

CERTIFICATION

I have reviewed the Annual Monitoring and Evaluation Report for the Bighorn National Forest for Fiscal Year 1998. I believe that the monitoring and evaluation requirements of the Forest Plan (Chapter IV) have been met and that decisions made in the Forest Plan are still valid. I have noted and considered the recommendations and will implement those that I decide are appropriate after further analysis and required public notification and involvement.

I am especially proud of the work accomplishments reported here. Fiscal Year 1998 was a formidable year with changes in policy and direction coming from the Washington Office, along with the disruption and upheaval that accompanies reorganization and downsizing. Some of our resource specialists were sent on special assignments to other National Forests and other agencies. Several others received promotions to jobs in other agencies and other National Forests while another made a career move to another National Forest. At the same time, we hosted employees from other National Forests and added a Fisheries Biologist to our staff. Despite shrinking budgets and the organizational change, we along with our cooperators and volunteers accomplished a great deal of project work on the ground, where it ultimately counts.

<u>/s/Abigail R Kimbell</u>	<u>March 29, 1999</u>
ABIGAIL R. KIMBELL	Date
Forest Supervisor	

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INTRODUCTION

The Bighorn National Forest Land and Resource Management Plan (Forest Plan) was approved in October 1985. It established direction and process so that all future decisions would include an interdisciplinary approach to achieve integrated resource management. The Forest Plan provides direction to coordinate multiple-uses on the Bighorn National Forest on a sustained basis. The plan also fulfills a legislative requirements and addresses local, regional, and National issues. The Forest Plan, Chapter IV requires monitoring and evaluation of management activities to determine:

- 1. How well Forest Plan objectives have been met.*
- 2. Consistency of activities with standards and guidelines contained in the Forest Plan.*
- 3. The need for amendment or revision.*

This report is the annual monitoring and evaluation report. It displays the results of monitoring and provides the Forest Supervisor and public with information on the progress being made toward achieving the goals, objectives, and management requirements in the Forest Plan. It also provides information regarding how well we are fulfilling public demand for goods and services while protecting the forest resources. An annual monitoring and evaluation report is to be prepared for each existing forest plan, including those plans under revision. Funds are provided for the preparation of the report based on information and data collected under agency direction. A target of one report has been assigned to each forest.

Monitoring is the quality control aspect of forest planning. Therefore, it requires data collection and observations of activities to provide a basis for periodic evaluation of the planning process and the forest plan. Evaluation is the analysis and interpretation of monitoring results. It addresses the goals, objectives, long-term relationships, management direction, and significant management activities occurring. There are four aspects to monitoring and evaluation, they include:

Implementation Monitoring

Forest personnel conduct monitoring as part of their routine assignments and management responsibilities. Their results are documented in project files. Monitoring is to determine if management activities are designed and carried out in compliance with Forest Plan direction and management requirements.

Effectiveness Monitoring

Effectiveness monitoring determines if management activities are effective in driving the forest toward the desired future condition described for the various management areas.

Validation Monitoring

Validation monitoring determines whether the initial data, assumptions, and coefficients used in development of the Forest Plan were correct, or if there is a better way to meet goals and objectives and achieve the desired future condition.

Evaluation and Conclusions

The purpose of evaluation is to interpret monitoring results and reach some conclusions as to what the monitoring results really mean with regard to implementation of the Forest Plan. The

interdisciplinary team (I.D. Team) may make recommendations and identify research needs as a result of the evaluation process.

PLANNING ACTIVITIES

Forest Plan Amendments

The Forest Plan has been amended twelve times since it was approved in 1985. The amendments are summarized below and the changes in management area allocations resulting from the amendments are displayed at the end of these summaries in a table.

Forest Plan amendment one updated the Ten-Year Timber Sale Summary (Appendix A)--Updated through 1990, Arterial and Collector Road Construction and Reconstruction Summary (Appendix B)--Updated through 1993, Trail Construction and Reconstruction Summary (Appendix C)--Updated through 1993 and Developed Recreation Site Construction/Reconstruction Summary (Appendix H)--Updated through 1993.

Forest Plan amendment two updated the implementation schedules, including the Ten Year Timber Sale Summary in Appendix A, Trail Construction And Reconstruction Summary in Appendix C, and Developed Recreation Site construction and Reconstruction Summary in Appendix H. It is necessary to update these schedules annually to reflect changes in planned activities due to such factors as differences between program budgets and actual appropriations, economic considerations, site specific analysis, and other natural and physical factors.

Forest Plan Amendment three updated Appendix A the "Ten Year Timber Sale Summary". Schedules are updated as needed to reflect changes in planned

activities due to differences between in budgets, actual appropriations, economic considerations, site specific analysis, and other natural and physical factors. The changes in the schedules did not represent a change in management direction.

Forest Plan Amendment four changed and improved some of the monitoring requirements for wildlife, range, soils, water, riparian, and fish habitat. The Forest Interdisciplinary Team had discovered that some of the procedures and standards did not provide the best means for monitoring.

Forest Plan Amendment five was issued to change the projected expenditures and returns shown in Forest Plan table III-1. This change updated the costs for plan implementation.

Forest Plan Amendment six added the Forest's Recreation Strategy as Appendix J and the designation of three scenic by-ways as Appendix K. These documents did not change the overall Forest Plan direction but did clarify the goals and objectives of the recreation program.

Forest Plan Amendment seven replaced the seven-year regeneration standard with a five-year regeneration standard which applied to final harvest of lodgepole pine. The amendment added additional standards and guidelines to be used in making a determination that regeneration can be assured within five years following final harvest. The amendment also made corrections to the lands designated as suited for timber harvest, reducing the amount of land suited for timber harvest by about 4,000 acres to 262,062 acres.

Forest Plan Amendment eight changed the visual quality objectives for the Twin Lakes Reservoir special-use permit area, Sections 34 and 35, Township 54 North, Range 87

West, Sixth Principle Meridian. The visual quality objectives in management areas 04B and 09A were changed from Retention and Partial Retention to Maximum Modification. This change allowed for the expansion of the Twin Lakes Reservoir to proceed and be consistent with Forest Plan direction.

which is .019 percent of the total Bighorn Forest. The following Management Area Summary Table displays these redistributions management area allocations.

Forest Plan amendment nine changed management prescriptions on 83 acres of lands because of the Tie Hack Dam and Reservoir, which is located on the South Fork of Clear Creek. This amendment changes 47 acres of management prescription 4B (wildlife management) and 36 acres of management prescription 7E (timber management) to 83 acres of management prescription 9E (water impoundment).

Forest Plan amendment ten changed the timber suitability on a 22 acres of Management Area 1A. The timber suitability for 22 acres was changed from suited forest land - timber emphasis (511 timber component) to unsuited forest land - land not appropriate for timber production (825 timber component) Forest Plan amendment eleven changed the management prescriptions on 101 acres of National Forest lands located at the Twin Lakes Dam and Reservoir site located on Coney Creek, Tongue Ranger District. This amendment changes 86 acres of management prescription 9A to 101 acres of management prescription 9E.

Forest Plan amendment twelve changed the Standards and Guidelines in the Area of Consultation described in the Medicine Mountain Historic Preservation Plan. The current Forest Plan land allocations within the Area of Consultation will remain the same.

These twelve amendment redistributed the management area allocations for 206 acres

MANAGEMENT AREA SUMMARY TABLE

MANAGEMENT AREA	EMPHASIS	ACRES ALLOCATED IN 1985 FOREST PLAN	CURRENT ALLOCATED ACRES
1-A*	Existing & Proposed Developed Recreation Facilities	913	935
1-B	Existing & Potential Winter Sports Sites	559	559
2-A	Semi-Primitive Motorized Recreation Opportunities	42,378	42,378
2-B	Rural & Roded Natural Recreation Opportunitie	15,220	15,220
3-A	Semi-Primitive Nonmotorized Recreation Opportunities	44,660	44,660
3-B	Primitive Recreation in Unroded Areas	45,980	45,980
4-B*	Wildlife Habitat Management for One or More Management Indicator Species	206,237	206,104
4-D	Aspen Stand Management	11,171	11,171
5-A	Wildlife Winter Range in Non-forested Areas	15,500	15,500
5-B	Wildlife Winter Range in Forested Areas	10,153	10,153
6-A	Livestock Grazing, Improve Forage Condition	26,494	26,494
6-B	Livestock Grazing, Maintain Forage Condition	242,541	242,541
7-E*	Wood Fiber Production	202,500	202,442
8-A	Pristine Wilderness Opportunities	122,224	122,224
8-B	Primitive Wilderness Opportunities	45,352	45,352
8-C	Semi-primitive Wilderness Opportunities	27,493	27,493
8-D	Transition Wilderness Opportunities	424	427
9-A*	Riparian and Aquatic Ecosystem Management	11,744	11,729
9-B	Increase Water Yield	4,080	4,080
9-E*	Needed Water Impoundment Sites	0	184
10-A	Research Natural Areas	1,320	1,320
10-C	Scenic, Geologic, Historic, and Other Special Interest Areas	165	165
10-D	Wild and Scenic Rivers Corridors	30,559	30,559
TOTAL FOREST ACRES		1,107,670	1,107,670

(*NOTE: Management Area 1A (Recreation Facilities) increased by 22 acres, Management Area 4B (Wildlife), decreased by 133 acres, Management Area 7E (Wood Fiber Production) decreased by 58 acres, Management Area 9A (Riparian) decreased by 15 acres, and Management Area 9E (Water Impoundment) increased by 184 acres.)

Monitoring Field Trip

An Integrated Regional Review was conducted on the Bighorn National Forest between October 5 and October 9, 1998. The review team was composed of the

Deputy Regional Forester, Regional Staff Directors or Actings, and the Forest Supervisor, Bighorn National Forest. This review was also planned as the monitoring field trip for Fiscal Year 1998. A report on the findings and observations was written

and transmitted to the Forest Supervisor. This report and a summary of the information provided to the review team has been included in this Monitoring Report. This review and report are the 1998 monitoring field review.

This review was the second Integrated Regional Review to be conducted under this general framework. The first was conducted in August 1995. Several sites, such as Burgess Junction Visitor Center, Shell Falls, Medicine Wheel and the Tie Hack Reservoir, were revisited which gave the team an opportunity to observe improvements, developments, and results and consequences of previous decisions.

The Regional Review team visited each District, in the field, though they did not physically visit each District office. All the Rangers and Forest Staff Directors spent time with the team and had ample opportunity to discuss general management issues in a number of different forums. The Regional Review team was able to visit a number of important projects and developments, both planned and already completed, over the course of the week.

Bighorn personnel are still adjusting to several significant changes in their organizational structure, but the team was able to get a fairly good feel for how the employees are adapting and changing in response to leadership direction and support. The Team talked directly with many employees to get a sense of the how people are feeling about the changes and challenges on the Bighorn National Forest. The discussions were fruitful, productive and lively since there was an open and candid interchange of ideas.

The Review Team flew to Sheridan, Wyoming, on Monday October 5 and began the review on Tuesday, October 6. They met in the Forest Supervisor's office

for an early morning coffee with the employees. They then traveled to the Burgess Junction Visitor Center and to the head of Dry Fork on the Tongue Ranger District. Wednesday morning, October 6, was spent reviewing watershed and fisheries work, being accomplished cooperatively with the University of Wyoming, and the visitor facilities at the Medicine Wheel National Historic Landmark. Wednesday afternoon was spent at Antelope Butte Ski Area discussing range management and winter sports and also at Shell Falls Visitor facilities. After spending the night at the Shell Creek Creek Guest Ranch, the team traveled to the south end of the Forest to discuss fuels, recreation, wilderness, outfitting and guiding, timber sale planning, land exchanges and development at the Tie Hack Reservoir. A closeout was conducted on Friday morning, October 9, in the Forest Supervisor's office.

Commendations:

1. The team expresses its special thanks to Fred Patten for his outstanding work at not only organizing and coordinating the review, but also for his attention to detail and conscientious management of the schedule. The review was conducted in a highly professional and productive way. The hospitality and friendliness that the team felt across the Forest was very special and all responsible are thanked for their efforts.
2. The Rangers and Staff were able to spend considerable time with the team and that was much appreciated and believed to be very important in building the kind of trust and understanding that is critical to our working relationship.

Thanks to the Forest for making this an important priority and taking the time to ensure we could spend this time together.

3. The work that has been done in rebuilding the Interregional Hotshot crew in Greybull is very much recognized and appreciated. In particular, Dave Myers, is to be commended for his commitment and leadership in managing this program.

4. Interpretive programs are viewed as some of the most outstanding in the Region and even though we visited well past the prime of the season, we are very impressed with the programs and the successes found throughout the Forest, including again, the fine work being done at the Medicine Wheel area. Bob Larson's work is exceptional and it was a pleasure to see so much energy and dedication to serving the public on the Bighorn.

5. Interpretive signing throughout the Forest is outstanding, including displays and signing at Burgess and other facilities, as well as cooperative signing along the highways.

6. There continues to be much good work being done in the Range program. The range folks on the forest are a persistent and professional bunch who are making progress the old fashioned way. They are working hard to earn respect, trust, and using science as a basis for their change efforts.

7. There are very favorable financial health indicators in the summaries for the forest, especially relating to property work done. They have met their target for INFRA starting from ground zero.

8. The Forest is dealing with some very tough issues and is making progress in all, including a very complex FERC licensing proposal, range program realignments, and continuing the outstanding work on the Medicine Wheel.

9. There were numerous examples cited by the review team of outstanding relationships with Regional Office staff, such as Sue Ballenski, Jim Maxwell, Scott Mitchell, Paul Momper, Pat Halligan, Charlie Richmond, Diana Menapace, and many others.

Regional Findings:

1. **Stand Replacements:** The fuels program involving stand replacement needs fully integrated planning and involvement to make sure we have the expertise and capability to accomplish our objectives. We also need extremely proactive public involvement to avoid the public second guessing and questioning our projects during implementation. The Regional Office needs an interdisciplinary discussion of this issue.

2. **Visitor Center strategy:** We need to continue to work on our planning and management of visitor centers within the Region to avoid being faced with tremendously expensive maintenance and management costs to live with after the construction is completed and the project is "done".

3. **Interpretive messages:** The Region has to continue to make progress in using our interpretive displays to carry the multiple use messages. The Bighorn has many very good example of how to do this.

4. **Motorized Use:** Motorized use is increasing regionwide and the need to move ahead quickly with effective travel management is very important to our survival in this area. There seems to continue to be a slight bias against motorized use which is of concern when the numbers of these users are seen to be increasing significantly.

5. **Budget:** The Bighorn has worked to acknowledge the need to have some flexibility in its ratio of fixed costs to discretionary costs and is making good progress, but there is a tremendous need to look at the overall financial situation within the Region and continue to do what can be done to increase our effectiveness at getting more funding for the Region. It seems important to move to a stronger strategy to involve more people and tell a consistent and credible story about the importance of funding programs in the Rocky Mountains.

6. **Law Enforcement presence:** Ground presence of our law enforcement personnel is a major concern. It is not a problem with most field going personnel in wanting to do the field work, there appears to be a national emphasis on paper work and detail in recording which is seen as more important than field work. If push comes to shove, the field work is traded off so that the national report is completed. The mission of the Forest Service and LE & I's role in that mission needs to be reexamined. Priorities for law enforcement work in the Rocky Mountain Region needs to be addressed at the Regional level.

7. **User fee strategies:** The user fee demonstration project has raised some very important issues about planning, strategies, and consequences of using or perhaps over-using this tool. The Forest has some very important experiences to share regarding how appropriate it is to charge at visitor centers and the impact fees have on the use and support for the visitor center.

8. **Administrative Site Strategy:** There were several examples, strengthening the realization that the Region needs a more comprehensive administrative site strategy.

9. **Horse Management:** There were further examples of the need for an integrated horse management strategy to ensure we

have high quality, dependable stock throughout the Region.

10. **Meaningful measures:** It is critical that the costs input into the system are true costs and reflect reality.

11. **Service Center:** Need to look at the quality of service provided and the importance of providing a product that is dependable and proven successful not simply testing and trying new things that may or may not work in reality.

12. **Outfitter and Guide Policies:** There appears to be different interpretations and even different policies throughout the Region. There needs to be more consistency in this area, regionally.

13. **Safety Health and Stress:** Safety Health of people is a question because of minimal staffing. There is a frustration among employees because they cannot get everything done. There is evidence of stress from long hours of work and evidence of much donated time.

14. **Skills in pipeline:** There are concerns with lack of intake of skills in the pipeline. Expertise is not deep and in some cases units just do not have the full component of skills to get the work done to the standards that are expected.

15. **Management Codes:** The Bighorn has the fewest management codes of any unit in Region and sets the example of showing how to minimize complexity of work planning and demonstrating a unified approach to budget which should be modeled Regionwide.

16. **Forest Radio Program:** The Forest invited the Regional Office to conduct a radio program review in December 1997. An Action Plan was prepared and completed. There appears to still be a need

to look at Northern Wyoming and opportunities to share system components among Forests and with other agencies.

FOREST FINDINGS:

1. **Range:** The progress in Range is very positive and will hopefully be accelerated now with the progress in the AMP process and the emphasis on resource condition in permit administration. There are some excellent examples of adaptive management. Balancing work on AMP's, with permit administration, with enforcement violations seems to be a challenge. At risk is the maintenance of working relationships with permittees who don't have apparent violations or problem areas, but are important partners in the move toward range vegetation management. There is priority being placed on AMP work on streams which are listed as high priority for restoration within the state.

2. **Dry Fork FERC project:** The work being done on FERC licensing on the Dry Fork is a major Regional project and is establishing the standard for participation and analysis. The team trusts Bighorn personnel to follow the process and let it determine where we go. We need to be careful not to get out ahead of process in our opinions or expectations.

3. **Dispersed Recreation:** The Forest is faced with a difficult challenge in managing a dispersed recreation program that is influenced by local custom and practice. We applaud the Forests sensitivity and desire to find reasonable solutions to this problem of having people leave campers on dispersed sites while not using them, but caution them not to lose sight of the national importance and values of the Bighorn National Forest and the importance of providing equal opportunities for traveling publics as well.

4. **Visitor Facilities:** The Forest Service is managing the visitor facilities in a very integrated way and can see the relationship and connection between them.

5. **Caribou Timber Sale:** There was an outstanding team effort from start to finish on the Caribou Timber Sale, not only at the District, Forest, and Region, but also with the DEQ, EPA, and Conservation District. In particular, the watershed restoration analysis and the focus on project purpose and need is a model for the Region.

6. **Tyrell Work Center:** The team questioned the effectiveness of the fuels work at the work center. It appeared to be too little and not realistically significant as a tool for facility protection. The Forest will want to review this project with both fuels and silviculture personnel.

7. **Wilderness Access:** There was concern expressed about the philosophy of using road maintenance, or lack thereof, as a means to reduce wilderness use by discouraging travel to trailheads. This appeared not to be a Forest policy, but rather a response from a field individual who might see it as a desirable approach.

