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for fiscal year 2007

Shoshone National Forest

prepared by the Shoshone National Forest
planning staff

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Introduction

This report is the Forest Plan Monitoring and Evaluation Report for the Shoshone National Forest (Forest) for fiscal year 2007. The Shoshone started forest plan revision in 2005 and is beginning a transition to the new planning regulations in formatting this monitoring report. Under the new planning regulations, the annual monitoring report will focus only on those items that were monitored in any given fiscal year. In the past, our monitoring reports included information on all monitoring items whether they were funded in a particular year or not. This will lead to a more focused report that highlights each fiscal year's monitoring. Much of the remaining information in past monitoring reports is now available in the Comprehensive Evaluation Report that is being prepared for plan revision. The latest copy of that report is available on our Web site.

This report includes information for various resource areas. Each resource area includes a summary of trend data components that relate to Forest Plan direction and monitoring, including the latest information for fiscal year 2007 and some 2008 data. Trend information provides context for what has happened to the resource during Forest Plan implementation.

The assessment of changes, if any, that need to be made to the Forest Plan because of the monitoring information is not included in this report. The need for change assessments are currently ongoing as part of the revision process. That information is available on our Web site.

Resource areas

Air quality

The Fitzpatrick, Washakie, and North Absaroka Wilderness areas are Clean Air Act designated Class I airsheds. Class I designation provides protection to pristine lands by severely limiting the amount of additional human-caused air pollution that can be added to these landscapes. All other areas on the Forest, including the Popo Agie and Absaroka-Beartooth Wilderness areas, are Class II airsheds, where air quality cannot fall below standards set by the Wyoming Department of Environmental Quality.

Data have been collected at the South Pass National Atmospheric Deposition Program site since 1986.[1] This site is presently funded via an agreement between the Forest Service and State of Wyoming.

Data have been collected at Ross Lake in the Class I Fitzpatrick Wilderness and at Lower Saddlebag Lake in the Class II Popo Agie Wilderness since 1986. Monitoring at these two lakes is being conducted to assess the effects of air pollutant deposition on air quality related values.

Data have been collected at the Dead Indian Pass Interagency Monitoring for Protected Visual Environments site since 2000 to monitor air quality and visibility in the Class I North Absaroka Wilderness.[2] This site is also useful for monitoring visibility in the Absaroka-Beartooth Class II Wilderness.

South Pass National Atmospheric Deposition Program site. Analysis of data collected between 1986 and 2006 (2007 data are not yet available) was completed in early

[1] Data are available at http://nadp.sws.uiuc.edu
[2] Data are available at http://vista.cira.colostate.edu/improve/.

2008. Both wet deposition and precipitation-weighted deposition data sets were analyzed. The analysis indicates change over time, with statistically significant upward or downward trend depending upon the parameter (Table 1 and Table 2 and Figure 1 and Figure 2).

Ammonia (NH_4) is on an upward trend and has basically doubled, but there are seasonal differences. The greatest deposition occurs during fall and winter. Potential sources of ammonia are upwind feedlots and machinery, e.g., drill rigs, that do not use catalytic converters.

Precipitation-weighted nitrate (NO_3) deposition is on an upward trend for all four seasons. There is no statistically significant trend with wet deposition nitrate levels, but values have increased substantially for the winter, spring, and fall seasons. The differences between wet and precipitation-weighted deposition are explained by units of measure, i.e., volume by weight by period versus concentration by precipitation volume, respectively. The statistically insignificant trend in wet deposition is due to differences between seasons and variability within and across seasons. A potential source of nitrate is upwind emissions from oil and gas developments.

Sulfate (SO_4) is on a downward trend through all seasons. Values have decreased by 25 to 50 percent. The trend could be related to 1990s-era reductions in the use of high sulfur diesel fuel. Controls on emissions at refineries and coal-fired power plants, on a western United States regional basis, could also be a cause.

There is no trend with inorganic-nitrogen (Inorg-N) at the 95 percent confidence level but there is an upward trend at the 90 percent level. A potential source of inorganic nitrogen is upwind agricultural activities.

