintain and improve stream health. Mill Creek and Rock Creek both show signs of downcutting, widening, and bank instability. Rock Creek has been identified as a key area for the long-term and short-term monitoring identified below.

Management actions listed in the proposed action were developed to address the key area, and were scheduled to be implemented as early as 2012. Monitoring the implementation and effectiveness of these management adjustments is critical to determining if management objectives are being met.

If monitoring in the key area (Rock Creek) indicates that riparian ecosystem condition and stream health are not moving toward the desired condition, or are not consistent with Forest Plan standards, and the annual monitoring has indicated that livestock impacts are still occurring, adaptive management actions to further reduce livestock impacts identified as part of this analysis will be implemented. If short-term monitoring indicates livestock impacts are minimal, then no additional actions will be taken with regard to livestock grazing on these stream reaches. If long-term monitoring indicates a decline in resource condition in any monitored reach (Mill Creek, Reed Creek, or Rock Creek), adaptive management actions including reduction in season of use and/or number of livestock will be required to improve resource conditions and meet Forest Plan standards and direction in Forest Service Handbook 2509.25.

Table D1. Monitoring indicators.

Long Term Indicators	Short Term Indicators
Longitudinal profile	Sedge stubble height
Stream bank stability	Stream bank alteration
Greenline stability rating	Photo points
Width/depth ratios	

Table D2. Riparian vegetation residue allowances.

Season of Use	Existing Rangeland Condition	
	Satisfactory*	Unsatisfactory*
Spring Use Pasture	4 Inches	6 inches
Summer & Fall Use Pasture	6 Inches	6 Inches

* Riparian vegetation species are plants that require some free water within their rooting zone to grow. Typical riparian species are sedges and rushes.

The standards and guidelines were incorporated into project design and implemented on the ground. Table D3 summarizes the monitoring data collected since 2011.

Table D3. Monitoring data.

Year	Green line	Bank stability	Bank trampling	Stubble height
2011 post livestock	6	43% unstable 57% stable	14%	8 inches
2012 pre-livestock	N/A	36% unstable 64% stable	16%	11 inches
2012 mid-season	N/A	35% unstable 65% stable	18%	8 inches
2012 late season	N/A	43% unstable	17%	9 inches

		47% stable		
2012 post livestock	N/A	58% unstable 42% stable	37%	8 inches
2013 pre-livestock	N/A	30% unstable 70% stable	1%	11 inches
2013 post livestock	N/A	51% unstable 49% stable	30%	10 inches

A reference area in Mill Creek was also identified in 2012. In 2013, the reference area in Mill Creek was read prior to livestock being moved onto the Reed Creek. The monitoring data for the reference area is shown in Table D4. The post-grazing monitoring data for 2013 has not been summarized.

Table D4. Reference reach data.

Year	Green line	Bank stability	Bank trampling	Stubble height	Bank stability design threshold
2012 pre-livestock	7	6% unstable 94% stable	4%	12 inches	70%
2012 post-livestock	N/A	15% unstable 85% stable	5%	13 inches	
2013 pre-livestock	N/A	5% unstable 95% stable	1%	13 inches	70%

Conclusions

The initial findings after monitoring the reference area in Mill Creek in 2012–2013 set a very high bar with bank stability at about 95 percent. The WCP indicates that bank stability should be at 74 percent of the reference area. Based on this information, bank stability of Rock Creek has not met the desired condition of the reference area for the past three seasons. Additional monitoring of bank stability in Mill Creek prior to livestock turn-out will be useful in determining if 95 percent stability represents a true baseline for that monitoring period.

So far we appear to be on track by identifying a reference reach that is clearly in a desired condition; however, it is unknown why the reference area (Mill Creek) showed less than one percent bank trampling prior to livestock turn-out in 2013 and Rock Creek measured 16 percent prior to turn-out in 2012 and one percent in 2013. This is a wide discrepancy requiring more pre-livestock impacts from wildlife. More post-grazing monitoring needs to be done on the reference area.

Theoretically, when additional water sources are established, we should see an improvement in Rock Creek, assuming that the permittee continues his diligence in moving livestock away from Rock Creek before allowable use and trampling thresholds are met.

Stubble height can be misleading depending on the species of sedges. Some species are more palatable than others and can change in palatability at different times of the growing season. It is not uncommon in monitoring stubble height to find that the results are well within the six inch height indicated in the Forest Plan; however, trampling and hoof shearing are certainly compromising the integrity of the stream banks.

Caution must be used on the timing when the monitoring is done. Bank trampling is defined as a clear hoof print located within a microplot from this year's grazing season whether by cattle or wild ungulate. If a large thunderstorm event precedes the monitoring attempt and washes away the prints or temporarily raises the level at which a stream flows, then the data is useless.

Probably the biggest challenge is explaining the methods to the permittees and why the results may require removal of livestock from the allotment. In this case, two hydrologists spent time on two different occasions trying to explain the procedure to one permittee.