8. **Tie Hack Reservoir Project:** The Forest is to be commended for the success in completing the work on this project with tremendous support and little controversy and no appeal. There are questions with regard to some safety issues on the dam and we commend the Forest for approaching these at this time to make sure they are adequately and carefully considered.

9. **People management:** The team observed some very positive trends within the Bighorn organization. There was an air of openness, good candid discussion, positive attitudes, evidence of much improved teamwork, open communication, cross-

district sharing, and lack of defensiveness throughout the forest. There was good evidence of strong staff support and staff working together and communicating very well. The Forest's effort to outreach more to retirees is a good example of the keeping in touch with the people of this organization, present and past.

10. Program integration: There were examples of integrated work throughout the forest, including the use of the road maintenance crew to do recreation work.

11. Recognition: The Forest has much to be proud of in the quality of people and the dedication to getting things done right at the field level. The team was impressed and sincerely felt that there should be more recognition and visibility of the Bighorn within the Region. The Forest Supervisor and the Regional Forester need to be mindful of this and watchful of opportunities.

The following information was sent to the Review Team in a briefing book before they arrived. It is presented here because it provides intuitions as to how the Review Team arrived at its conclusions and it also presents current information and issues about the 1985 Land and Resource Management Plan.

1. Fee Demonstration and Interpretive Program Burgess Junction

The Burgess Junction Visitor Center opened in May of 1997 and the facility was entered into the fee demonstration project in mid-June. Receipts were disappointing and in August the fee demonstration project was discontinued and we returned to voluntary donations. Receipts were similar under the two programs, but our multiple-use message was getting to almost 80 percent of the visitors giving donations, instead of 10 percent charged the fee.

We studied alternative ways to generate operating revenue for the site in 1998. On Saturday nights, from June 27 to August 29, the Visitor Center Theater was host to a special program presented by employees or volunteers. We collected \$2 per person (over 12 years old) for each presentation. The average attendance was 20 people and an indirect benefit was additional interpretive sales. The flyer, advertising "Saturday Night Live" at Burgess Junction Visitor Center, was distributed through the local Chambers of Commerce, mountain lodges, hotels, campgrounds, and news releases. In the Sheridan area, we advertised on the Public Pulse, KROE radio. Information was also distributed through the Internet as well as being available at other interpretive sites along the Passage to Adventure travel corridor.

A Pow Wow, modeled in part after the Burgess Junction Visitor Center Dedication-Bighorn National Forest Centennial Celebration, took place on Saturday, July 25th. This event was for the benefit of the Medicine Wheel National Historic Landmark. An admission fee was set at \$3.00 for each adult. The Pow Wow included Native American dance contests, a Junior Princess Pageant, art and craft booths, and Indian tacos and fry bread concessions. The Pow Wow was advertised extensively, including all outlets used for Saturday Night Live. The interpreters at the Medicine Wheel promoted the event throughout the summer too.

Rick Laurent, Forest Archaeologist, conducted a program called "Skills of the Past: From Arrowheads to Yucca Cordage". The fee was \$20 per person. Local advertising was done by flyers, radio and newspaper but only three people attended.

The Burgess Junction Visitor Center was open from May 19 to September 22, from

8:30 AM to 5 PM. Operation and maintenance costs were approximately \$100,000 and visitation was 47,000 which was less than expected.

2. Dry Fork Energy Storage Project, FERC No. 10725

The Dry Fork of the Little Bighorn River cuts a northwest-southeast canyon in the northern part of the Bighorn Mountains in northern Wyoming. The Dry Fork Energy Storage project is proposed in this remote area of the Big Horn Mountains, which is a relatively roadless primitive area.

The proposed Dry Fork project would consist of an upper reservoir, on the Dry Fork Ridge. This reservoir would be 73 surface acres and would be created by scouring a depression on top of the ridge and encircling it with a large berm. There would be four, ten foot diameter penstocks and a 28,000 square foot powerhouse tunneled within the ridge. The lower reservoir would be created on the Dry Fork River by a 210 foot high dam just below the conveyance with Lick Creek, and it would cover 137 surface acres. A 230 kilovolt (kV) transmission line would travel from a substation located next to the upper reservoir, eastward to an existing transmission line near I-90. Both reservoirs would be fenced, because the water level fluctuation would make them unsafe for public recreation. The 24 hour fluctuation in the lower reservoir could be as much as 31 feet. A temporary labor camp for several hundred workers and eventually a permanent housing facility for about 80 employees would be located at the lower reservoir.

The Dry Fork Energy Storage project is not consistent with the objectives and direction in the 1985 Bighorn National Forest Land and Resource Management Plan. The differences between the activities necessary to construct this project and the Forest Plan

objectives are so great that the difference in some prescriptions cannot be resolved through mitigation or section 4(e) conditions.

3. North Tongue Watershed Management Process

The goal of this project is to develop an approach for the management of trout fisheries in Wyoming. The process for watershed management applied by natural resource management agencies and private industry includes several steps. These steps are: (1) identifying issues and desired conditions (2) identifying key physical and biological processes and functions- (3) stratifying the watershed into manageable units; (4) assembling analytical information, (5) describing past and current watershed conditions; (6) describing trends and predicting effects of future land management activities; (7) integrating and interpreting findings; and (8) managing information, monitoring responses to management, and revising management plans. The specific objectives of this project are to:

(1) Conduct a literature review and survey of agencies and industries to define the current status of watershed analysis and its application to fisheries management and synthesize the information into a pilot approach for use by the Fish Division of the Wyoming Game and Fish Department.

(2) Test the use of the pilot approach in Wyoming using the North Tongue River drainage in a pilot study.

(3) Develop maps of the North Tongue River drainage describing the distributions of important physical and biological features in order to evaluate and demonstrate the use of GIS technology in watershed management.

(4) Develop recommendations for modification or implementation of the watershed management approach by the Fish Division.

Two graduate research assistants conducted the research for this project. A review of the available literature on watershed assessment and management for sport fisheries and a survey of state natural resource management agencies was conducted to determine the approaches currently being used. Upon completion of the review and survey, a project coordination committee of six to eight people will be selected and convened. They will work with the principle investigators and research assistants to develop a pilot approach for watershed management. The pilot approach documentation will be prepared for review and comment by WGFD personnel, professional natural resource managers, and stakeholders such as anglers and grazing permittees. The document will then be revised in consultation with the project coordination committee for a test of its application.

A test of the watershed approach will be conducted on the North Tongue River watershed in the Big Horn Mountains, near Sheridan Wyoming. The implementation of the test watershed approach will include compilation of the state collaborative watershed analysis and management survey information, synthesis of this information into an approach to be used by the North Tongue River Watershed (NTRNW) management team in conjunction with the watershed management project coordination committee, introduction of the selected watershed management methodology to the NTRNW management team for their application on the North Tongue River, and collection and transfer

of information within the North Tongue River watershed for NTRW management team use. A large part of the information gathering and synthesis to be conducted within the context of the North Tongue River watershed will be executed by the research assistants working on the project and will contribute to their thesis and dissertation.

The following is an outline of the specific objectives and responsibilities of the research assistants, research associate, and principle investigators throughout this project.

Objective 1: Define the Current Status of Watershed Analysis and its Application to Fisheries Management.

(A) Conduct a thorough literature review. (B) Survey state agencies to define the current status of watershed analysis and its application to fisheries management. (C) Synthesize this information into a pilot approach for use by the Fish Division of the WGFD. (D) Coordinate with WGFD advisory committee to revise pilot approach

Objective 2: Initiate the Implementation of the Pilot Approach in Wyoming Using the North Tongue River Drainage in a Pilot Study.

(A) Delineate sediment and substrate distribution patterns within the North Tongue Watershed drainages. (B) Delineate the sources of the sediment that currently influence the pattern of sediment and substrate distribution within the North Tongue Watershed drainages. (1) Identify sources of sediment relative to different land uses (road construction, logging, grazing), and physical (geology, topography, drainage patterns) and biological characteristics (types of vegetation and their distributions) of the watershed. (2) Determine the relative contribution of sediment associated with

different land uses (road construction, logging, grazing), and physical (geology, topography, drainage patterns) and biological characteristics (types of vegetation and their distributions) of the watershed. (3) Utilize GIS technology to map patterns of sediment distribution, land use, and physical and biological characteristics of the watershed and integrate the information to identify the primary sources of sediment throughout the watershed. (4) Integrate the study results to describe the reasons for the current substrate and sediment patterns in the North Tongue River watershed. (C) Describe the influence of the current sediment and substrate patterns on trout in the North Tongue River watershed. (1) Inventory the distribution and quality of habitats important to trout for: (a) spawning; (b) Age-0, (c) Juvenile and Adult. (2) Inventory the distribution and relative abundance of trout by: (a) species, (b) life stage. (3) Identify factors influencing distribution of different species and life stages of trout such as: (a) sediment and substrate patterns, (b) pools, (c) overhanging bank- cover, (d) barriers to movement. (4) Integrate this information to identify the factors affecting recruitment of trout and the distribution of juvenile and adult trout in the North Tongue River watershed.

Objective 3: Develop GIS Maps of the North Tongue River Watershed Describing the Distributions of Important Physical and Biological Features.

(A) Define and map existing GIS layers: (1) Road network, (2) stream network, (3) vegetation.

(B) Digitize and map data gathered during the 1996-1998 field seasons to describe the distribution of important physical and biological features of the North Tongue River watershed in order to evaluate and

demonstrate the use of GIS technology in watershed management: (1) Upland erosion potential, (2) in-channel sediment distribution, (3) substrate distribution, (4) trout habitat distribution. (C) Design maps for use by the North Tongue River Management Group.

Objective 4: Develop Recommendations for Modification or Implementation of the Watershed Management Approach by the Wyoming Game and Fish, Fish Division.

(A) Develop recommendations for modification of the watershed management approach by the Fish Division. (B) Develop management recommendations for the North Tongue River watershed.

4. Facility Information

The Forest Service owns and maintains 83 buildings around the Bighorn National Forest and it leases and additional four offices. The majority of these government buildings are distributed within five Guard Stations located on the Big Horn Mountains. These Guard Stations were constructed by the Civilian Conservation Corp. in the 1930's. They consist of crew quarters, barns, and small offices. There have been additional structures and trailer parking sites constructed at these sites to increase housing capacity for seasonal workers, to add storage space, and to accommodate camper trailers for transient work-crews.

These facilities represent a considerable investment. Even though many of our structures are old and have served us well, we maintain them to meet current health and safety standards. Replacement of these facilities, at today's costs with today's budgets, is highly unlikely. Maintenance of Fire, Administration and Other facilities is funded through NFFA, from the unit's total National Forest funding, and quarters

maintenance is funded by quarters collections. Quarters collections are declining due to the reduction in seasonal work force.

In 1992, a contract was awarded to determine the historic eligibility of the Forest facilities. An in depth study was undertaken to research the older facilities and determine their historical significance. In 1994, another contract was awarded to determine the accessibility of the facilities. The information from these studies is used to guide remodeling and modification of the facilities to meet accessibility standards and to preserve the historic significance of the structures. Also some of the maintenance is being done by volunteers.

We embarked on a rehabilitation strategy to improve our campgrounds along our three Scenic Byways. We accomplished this work using our force account crew and equipment and the work was recognized by a Regional Forester's Special Achievement award in 1994. We are proud of the fact that we did a quality job and accomplished far more than we could have through contracting. The costs averaged approximately \$10,000 per unit. In addition, Sibley Lake day-use area was rehabilitated to accommodate persons with disabilities and we have installed a timber bridge on a road at a popular trailhead because of a donation.

The Bighorn National Forest is approximately 1.1 million acres. Within the boundary there are approximately 1,619 miles of roads which access the various Forest resources. These roads range from Primitive 4 - wheel drive roads to smooth surfaced all weather roads suitable for passenger cars. There are also three major highways that cross the Big Horn Mountains that have been designated Scenic Byways. These Scenic Byways are the primary access routes to the forest

transportation system. We also cooperate with Counties, other Federal agencies, commercial and special use interests for maintenance agreements. We estimate that 2,370,00 vehicle miles are driven on our surfaced roads annually and an additional 1,215,000 miles are driven on our high clearance roads.

5. Prescribed Fire

The Tongue District prescribed fire project objectives in the Dry fork area are to: (1) increase the availability and palatability of forage; (2) reduce sagebrush densities; (3) stimulate aspen regeneration; (4) increase the opportunities for fire suppression by reducing fuel. It is important for both wildlife habitat and livestock grazing. The area has gradually changed over time as sagebrush densities increased, aspen stands became decadent and lacked healthy regeneration. Many of these changes can be attributed to the lack of fire in the ecosystem.

The cumulative effects on livestock forage and wildlife habitat has been a reduction in forage availability and quality, a decrease in aspen vigor and distribution, and a decrease in overall plant diversity. A fire can improve the habitat by stimulating aspen regeneration, improving forage quality and increasing plant diversity. The resulting mosaic landscape would contain a variety of vegetative age classes, sizes, and species composition that would benefit livestock forage as well as wildlife habitat.

The Dry Fork fire project is generally a northwest aspect, dominated by declining aspen stands and decadent sagebrush. There has been 80 years of fire suppression and removal of fine fuels by livestock. Prescribed fire in aspen will require monitoring for regeneration and excessive grazing by both wildlife and livestock. If grazing is preventing aspen re-

establishment then the establishment of modified grazing practices would allow for successful aspen regeneration. This project has been reviewed and a determination made that it is consistent with the goals, and standards and guidelines of the Land and Resource Management Plan.

6. Historic Preservation Plan for the Medicine Wheel National Historic Landmark

The Historic Preservation Plan is designed to provide information on the historic, archeological and traditional cultural properties associated with the Medicine Wheel National Historic Landmark, and Medicine Mountain to provide long-term management strategies for protection, education, interpretation and monitoring. The Medicine Wheel National Historic Landmark and immediate vicinity will continue to be managed as a Special Interest Area under Forest Plan Prescription 10C. Management of this area will be exclusively for protection of heritage and cultural resources.

The 1998 season was been very successful at the Medicine Wheel National Historic Landmark. Visitation, Native American ceremonial use, and donations were consistent with 1997 levels. The individuals who are normally most active are also very active during the summer months with their own ceremonial activities. We are currently planning a new parking lot at the interpreter's cabin, new rest rooms, and a boardwalk and improved fencing around the Medicine Wheel. We are also working on a "vegetation management plan" for the consultation area. This plan will be the basis for future vegetation management projects such as timber sales and prescribed burning.

An ethnographic study has been on-going for seven years and a draft is now being

reviewed by the Native American tribes for sensitive issues. The ethnographic study is a product of the Wyoming State Historic Preservation Officer and consultant/anthropologist, Dr. Jim Boggs. It is a study of archeology and traditional cultural practices and it will be used as the basis for considering expansion of the Medicine Wheel National Historic Landmark. The current National Historic Landmark is 11 acres which was established in 1969. The proposed expansion boundaries may encompass 13,000 to 22,000 acres. We will sponsor a peer review of the study and environmental analysis prior to making any recommendations.

In the 1996 environmental analysis and in the Historic Preservation Plan, an area surrounding the Medicine Wheel was designated as an "Area of Consultation." Activities planned within this boundary must be discussed with the signing parties to the Historic Preservation Plan. The current Forest Plan land allocations, 7E, 6B, 4B, within the Area of Consultation remain the same. The Standards and Guidelines applied to these allocations in this area changed. The Bighorn National Forest Plan was amended (Amendment No. 12) to change the Standards and Guidelines to be applied to all Management Areas within the Area of Consultation.

7. Shell Falls Interpretive Master Site Plan

This project involves development of a master site plan to guide rehabilitation of interpretive facilities and the rest area infrastructure at Shell Falls. The master plan will ensure that future development efforts are completed in a coordinated and effective manner.

The Forest Service constructed this Interpretive Site in 1976. As the name implies, the facility features a waterfall, Shell Falls, that is the only waterfall

adjacent to any of the three scenic byways. However, the site also offers outstanding opportunities for interpretation of geologic formations and canyon flora and fauna, including Bighorn sheep.

This area receives about 250,000 visitors per year, compressed into a four month operating season, (mid-May through mid-September). It is a popular stop for many tour bus companies while en route to or from Yellowstone National Park. The facility is staffed by seasonal Forest Service employees seven days a week, during this period. They provide recreation and interpretive information and they sell interpretive materials. The site is cooperatively managed by the Bighorn National Forest and the Rocky Mountain Nature Association, who furnish a non-Federal match for operation and maintenance.

This facility is in need of rehabilitation because of significant deterioration to its rock walls, sidewalks, parking area, trails, and viewing bridge. The Forest Service invested \$330,000 to modernize the toilets in 1997. While some of the facilities, such as the viewing bridge, will likely be reconstructed in kind, other features should be considered for significant modification. These observations and recommendations are included in the scenic byway corridor management plan.

8. Fuels Management and Prescribed Fire

The fuels management program has grown during the past five years. Before this, we treated about 400 acres a year. Over the last four years there has been a gradual escalation of treated acres and this past year we treated 1,600 acres. This program has achieved this growth while we treated 3,700 acres of back log activity fuels, and by the fall of 1998 we should be finished with this backlog!

Our target for 1998 was 2,500 acres. This target has been hard to achieve during the last two years due to above average temperatures and precipitation. Live fuel moistures have been above normal during the summer and fall months which has not allowed many of the sites to be treated. We have an estimated 8,500 acres in approved for treatment with prescribed fire but most of these sites are where live fuel moistures play a critical role in the execution.

We are analyzing Hunt Mountain and the Little Horn area in order to have various fuel types, such as understory burning, and other fuel treatment opportunities available. Another area of analysis will be started in Fiscal Year 1999, it will cover the East Slope of the Big Horns Mountains. An emphasis needs to be placed on completing these analyses in order to provide a future source of fuels management and prescribed fire projects.

Over the last four years, several sites have had hand crews and the Wyoming Interagency Hotshot Crew treat hazardous fuels around Forest Service work centers, lookouts, popular visitation sites and summer home groups. This work has consisted of thinning, piling and burning to reduce the risk of high suppression costs for protection and reduce the hazard to the fire crews in protecting these sites should an incident occur.

9. Lands and Special Uses

There are approximately 370 recreation special use permits on the Forest. We administer approximately 130 nonregulation special use permits, including communications sites, reservoirs and ditches, road permits, easements, power lines, and a variety of miscellaneous uses. In addition, there are 10 resorts, three organization camps, two ski areas and 264 recreation residences. Other permits include numerous outfitter guide operations, several large annual recreation events and a campground concession permit.

The Tie Hack Dam and Reservoir construction resulted in the removal of the Tie Hack Campground, a small 10 unit facility along the South Fork of Clear Creek. The EIS for the Tie Hack Dam and Reservoir had mitigation requirements that required the City of Buffalo to replace the campground with a similar facility of 20 units. The reservoir site was appraised and the annual fee set at \$12,200. The City asked that the fee be waived, but the Forest Supervisor denied this request. The City appealed to the Regional Forester, but the appeal was denied. It was not reviewed in the Washington Office. The City is now proposing a land exchange where they would acquire lands at the reservoir and trade other lands to the Forest Service. The City is still negotiating on a land purchase price. This exchange would likely have local support as well as congressional support. The Regional office staff also supports this proposal.