Table 1—South Pass National Atmospheric Deposition Program site wet deposition trend analysis

Wet deposition (kg/ha)								
Parameter	Seasonality	Season	1986	2006	Difference	Change	Trend	Significant
NH_4	Yes	Winter	0.041	0.077	0.036	88%	Up	0.05
		Spring	0.122	0.206	0.084	69%		
		Summer	0.141	0.194	0.053	38%		
		Fall	0.060	0.139	0.079	132%		
NO_3	Yes	Winter	0.621	0.755	0.134	22%	None	--
		Spring	0.823	1.170	0.347	42%		
		Summer	0.910	0.892	-0.018	-2%		
		Fall	0.415	0.863	0.448	108%		
SO_4	Yes	Winter	0.638	0.377	-0.261	-41%	Down	0.01
		Spring	0.900	0.643	-0.257	-29%		
		Summer	0.950	0.508	-0.442	-47%		
		Fall	0.599	0.410	-0.189	-32%		
Inorg-N	Yes	Winter	0.160	0.247	0.087	54%	Up	0.10
		Spring	0.282	0.406	0.124	44%		
		Summer	0.353	0.377	0.024	7%		
		Fall	0.148	0.316	0.168	114%		

Figure 1–South Pass National Atmospheric Deposition Program site wet deposition trend analysis

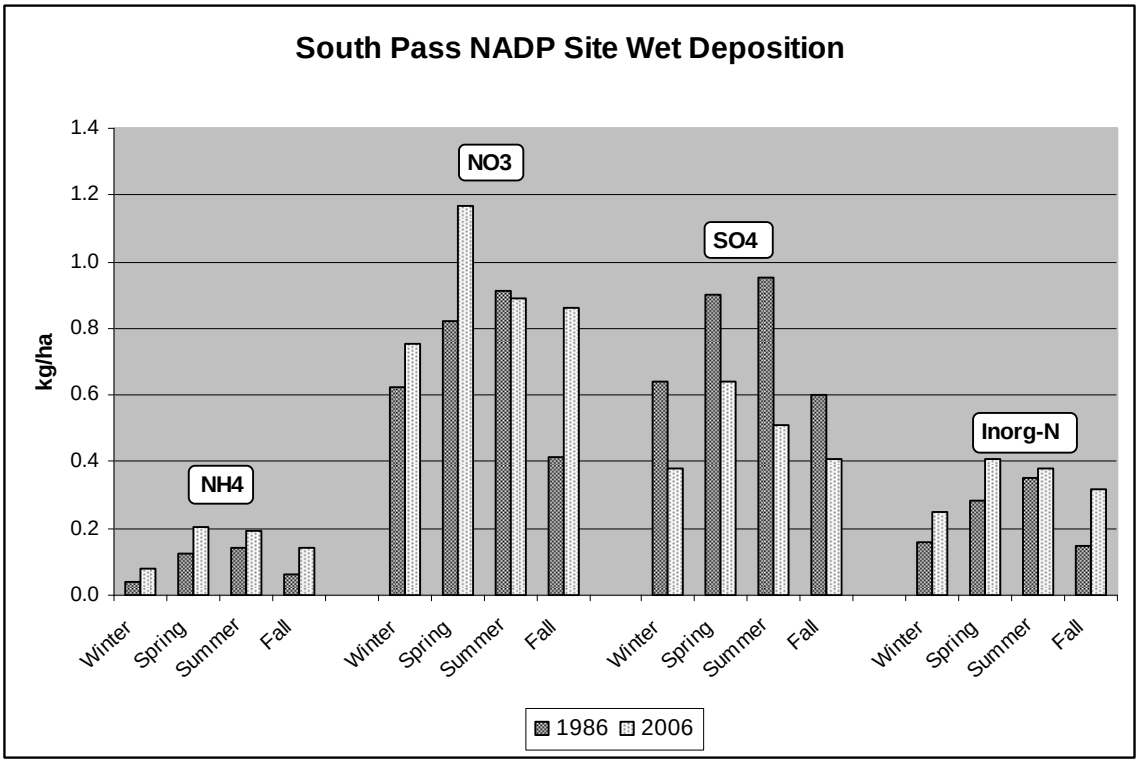
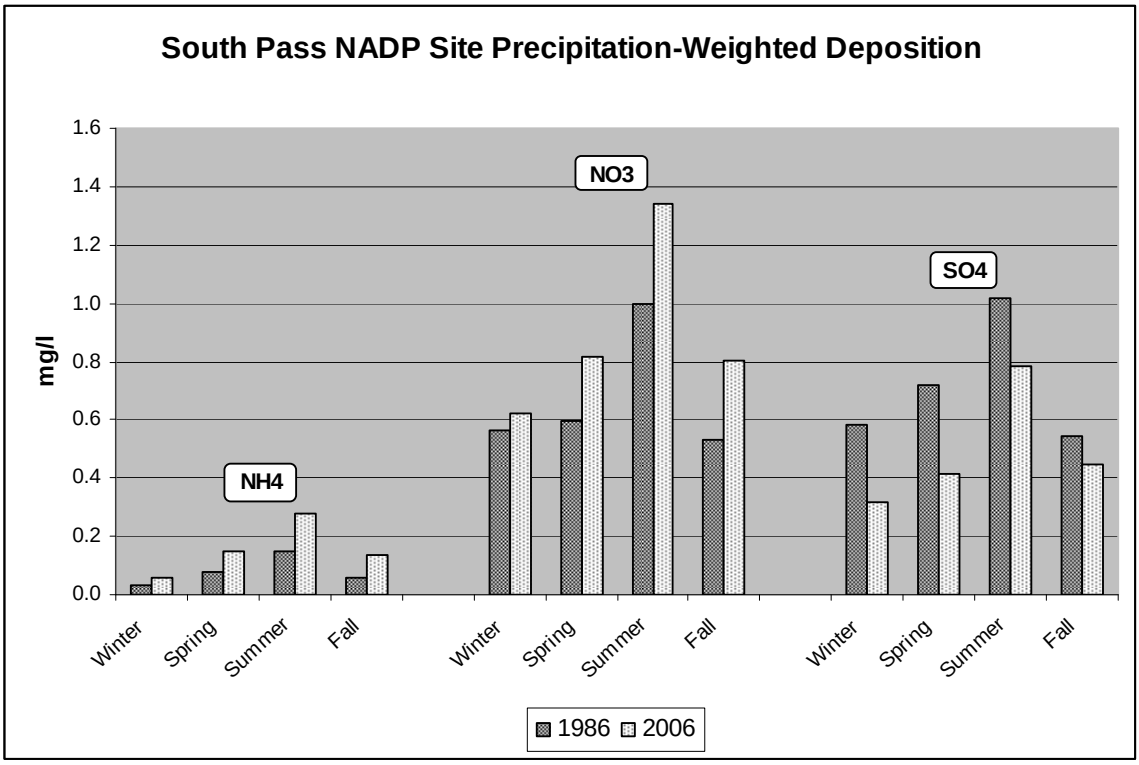