Recommendations

- Continue to evaluate whether reference areas truly represent portions of streams being impacted by livestock or wild ungulates.
- Use green line monitoring as a long-term method and only when existing species composition is an issue. The protocol can be subjective and the likelihood of making a determination in the change of baseline species composition cover over time by the same individual or a different individual as measured by pacing is extremely difficult. This method is very time consuming and difficult to achieve a level of accuracy based on ocular estimates on species composition.
- Continue to assess bank stability.
- Continue to monitor the levels of bank trampling/alteration, but use discretion in assessing other natural events like thunderstorms, extended periods without rain, utilization of upland vegetation, and effectiveness of alternate water sources.
- Continue to measure sedge/stubble height, but be cognizant that stubble height alone does not necessarily determine whether riparian condition is meeting Forest Plan guidelines.
- Realize that it may take several seasons of monitoring to identify a trend in riparian condition. Monitoring is used primarily to address an adaptive management approach to adjusting management at some point in the future. The monitoring workload associated with this approach across several districts for various projects is reached a threshold that is difficult to accomplish. We should continue to address this as a Forest priority for decision documents that require monitoring and decide what we can actually accomplish with current resources.

Parks Monitoring Field Trip Stop 1

The Parks Ranger District IDT visited the LaFevre Timber Sale, part of the Owl Mountain North Analysis. The primary objective was to determine if the timber sale met the silvicultural objectives of the project. Design criteria and mitigation measures were examined to determine if they were implemented and their effectiveness for the following resources: soil, water, heritage, scenery, recreation, and aquatics organisms. A representative unit, not the whole project, was visited so not all design criteria/standards and guidelines from the EA/DN were reviewed.

Standards and guidelines considered to be the most significant by the review team were:

- FSH & FSM direction pertaining to vegetation management indicate that reforestation standards identified in the Routt Forest Plan must be met within 5 growing seasons. The project is currently being monitored to meet this requirement. Recent cutting has resulted in 2013 being the 1st growing season.
- Routt Forest Plan Water and Aquatic Standard 2, 3, 5-7, and Guideline 1.
- Routt Forest Plan Biological Diversity Standard 3.
- Routt Forest Plan Threatened, Endangered, Sensitive Species & Wildlife Standard 7 & 8.
- Visual quality objectives for MA 5.11.
- Adopted Recreation Opportunity Spectrum of "Roaded Modified."

Results/Evaluation

Forest Plan standards and guidelines were incorporated into the proposed action and decisions along with design features, watershed conservation practices, and best management practices.

Standards and guidelines were incorporated, for the most part, into both the contract and the project design through timber contract clauses and unit layout. During the sale layout certain changes were made in relation to the roads and stream crossings. These were not documented in writing and led to confusion during the monitoring trip.

Standards and guidelines that were included in the contract were implemented on the ground for all resources with some exceptions for hydrology and fisheries. Two culverts were installed on NFSR 792.1a that had a number of issues. They were too small to contain high spring flows which resulted in erosion of the road fill and capture of the stream into the road prism. There was not enough road fill over the culverts and the fill was not properly compacted, likely due to the time of year it was installed. Fortunately, aquatic passage was not an issue in this case as the streams are too small to support fish populations.

This could potentially have been avoided with a hardened ford crossing. According to the timber shop, the hardened crossing was decided against after consultation due to increased impacts. There is confusion over discussions on implementation of these crossings that occurred during implementation. The resulting impacts to the stream and associated riparian areas are not consistent with Forest Plan Water and Aquatic Standards 2, 3, 5, 6, and 7. This will have to be addressed after logging has finished.

Conclusions

Forest Plan standards and guidelines were implemented on the ground. Silvicultural goals were met and monitoring will continue to confirm that the 5 year regeneration goals are being met and that haul roads have stabilized. Additional work will be necessary to address impacts associated with the temp roads and unplanned use of NFSR 792.1 for hydrology, botany, and fisheries. This cannot be accomplished until logging operations have finished.

Slash piles along the foreground of NFSR still need to be burned to meet the standards for scenery and are planned to be completed at a later date. Public compliance with the closure orders for the project area during logging operations and the adjacent road is difficult.

Recommendations

The review team expressed mixed satisfaction with the overall results of the project. Most resource specialists felt the project was completed in an acceptable manner with the exception of botany, fisheries, and hydrology in relation to the use of NFSR 792.1. Discussion among team members identified several issues that deserve greater attention prior to implementing a similar project:

- Project modifications need to be recorded in a timely manner and with accuracy. Discussions between resource specialists regarding the roads used during logging operations showed confusion over the original decision, field trips, and modifications during implementation.
- The relocation site for NFSR 792.1a should have been field verified and determined if the cost was feasible during the NEPA process. It was brought up during the NEPA process that NFSR 792.1a was too wet for logging operations. This was evident in the condition of the road following winter logging. A better job needs to be done ensuring that all project proposals, designs, and design criteria are practical and affordable, and can be followed through in implementation.

- Some road decommissioning may still occur. If so, some of these areas may need native plant materials other than those specified in the original design criteria. It is necessary to plan and coordinate these needs to ensure these materials are ready in time for implementation.
- To improve public compliance with special orders for road closures, it may be necessary to install permanent gates at critical road junctions. Reducing the length of operations that would reduce the periods of enforcement of closures to public use would be beneficial.
- Hydrology, soils, and aquatic specialists should be included during the road design phase in the future when in the vicinity of streams and wetlands. The poorly designed culvert installations resulted in increased sediment into the streams and impacts to adjacent wetlands and riparian areas. This negatively impacted the quality of amphibian habitat in the wetlands and riparian area as well as fish habitat in occupied streams downstream. These issues should be addressed in the near future.