Land Exchange is not a major component of our program because the Bighorn National Forest is one of the most consolidated National Forest's in the nation. However, several proposals are pending. One involves the exchange of ski area base

facilities at Antelope Butte for private lands, as yet unnamed.

There are two resorts that have trailer courts. This situation developed back in the 1960's. Both resorts are allowed to rent sites on a long-term basis. Some trailers (actually mobile homes) have been on-site for more than 20 years. This is contrary to National Forest policy. About four years ago we began a process to have the trailers removed (over a three year period). The two resorts were not happy as the rented spaces bring in considerable income. Without this type of use winter camping would be very limited. Bear Lodge has about 70 spaces while Arrowhead has about 40. This issue was placed on the "back burner" pending additional analysis.

We issued a moratorium on any new outfitter-guide permits. This may become an issue with various small groups, particularly institutional users. The moratorium was issued for two reasons: the lack of an updated capacity analysis and the lack of resources to adequately administer permits.

We contracted for the appraisal of recreation residences during Fiscal Year 1996. The fees will be assessed in 2000, unless a moratorium is declared by Congress. Appraisals were also completed on a number of reservoirs throughout the Forest. Substantial fee increases in calendar year 1999 have resulted in strong objections from the reservoir owners.

10. Caribou Watershed Protection Measures

This area has had several projects during the past 30 years. These projects include timber sales that have resulted in the current road system and stand conditions. The previous decisions did not restrict the Caribou EA decision to a predefined outcome. However, a more complete sense of the effects of the current decision are

possible by understanding how the analysis area arrived at its current condition. The current decision will not bind future management decisions. Past management decisions initiated a three step shelterwood silvicultural system.

The planning documents for the previous analyses can be found at the Buffalo Ranger District office, except for the environmental analysis for Rock Knob. The Clear Creek/Crazy Woman Creek Landscape Assessment was completed in August 1997. It analyzed past and present conditions for all resources in the area, compared those conditions to Forest Plan objectives and desired conditions, and made recommendations for potential management actions.

A decision made in the Forest Plan was that timber sale volume would be offered. The purpose of the Caribou timber sale is to implement this objective and increase the amount of hiding cover.

The goal of the original entry or preparation cut, was to determine windfirmness of the remaining the stand and to increase the wind firmness of the seed trees that would remain following a second entry. This thinning of the overstory resulted in stands that are not dense enough to provide wildlife hiding cover. Three of the diversity units analyzed were below the Forest Plan standard for hiding cover. Hiding cover is very specifically defined, namely, topographic or vegetative cover that will hide 90% of an elk at a distance of 200 feet. The current conditions of the stands provide too much shade and not enough mineral soil seed bed to result in lodgepole pine regeneration. When lodgepole pine reaches about 6-10 inches in height, with enough stems per acre it provides hiding cover. A regeneration harvest entry will provide cover in an estimated 20-30 years if there be no

treatment of these stands, it will take an estimated 60-80 years to establish hiding cover.

There is a need to improve the watershed health of Pole Creek and the North Fork of Crazy Woman Creek, in order to meet the objectives of the Forest Plan and Clean Water Act. The past management decisions have resulted in the existing road system and with the exception of FDR 476, all roads accessing the Caribou timber sale units are closed with metal gates, per the mitigation measures from past decisions. These roads were not revegetated, nor otherwise rehabilitated following past harvests. These roads are currently connected to, and are contributing sediment to, Pole Creek and the North Fork of Crazy Woman Creek. These two streams are on the Wyoming Department of Environmental Quality's list of streams that are partially for beneficial uses. Maintaining existing drainage structures, removing culverts on local intermittent roads, revegetation, or obliteration, just to mention a few options, can be used to improve watershed health. Timber sale receipts were used to construct these roads, so it is logical to use timber receipts to manage and maintain the road system.

Water quality was raised as an issue by numerous people, both internally and externally. Part of the Purpose and Need of this project is to improve the health of these streams. Pole Creek and the North Fork of Crazy Woman Creek are watersheds on the State 303(d) list due to, among other things, sedimentation. Since roads are considered to be a leading cause of sedimentation in this area, important watershed improvements can be made by conducting erosion prevention measures on the existing road system. Engineering reconstruction design for the timber sale contract will specify the location and type of road maintenance and rehabilitation methods from this list, and that will be incorporated

into the timber sale contract. Post-harvest measures for road rehabilitation and obliteration will be completed after the logging is complete, or after the regeneration treatments such as prescribed burning are complete, which ever is sooner.

To mitigate the potential increased road use due to the thinning of the forest stands, and the resulting increased sedimentation risk and wildlife disturbance impacts, additional "road barrier effectiveness" measures will be implemented behind the closure gates on the roads listed in this section. These road barrier effectiveness measures will include a combination of road bed obliteration outsloping cross-ripping, and the use of stumps, logs, and rocks to discourage use, except on snowmobile trails

**TABLE OF PROJECTED AND ACTUAL
OUTPUTS**

The following table displays the projected average annual outputs, costs, and returns from Forest Plan Table III-1. It compares these projections with actual Fiscal Year 1998 accomplishments. A direct comparison of projected outputs is not always appropriate. Table III-1 contains "average annual" values, or the average of

several individual and varying years. Output data for individual years by itself may not provide a sufficient basis from which to draw conclusions

Interpretation or analysis of the information in this table is provided in the narrative section for each resource area. Monitoring over several years establishes the trends necessary to accurately evaluate outputs.

Table III-1

Activity	Unit of Measure	1991-2000 Avg. Annual Projected Outputs	FY 98 Outputs
SOILS			
Soil and Water Resource Improvements (i.e., improved watershed condition)	Acres	38.5	40.0
Annual Soil Survey	Acres	Not Estimated	Completed
Soil Loss (incremental increase due to timber harvest and road construction)	M tons	9.3	~
WATER			
Water Yield	MAF	699	699
Water Meeting Water Quality Goals	MAF	Not Estimated	~
Water Not Meeting Water Quality Goals	MAF	Not Estimated	~
MINERALS			
Leasing Availability Recommendations			0
-No Lease	M Acres	211.98	0
-Lease	M Acres	723.84	0
-Lease Without Surface	MAcres	171.85	0
Minerals Operating Plans	Total Number	5	1
FIRE			
Fire Management -Most Efficient Level	Thousand \$'s	390 (609.3)	442.0
Fuels Breaks and Natural Fuels	Acres	300	1,618
WILDLIFE AND FISH			
Wildlife Habitat Improvement	Acres	2,560	2,118
Big Game Winter Range Carrying Capacity			
- Elk	Number	527	527
- Deer	Number	1,053	1,053
Riparian Area Improvement	Acres Improved Annually		30
Aspent Treatment	Acres	527	0
Changes in Habitat Capability of Indicator Species			~
- Early Successional Stage	% change (mean of 8 species)	not estimated	0
- Mid Successional State	% change (mean of 8 species)	not estimated	0
- Late Successional Stage	% change (mean of 6 species)	not estimated	0
Fisheries Improvement Structures	Structures Constructed Annually	60	10
Activity	Unit of Measure	1991-2000 Avg.	FY 98 Outputs

		Annual Projected Outputs	
Wildlife Structures	Structures Constructed Annually	15	3
Threatened and/or Endangered Species Habitat Management	Number of Animals	0	2
RANGE			
Permitted Livestock Grazing	MAUM'S	140	114
Areas of Grazing, Recreation & Wildlife Conflicts Where Conflict are Reduced	Thousand Acres (Cumulative totals rather than annual outputs)	22	111
TIMBER			
Total Prograded Sale Volume Offered	Million BF	16.4	5.67
Total Prograded Sale Volume Offered	Million CF	4.2	1.15
Sawtimber Volume (7'+)	Million BF	14.5	2.85
Sawtimber Volume (7'+)	Million CF	3.8	0.63
Roundwood Volume Offered (live 5" - 6.5")	Million BF	0.5	0.16
Roundwood Volume Offered (live 5" - 6.5")	Million CF	0.08	0.04
Mortality Volume	Million BF	1.4	2.66
Mortality Volume	Million CF	0.37	0.48
Timber Stand Improvement	Acres	400	1,169
Reforestation (planting and seeding)	Acres	360	255
Clearcutting	Acres	1,194	43
Shelterwood Cutting	Acres	625	1,227
Uneven-aged Selection Cutting	Acres	100	0
Catastrophe Salvage	Acres	0	0
INSECTS AND DISEASE			
Insect and Disease Survey	M Acres	800	0
DEVELOPED RECREATION			
Developed Recreation Capacity (except downhill skiing)	MRVD's	1,137	1,109
Developed Recreation Use (including visitor information services, not including downhill skiing)	MRVD's	735	730
Subcategories of Developed Recreation			
Developed Recreation Capacity, public sector	MRVD's	592	614
Developed Recreation Use, public sector	MRVD's	490	461
Developed Recreation Capacity, private Sector (except downhill Skiing)	MRVD's	545	495
Developed Recreation Use, private Sector (except downhill Skiing)	MRVD's	245	269
DOWNHILL SKIING			
Downhill Skiing Capacity	MRVD's	25	25
Downhill Ski Use	MRVD's	18	10

Activity	Unit of Measure	1991-2000 Avg. Annual Projected Outputs	FY 98 Output
DISPERESED RECREATION			
Total Dispersed Recreation Capacity (not including wilderness)	MRVD's	2,163	2,597
Total Dispersed Recreation Use (not including Wilderness)	MRVD's	1,063	912
Dispersed Recreation Capacity by Recreation Opportunity Spectrum Setting			~
Primitive & Semi Primitive Nonmotorized Setting (outside of wilderness)	MRVD's	215	108
Semi-Primitive Motorized Setting	MRVD's	311	264
Roaded Natural and Rural Setting	MRVD'Ss	1,648	2,225
Dispersed Recreation Use by Recreation Opportunity Spectrum Setting			
Primitive & Semi Primitive Nonmotorized Setting (outside of wilderness)	MRVD's	129	55
Semi-Primitive Motorized Setting	MRVD's	290	219
Roaded Natural and Rural Setting	MRVD'Ss	644	638
Number of Trailheads with Access for all Classes of Vehicles (incremental over pervious period)	Total number (1978-1998)	Not Estimated	~
Trail Construction/reconstruction	Miles	2.9	1.9
WILDERNESS			
Wilderness Management	Acres	189,000	189,000
Wilderness Capacity	MRVD's	124	124
Wilderness Use	MRVD's	110	110
LANDS			
Land Purchase and Acquisitions	Acres	Not Estimated	~
Land Exchange Offers	Acres	Not Estimated	~
Right-of-Way Acquisitions	Total Cases Each Period	0	0
Occupancy Trespass	Cases	4	1
Landline Location	Miles	38	0
FACILITIES			
Road Construction			0
- Arterials	Miles	1.9	0
Road Reconstruction			0
- Arterials	Miles	1.9	0.5
- Local Roads	Miles	8	0
HUMAN AND COMMUNITY DEVELOPMENT			
Human Resource program (includes al programs except YCC and Job Corp)	Enrollee years	12	5.68
Job Corp	Enrollee years	Not estimated	~
Activity	Unit of Measure	1991-2000 Avg.	FY 98 Output

		Annual Projected Outputs	
EXPENDITURES			
Operation and Maintenance	Million Dollars	6.96	3.19
Capital Investment	Million Dollars	2.61	0.53
General Administration	Million Dollars	1.46	0.81
Long Range Fixed Costs	Million Dollars	0.88	1.43
Total Budget	Million Dollars	11.92	5.96
RETURNS TO TREASURY			
Returns to Treasury	Million Dollars	2.51	0.88

This section has been left blank intentionally so the above charts would fit into this report!

ACHIEVING OBJECTIVES OF THE FOREST PLAN

Compliance with Outputs and Effects or activities projected or scheduled in Forest Plan

A review of the Table of Projected and Actual Outputs will indicate variability in accomplishments. Outputs often vary substantially from year to year as funding levels vary. The trends in various resource areas over a three to five year period are a better reflection of whether or not the Forest Service is progressing toward accomplishment of its goals and objectives to reach the desired future condition. A more detailed discussion is contained in the narratives for individual resource areas.

The single factor that most impacts outputs and program effectiveness is the annual budget. Frequently, distribution of our funds reflects national direction and priorities of the administration and Congress. Traditionally, we have been funded at a level significantly below what was projected

to implement the Forest Plan. The Fiscal Year 1998, funding level was about 50 percent of our projected need.

For the past several years we have been using a system of project budgeting often referred to as a unified budget. Employees plan this budget and execute projects on Forest wide basis and trade-offs are realized at the beginning of the fiscal year year. We have made an effort to "cap" our fixed costs, (permanent employees salary, vehicles, rent and utilities, etc.) at 70 percent of the annual budget. The remaining 30 percent of the annual budget is then to be used to provide flexibility to fund a seasonal workforce, provide training, purchase equipment, and deal with unplanned events.

There is little control at this organizational level in "out year" budget planning. Often we have frantic last minute planning when the Regional Office requests project information after monies become available at the national level.

MONITORING RESULTS

A. PHYSICAL COMPONENTS

DISCUSSION

Fiscal year 1998 was a year of change for the watershed, air, soil and fisheries programs on the Bighorn National Forest. The Forest Hydrologist was promoted to a position in Colorado. The Fisheries Biologist position was filled in July.

Charlie Marsh transferred in early June 1998. Bryce Bohn was promoted from the Kootenai National Forest in Montana in early November 1998. Hydrologists from other forests conducted the work through the field season. These employees did an excellent job of keeping the program running and implementing the Forest Plan. However, due to their temporary nature, some monitoring items were either not completed or were not recorded. Therefore, Fiscal Year 1998 outputs are not as complete as in years past.

AIR QUALITY

Program Summary

The 189,000 acre Cloud Peak Wilderness is a Class II Air Shed that is subject to protection under the Clean Air Act. It has beautiful views and outstanding scenery that could be impacted by air pollution. There are few threats to the air quality from local sources, but sources outside the area and global acid rain deposition may pose a larger threat in the future.

IMPLEMENTATION MONITORING

A camera to monitor visibility was installed on Grouse Mountain early in the summer of 1995. The purpose of the camera is to

monitor the long term air resource of the Cloud Peak Wilderness. Two photographs are taken daily of Mathers Peak. These photographs are analyzed to determine whether or not there has been an increase in particulate matter over time.

SOIL AND WATER

Program Summary

As stated earlier, the incumbent hydrologist left in early June 1998. A replacement was not seated until early November 1998. During that time, the new Fish biologist (David Mandrella) conducted the aquatics program. The fisheries biologist and hydrologist together form an aquatics resource team responsible for water and fish habitat as well as minerals air quality and soils. The new program structure appears to work quite well and should result in a more integrated approach to watershed management in-line with the ideals of ecosystem management.

The emphasis for the Forest Hydrologist and the detailers during Fiscal Year 1998 was to continue working with the State of Wyoming to evaluate the State's Water Body Impairment List while supporting the other resource areas.

Five issues carried forward from 1997 continue to be a challenge. They are:

- (1) travel management and the effects on the aquatic resources,
- (2) grazing and the effects on the riparian and aquatic resources,

- (3) timber harvest and the work load associated with NEPA analysis,
- (4) implementation and monitoring of Best Management Practices,
- (5) NEPA work loads and the struggle to provide adequate aquatic information.

A considerable amount of time was devoted to collecting information on the State's 303(d) monitoring streams. During the summer, two seasonal employees collected T-Walk and Proper Functioning Condition (PFC) data for Bighorn streams within on the State's monitoring list. During the summer, the crew collected and organized data on 50 sites across. The information was compiled into a report and is available for agency and public review. This information was presented to the State Department of Environmental Quality (DEQ) in December 1998. The State is going to review this data to assess whether or not it is sufficient to remove some streams from the Impaired list.

Several large watershed improvement projects were initiated and completed during Fiscal Year 1998. Approximately eight miles of road were decommissioned in the Caribou timber sale area. These roads were treated to reduce the amount of connected disturbed area within the watershed and to reduce the cumulative effects of land management in the area. Other watershed improvement projects completed in Fiscal Year 1998 included five miles of fish habitat improvements and ten acres of erosion control. The Forest Service began an analysis of a watershed improvement project for Sibley Lake and Prune Creek. This project will be funded by the settlement from the water quality violations for Twin Lake Reservoir. The Forest Service also completed a Regional Watershed Reconnaissance for Bighorn National Forest watersheds. The product of this analysis is an understanding of the watershed 'health' and a determination of

factors leading to a degraded or an impaired condition.

Erosion from from road prisms continues to be a concern as a source of sediment. A priority was placed on revegetating road cut and fill slopes, closing roads and repairing damage done to roads by flooding.

Approximately 40 acres of watershed improvements completed during Fiscal year 1998, with an emphasis on improving stream crossings where environmental damage has been identified.

IMPLEMENTATION MONITORING

Forest Plan Standard and Guidelines are addressed during project planning, however, during project implementation the Standards and Guidelines can not always be reviewed due to a limited number of resources. Project monitoring where Standards and Guidelines and Best Management Practices have been implemented, demonstrate Forest Plan direction will protect the soil and water resource. However, training employees on the appropriate Best Management Practices and their implementation is desirable in the future.

Effectiveness Monitoring

When Standards and Guidelines and Best Management Practices are implemented they protect the soil and water resources. When the Standards and Guidelines and Best Management Practices are not implemented, effects have occurred and corrective measures have to be taken.

Validation Monitoring

The difference between natural erosion and erosion resulting from management activities needs to be defined. The relationship between the Standards and

Guidelines and technology needs to be evaluated to reduce costs.

Evaluation and Conclusions

SOILS AND WATERSHED

The mechanism being utilized to protect the soil and water resource is to concentrate efforts during the project planning phase. This process is effective as long as follow-up monitoring is accomplished. More emphasis is on implementation, monitoring and review of project implementation as it relates to NEPA decisions. Monitoring activities that relate to implementation of project impacts, Standards and Guidelines need greater emphasis and they need to be meaningful.

Soil and Watershed Monitoring Contributed by the East Zone Wildlife Biologist

Concrete cable mats were installed in a tributary to Copper Creek, on Forest Development Road 670. They were installed to improve water quality and reduce the cost of long-term maintenance. The cost of the cable mats, including installation, was less than what it would cost to replace a culvert. This structure should require very little maintenance and the Forest Service should realize future savings when compared to a culvert. This project benefitted about five acres of water and 0.2 mile of stream habitat.

There were plans to install a hardened crossing on the East Fork of the South Tongue, the Woodchuck Pass Road but it was not funded.

The existing hardened crossings on Babione Creek (cable concrete mats) and on West fork of South Tongue (Geoweb) were visited. The Babione crossing was in excellent condition and no maintenance is needed or expected. The crossing near

Woodrock Guard Station however, will require some modification as soon as funding will allow. The cable concrete mats are easier to install and they will require less maintenance than the Geoweb crossing.