Table 2–South Pass National Atmospheric Deposition Program site precipitation-weighted deposition trend analysis

Precipitation-weighted (mg/l)								
Parameter	Seasonality	Season	1986	2006	Difference	Change	Trend	Significant
NH_4	Yes	Winter	0.033	0.061	0.028	85%	Up	0.05
		Spring	0.076	0.147	0.071	93%		
		Summer	0.147	0.280	0.133	90%		
		Fall	0.056	0.133	0.077	138%		
NO_3	Yes	Winter	0.565	0.623	0.058	10%	Up	0.05
		Spring	0.596	0.816	0.220	37%		
		Summer	1.000	1.340	0.340	34%		
		Fall	0.534	0.806	0.272	51%		
SO_4	Yes	Winter	0.584	0.318	-0.266	-46%	Down	0.01
		Spring	0.719	0.417	-0.302	-42%		
		Summer	1.020	0.782	-0.238	-23%		
		Fall	0.542	0.447	-0.095	-18%		

Figure 2–South Pass National Atmospheric Deposition Program site precipitation-weighted deposition trend analysis



In addition to Forest Service uses, the Wyoming Department of Environmental Quality and other agencies continually utilize data collected from this site. These data, along with data from other National Atmospheric Deposition Program sites in Wyoming, are used to model and track emissions and acid deposition across southwest Wyoming, which includes the Class I Fitzpatrick and Class II Popo Agie Wilderness areas on the Forest. Because of industrial development in southwest Wyoming and growth of several major cities upwind of the Forest, continued monitoring of this site is important relative to Forest managers being able to demonstrate compliance with the Clean Air and Wilderness Acts.