There were plans made to extend the hardened foot trail at Sibley Lake, and reset the abutments on the foot bridges but this project is not yet funded.

There was work done to improve a stream crossing at Vale Creek for Forest Development Road 309. This work improved about five acres for water quality and about 0.2 mile of stream habitat.

There was work completed to improve a stream crossing on the West Fork of Little Goose Forest Development Road 309. This included filling the bomb craters on the east side of the crossing. This project benefitted about five acres of water quality and 0.2 mile of stream habitat.

Some Heavy equipment was contracted to obliterate and rehabilitate an abandoned road on North Tongue Forest Development Road 160). It was once the access road to the Butler's cabin which was "deleted" in the early 1980's. The road bed was ripped water bars installed, and it was seeded with a mixture of native grass species to stabilize the soil surface and minimize erosion. This project benefitted about three acres of water quality and 0.5 mile of stream habitat.

An analysis, an Environmental Assessment and a Decision Notice were written to obliterate part of the road leading in to the Bull Creek fish exclosures Forest Development Road 176. This road bed was ripped, water bars were installed, and the old road bed was seeded with a mix of native grasses. Also, debris, logs, and rocks were placed on the road bed to discourage illegal use by ATV's. This project

benefitted 5 acres of water quality, and 1 mile of stream habitat.

A project was undertaken on the Tongue District to remove an old bridge abutment and slope stream banks on Marcum Creek (Sec 13, T55N, R89W). This bridge remained from when Highway 14 ran along the west side of the private land behind Hanft's. After the banks was shaped and seeded, the area was fenced to exclude cattle. A backhoe was used to accomplish the earth work. The banks were seeded with a mix of native grasses and the area was covered with erosion control matting. The enclosure fence is a four-strand barbed wire type, and it will be maintained by the Forest Service until no longer needed. It is estimated to take five years to establish vegetation on this site, at which time the fence will be removed. This project benefitted seven acres for water quality, 0.2 mile of stream habitat, and seven acres of riparian habitat.

The Watershed Improvement Needs (WIN) list was updated for the Tongue District. This is done annually to remove completed projects, and to add new projects. It is also used to prioritize work forest-wide.

FIRE

Program Summary

The Bighorn National Forest Fire Management Organization has completed three levels of the National Fire Management Analysis and implemented the fourth, which is monitoring and evaluation. Implementation began during the Fiscal Year 1992 budget. The first National Fire Management analysis was completed in 1989 and a updated during the fall and winter of 1994. Regional certification of this analysis was completed in 1996. A reanalysis was started last year and completed in January 1998 with Regional

certification being given in December 1998. The reanalysis strengthened the fire and fuels management programs, increasing the coverage of days for forest engines from five to seven days. The Most Efficient Level was \$1,139,000. The increase funding was due to changes in the resource coverage levels. The coverage levels were analyzed to provide coverage for seven days a week.

The classic wildland urban interface is not a complex issue since there are only 7,400 acres of alienated lands within the forest boundary. However, there are complications because there are over 300 special use summer homes, 16 special use lodges and two ski areas scattered throughout the forest. Our fire history shows that special use and private structures have been threatened or burned.

Funding for Fiscal Year 1998 was at the minus 45 percent level which was below the lowest level of funding (minus 30%) analyzed during the 1994 analysis. Funding for Program leadership was for a Staff officer, Forest Fire Management Officer, a West Side Zone Fire Management Officer, a East Side Zone Fire Management Officer and an assistant East Side Zone Fire Management Officer. There is a need for an assistant for the West Side but funding was not available. Dispatching for Initial Attack is provided by the Cody Dispatch Center, Cody, Wyoming. The hand and engine crews were funded for 60% of the fire season.

The fire season was at a below normal of occurrence. We received and distributed one third of the annual funds for the Fort Washakie helicopter and helitack crew to the Bureau of Indian Affairs. The Forest Service provided the assistant Helitack Foreman for this Program. The Forest Service dispatched two engines to Florida and participated in prescribed burning programs on the Custer National Forest.

There were seven fires that burned 2.7 acres during Fiscal Year 1998. The Forest fire crew initial attacked two fires on private lands that amounted to 35 acres. These fires were threatening the forest. The 1998 fire danger was high to very high early in the fire season moderating during July and early August. By the end of August the fire danger was approaching very high conditions. Rains by September 10 lowered the danger to moderate for the remainder of the Fall.

Because of the abundance of moisture and warm temperatures through the month of September broadcast burning projects were not accomplished as planned. These moist conditions kept a lid on prescribed burning till late in October. Most of the 1,500 acres were accomplished early in the Fiscal year during late April and May.

IMPLEMENTATION MONITORING

The fire organization is a team effort between the Zones. Cody Dispatch Center is responsible for initial attack dispatching. We hired 18 firefighters, one fire cache/prevention/fuels manager technician and a four person fuel crew. The Wyoming Interagency Fire Crew had new faces this year. Kevin Pfister took over as Crew Superintendent. Jay Kirth moved inot the assistant Crew Superintendent position. Jennifer Powers and Doug Downs took over squad boss positons as so the crew was fully staffed for the 1998 summer fire season.

Two of the three planned 300 gallon Model 52 engines were purchased and placed into operation. There were three engines with a total carrying capacity of 800 gallons. The forests reconfiguration of engines will be complete by the summer of 1999 when the 200 gallon engine will be replaced with 300 gallon unit. Carrying capacity for the forest

has increased to 300 gallons more water with three less engines in Fiscal Year 1994. Two new remote automated weather stations (RAWS) were placed into operation. One station is located on Boyd Ridge and other is in Leigh Creek drainage. The Forest has five RAWS stations. These new stations will give us weather observations at lower elevations. These stations will provide us with current and past data for planned prescribed burning operations.

Effectiveness Monitoring

The low to moderate fire dangers during July and early August kept the fire occurrence in check for most of the season. The crews were kept busy with thinning projects that paid for part of crews wages. Thinning was accomplished on acres. The fuels crew worked on fuels reduction project of previous thinning slash in the Big Goose area. Fifty seven acres was accomplished by handpiling and burning. Even though it was wet season, broadcast burning was accomplished on 1,618 acres and over 597 acres of slash piles were treated during the fall. About 95 percent of the 20 years of backlog slash units have been treated on the Forest.

Evaluation and Conclusions

The fire management program has stabilized with the hiring of the East Side Zone Fire Management Officer. The management of program has become more effective and efficient. The hiring of three permanent part-time engine operators (Tom Hubbard, Bob Klages and Chris Zoler) has added depth and leadership to our initial attack program. A position being considered is an Assistant West Side Zone Fire Management Officer. The Zones have worked very well together in exchanging and sharing fire resources for initial attack and project work.

Radio communications is a continuing issue. Radio communications are sometimes limited by coverage and the equipment limitations. Equipment was purchased for the Cody dispatch center to help fix it's problems. Adjustments have been made with cell phones, human repeaters, and local offices to provide safe and effective communications.

The Big Goose fuel reduction project was completed but additional fuel reduction is needed in this area. The Granite Creek Summer Home Group fuel reduction project was started by the Interagency Fire Crew but little was accomplished because the Crew were on fire assignments for most of the summer.

Forest Plan direction for fire management is very general. The Standards and Guidelines provide limited direction for Fire Management while the Fire Management Action Plan has been written to provide specific fire management direction for suppression in the management areas. Preliminary data and mapping projects have been initiated to prepare for the upcoming forest plan revision.

The National Fire Management Analysis System and the Fire Management Plan provides the necessary direction to fund an organization and implement direction to meet the Forest Plan Standards and Guidelines.

B. BIOLOGICAL COMPONENTS

WILDLIFE

Program Summary

The Bighorn National Forest supports a diversity of habitats for an estimated 300 species of wildlife. These habitats range from low elevation deciduous riparian woodlands to alpine tundra. The most common uses of the wildlife resource are viewing, photography, and big game hunting. Other uses include trapping, bird hunting and small game hunting.

Partnerships with organizations such as the Wyoming Game and Fish Department, Rocky Mountain Elk Foundation, Foundation of North American Wild Sheep, Trout Unlimited, The Nature Conservancy, Audubon Society and others are helping us meet Forest Plan goals for wildlife and fish habitat.

The success of seeding and rehabilitation work was monitored for the West Pass Fire. This area burned by a wildfire during mid-summer of 1996. All waterbarring, ripping, and seeding work was found to be functioning well, and no additional work is needed. The Stockwell Fire also occurred in 1996, and rehabilitation work was accomplished on the Stumpy Ridge road and some seeding near the Little Goose Peak Mine. The mine area was not checked during 1998, and status of rehabilitation efforts is unknown.

The Tongue Canyon prescribed fire of 1995 was checked, but no photographs were taken. Overall, this treatment did not seem to increase the quantity of forage for big game animals and it appears, elk have not

returned to this historical winter range. The Kerns Prescribed burn area was not monitored this year.

All Aspen exclosures on the Tongue District were maintained during 1998. The individual exclosures are listed below and total 47 acres.

N. Tongue - 2 exclosures, Marcum Creek - 1 exclosure, P.K. - 3 exclosures, Sheeley cabin - 1 exclosure, Hay Creek - 5 exclosures, Dry Fork - 2 exclosures, 4, Camp Creek - 1 exclosure, 1 acre.

An attempt was made to treat more of the Kerns winter range with prescribed fire. About 30 acres were burned in May but this fire would not carry due to excessive utilization of grass by elk. This project is cooperatively funded by the Rocky Mountain Elk Foundation.

The Tongue Canyon prescribed burn project was completed this year. This portion of Tongue Canyon is historical big game winter range, but is no longer used by elk. About 500 acres had been burned previously, and an additional 309 acres were burned in April. The target fuels included deciduous brush and Aspen. The burning went very well and all objectives were met. This project is partly funded by the Rocky Mountain Elk Foundation.

Some progress was made on the Dry Fork Prescribed Burning Project. The objectives for this project are to increase the quantity and quality of forage for livestock and big game animals. Attempts to burn in October of 1997 failed due to the green condition of grasses, late in the season and due to heavy utilization of forage by cattle. The Skull

Ridge unit was treated this year, and about 95 acres were burned in May. The amount of area burned was limited by lack of fuels, primarily grass. This project is cooperatively funded by the Rocky Mountain Elk Foundation and trust funds from small sales collections (Knutson-Vandenberg) on the Tongue District.

Three additional bat houses were constructed and installed this year, and all six were monitored. The one at the Sheridan Work Center contained two Western smallfooted myotis, which is a Wyoming Game and Fish sensitive species. The bat house at Big Goose Ranger Station contained one little brown myotis. The bat house at Hunter Ranger Station contained one Townsend's big-eared bat which is a sensitive species. The other three bat houses were not used this year. All bat houses were constructed utilizing scrap materials and volunteer labor. The only expense to the Forest Service was for salary to install and monitor them. Also, a maternity roost containing Little Brown Myotis was discovered at Big Goose Ranger Station and was reported to the Wyoming Game and Fish Department, non-game section.

One hundred Bluebird houses on the Tongue District were monitored by volunteers. They were from the Sheridan chapter of the Audubon Society and John Kraft. They found nesting success was sporadic and concluded it could be related to climatic conditions.

There are six owl nest platforms on the Tongue District. Only three could be checked during March of 1998 due to weather conditions and none of them contained any active nests. This project was undertaken several years ago to learn whether or not great grey owls were breeding on the Bighorn Mountains. There has been no breeding documented

yet. This project is accomplished wholly by volunteers. More nest boxes are needed to effectively check the census for breeding success of great grey owls.

Improvements were made to some existing road closures on the Tongue District. This work was done to make the existing closure points more effective in restricting illegal motorized use and to increase the closure effectiveness in improving solitude for big game animals, primarily elk. 810 acres of big game habitat benefitted. Listed below are the closed roads which were improved:

- Sheeley Creek - FDR 214 - Place Carsonite and two barrier posts to prohibit motorized travel to the top of Big Willow Divide.

- Little Willow - FDR 155 - Place Carsonite and two barrier posts to prohibit motorized into the wetland mitigation enclosure.

- Gillis' cabin - FDR 169 - Place Carsonite and 2 barrier posts to stop motorized on Big Willow Divide east of access road.

- Big Willow Creek - FDR 159 - Add structure to the buck and pole fence at the end of this road to prohibit ATV use further up the drainage and up to Hunt Mountain Road.

- Garland Gulch - FDR 177 - Add barrier posts to the Carsonite closure sign to stop ATV use in to the Ghastly Sale area.

- Kane Cow Camp - FDR 144 - Install Carsonite sign and two barrier posts on old road. ATV's are using the old road to circumvent the gate closure on the logging road.

Snow track surveys for forest carnivores (pine marten, lynx, wolverine) were conducted in the proposed Sourdough Timber sale. A total of 2,200 acres were surveyed in the spring. No tracks were

found with the exception of one mountain lion.

Surveys for Boreal owls were conducted on the Tongue District with a taped call during the spring nesting season. The areas around Sawmill Divide and Burgess Overlook were surveyed. 1700 acres were surveyed after dark in April, but no Boreal owls were found.

Goshawk nests were surveyed for in the proposed Sourdough, Swamp, and Woodrock Timber Sales, the area near Duck Pond was also surveyed and the Twin Nickel Timber Sale was studied. The surveys were conducted in June and July and the acres surveyed for each area are shown below:

Sourdough 984 acres, Swamp 1,312 acres, Woodrock 1,680 acres, and another 96 acres.

A slide presentation called, "Amphibians of the Bighorn National Forest, their Occurrence, Status, and Identification," was developed and shown to Wyoming Game and Fish Department personnel in the Sheridan office, the general public at the Sheridan County Fulmer Public Library, and to Forest Service personnel in the Sheridan office. The purpose was to demonstrate the extent of our knowledge and to attempt to get more reports of sightings to broaden this knowledge. Four presentations were made to 65 people.

A proposal to write a cave management plan for Cliff Dwellers cave was made, but was not funded. This cave is the least impacted by humans of the four main caves on Tongue District, but it is also one of the most important caves since it contains three species of bats one is a Region 2 sensitive, and one is a Wyoming sensitive bat. It is important that management of this cave

resource is addressed in a proactive manner before irretrievable impacts occur.

The Columbia Spotted Frog is proposed for Federal listing and an attempt was made to write a Conservation Strategy for it in Region 2 during January 1998. The Wyoming Game and Fish Department refused to participate in a Conservation Agreement, and the project was dropped. A Conservation Strategy or Agreement is a step toward preventing the listing of this species as Threatened or Endangered. A Conservation Strategy or Agreement would also provide for funding habitat improvements, which would benefit this species. Surveys of Old Growth were conducted in the proposed Sourdough, Swamp, and Woodrock Timber sale areas. The total area surveyed for each sale was: Sourdough 1,148 acres, Woodrock 3,080, Swamp 990 acres.

About 20 acres of the Squirrel Timber Sale, containing logging slash, were burned this year. This treatment was to reduce fuel loadings, avoid soil disturbance from conventional machine piling, and leave large woody debris for cover for microtome wildlife. These burns met these objectives and resulted in better habitat for small mammals than could have been achieved with the normal pile and burn type of site preparation.

Surveys were conducted for amphibians on the Buffalo District. Previous sightings are anecdotal, and scientific surveys were needed to validate sightings. Survey forms developed by the National Biological Service were used and results were sent to the Wildlife Observation System database which is maintained by the Wyoming Game and Fish Department and to the Wyoming Natural Diversity Database which is maintained by The Nature Conservancy. The Bighorn National Forest also maintains a record of all documented amphibian

sightings. A total of 200 acres were surveyed.

The Shutts Flat area on the Tongue District was surveyed for toads this summer but there were none found, and these surveys are ongoing.

The Tongue District biologist assisted with a research project in 1998 which involved genetic sampling of Columbia Spotted Frogs. Researchers from B.Y.U. sampled the Bighorn population as part of their study.

Breeding success of the Columbia Spotted Frog was monitored again this year. Survival was done from previous years primarily due to freezing of the egg masses prior to hatching. Post hatch mortality of larvae was normal.

Monitoring for active Goshawk nests in was conducted in three active/planned timber sales: Caribou, Twin Nickel, and Schuler. Relocated Goshawk nest in Twin Nickel. Also located an active nest in the Squirrel Timber sale. Both areas were avoided by the purchaser until after the goshawk young had fledged and left the nest. The nest site in Twin Nickel was excluded from the cutting unit after the contract had been awarded using a contract provision for minor modifications.

The goshawk pair returned to the same nest site during 1998 and successfully raised a brood which indicates that the sale activities did not cause them to abandon the nest site or to move to an alternate location.

An Environmental Assessment, a Biological Evaluation, and Special Closure order were written to close approximately one mile of the Bull Creek Road (FDR 176). This was done primarily for soil/watershed improvement, and to increase elk security. The closed road was obliterated using a

bulldozer and reseeded using native grasses and was covered with slash to discourage illegal motorized use. Wildlife habitat was enhanced on 200 acres

Wildlife support was provided for the following environmental analyses:

- Sourdough Timber Sale
- Sibley trail rehab and suction dredging
- Woodrock Timber Sale
- Little Horn Burn
- Tie Hack Campground
- Buffalo District Grazing AMP
- Cloud Peak Wilderness Standards and Guidelines Environmental Assessment
- Highway14 Reconstruction - Sibley Section
- Caribou Timber Sale
- Noxious weed treatment
- Cold Spring Timber Sale
- Shell Creek Amp
- Antelope Butte Ski Area

A project was completed on the Tongue District to install one gate to effectively close a road. The location is near the Schuler Timber Sale in an old clear cut from the 1970's. The road chosen has been administratively closed for over 20 years, but several forest users each year were illegally using the road anyway. By installing a permanent gate, the road will be more effectively closed, and the Forest Service will maintain access to the area if needed for emergencies such as wildfire suppression. This project was funded with Knutson - Vandenberg Trust funds collected from the sale of Christmas trees and pole permits. It also benefitted 100 acres of wildlife habitat by providing more effective seclusion for big game animals.

Gates were installed on 3 roads in the Lick Salvage Timber sale. Roads gated: 134315, 134324, and 134319. This project was funded with Knutson - Vandenberg Trust

funds collected from the timber sale and is intended to provide security for big game animals while maintaining access for emergencies such as wildfire suppression. This project benefitted an estimated 300 acres of wildlife habitat.

Logging slash was hand piled and burned in part of the Squirrel Timber Sale. Most of the branches and tree tops within 75 feet of the Big Goose road in Units 1-7,9,11,29,33,34 were piled this summer and all but 10 piles were burned in September. The main purpose of this project was to improve the visual quality along the Big Goose road and to reduce fuel loadings which in turn reduce chance of man caused wildfires.

This project reduced fuels and improved wildlife habitat on 38 acres, and was funded with trust funds from the Squirrel Timber Sale (Knutson - Vandenberg).

A presentation on proper conduct and camping etiquette in bear country was presented to the general public in Sheridan during the State outfitter convention in December. This was part of an all day workshop on bears sponsored by Wyoming Game and Fish Department. One presentation was made, which reached 60 people.

Sightings of TES and other significant wildlife species were recorded on the Tongue District and reported to the Wyoming Observation System which is maintained by Wyoming Game and Fish Department, and to the Wyoming Natural Diversity Database which is maintained by The Nature Conservancy. These sightings are considered to be sensitive information and are not available to the general public. The recordings are mentioned here only to show that the Forest is tracking verified TES sightings.

Fish Monitoring Contributed by the East Zone Wildlife Biologist

The enclosure fences on Lick Creek were modified to eliminate gaps at stream crossings. This area had fisheries structures installed several years ago and then was fenced to exclude livestock. The fence was originally built as three separate enclosures with gaps between to facilitate cattle movements. Cattle movements through the gaps was creating problems with bank stability and water quality. The grazing permittees have since indicated that the entire area could be fenced as one continuous enclosure and cattle movements would not be adversely affected. Removing the gaps benefitted about 30 acres of wetland/riparian habitat and one mile of fisheries stream habitat. The project also reduced long term maintenance costs.

Photographs were taken in the Shutts Flat fisheries project (South Tongue River) for monitoring purposes. "Before" photos were taken in 1992 by Tom Wesche when he was under contract to design the fish structures. The photos taken this season will show the structures when first installed, and the same photo points will be used in the future to monitor the success of each structure. Other photos were taken along this stream to monitor bank vegetation changes in areas without structural improvement.

Willows were planted in Shutts Flat. Approximately 1,000 willows were planted in May of this year. Areas targeted for plantings were the same sites where Wyoming Game and Fish would be installing their rock revetments later in the season. The application of willow cuttings prior to placement of rock rip-rap should provide short term protection to the willows from browsing and will provide long-term protection of stream banks and visual screening of the man-made structures.

About five acres of riparian habitat was benefitted.

The Wyoming Game and Fish Department completed construction of 30 structures in the Shutts Flat area this season. The structures installed included bank revetments, cover trees, boulder placements, and rock weirs for grade control. This construction completed this project.

All of the riparian exclosures on the Tongue District were maintained this season. These exclosures protect 998 acres of riparian habitat and a total of six miles of fisheries streams.

The affected streams are:

- Lick Creek, 3 exclosures, 30 acres, 1 mile of stream
- Fool Creek, 2 exclosures, 30 acres, 2 miles of stream
- Sucker Creek, 1 exclosure, 20 acres, 0.5 mile of stream
- Ranger Creek, 1 exclosure, 50 acres, 0.5 mile of stream
- East Fork, 1 exclosure, 600 acres, 1 mile of stream
- Preacher Rock, 1 exclosure, 250 acres, 0.7 mile of stream
- Bull Creek, 1 exclosure, 3 acres, 0.2 mile of stream
- Little Willow, 1 exclosure, 15 acres, 0.1 mile of stream

The work was started to rebuild the upper riparian exclosure on Fool Creek. The local chapter of Trout Unlimited contracted this project this year and approximately 1/4 of the wooden rail portion was rebuilt this year. The lower fence will also require some reconstruction now that both fences are over 20 years old. The Forest Service will continue to rebuild portions of the lower exclosure as funding allows.

All the fish structures inside the Fool Creek Exclosures were maintained this year. The majority were visited did not require maintenance. About 10 structures, out of the 130 found on this reach of the stream, were rebuilt or modified and so about one mile of fisheries habitat benefitted.

There were inspections made to monitor the success or failure of the Fiscal Year 1997 willow transplants on Fool Creek. Plant survival was estimated to be over 90 percent. Ten additional cages were installed within the Fool Creek exclosures this year and willows were planted inside these cages during late September and about 54 acres benefitted.

A third fisherman crossing was constructed at Bull Creek. This is a very popular fishing spot and the heavy amount of fishermen use was affected livestock fence maintenance. By installing walk-through gates, fence maintenance costs will be reduced and safety will be improved.

A letter written to Trout Unlimited in February listed the fisheries projects planned for the Tongue District so they could consider volunteering to help with some of these projects. Trout Unlimited did not reply nor did they participate in any of the fisheries improvement projects on the Tongue District this year.

The Twin Lakes reservoir was completed this year. This will result in a long-term improvement to fishing. The lake, when full, will be about 84 surface acres.

MONITORING REQUIREMENT:

Management Indicator Species

Biological Evaluations and Specialist Reports were completed or are in the process of being completed for activities planned and/or executed on the westside of the Forest, including Cold Springs timber

sale, Antelope Butte Ski area expansion, westside blowdown salvage timber harvest proposal, Shell Drainage Allotment Management Plan, Red Reservoir Prescribed Burn, and Hunt Mountain Prescribed Burn Plan. Management indicator species, including appropriate threatened, endangered, proposed, and sensitive species were evaluated to determine possible effects of implementing proposed activities. Mitigation measures were recommended as needed. An analysis of existing wildlife habitat condition was conducted for each of these areas

Field surveys for pine marten were performed in potential marten habitat for the proposed blowdown salvage project. As a result, treatments were revised to ensure marten habitat would be protected. Field surveys were also conducted for water voles.

A field reconnaissance to evaluate habitat diversity, old growth, hiding cover, structural stages, and road densities was conducted during a proposed timber sale assessment in Cold Springs. Data was evaluated to assess potential impacts of timber harvest and associated activities; modification of treatments and mitigation measurements have been made. Permanent hiding cover transects were established to assess the effects of thinning on hiding cover quality. Additional inventories and surveys, such as goshawk nests, will be conducted where needed.

Shell Canyon bighorn sheep continue to be monitored to determine population trends, effects of management activities, and future management direction. Monitoring is accomplished cooperatively with the Wyoming Game and Fish Department. Monitoring has become more difficult since all the radio collars have exceeded their life expectancy and are no longer operational.

Aspen transects were used to monitor and partition use between domestic livestock and wildlife. The following transects were set, read, and photographed twice last field season: Battle Park, Toe of Cement #1 and #2, Upper Woodchuck #1 and #2 and #3, Middle Fork Paintrock, East Cement, Salt Creek, West Cement #1 and #2, Granite Creek, and Salt Creek #1 and #2. Results can be found under the Range portion of the report.

Willow transects and photo points were used to monitor and partition use between domestic livestock and wildlife. The following transects were set, read, and photographed twice last field season: Buckley Creek #1 and #2, Crooked Creek, Jack Creek, Willow Swamp #1 and #2, Sheep Creek #1 and #2 and #3, Shell Creek, Trout Creek, Meadow Creek #1 and #2, Medicine Lodge Creek #1 and #2, Trapper Creek, Moraine Creek, Johnny Creek #1 and #2, Mail Creek, Salt Creek, East Willet Creek, Middle Fork of Granite Creek, West Fork of Trout Creek, and Klondike Creek. Additional willow photo points were monitored on Crooked Creek, Trapper Creek, and Jack Creek. Results can be found in the Range section.

MONITORING REQUIREMENT:

Peregrine Falcon Occupancy

No peregrine nesting activity was observed on the west side of the Bighorns.

MONITORING REQUIREMENT:

Wildlife habitat diversity

Ongoing high intensity aspen monitoring compared livestock and wildlife utilization levels on Cattle, Horse and Sheep allotments. Stubble height of herbaceous vegetation was also measured in conjunction with aspen transects; data can be found in the range portion of this report. Locations included aspen stands in Sunlight Mesa, Red Canyon, two in Toe of Cement, East Cement, two in Woodchuck Bench, West Cement, two on Salt Creek, and Grouse Creek.

Aspen stands were monitored to determine response following prescribed fire conducted in 1996. Stands were examined to measure regeneration and to determine if regeneration was receiving excessive browsing by ungulates. An electric fence was erected around the treatment area to protect regenerated aspen.

All the projects listed under the Management Indicator Species section were analyzed to determine if these areas presently meet Forest Plan Standards and Guidelines, whether they would meet these Standards and Guidelines, following the proposed project, and what mitigation measures would be needed to comply with the Forest Plan. A variety of habitat components were inventoried or surveyed to determine presence/condition/classification for characteristics such as old growth, structural stages, hiding cover, snag densities, and species composition.

MONITORING REQUIREMENT:

Winter Range Carrying Capacity

Wyoming Game and Fish Department conducted classification surveys and trend counts on winter range. Data indicates a slight population increase over the last three years.

MONITORING REQUIREMENT:

Fish habitat rating

Stream channel type, vegetation community, and stream condition (PFC - Proper Functioning Condition) monitoring occurred in association with revision of the Shell Drainage Allotment Management Plan currently being written. Multiple monitoring techniques were used at numerous locations on the following creeks: Mail, N. Granite, Antelope, Willet, Klondike, Crooked, Jack, W. Fork of S. Tongue, Tongue, Buckley, Shell, Morraine, and Buckskin. Forty-one percent of the stream monitoring for PFC keyed out to Proper Functioning, forty-four percent is Functioning But At Risk, and fifteen percent are non-functional.

Additional monitoring elsewhere on the westside includes retaking permanent photo points established for the 1995 Riparian Monitoring Evaluation.

MONITORING REQUIREMENT:

Riparian Ecosystem Trends

Ongoing intensive monitoring of willow utilization by wildlife and domestic livestock was conducted on various allotments including the areas described under the Management Indicator Species section. Stubble height was also measured in conjunction with willow transects; this data can be found in the range portion of this document. See the section above, Fish Habitat Rating for a description of riparian ecosystem trend monitoring that was

conducted for the Shell Allotment Management Plan.

FISHERIES

Program Summary

The Bighorn National Forest has 1,300 miles of trout streams and approximately 5,200 acres of lakes, reservoirs, and ponds. The aquatics program strives to restore, protect, and enhance aquatic resources. The diversity of water resources provides habitat for many species of fish, invertebrates, and amphibians. The Goal of the program is to provide healthy habitat so aquatic ecosystems can function.

MONITORING REQUIREMENTS:

Fish Habitat Rating

Inventories of habitat and fish populations in selected streams were completed on the Bighorn National Forest in cooperation with the Wyoming Game and Fish Department in 1998. The data collected is the primary source of information for the evaluation of watershed conditions and to determine the trend of fish populations and stream and lake habitat.

Survey work was completed on the South Tongue River drainage to update records for previously established sampling stations. Seven stations on four streams were sampled in 1998. Sample stations were duplicated from previous surveys and included both the East and West Forks of the South Tongue, Prune Creek, Prospect Creek and Compartment Creek.

A variety of physical parameters were measured either in electrofishing stations or over longer stream segments of 500 feet. Measurements included average width, percent eroding banks, Tarzwell substrate rating, maximum depth, and reach sinuosity.

As was the case with past surveys of the South Tongue drainage, trout population estimates varied widely between streams and are numerically dominated by brook trout. Growth parameters show a preponderance of small fish in these streams which is consistent with all surveys. Logically, cold temperatures, short growing seasons, shallow streams, high densities, and the relatively low productivity of the granitic watersheds are all factors that could limit the maximum size fish attain in these streams. The average condition factors for trout in these drainages is high, and there is no obvious indication that food is in short supply.

Stream channel type, vegetation community, and stream condition (PFC - Proper Functioning Condition) monitoring occurred in association with revision of the Shell Drainage Allotment Management Plan currently being written. Multiple monitoring techniques were used at numerous location on the following creeks: Mail, N. Granite, Antelope, Willet, Klondike, Crooked, Jack, W. Fork of S. Tongue, Tongue, Buckley, Shell, Morraine, and Buckskin.

The Wyoming Game and Fish Department, in cooperation with the Bighorn National Forest, conducted wilderness lake inventories on four lakes in the Cloud Peak Wilderness. Information was gathered on species composition, water chemistry, and shoreline and lake habitat. Results from the survey are used to determine whether a lake will support a fish population, and monitor the success of previous fish plants. Information from the surveys will be used to develop a comprehensive wilderness lake management plan that will incorporate wilderness values.

The Wyoming Game and Fish Department completed installation of structural improvements in the Shutts Flat area on the South Tongue River in Fiscal Year 1998.

The types of structures installed included bank revetments, cover trees, boulder placement, and rock weirs for grade control. About 30 structures were installed and this project is now complete.

Photographs were taken in the Shutts Flat fisheries project area for monitoring purposes. "Before" photos were taken in 1992 by Tom Wesche when he was under contract to design the fish structures. The photos taken this season will show the structures when first installed, and the same photo points will be used in the future to monitor the success of each structure. Other photos were taken along this stream to monitor bank vegetation changes in areas without structural improvement.

Approximately 1,000 willows were planted in the Shutts Flat habitat restoration area. The application of willow cuttings in May, prior to placement of rock rip rap, provided short term protection to the willows from browsing and will provide long-term protection of stream banks and visual screening of the man-made structures. About 5 acres of riparian habitat was benefitted.

Another fisherman crossing was constructed at Bull Creek. This is a very popular fishing spot and the heavy amount of fishermen use affected livestock fence maintenance. By installing walk-through gates, fence maintenance costs will be reduced and fishermen safety will be improved.

The Twin Lakes reservoir replacement was completed this year. This will result in a long-term improvement to fishing recreation. The lake, when filled, will have about 84 surface acres.

All fish structures inside the Fool Creek Enclosures were maintained. The majority were visited and did not need maintenance.

About ten structures, of the 130 on this section of the stream, were rebuilt or modified and about one mile of fisheries habitat benefitted.

MONITORING REQUIREMENT:

Riparian Ecosystem Trends

The enclosure fences on Lick Creek were modified to eliminate gaps at stream crossings. This area had fisheries structures installed several years ago and was fenced to exclude livestock. The fence was built as three separate enclosures with gaps to facilitate cattle movement.

Cattle movement through the gaps was creating problems with bank stability and water quality. The Permittees have indicated the entire area could be fenced as one enclosure and cattle movements would not be affected. Removing the gaps benefitted about 30 acres of riparian habitat, one mile of stream habitat, and reduced maintenance costs.

Work was started to rebuild the upper riparian enclosure on Fool Creek. The local chapter of Trout Unlimited has accepted responsibility for the project and they have contracted the work. About one quarter of the wood rail portion was rebuilt this year. The lower fence also requires some rebuilding as both fences are now over 20 years old. The Forest Service will continue to rebuild portions of the lower enclosure as funding allows.

Inspections were made to monitor the Fiscal Year 1997 willow transplants on Fool Creek. Survival was estimated at over 90 percent. Ten more cages were installed within the Fool Creek exclosures and willows were planted inside the cages late in September. About 54 acres benefitted.

All riparian exclosures on the Tongue District were maintained. These exclosures protect a total of 998 acres of riparian habitat and a total of six miles of fisheries streams. Listed below are the specific streams affected:

Lick Exclosures	Creek3	30 acres	1 mile of stream
Fool Creek2 exclosures		30 acres	2 miles of stream
Sucker exclosure	Creek1	20 acres	0.5 mile of stream
Ranger exclosure	Creek1	50 acres	0.5 mile of stream
East Fork1 exclosure		600 acres	1 mile of stream
Preacher exclosure	Rock1	250 acres	0.7 mile of stream
Bull Creek1 exclosure		3 acres	0.2 mile of stream
Little exclosure	Willow1	15 acres	0.1 mile of stream

Range

This report is a summary of monitoring data collected and analyzed for 1998. Due to time constraints and the volume of information gathered and submitted by permittees the report is not yet included. With this in mind starting next year we will present range monitoring data a year later. In 1999 then we will present the complete 1998 monitoring summary and in the year 2000 we will report 1999. This will allow us to report and analyze complete data.

Program Summary

The Forest Service has 76 active grazing allotments and 9 vacant allotments. There are 112 permittees permitted to graze 27,637 cattle, 22,887 sheep, and 260 horses. Non-use was authorized for 1,883 cattle, 5,600 sheep, and 26 horses.

Since approval of the Bighorn National Forest Land and Resource Management Plan we have monitored Standards and Guidelines. During this time a variety of monitoring methods have been used, but

due to time and workload we had been only been able to monitor an estimated 30 to 35 percent of our allotments annually. In 1995, a "self monitoring" program was implemented. This monitoring program included grazing permittees and the public and it increased the number of allotments monitored from 30-35 percent to 84 percent in 1995, 81 percent in 1996 and 82 percent in 1997. The 82 percent may not be entirely accurate as some permittee data has not been turned in or not all of the data has been analyzed. This percentage could increase 5 to 10 percent once all data is entered. Based on the data collected three allotments exceeded standards to the point of implementing recovery periods to allow the vegetation to recover.

Since 1995, when the program was implemented, there have been two training sessions held. These sessions were on monitoring techniques and they were presented in cooperation with the University of Wyoming Department of Rangeland Ecology and Watershed Science, Bighorn Forest Grazing Permittees Association, and Wyoming

Cooperative Extension Service. Training sessions were held in 1998.

A significant effort concentrated on implementing and validating the Bighorn National Forest Riparian Guidelines and initiating the allotment management planning process for the Powder River and Clear Creek-Crazy Woman watersheds. A greater portion of the annual monitoring data was turned over to permittees and

more emphasis placed on spot checking and addressing permittee concerns and questions in the field.

The utilization of the current year's forage production that is removed by grazing or browsing animals may refer to a particular species or to the entire plant community and is usually expressed as a percentage.

Stubble Height Guidelines for key management species on Allotments with riparian and wetland areas*		
ALLOTMENT STATUS	GRAZED BEFORE AUGUST 1 ANNUALLY	GRAZED ON OR AFTER AUGUST 1 ANNUALLY
U-1 AND U-2	Average Four inch stubble height	Average six inch stubble height
S-1, S-2 and U3 Allotments	Average Four inch stubble height	Average Four inch stubble height

Livestock will be removed from the pasture when proper stubble height is achieved. The Forest Service completed NEPA analysis for nine Allotments and one Stock Driveway during 1998 on the Powder River Ranger District. The following Allotments were analyzed and the Allotment Management Plans will be completed in 1999:

1. Clear Creek C&H Allotment
2. Crazy Woman S&G Allotment
3. Doyle Creek C&H Allotment

4. Grommund Creek C&H Allotment
5. Muddy Creek C&H Allotment
6. Poison Creek C&H Allotment
7. Powder River C&H Allotment
8. Sourdough C&H Allotment
9. Upper Doyle S&G Allotment
10. Crazy Woman Stock Drive

Permit action was taken against one Term Grazing Permit for failure to maintain improvement and litigation is continuing on the Forests denial of a request for a grazing permit.