Lower Saddlebag and Ross Lakes. Analysis of data collected between 1986 and 2007 was completed in early 2008. The analysis indicates change over time, with statistically significant upward or downward trend depending upon the parameter, season, and lake sampling location (Table 3 and Table 4).

Acid neutralizing capacity is on a downward trend at both lakes. There is a greater change at Ross Lake. The change is occurring at all sampling locations, i.e., inlet, outlet, epilimnion, and hypolimnion.[3] The inlet at both lakes exhibits seasonality, but the outlets do not. The change at Lower Saddlebag, at the outlet and hypolimnion, is statistically non-significant, while at Ross it is significant.

The commonly accepted threshold for acid neutralizing capacity, when acid neutralizing capacity values are greater than 25, is no more than a 10 percent change. Thus, the downward trend at Ross Lake is a significant concern. The downward trend at Lower Saddlebag is approaching the threshold level, so it is a

[3] Epilimnion is the upper layer of water in a stratified lake. Hypolimnion is the lower layer of water in a stratified lake, typically cooler than the water above and relatively stagnant.

concern as well. The downward trend in acid neutralizing capacity at each lake may be due to the upward trend in nitrate (NO_3) at both lakes.

Nitrate (NO_3) is on an upward trend at the inlet of both lakes. Lower Saddlebag Lake exhibits seasonality, while Ross Lake does not. There is no trend at either lake at the outlet or epilimnion. The hypolimnion at Lower Saddlebag is on an upward trend while at Ross there is no trend.

The upward trend at the inlet of both lakes is a significant concern and could explain the downward trend in acid neutralizing capacity. Since there is no trend at the lake outlets, it is possible the influx of nitrogen (N) is being used by aquatic biota (both plant and animal) living in the lakes. Increases at each lake in the hypolimnion are also a significant concern because this zone is typically void of nitrogen. Thus, this increasing trend could be the enrichment phase of eutrophication,[4] meaning these once stable lakes (in terms of N) are becoming acidified. NO_3 sources could be emissions from upwind locations, such as oil and gas developments, or from what was stored in glaciers and large snow fields that have been rapidly melting over the last decade.

Sulfate (SO_4) at Lower Saddlebag Lake does not exhibit a statistically significant change, but there has been a 20 percent decrease (approximately). SO_4 is on a downward trend at Ross Lake at the inlet, outlet, and hypolimnion, but not the epilimnion. This trend at the Ross Lake inlet is not statistically significant, but it is statistically significant at the outlet and hypolimnion. Lower Saddlebag does not exhibit seasonality, but Ross does.

The downward trend could be related to 1990s-era reductions in the use of high sulfur diesel fuel. Controls on emissions at refineries and coal-fired power plants, on a western United States regional basis, could also be a cause.

In addition to Forest Service uses, Wyoming Department of Environmental Quality and other agencies continually utilize data collected from these lakes. These data, along with data from other lakes in the Wind River Mountains, are used to model and track emissions and acid deposition across southwest Wyoming, which includes the Class I Fitzpatrick and Class II Popo Agie Wilderness areas on the Forest. Because of industrial development in southwest Wyoming and growth of several major cities upwind of the Forest, continued monitoring of these lakes is important relative to Forest managers being able to demonstrate compliance with the Clean Air and Wilderness Acts.

[4] Eutrophication refers to excessive richness of nutrients in a lake or other body of water, frequently due to runoff from the land, which causes a dense growth of plant life and death of animal life from lack of oxygen.

Table 3–Lower Saddlebag Lake trend analysis

Lower Saddlebag Lake									
Parameter	Location	Seasonality	Season	1986	2007	Difference	Change	Trend	Significant
ANC (ueq/l)	Inlet	Yes	Spring	66	62	-4	-6%	Down	Yes
			Summer	77	67	-10	-13%		
			Fall	71	75	4	6%		
	Outlet	No		68	67	-1	-1%	Down	No
	Epilimnion	N/A		73	69	-4	-5%	Down	Yes
	Hypolimnion	N/A		76	68	-8	-10%	Down	No
NO_3 (mg/l)	Inlet	Yes	Spring	0.126	0.784	0.658	522%	Up	Yes
			Summer	0.079	0.434	0.355	449%		
			Fall	0.024	0.662	0.638	2658%		
	Outlet	Yes	Spring	0.233	0.326	0.093	40%	None	--
			Summer	0.051	0.046	-0.005	-10%		
			Fall	0.034	0.037	0.003	9%		
	Epilimnion	N/A		0.011	0.014	0.003	27%	None	--
	Hypolimnion	N/A		0.001	0.201	0.200	20000%	Up	Yes
SO_4 (mg/l)	Inlet	No		1.030	0.838	-0.192	-19%	None	--
	Outlet	No		1.030	0.824	-0.206	-20%	None	--
	Epilimnion	N/A		0.969	0.816	-0.153	-16%	None	--
	Hypolimnion	N/A		0.975	0.971	-0.004	0%	None	--