Stubble Height Monitoring Results 1998

<i>I. Number of Allotments:</i>	MW/ PN	PDR RVR	TONGU E	Entir e Fore st
Total Number of Active Allotments w/Term Permits	32	24	28*	84
Allotments Monitored by Permittees	26	16	12**	54
Allotments unknown-Data not received yet		5		5
Allotments Monitored by F.S. (Transects run)	22	4	9	35
% of Allotments Monitored by Permittees	81	67	43	
% of Allotments Monitored by U.S.F.S	69	17	32	
Total Percent of Allotments Monitored **	81	67	61	70
** not 100% of Allotment Acreage				
Allotments Exceeding Standards to the Point of Discussing/Implementing Resource Recovery Period	0	0	1	1
<i>II. Number of Permittees</i>				
Total # of Permittees (Permittees only counted once)	38	36	34	108
Number of Permittees Providing Transect ***	17	29	21	67
% of Permittees Providing Transects	45	81	62	63
<i>III. Number of Forage Utilization Transects</i>				
Transects Read by Permittees	41**	78	48	167
Number that met Standards	41	75	46	162
% that met Standards	100	96	100	99
Transects Read/Spotchecked by USFS	17	13	43	73
Number that met Standards	15	11	38	64
% that met Standards	88	85	88	88
Total Number of Transects Read	44	89	91	224
Total No. of Transects Meeting Standards	41	84	84	209
Total % of Transects Meeting Standards	93	94	92	93
<i>IV. Number of Willow Utilization Transects</i>				
Transects Read by Permittees	19** *	0	3**	22
Transects Read/Spotchecked by USFS	20** *		20**	40
Total Number of Transects Read	22		23	45

<i>Willow Utilization Transects, Continued</i>	MW/ PN	PDR RVR	TONGU E	Entir e Fore st
V. Number of Aspen Utilization Transects	13			13
Transects Read by Permittees	1**	1	1	3
Number that met Standards	1	1	1	3
% that met Standards	100	100	100	100
Transects Read/Spotchecked by USFS	11	1	1	13
Number that met Standards		1	1	
% that met Standards		100	100	
Total Number of Transects Read	12	1	2	15
Total No. of 'Transects Meeting Standards	***	1	2	
Total % of Transects Meeting Standards		100	100	
VI. Number of Bank Stability Photos				
Photos Taken by Permittees		1+		1+
Photos Taken by Forest Service *5				
Total Number of Photos Taken		1+		1+
VII. Photopoints				
Recorded by Permittees	3**	11	4	18
Recorded by Forest Service *	4		6	10
*FS photos not summarized/reviewed to date		5		5+
Recorded by FS/permittee jointly	19	11		30
Total Photopoints Recorded	26**		10	52

Tongue Ranger District: (Foot notes for both tables)

* Does not include Piney, Little Piney, or Willow Park allotments. These allotments should be included in the Powder River Ranger District figures.

** Number at time of report - permittees indicated others were monitored but data not yet turned in.

*** Number at time of report - others indicated they had data but had not yet turned it in

On community allotments, if data was turned in, then all permittees on the allotment were counted as "providing Transects"

Willow

** Includes pre- and post- grazing transects, measuring height and density and ocular spot checks

MONITORING REQUIREMENT: Forage Utilization(Upland range sites, riparian covered in table above)

ALLOTMENT	PASTURE	MONITOR BY	VEG TYPE	METHOD	UTILIZE
Amsden	ArneysCross	Perm	Upland	Transect	SH 13.1"
	Cabin	Perm	Upland	Transect	SH 8.8-11.9"
Big Goose	Big GoosePark	FS	Upland	Ocular	<15%
	Big GoosePark	FS	Upland	Ocular	65+%
	Babion	FS	POA	Ocular	50+%
Cop Crk/Up	CopperCreek	FS	POA	Ocular	40%
Dry Fork	WForkSTng	FS	POA	Ocular	60+%
	E Fork	FS	POA	Ocular	60+%
Freezeout	Elk	FS	Upland	Ocular	40-50%
	River	FS	Upland	Ocular	40-50%
	River	FS	Upland	Ocular	60+%
	Schuler Park	FS	POA	Ocular	60+%
	Schuler Park	FS	Upland	Ocular	30-40%
	Hay Crk	FS	POA	Ocular	60+%
	Hay Crk	FS	Upland	Ocular	50-60%
	Hay Crk	FS	Upland	Ocular	40-60%
	Dry Fork	FS	Upland	Ocular	40-45%
	Dry Fork	FS	Upland	Ocular	50-60-%
	Dry Fork	FS	Upland	Ocular	20-40%
	Dry Fork	FS	Upland	Ocular	40-60%
Lake Crk	Lick Crk	FS	Upland	Ocular	<20%
	Lick Crk	FS	Upland	Ocular	<30%
	Lake Crk	FS	Upland/POA	Ocular	45-60%
LittleGoose	Campground	Perm	Upland	Transect	SH 6.9-10.0"
	Lt GoosePark	Perm	Upland	Transect	SH 5.6-7.9"
	High Country	Perm	Upland	Transect	SH 7.6-8.2"
	Kenniwood	Perm	Upland	Transect	SH 5.2-5.6"
LittleTng	Shutts Flat	FS	POA	Ocular	40-50%
	Shutts Flat	FS	Reseeded	Ocular	50+%
	Shutts Flat	FS	POA	Ocular	40-50%
	Shutts Flat	FS	Upland	Ocular	20-40%
LowerTng	LittleWillow	Perm	POA	Transect	SH 9.9-10.3"
	Bear Lodge	Perm	POA	Transect	SH10.8"
Lower Tng	SheeleyCrk	Perm	POA	Transect	SH 7.9-8.2"

ALLOTMENT	PASTURE	MONITOR BY	VEG TYPE	METHOD	UTILIZE
	NTng CG	Perm	Upland	Transect	SH 9.8
	Lt. Willow	FS	POA	Ocular	65+%
	Bear Lodge	FS	POA	Ocular	60%
	Bear Lodge	FS	Upland	Ocular	40-50%
Lower Tng	Big Willow	FS	POA	Ocular	60+%
	Big Willow	FS	Upland	Ocular	45-50%
	West Exp	Perm	POA	Transect	6.8"
	East Exp	Perm	Upland	Transect	7.22"
Rapid Crk	Rapid Crk	FS	Upland	Ocular	40-55%
	Rapid Crk	FS	POA	Ocular	60%
	Rapid Crk	FS	Upland	Ocular	50%
	Rapid Crk	FS	Upland	Ocular	30-35%
UpperTng	Highway	FS	POA	Ocular	50-60%
	Highway	FS	Upland	Ocular	35-45%
	Highway	FS	Upland	Ocular	40-50%
	River	FS	POA	Ocular	50-60%
	River	FS	Upland	Ocular	40-45%
Walker Prair	Lower	Perm	Upland	TX	SH 8.0"
Wolf Crk	Star Fish	Perm	Upland	TX	SH 5.8"

*Many of the riparian areas along Copper Creek, Sucker Creek, the South Tongue River and several of their tributaries within the Copper Creek and pastures of the Little Tongue Allotments were classified into existing plant communities using the 1997 classification of Riparian Communities on the Bighorn National Forest. It was not possible to accurately determine trend in the initial application of the riparian classification, but from the notes and photos taken will be able to determine site potential and changes from existing plant communities. Approximately 11 - 12 miles of riparian areas adjacent to streams and within wet meadows were classified into 18 - 20 community types.

Medicine Wheel/Paintrock Ranger District

**Not all monitoring information has been turned in to date by permittees, so there will

be additional numbers of photo points and transects read for 1998 monitoring that are not reflected above for Medicine Wheel and Paintrock portion.

***Seven of the willow transects are read to obtain percent of twigs removed. Five of those transects are on an allotment where utilization of 30% is standard. Four of those transects did not meet standards. Two of the transects were established to determine the amount of use and by which browser. The remaining 14 transects measure height and were established to detect a positive or negative change in height.

***Eleven Aspen transects were read. Eight of these transects are located on an Allotment which has an Aspen utilization standard of 10% on terminal buds. Only one of these transects recorded use levels below. The remaining transects were

established to monitor change in height and number of sprouts.

FOREST VEGETATION AND TIMBER OUTPUTS

The 1998 outputs for timber are shown on the table of projected and actual outputs (Table 3). The data is from the cut and sold reports, STARS report, and planned accomplished records in the RMRIS data base (Rocky Mountain Resource Information System). The thirteen year trend in timber management outputs is also shown in figure 3.

IMPLEMENTATION MONITORING

From chapter IV, Land and Resource Management Plan, Bighorn National Forest.

MONITORING REQUIREMENT:

Clear-cut Harvest Unit Size

Silvicultural prescriptions, sale design plans, sale maps, and sale layout were reviewed for compliance with the maximum size limits, and no created openings greater than 40 acres were found.

MONITORING REQUIREMENT:

Assure Regeneration within Allowable Time Frames of Final Harvest

During Fiscal Year 1998, the Forest Service surveyed approximately 1,240 acres to determine the status of the regeneration of final harvest units, as defined by 36 CFR 219.27, for commercial timber sales. 974 acres were certified as regenerated. The 1998 surveys will be reviewed and certifications made from them in 1999. Continued monitoring, and corrective actions are planned for those areas not certified as regenerated.

Seedlings were planted on 255 acres in the following areas; Dayton Gulch #2 Timber Sale, the 1993 blowdown salvage area, and the Intermission Fire. Appropriated funds, collections from timber sale receipts and a generous donation from the Wyoming Business and Professional Women were used to accomplish this work. Surveys of past planting indicate good success over most of the areas, with two exceptions. The Fool Creek plantations were impacted by cattle grazing, and the Intermission Fire has a large population of Pocket Gophers that are killing some seedlings, but survival is still acceptable. If these two situations escalate, control measures will be required to assure regeneration.

Vegetation management projects executed without silvicultural prescriptions, include highway right-of-way expansion, and ski area expansion, and rehabilitation. Regeneration of these sites was not intended. A project that planted off-site trees in disturbed areas of highway construction has had no survival. An alternative planing is planned for this site.

There is no evidence in the data base of surveys to assure regeneration, or certification that past aspen regeneration treatments have met forest plan stocking requirements.

MONITORING REQUIREMENT:

Assure Reforestation and TSI Treatments are Current and No Backlog Created

The reforestation needs report in RMRIS shows, 2,578 acres needing reforestation, which is down from 3,086 acres last year. The Forest Service should continue its commitment to the reforestation program to continue these successes.

The RMRIS database shows 10,893 acres (11,931 last year) requiring Timber Stand Improvement (TSI), and 2,683 (2,814 last

year) acres needing release. These confidence in these figures is low because many of the areas were harvested ten to thirty years ago have grown in dense and need thinning and they are not included in these needs. There is mature suppressed lodgepole which have historically shown little response to thinning included in this information. In 1998 the Forest Service accomplished 1,169 acres of thinning and release with contracts and force account crews.

The past eleven monitoring reports recommended the "needs" portion of the database for reforestation and TSI be cleaned up. The reforestation database now reflects a more accurate assessment of our needs. Corrections to the "needs" section for TSI are still needed. In order to use this system to accurately calculate the "needs" for reforestation and TSI, we must maintain the data, and clean up inaccuracies.

MONITORING REQUIREMENT:
Compliance with Schedule and Outputs

Commercial timber outputs are below projections, except for mortality volume or fuelwood, as shown in table 3. The harvest acres by regeneration method are also below projected outputs. Funding levels have contributed to lower outputs than what was projected in 1985.

Through the end of Fiscal Year 1998, after thirteen years of implementation, the Forest Service has offered 31.1 million cubic feet (123.70 MMBF), as compared to a projected output of 54.6 million cubic feet (212.2 MMBF), or 57 percent of the projected Allowable Sale Quantity. This compares with a figure of 59 percent reported last year. The Forest Service has not identified a timber sale program for the current Forest Plan sale quantity. Current and projected budgets indicate funding for a sale program of less than seven million board feet

including sawtimber, products other than logs (POL and mortality).

The District Rangers continue to see a demand for fuel wood and (POL). Mortality volume offered (fuel wood) continues to exceed Forest Plan projections by 201 percent. The amount in the Forest Plan of scheduled outputs for mortality volume has been exceeded during the life of this Plan. A more accurate output will need to be derived during the Forest Plan Revision process.

Thinning and release (TSI) were accomplished on 1,169 acres in 1998. Over the planning period the Forest Service has accomplished 116 percent of the projected amount of TSI.

The Forest Service completed 255 acres of, planting and certifying without site preparation on 506 acres. During the life of this plan the Forest Service has accomplished 42 percent of the projected amount of reforestation which, up from 39 percent last year.

No regeneration cutting for aspen was accomplished in 1998. The Forest Plan objective was to treat 85 acres of aspen annually, and the records only show 10 percent of this projected output being met.

MONITORING REQUIREMENT:
Monitoring Standards and Guidelines

The Standards and Guidelines for vegetation management have a significant effect on the amount and kind of vegetation management allowed, and the resultant outcomes and outputs available for this planning period, including sawtimber.

There have been requests for change to the Standards and Guidelines after new studies, research or philosophies surface. This needs to be tempered with the need to apply

consistent Standards and Guidelines over the planning period, because they were developed in a integrated manner.

The Standards and Guidelines for silviculture do not reflect the range provided in the Regional Guide. Adaption of the Regional Guide will allow better ecosystem management. 1998 monitoring has again identified a need for the Forest Service to clarify the requirements for certification of regeneration. The Regional Guide Standards is recommended.

Validation

The acres of treatment by method from the Forest Plan are listed in Table 3. Since the plan was implemented the Forest Service has not matched this prescribed mix. Total acres harvested are 46 percent of the total projected for the planning period while

reforestation acres are 42 percent of the projected output, and Allowable Sale Quantity is 57 percent of projected output. When the Forest Plan is revised, there should be a concerted effort to re-examine the mix of treatment methods.

The Bighorn National Forest management area designations are too small in size and to numerous in any given landscape to manage for a dominant use on a landscape scale. Landscapes do not have a dominant use, or management emphasis, but rather the management emphasis seems to be averaged. This results in management for the average rather than managing for any particular emphasis. Because of this, management areas are often overlooked in project initiation and implementation. This affects the ability to meet Forest Plan objectives, outcomes and outputs.

INSECTS AND DISEASE

Program Summary

Aerial surveys were not conducted in 1998. These surveys are conducted every three years with the last survey occurring in 1997.

Here is the status of insect and disease pest populations noted on the Forest in 1998.

The agent killing the limber pine in the north of the Forest was still not formally identified. Reports confirm a fairly widespread area affected from the east Forest boundary into the Dry Fork and in the upper reaches of the Little Bighorn River. The probable causal agent is thought to be White Pine Blister Rust (Cronartium ribicola). Surveys should be scheduled for next summer to identify this agent and develop management alternatives.

The lodgepole needlecast fungus (Lophodermella montibaga) continues to be on the decline with no known epicenters detected in 1998. Continued monitoring is recommended.

Tensleep and Leigh canyons on the Powder River District continue to show effects of mountain pine beetle (Dendroctonus ponderosae) and white pine blister rust (Cronartium ribicola). The affected areas include many dead and dying limber pine trees on rugged steep terrain. There appears to be no threat to commercial timber lands at this time. Some of the dead trees close to roads are being salvaged for personal use fuelwood, but commercial opportunities are not practicable. Continued monitoring is recommended.

Since 1989 the Medicine Wheel District has noted an infestation of Western spruce budworm (Choristoneura occidentalis) infecting Douglas fir (Pseudotsuga menziesii). We were unable to conduct any

ground surveys to monitor this situation. There was concern expressed about the number of "dead trees" in Devils C'anyon should a fire spread in that direction. This area should be watched in the future.

The 1991 "microburst" blow down has been an area of concern, but there have been no epicenters reported to date. We continue to monitor it, especially around the developed sites for any increase in tree mortality.

The area not salvaged from the 1993 "microburst" is still of concern. While no surveys were conducted in 1998, visual observations of Spruce Beetle populations showed no epicenters. If there is a significant increase in spruce beetle populations in these areas, actions may be necessary to keep the beetles from adjacent standing forested stands.

The East Duncum area has also experienced tree mortality in and around past harvest sites. A Survey is planned for 1998 did not take place, and needs to be rescheduled for next summer.

Gypsy Moth trapping on Forest lands, and by cooperating agencies off the Forest, has been ongoing. Continued detection monitoring is needed to keep this exotic pest from becoming established.

IMPLEMENTATION MONITORING

MONITORING REQUIREMENT:

Compliance with Schedule and Outputs.

The forest plan projected a need to survey 800,000 acres annually. These aerial surveys are conducted every three years through the zone Forest Health Management office.

Effectiveness Monitoring

Aerial surveys are effective in determining levels of infestation of various pests, but are not cost effective annually. Ground validation is necessary to determine the

exact forest pest, population levels, and what if any management actions may be warranted.

C. SOCIAL COMPONENTS

RECREATION AND VISUALS

Program Summary

Forest visitation was up in 1998 by 3.1 percent and highway traffic counts on US Highways 14 and 16 rose by 5 percent over the preceding year. A dry summer was possibly a major contributing factor. The heaviest use period was mid July to mid August. Many recreation sites were filled to capacity on weekends, but space was available during the weekdays.

User satisfaction was measured using "customer comment cards". We received very few negative comments. On the contrary, most expressed high praise for the cleanliness of facilities and the extra effort by campground hosts. One visitor stated, "I have camped and elk hunted from this campground for 30 years. I have never seen the rest rooms this clean!"

The Burgess Junction Visitor Center began its second year of operations in mid May. The facility closed on September 22. During the core part of it's season (June through September), Burgess was open seven days a week from 8:30 AM to 5:00 PM. Public services included rest rooms, visitor information, interpretive programs, interpretive exhibits, sales area, theater presentations, and a short interpretive trail. Staffing consisted of seasonal employees who handled the sales outlet as well as interpretive and information duties, and another resindividual responsible for janitorial and site maintenance. Oversight

and supplemental staffing included permanent staff. Four volunteers assisted with sales, information and maintenance. Operating expenses totaled \$100,000.

Summer visitation to the Center was estimated between 40,000 and 50,000, slightly down from last year. Most visitors were on their way to or from Cody, Wyoming and Yellowstone National Park.

The Forest Service discontinued the mandatory exhibit fee for the Visitor Center due to poor public acceptance in 1997. A fee was charged to those interested in viewing the displays in the exhibit area and theater. The fee was \$2.00 per adult and \$1.00 per child. Less than 10 percent of visitors were willing to pay. The total revenue for the 1997 season was \$1,954 which is nearly the same as collected using a donation box.

The Rocky Mountain Interpretive Association sales were excellent! There sales totaled over \$166,000 for books and interpretive materials at Burgess Junction and Shell Falls; up by 11 percent over 1997. Although both sites serve the traveling public on Highway 14, they seem not to compete for sales. Funds from the sales are used to pay the seasonal staff and supplement publication of interpretive materials.

To encourage more visitation and foster continued cooperation with the Native

Americans, a Bighorn Mountain Pow Wow was held on July 25, 1998. Approximately 500 people attended this event. An admission fee of \$3.00 per adult helped offset expenses. This program may be expanded in future years.

In addition, interpretive talks were held every Saturday evening during the peak summer season. A charge of \$2.00 per person offset these costs. The audience was campers from local campgrounds. It was very well received.

Rick Laurent, Forest Archaeologist, held a one day seminar with hands-on experience in flint knapping, bow and arrow making, fabrication of bone tools and yucca cordage. The Visitor Center was open during the fall hunting season and cooperatively staffed with the Wyoming Department of Game and Fish.

The construction of Circle Park Campground was completed in early September of 1997. This facility opened for public use in May, 1998. We are proceeding with the design of a 20 unit campground near the Tie Hack Reservoir and a contract was awarded in late September. Construction should start in the Spring of 1999. Tie Hack Reservoir, one of only three easily accessible "lakes" opened for use (fishing, boating & picnicking) in early July.

There is still a substantial recreation maintenance backlog. Improvements were made on some facilities including; staining and painting of rest rooms, fence repairs, and new fire rings for four campgrounds.

The Shell Falls Interpretive Site operated for its second year with a flush toilet. Although well maintained, additional improvements to this facility are necessary. Visitation exceeded 310,000 people.

Dispersed long term trailer camping is a major concern. Use is increasing every season and accompanied by more resource damage. Some sites are occupied by trailers though the owners are absent. To gain a better understanding of these resource impacts, Forest personnel began an inventory of campsite conditions on all Ranger Districts and an analysis of results is expected in early 1999.

Trails

The Bighorn manages 1,223 miles of trail. Three hundred and sixty-seven miles are designated and groomed for snowmobiles.

We did not conduct condition surveys for our trail system. Field personnel and trail users confirmed the maintenance backlog is increasing while forest trail conditions are declining. Volunteers from several user groups provided critical work in trail maintenance this season. We help each other by sharing trail maintenance techniques and technology. Working with diverse groups should help meet budget short falls.

IMPLEMENTATION MONITORING

MONITORING REQUIREMENT:

Developed Recreation Use

Traffic counters on US 16 (Cloud Peak Skyway) and US 14 (Big Horn Scenic Byway) indicated increased Forest visitation over 1997. Use was up by 5.4 percent on Highway 16 and 4.1 percent on Highway 14. Although some of this traffic volume can be attributed to commercial use (e.g., trucks, school buses), most is associated with a recreational activity. Recreation visitor days totaled 1,712,800 (up 3.1 percent over 1997). Similar increases occurred throughout the forest. As in previous years, visitation is heaviest during the months of July and August, and with many popular

facilities filled to capacity during weekends. Use in 1997 was lower than traditionally experienced levels. Historic figures (1989-1997) show an average growth of 1.3 percent.

The Burgess Junction Visitor Center, Shell Falls, and the Medicine Wheel were the primary focal points for interpretive programs. Unlike 1997, an admission fee for Burgess Junction was discontinued due to a lack of public support. We returned to a voluntary donation system. We also looked at other ways to generate operating revenue including "Saturday Night Live", a "Big Horn Mountain POW POW", and a "seminar" on flint knapping and bow and arrow making.

Saturday Night Live at Burgess Junction Visitor Center

Every Saturday night from June 27 to August 29, the Visitor Center theater was host to a special program presented by Forest employees and volunteers.

Saturday night presentations were designed to draw people from the surrounding communities and campgrounds. This year the programs were designed to operate with no additional costs to the government. Evening presentations were handled by voluntary adjustment of workers' schedules. This year we charged \$2.00 per person (over 12 years old) for each Saturday night presentation. Average attendance was 20 people. An indirect benefit was additional interpretive sales. In future years this program may expand to additional nights each week, or higher fees for each program.

The flyer advertising "Saturday Night Live" was distributed through the local Chambers of Commerce, mountain lodges, hotels, campgrounds, and news releases. In the Sheridan area, we advertised on the

Public Pulse KROE radio. Information was also distributed through the Internet as well as being available at other interpretive sites along the Passage to Adventure travel corridor.

Big Horn Mountain POW WOW

The Pow Wow was a day-long event modeled in part after the Burgess Junction Visitor Center Dedication Bighorn National Forest Centennial Celebration of 1997. The event took place on Saturday, July 25, 1998.

The Pow Wow included Native American dance contests, a Junior Princess Pageant, art and craft booths, and Indian tacos and fry bread concessions. This event was billed as a benefit for the Medicine Wheel National Historic Landmark. The admission fee was set at \$3.00 per adult. Advertising for the Pow Wow was extensive and included all outlets used for Saturday Night Live. Our interpreters at the Medicine Wheel promoted the event throughout the summer.

Seminars

Plans for a multi-day seminar were pared down to a one-day event due to work loads and time constraints on Rick Laurent, Forest Archaeologist. He conducted a program called "Skills of the Past: From Arrowheads to Yucca Cordage". Discussion included basic theory, demos and hands-on experience with the ancient skills of flint knapping, bow & arrow making, and fabrication of bone tools and yucca cordage. The fee was set at \$20.00 per person. Local advertising was done by flyers, radio and newspaper. Only three people attended. Greater participation is possible by reaching the appropriate audience with better lead times.

Although these efforts were recognized as an important step in providing customer

service, lack of funding did not allow all identified needs for interpretation or information services.

The construction projects completed in 1998, included; Circle Park Campground (redesign and upgrade of an existing facility) and Tie Hack Picnic Ground. This picnic ground is associated with the new reservoir built as a water supply for the City of Buffalo, Wyoming.

Operation of most developed recreation facilities continued under terms of a Special Use Permit to Gallatin Canyon Campgrounds, Canyon Enterprises, Inc.; a private corporation with offices in Bozeman, Montana. The campgrounds were kept in excellent condition and we received many compliments and few complaints about service.

MONITORING REQUIREMENT:
Site Facility Condition

As mentioned in previous monitoring reports, most of our developed facilities are deteriorating, in part due to age, heavy use and lack of funding. In general, Districts report that 75 percent of their developed sites are in need of rehabilitation or redesign to meet today's needs for larger recreational vehicles. The concessionaire has made significant repairs to those campgrounds under her control. Gravel was stockpiled and spread on many of the campsites in Boulder Park. Additional work included; installation of new firerings at Shell Creek, Ranger Creek and Cabin Creek, the construction of concrete pads around well heads at Sitting Bull, Sibley and Lakeview Campgrounds to meet EPA safe drinking water standards, and repair of nearly 1,000 feet of bucking pole fence around Circle Park Campground. Total investments exceeded \$10,000.00

Areas needing attention:

Post Creek Picnic Ground and Granite Creek Picnic Ground continued to deteriorate. These facilities should be closed or upgraded to meet standards expected adjacent to a Scenic Byway.

- *Edelman Trailhead* is approximately 10 years old. It's in good condition, but in need of maintenance. Minor repairs were accomplished with the current workforce.

- *Bucking Mule Falls Trailhead* should have the stairs from the parking lot to the toilet building rebuilt. This facility gets heavy use during the Summer from hikers on the Bucking Mule Falls National Recreation Trail and by hunters in the Fall.

- *Shell Falls Interpretive Site* is the most heavily visited recreation facility on the Bighorn National Forest, serving approximately 310,000 visitors. Although it is well maintained, most of the improvements are over 20 years old. The needed maintenance includes: repair of the rock walls, new layer of asphalt on the parking lot, structural changes to the viewing platform/bridge, and replacement of the interpretive signs.

- The *Medicine Wheel National Historic Landmark* is managed under a Historic Property Plan to protect its integrity as a sacred site and a nationally important traditional cultural property. This plan targets the following improvements: improved base parking and toilet facilities, reconstruction of the Medicine Wheel fence and pathways, and obligation of an old parking lot near the Medicine Wheel. There was construction scheduled for 1997, but delays postponed this work.

MONITORING REQUIREMENT:
Dispersed Recreation Use & Experience

The number of Forest visitors and predictions for future demand are at best

estimates. Nevertheless, trends are apparent. At some locations, on weekends and Holidays, visitor encounters exceed the Forest Plan ROS (Recreation Opportunity Spectrum) Standard (e.g., West Tensleep Lake Road corridor, Park Reservoir) Although of short duration, this use indicates a need to develop strategies to deal with the increasing demands. Low funding levels also inhibit administration of "on-the-ground" contact, education, and compliance of many general Forest areas to a desired level. The District Ranges need to prioritize patrols to concentrate in areas which have the most use or where recent reports of illegal activities occur. Likewise, new uses such as rock climbing in Tensleep and Crazy Woman Canyons occur with no Forest Service management.

Long term trailer camping, in dispersed areas, continues to be a concern. This use increases every season and is accompanied by additional resource damage. To better quantify these trends, the District Rangers completed an inventory of dispersed campsite conditions for selected areas during the summer of 1998 (e.g., Willow Park, Tongue Ranger District). The results have not been finalized, but initial computer outputs on the Medicine Wheel/Paintrock Ranger District indicate 23 percent of all sites are Frissell condition Class 4 & 5 which is not in compliance with the Forest Plan Standards. These results are similar to surveys conducted on the Buffalo Ranger District during the 1996 season (See Fiscal Year 1996 Monitoring and Evaluation Report, Page 54-55). These findings show campers leave all kinds of evidence of their use. The cleanup of several campsites required employees to dismantle numerous structures. Resource damage continues to be a problem from individuals making repeat visits to the same area creating new access roads and compacting the soils. The public does not understand that compacted soils lead to vegetation loss and soil erosion.

Environmental impacts seem to be most pronounced during the hunting season due to wet road conditions. Hunter patrols, prior to opening day, are effective, however, not all camps are contacted.

The Forest Service needs to consider revising the 14 day camping order, educate users, and provide alternatives to facilitate this use. This may include creating a larger group use area for extended camping periods. A potential solution may be to provide alternative sites that allow for social interaction or for solitude which is a different ROS experience.

Winter sports, snowmachine use and cross-country skiing, are also important activities. Trail maintenance and grooming is limited and largely dependent on the State of Wyoming and volunteers. The potential change in policies by the National Park Service for Yellowstone National Park could result in more user demand on the Bighorn National Forest.

MONITORING REQUIREMENT: *Off-Road Vehicle Damage*

Forest employees recorded numerous violation incidents and reports of illegal vehicle traffic, especially ATV's. The damage continues to occur by people paralleling roads to avoid ruts, snow or mud. Vegetation should recover if no further impacts are inflicted, but remaining wheel tracks often promote more use. Funding limits our efforts to control this use or rehabilitate damaged areas. The number of OHVs (Off-Highway Vehicles) has increased dramatically in the last five years. Unethical or illegal use of OHV's is one of the biggest complaints received by the Wyoming Game and Fish Department. Grazing permittees have also noted that unscrupulous riders purposely scatter or run their livestock. Some alternatives to

address these problems are detailed in the 1996 Forest Plan Monitoring Report.

The inconsistencies between the Forest Plan and recent editions of our Travel Map were corrected this past year. The Tongue River Canyon was closed to all motorized use.

MONITORING REQUIREMENT:
Trail Construction and Reconstruction

We reconstructed 5.7 miles of trail in 1998, this was mostly trail rerouting around wet areas. Our major projects included: Coney Creek Trail, Solitude Loop Trail near Florance Pass, Upper Little Horn Trail, Little Goose Falls Trail, bridge construction over Piney Creek near Willow Park Reservoir, and the Tongue River Cave Trail with help from Sheridan High School environmental science class.

Other Volunteer groups, fire crews and outfitter permittees cleared downfall on 120 miles of trail and extensive drainage work was accomplished on an additional 11 miles of trail. Volunteer labor (e.g., Cloud Peak and Powder River Back country Horsemen, Corbett Inc., Wyoming Girls School, Lovell Eagle Scouts,) is critical to continued maintenance. We celebrated National Trails Day by clearing downed trees from system trail and clean up of the Elgin Park

Trailhead. Outdated information continues to be used to prioritize segments of trail requiring corrective action. Observations from field personnel and trail users confirm that our trail system is in need of major repairs. Trail erosion with resulting resource degradation is at unacceptable levels. Congress has mandated that condition surveys be conducted, beginning in 1999. This work is scheduled to take approximately five years. The funding for these repairs will hopefully follow.

The Forest Trail system bridges are at a critical stage, several non-standard bridges collapsed during the last five years. This is covered in detail in the "Fiscal Year 1996 Trail and Trail Bridge Accomplishment Report" and the "Fiscal Year 1994 Trail Bridge Inspection Report".

Monitoring Addition: Law Enforcement

The following table summarizes law enforcement incidents beginning in 1994. Law Enforcement is an important component of recreation management. Reported incidents are a function of the number of field personnel (statistics include wilderness violations). This data is generally used in setting program priorities.

REPORTED INCIDENT	1994	1995	1996	1997	1998
Timber Theft	65	110	176	181	112
Fire Violations	315	142	235	223	109
Destruction of Property	20	16	30	25	47
Off-Road Vehicles	29	44	31	44	120
Developed Recreation Sites(1)	22	5	5	5	10
Sanitation (Littering)	157	51	73	290	192
Fish/Wildlife Violations	1	2	2	2	0
Occupancy/Use Violations (2)	257	114	205	179	67
Road/Trail Violations (3)	22	59	48	52	17
Non-Payment of Fees	8	0	2	2	2

Others	483	79	259	222	108
TOTALS	1379	622	1066	1215	784

- (1) Horses in campgrounds
- (2) Mainly dispersed recreation (ie. over 14 day stay limit.)
- (3) Driving closed roads

Recreation and Travel Management Contributed by the East Zone Wildlife Biologist

Here is a listing of the maintenance of travel management devices for the Tongue District:

- five post hole sleeves were installed in Right-of-Way fences along U.S. Highway 14 to facilitate the annual let down of these fences for snowmobile traffic,
- the road sign on FDR #172 (Bull Creek) was replaced,
- travel management signing such as road closed signs and road number signs were maintained across the entire district,
- a new sign was built and installed on Big Willow Creek where it crosses Highway 14A,
- a stop sign was replaced on Forest Development Road 223 (Gloom Creek),
- a sign knocked over by cattle near Bull Creek was replaced,
- a sign designating the Skull Ridge road Forest Development Road 151 was replaced,
- a road closure sign was replaced and two barrier posts were set at a location off the Burgess road just north of Burgess Junction.

A project was started to transplant evergreen trees to campgrounds on the Tongue District. Many campgrounds are beginning to lose dominant tree cover and the Forest Service is concerned that visual screening may be lost. For this project, trust funds collected from the sale of forest products such as Christmas Trees and post and pole permits were used. A total of 27

trees were transplanted in Prune Creek Campground. All transplants were monitored for survival at the end of the growing season, and so far, we have 100 percent survival. This project will be ongoing for several years.

A quarter mile of trail rehabilitation work was completed in the Squirrel Timber Sale area. This project was located between units 14 and 15, on a trail which extends from Shelton's cabin south and west into Dome Rock. The trail was designated a keep open in the contract package and no brush work was needed. Project consisted of installing water bars and other measures to reduce erosion, and was funded by timber trust funds receipts (Knutson-Vandenberg) from the Squirrel Timber Sale. This project benefitted about five acres of water quality and 0.3 mile of trail.

Rocks were blasted from a snowmobile trail on the Granite Road, Paintrock District, in October. This work was done to facilitate grooming of this route and to improve user safety.

Routine patrols were conducted during the 1998 big game hunting season.

The Annual Operating Plan for the Cooperative Law Enforcement Agreement was executed with the Sheridan County Sheriff to provide patrols. The Forest Service receives funding annually for this Agreement.

MONITORING REQUIREMENT:
Scenery Management

The Forest Service established a full time Landscape Architect position in September, 1998. The Forest Service also conducted a two day training class on scenery management.

Monitoring was completed for two projects in 1998. *Frequency of measurement* was below the standard established in the Forest Plan (page, IV-4).

•Pre-commercial thinning of lodgepole pine along Pole Creek Road. Work met Forest Plan minimum standards of partial retention in the foreground zone of a collector road (Prescription 7E on page III-167). Selected clumps of dog hair lodgepole were retained along the road corridor for screening and vegetative variety.

•Heavy maintenance of reconstruction on Trigger Lake Road (#382) In general, work met the Forest Plan minimum Standard of modification (Prescription 7E on page III-167). However, we identified a specific problem in relation to the visual resource management requirement of "blending soil disturbance into natural topography to achieve a natural appearance, reduce erosion and rehabilitate ground cover: (page III-27)". The State highway department developed a small borrow pit next to the road during reconstruction. With project completion reclamation work was not undertaken. Ideally, topsoil should be stockpiled before work begins -- later the borrow area should be reshaped, topsoil spread and native seed applied (broadcast and raked).

Effectiveness Monitoring

Securing the necessary funding to implement a "well balanced" recreation program is the most difficult action facing the recreation program in the next decade. To do so we must place a greater emphasis on collecting and analyzing use information

and in costing out our operations. Facilities and/or activities that are no longer economically efficient to manage will most likely be taken out of service. The competition for funds will become more intense and as stated in the 1996 and 1997 monitoring reports, the effective management of dispersed recreation remains the most important emphasis area for the recreation program.

Validation Monitoring

Some of the initial data assumptions and methodology used in the development of the Forest Plan were in error. We should adjust and clarify both capacity figures and ROS (Recreation Opportunity Spectrum) guidelines for each "Management Area". For example, Semi-Primitive Nonmotorized areas currently allow the construction of roads and the harvesting of timber. Both activities are not compatible with meeting this recreation management goal. The current Standard does not allow us to adequately analyze nor portray the "true" mix of available Forest recreation opportunities.

WILDERNESS

MONITORING REQUIREMENT:

Condition of use areas

The Forest Service did not monitor campsite conditions in 1998. Rather we revised the Wilderness Standards and Guidelines to make them more reliable and easier to measure. We adopted an environmental indicator standard of 500 square feet of bare ground (maximum) for each campsite in a Semi-primitive Management Area and a Guideline of zero square feet of bare ground in a Pristine Management Area. To establish trends an inventory is scheduled every five years using Cole's protocol for "Area of Vegetation Loss: A New Index of Campsite

Impact", Research Note INT-389, July 1989.

MONITORING REQUIREMENT:

Amount and distribution of wilderness use

Use in the Cloud Peak Wilderness was up nearly ten per cent from the previous year. The summer of 1998 was dry relative to 1997. Use reports for 1998 total approximately 61,000 RVD's (A Recreation Visitor Day is: 1 person for 12 hours of use), similar to 1996. The average length of stay remains one night which has been the trend for the last 10 years. The distribution of use remains 85 percent hikers and 15 percent horse users. Use figures were collected using a mandatory self-registering program. Wilderness visitation remains concentrated at trail heads accessed from US 16. This is more than 80 percent of our visits. The more difficult to reach northern and northwestern access points receive less than 20 percent use.

Effectiveness Monitoring

Bare ground Standards and Guidelines should provide consistent monitoring of campsite conditions. Preliminary observations indicate an average amount of bare ground per campsite of slightly more than 600 square feet. These campsites will be monitored approximately five years from the initial review. Comparisons will be made between this base line data and the inventoried campsites. Trends will be calculated for the average of all campsites. Any results greater than the base average line of 600 square feet per campsite will trigger management actions.

Self registration has improved use estimates. Prior to the mandatory system, registration was voluntary. Compliance averaged 50 percent for hikers and 20 percent for horse riders. The compliance with mandatory registration approaches 95

percent. and therefore our confidence level with our estimates of use is much higher.

HERITAGE RESOURCES

Program Summary

Evidence of past human presence is abundant on the forest. There is a continuous record of human use of the Bighorn Mountains, at least on a seasonal basis, thought to begin shortly after the first Americans arrived on this continent. Protection and management of these irreplaceable resources are the focus of the Heritage Resources Program. The majority of heritage resource work is devoted to site protection and program administration. There were approximately 4,900 acres surveyed for Heritage Resources during 1998. The majority of the surveys were associated with the timber and range management programs. Fourteen new Heritage Resource sites were discovered on the Tongue Ranger District.

Other work included two trail projects, three summer homes projects, and a stock tank. We also completed two Programmatic Agreements with the State Historic Preservation Office, and the Advisory Council on Historic Preservation. The first addressed the Forest's road management program, and the second the management of a historic Tie-Hack District.

Public education for the year included four flint knapping demonstrations, two historic photographic displays, and a class at Sheridan College. Personnel from the Tongue District held several talks that took place at the Burgess Junction Visitor Center. The programs included the Sibley Battle, flint knapping demonstration, and a prehistoric technology workshop.

IMPLEMENTATION MONITORING

MONITORING REQUIREMENT:

Evaluation of Ground Disturbing Activities Protection of Significant Cultural Resource Properties.

Thirty-one Heritage resource properties were examined on the Tongue District. Twenty-five of the properties were prehistoric, and six were historic. Six prehistoric sites showed damage, one from erosion (old road cut), four from cattle trampling, rodent disturbance. The Forest Service has plans to reduce impacts caused by cattle. No plans, at present, are foreseen for the remaining prehistoric sites. However, the remaining impacts are less than five percent of the sites' total area, are not sufficient to change site status, and will not change site status in the foreseeable future.

Five of the historic properties are tie-hack era resources, and one is an historic cow camp. The tie-hack sites continue to be impacted by natural deterioration, and could be lost at any given time. The Forest Service is completing a management plan for tie-hack sites to reduce the effects of natural deterioration. The historic cow camp is incurring no impacts.

We monitored the construction of the Little Goose Falls Trail to ensure compliance with direction in the National Environmental Policy Act. The project was implemented as decided.

The Medicine Wheel National Historic Landmark and two other historic properties within the Area of Consultation were monitored monthly from July through October. We observed no deterioration or damage to this Landmark. A slight amount of erosion occurred at the other two properties.

Effectiveness Monitoring

Two goals are associated with effective Forest Plan Monitoring. 1) identification of appropriate resource management, and 2) initiate actions to reduce deficiencies. We are able to comply with approximately 75 percent of goal one. We could meet this goal by implementing a level of monitoring as described in the Recommendation section.

The Forest Service initiated several agreements (PA's) in the past few years that will help meet the second goal. We now have standard procedures for reducing effects from range and travel activities. The Forest Service completed a management plan for the Medicine Wheel National Historic Landmark, and is in the process of finalizing a management plan for tie-hack properties on the Tongue Ranger District. This latter document can be used for other tie-hack properties across the Forest.

Validation Monitoring

Heritage resources continue to be effected by natural deterioration, grazing and animal activities (i.e. burrowing rodents). Amending the Forest Plan to give specific direction to meet Federal Law should be a priority. Nevertheless, one problem will always remain -- finding enough funds to implement the intent of the Plan. New agreements with the State Historic Preservation Office and new Forest policy and funding, should improve our level of heritage resource management.

Evaluation and Conclusions

Based on direction from the Forest Service Washington Office (i.e., perform deferred maintenance assessments), and through several agreements (i.e., Range), we are taking steps to achieve numerous goals in the Heritage Resource program. It will be several years before personnel can measure the full positive extent of these actions

LANDS - SPECIAL USES

Program Summary

The Lands and Special Use program consists of real estate management including land acquisition, withdrawals, adjustments, right-of-way access, and the administration of special use permits.

We administer approximately 130 nonregulation special use permits including communications sites, reservoirs and ditches, road permits and easements, power lines, and a variety of miscellaneous uses. In addition, there are ten resorts, three organization camps, two ski areas and 264 recreation residences on the Bighorn National Forest. Other permits include numerous Outfitter-Guide operations, several large annual recreation events and a campground concession permit. There are approximately 370 active recreation special use permits.

We were effected by two major new developments: Tie Hack Dam and Reservoir on the Power River Ranger District and the Twin Lakes Dam and Reservoir on the Tongue Ranger District along with our routine recurring work. We received several applications, 21 just prior to the December 31 deadline, in December 1996 for easements under the Ditch Bill, We have processed these applications.

Land Exchange activity is not a major component of our lands program. The Bighorn is one of the more consolidated Forests in the Nation. However, several proposals are pending. One involves the possible exchange of ski area base facilities (Antelope Butte) for private lands as yet unnamed. The other involves the City of Buffalo and Tie Hack Reservoir, a municipal water supply. The City is proposing to exchange reservoir lands

below high water mark for a tract of land along the east side of the Bighorn Mountains.

There is a moratorium on issuance of any new Outfitter-Guide permits. The moratorium was issued because of: the lack of a current capacity analysis (appears that we have reached capacity for some activities hunting), and the lack of resources to administer current permits.

In 1998 the Lands and Special Uses staff were reorganized and placed under the direction of the Forest Recreation Staff Officer. Originally, most lands issues were managed by two personnel stationed in Sheridan, Wyoming. The new organization has one person doing these duties. Most of the on-the-ground work in recreation residences and outfitter guides is handled by District personnel.

IMPLEMENTATION MONITORING

MONITORING REQUIREMENT:

Ensure compliance with terms of permits and operating plans.

Inspection and compliance checks are performed to ensure compliance with permit requirements. Due to limitations of personnel, not all permitted operations are inspected on the frequency preferred to ensure compliance with terms of the permit.

MONITORING REQUIREMENT:

Effect on non-National Forest land management practices on adjacent or intermingled National Forest System lands or on Forest goals.

Activities such as grazing, timber harvest, building construction, road construction and recreation uses; on adjoining and intermingled lands are increasing. These activities increase the workload for a limited staff. Response times for requests

are slower having the potential to cause economic effects for those needing the services (e.g., utility companies, land owners).

Effectiveness Monitoring

The Lands and Special Uses program complies with the direction found in the Forest Plan. Forest Service manuals provide principal management policy and procedures. Limited funds and personnel make it impossible to adequately administer all permits to these established standards.

Highway 14 Monitoring Contributed by the East Zone Wildlife Biologist

1. Photographs were retaken of "before" sites on the Tongue River Section of U.S. Highway 14. The original photos were taken at the onset of construction and the photos taken this year show the changes to the landscape.

The success of the seeding, tree transplants and erosion control work was monitored on U.S. Highway 14 reconstruction project. WYDOT made some changes to erosion control structures where needed, and the seeding success was adequate for the project. Dead trees were removed from the Bowl Quarry site to improve visuals.

The wetland enclosure fence on Little Willow Creek was modified to allow snowmobile traffic around the west side. This site includes a mitigation site to replace wetlands which were inundated by the reconstruction of the Tongue River section of US Highway 14. The original fence extended to the tree line and snowmobiles were cutting the fence each winter so they could travel adjacent to the trees where snow accumulated. The northwest corner of the fence was modified to move the fence line far enough from the trees to accommodate snowmobile traffic thereby

reducing long-term maintenance costs. About 15 acres of riparian habitat are benefitted by this enclosure.

Boulders were "planted" adjacent to the Burgess Dump Station to discourage access through the trees when the gate is closed. Trees cleared for the highway reconstruction removed natural barriers and forest users could access the dump station by driving off-road to get behind the gate. This method of restricting off-road travel is permanent, which reduces long-term maintenance costs, and is more visually acceptable than installing gates or other man-made barriers.

Small portions of the Right-of-way fences along US Highway 14 were converted to let-down type fence at snowmobile crossings a couple of years ago. Each year now, the Forest Service puts those fences up in the spring and takes them down in the fall. As a result of this additional ROW fencing, the Forest Service must now spend time and funding each year on this work to accommodate snowmobile traffic. Listed below are the areas affected:

- Bowl - 3 sections
- Burgess VIC - let-down fence
- Plant site - 2 sections
- Burgess Junction - 4 sections
- 14A - 2 sections

Lands and Special Use Monitoring Contributed by the East Zone Wildlife Biologist

Archeological surveys were conducted on three cabin sites on the Tongue District. This was done in response to cabin owner requests to make improvements or additions to their permitted sites.

Cabin inspections were conducted on seven sites on the Tongue District. Permit administration for three cabins, located in Little Bighorn Canyon, was transferred to

the Sheridan office, and these sites have not been inspected for some time. There were other scattered cabins inspected all over the District. The inspections were completed to update the files and to assure the improvements were in compliance with permit stipulations.

Slash piles were burned at various cabin sites on the Tongue District. This slash was piled by cabin owners in an attempt to reduce fuel loadings. Fuels were reduced on three acres.

One hundred two Recreation Resident permits were maintained to standards on the Tongue District.

Two cabin permits were transferred on the Tongue District in response to sale of the permitted improvements.

The Tongue District responded to three requests from employees of the US Census Bureau for information on cabin sites. Each request required about one half day to locate, organize, and display the information.

Outfitter and Guide Monitoring Contributed by the East Zone Wildlife Biologist

Inspections were conducted on three outfitter camps on the Tongue District during fiscal year 1998. These inspections were routine and conducted periodically to assure the camps are maintained and in compliance with permit direction.

Seven applications were processed to renew outfitter permits on the Tongue District. These requests were due to the expiration of existing permits. No new authorizations were issued. The Forest Supervisor re-issued a decision to not issue any new outfitter authorizations pending the completion of a forest capacity analysis and pending adequate funding to administer additional permits.

A total of 20 Outfitter and Guide permits were administered to standard on the Tongue District this year. These permits cover a variety of activities in addition to big game hunting or fishing such as sight-seeing, cattle drives, horse packing, mountain lion and moose hunting, and snowmobiles.

Several illegal outfitters were cited on the Tongue District last year. A considerable amount of time was spent dealing with reports of other suspected illegal outfitter activities. This is a growing problem and it is requiring more time than the Forest Service is funded to provide.

FACILITIES

Program Summary:

The Forest Service infrastructure consists of those facilities required for the management of the National Forest. On the Bighorn National Forest there are approximately 1,552 miles of system roads and 87 buildings along with associated structures and utilities which are utilized for resource management.

Funding for maintenance of the infrastructure has never been adequate. As such, priorities have to be set as to what work will be accomplished and what will be deferred. As budgets have declined, the amount of deferred work, or backlog has increased dramatically. Adding to this, is the fact that the majority of our roads and buildings are at or near the end of their design life and in many cases a more substantial investment than routine maintenance will be required.

In 1998 the Forest Service determined that more information was needed to accurately identify what our maintenance needs actually are. An ambitious five year inventory and reporting program was

initiated to identify annual maintenance, deferred maintenance and capital improvement needs for the entire infrastructure of the Forest Service. Through this initiative, every road, trail, building, campground, bridge, etc. will be reviewed for annual maintenance needs, deferred maintenance needs, and capital improvement needs over the next five years.

A random sample of roads was inventoried during the fall of 1998 according to the proposed deferred maintenance protocols. The Bighorn was assigned a random sample of approximately 75 miles of various road types to review for maintenance needs. The needs of the sample set of roads were then projected over the entire Forest's transportation system. This statistical analysis indicated that the Bighorn National Forest would require approximately \$518,000 for annual maintenance of the road system, \$23,856,000 deferred maintenance needs and \$4,418,000 in capital improvement needs for the entire road system. Annual funding for road maintenance is around \$250,000 per year.

In 1998 routine maintenance was performed on approximately 348 miles of roads by force account crews, contracts and by permit holders according to the permit requirements. Approximately 2.0 miles of road were constructed and 1.3 miles reconstructed for the Schuler timber sale. The one half mile of the Crazy woman Canyon road washed out in 1997 was reconstructed in partnership with the NRCS. 2.8 miles of road were obliterated.

A trail bridge was constructed at Willow Park Reservoir with force account crews. Routine maintenance and emergency repairs were performed on various buildings across the forest. A water system for Hunter Work Center was constructed and a contract was let for the construction of a new 20 unit campground as part of the

Tiehack Reservoir mitigation. Technical support was also provided in the areas of special uses, Interdisciplinary teams, accessibility, safety, resource issues as required.

Beginning in 1999 a three year rotation of the road maintenance crew will be initiated to improve efficiency. Road maintenance operations other than emergency repairs and routine grading will be concentrated on one unit for the entire year rather than trying to cover the entire forest in a single season. We are anticipating that this will allow us to do a more complete job and save time and money by concentrating our efforts in one area. Future monitoring reports should review this process to determine if in fact we are accomplishing our goal of increased efficiency and effectiveness.

IMPLEMENTATION MONITORING

Construction, reconstruction and maintenance projects are monitored to ensure compliance with applicable laws, regulations, plans and specifications. Coordination with specialists during project planning is accomplished to ensure health, safety and resource protection measures are incorporated into the projects as required.

MONITORING REQUIREMENT:

Arterial, collector and local road construction and reconstruction.

Road construction and reconstruction standards and guidelines are met by utilizing design criteria developed through an interdisciplinary process and approved by the line officer.

Arterial and collector road construction/reconstruction in 1998 consisted of the reconstruction of 0.5 miles of the Crazy Woman Canyon road in partnership with the NRCS.

Local road construction consisted of the Schuler timber sale with 2.0 miles of construction and 1.3 miles of reconstruction.

Systems, Maintenance Management Systems etc. should be incorporated into a unified system and kept current to aid in the ongoing evaluation and management of the Forest Service infrastructure.

Effectiveness Monitoring

During project implementation monitoring is achieved through onsite inspections by qualified personnel. Deviations from the planned design are accomplished as necessary to account for a change in conditions or a plan oversight. Input from other specialists are sought as conditions warrant. Final acceptance of contracted projects by the appropriate authority is required.

Validation Monitoring

Construction projects are monitored by personnel during the performance of their routine duties. Changes in future design or modification of maintenance activities are incorporated as necessary to meet management objectives.

Evaluation and Conclusions

Emphasis should be placed on maintaining the portions of existing infrastructure needed for long term forest management.

The roads and buildings that are no longer needed or if there is inadequate funding to maintain them should be identified and disposed of.

Maintenance responsibilities should be shifted to permittees and other users where appropriate.

A Capital Improvement Program should be developed to address the problems of worn out roads and obsolete buildings.

Infrastructure management tools such as databases, road, Geographic Information

RECOMMENDATIONS

A. RECOMMENDATIONS

This list is not all inclusive, but it addresses key issues from previous years monitoring reports.

SOILS AND WATERSHED

1. Ensure that all aspects of project decisions are identified and funded through the annual budget process. This should include monitoring activities for the soil and water resources. Periodic project reviews should be conducted to ensure NEPA decisions are being implemented in whole.
2. Continue to design Best Management Practices during project design and then assure they are properly implemented and maintained.
3. Emphasize soil and water protection measures during project design and implementation. Ensure that monitoring of protection measures is conducted on a regular basis.
4. Increase emphasis on monitoring of special use permits related to water conveyance systems, septic systems, and in stream flows.
5. Conduct landscape scale analyses in order to assess the existing conditions within large watersheds on the forest.

TIMBER

1. Emphasize the process of assuring adequate regeneration on regeneration treatments, including aspen regeneration and non-traditional treatments.

2. Review the suitability of forested lands in all NEPA analyses where treatment of woody vegetation is proposed.

3. Update silviculture Standards and Guidelines to those listed in the Regional Guide for regeneration, size of created openings, size of uncut areas between created openings, when a created opening will no longer be considered an opening, guidelines that provide direction for the use of landscape level management and guidance for applying silviculture systems to the landscape.

4. Emphasize the importance of requiring silvicultural prescriptions for all vegetative manipulation.

INSECTS AND DISEASE

1. The service center in Rapid City should schedule a flight for pest activity every third year. The next flight should be scheduled for 2000.
2. Change the monitoring requirement in the Forest Plan to reflect surveys every three years, rather than the 800,000 acres each year.
3. Monitor the items listed in the Insect and Disease section to determine the extent of known populations.

RECREATION AND SCENERY MANAGEMENT

(These recommendations were also acknowledged in the 1997 monitoring report.)

1. Ensure that mitigation measures are carried out during project implementation,
2. Adjust and clarify both capacity figures and ROS guidelines in the Forest Plan.
3. Initiate an intensive education and law enforcement program for off-road vehicle use and dispersed camping (See 1996 Monitoring Report).
4. Develop strategies for collecting reliable recreation use statistics and in defining recreation resource assets.
5. Secure more staff time and outside Forest/Agency involvement in monitoring.
6. Recognize that personal perceptions, needs and values are a part of ecosystem management.
7. At the time of Plan Revision, consider modifying the definition of a "Management Area". Use larger blocks of land on a "dominant" or "emphasis use" basis. Landscape types, character, and public sensitivity help to define these areas.
8. Ensure adequate funding for trail maintenance.
9. Place more emphasis on development on partnerships and the use of volunteers to accomplish objectives.

HERITAGE RESOURCES

These were acknowledged in the 1997 Monitoring Report and they are repeated for clarity.

1. Amend the Forest Plan to address changes necessary in the management of the Heritage Resource. More specific statements are needed in the "General Direction" and "Standards and Guidelines" sections of the Plan. The Forest Plan should reflect a 1988 Amendment to the Archaeological Resource Protection Act, Section 14(b), that requires the preparation of a schedule for surveying lands that are likely to contain the most scientifically valuable archaeological resources, etc.

2. Ensure the Forest Plan addresses aerial spraying to control pest and noxious weeds not be conducted only with protective measures in areas containing petroglyphs and pictographs, or in uninventoried areas containing rock outcrops, cliff faces, or rock overhangs. Recent advances in analytical techniques allow for the dating of petroglyphs and pictographs through sensitive chemical ratios.

3. Develop a Heritage Resource Program that manages the resources. Protection and interpretation of our Heritage Resources for future study and enjoyment by the public is necessary.

4. Incorporate paleontological resource management.

5. Enter into an agreement with the Wyoming State Historic Preservation Office that deals with acceptance of impacts to all but the best examples of resource types (e.g. the best tie-hack cabins; the best teepee ring sites).

To date, there are approximately 327 unevaluated heritage resources properties. Because of legal requirements, these properties must be managed as though they are eligible to the NRHP (National Register of Historic Places). Administrative Studies are needed to determine property NHRP status. Findings could result in reduced

long-term management cost. Additionally, we should initiate studies to determine impact significance from such activities as erosion, vandalism, and grazing.

LANDS AND SPECIAL USES

As funding levels decrease and demands for additional services increase, we need to look

to sharing duties with neighboring administrative units. Opportunities may exist to "split" responsibilities of record keeping and permit issuance with the Shoshone National Forest. An analysis and evaluation of alternatives is planned for early 1999.

B. RESEARCH IDENTIFIED

WATERSHED

- 1. Develop a watershed cumulative effects model for analysis.**
- 2. Identification of reference stream reaches would also aid in determining effects from management activities.**

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