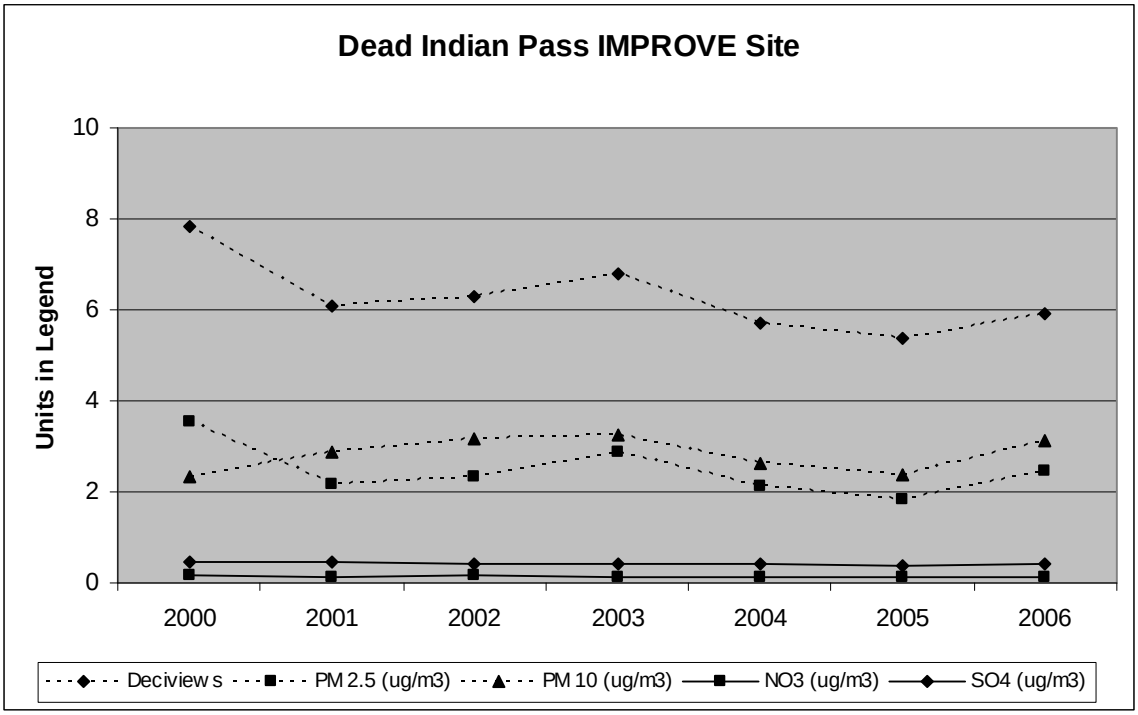
Table 4—Ross Lake trend analysis

Ross Lake									
Parameter	Location	Seasonality	Season	1986	2007	Difference	Change	Trend	Significant
ANC (ueq/l)	Inlet	Yes	Spring	74	59	-15	-20%	Down	Yes
			Summer	66	50	-16	-25%		
			Fall	66	60	-6	-9%		
	Outlet	No		69	61	-8	-11%	Down	Yes
	Epilimnion	N/A	Summer	76	55	-21	-28%	Down	Yes
	Hypolimnion	N/A	Summer	74	65	-9	-12%	Down	Yes
NO3 (mg/l)	Inlet	No		0.033	0.395	0.362	1097%	Up	Yes
	Outlet	No		0.022	0.049	0.027	123%	None	--
	Epilimnion	N/A	Summer	0.014	0.079	0.065	464%	None	--
	Hypolimnion	N/A	Summer	0.027	0.034	0.007	26%	None	--
SO4 (mg/l)	Inlet	Yes	Spring	1.020	0.881	-0.139	-14%	Down	No
			Summer	0.890	0.808	-0.082	-9%		
			Fall	1.020	0.698	-0.322	-32%		
	Outlet	Yes	Spring	1.060	0.894	-0.166	-16%	Down	Yes
			Summer	0.914	0.826	-0.088	-10%		
			Fall	0.963	0.872	-0.091	-9%		
	Epilimnion	N/A	Summer	0.884	0.837	-0.047	-5%	None	--
	Hypolimnion	N/A	Summer	1.050	0.926	-0.124	-12%	Down	Yes

Dead Indian Pass Interagency Monitoring for Protected Visual Environment site. Available data, collected since 2000, can serve only as informational at this point because there is insufficient record to conduct statistical analysis (Figure 3). Over time, as more data are collected, the record will be analyzed to determine if a baseline can be established and if there are trends in visibility. Several more years of data collection are necessary before meaningful analysis can occur. Relative to Figure 3, readers must recognize data for the year 2000 are very suspect because the data do not meet quality control/quality assurance criteria and data for the year 2006 are provisional. Data for 2007 are not yet available.[5]

In addition to Forest Service uses, Wyoming Department of Environmental Quality and other agencies continually utilize data collected from this site. These data, along with data from other Interagency Monitoring for Protected Visual Environment sites in the Greater Yellowstone Area, are used to model and track air quality in the region. This includes the Class I North Absaroka and Class II Absaroka-Beartooth Wilderness areas on the Forest. Because of upwind sources of air pollution, continued monitoring of this site is important relative to Forest managers being able to demonstrate compliance with the Clean Air and Wilderness Acts.

Figure 3–Dead Indian Pass IMPROVE site record



Projections

Air quality issues and concerns are expected to increase due to expected population increases in upwind states (Utah, Arizona, and California), expansion of oil and gas developments in southwest Wyoming, more prescribed fires designed to reduce fuel loadings, and more wildfires because of high fuel loads and insect epidemics. As air quality data are collected, analysis will occur to determine if wilderness air quality and air quality related values are being protected. If protection is not being afforded, potential corrective

[5] Data collected to date are available on the Interagency Monitoring of Protected Visual Environment Web site at http://vista.cira.colostate.edu/improve/.

actions will be discussed and taken. The effectiveness of mitigation measures taken directly by the Forest will most likely be limited given that the source of many emissions is off-Forest.

Insects

Native insects are natural components of ecosystems. They play critical roles in the development and succession of plant communities, decomposition, and soil formation. Population dynamics of native insects are influenced by vegetation conditions, climate, other disturbances, management activities, host defenses, and natural enemies.

Bark beetles are a disturbance process in the forested ecosystem; both endemic and epidemic populations of forest pests are natural parts of an ecosystem. The results of bark beetle epidemics produce changes on the landscape that will last for long periods. Beetles do provide important ecosystem functions such as nutrient cycling and successional changes of a forest. With epidemic levels of beetle activity, there is the potential for unintended negative resource consequences. Epidemic beetle populations can reduce the ability to meet desired conditions and management objectives for the Forest. Losses may include timber volume and value, potential growth of forest vegetation, native plant species and forage condition, quantity and quality of wildlife habitat, recreation opportunities, visual quality, and changes in fuel conditions.

Recent reports confirm the level of bark beetle-caused mortality is increasing across the Rocky Mountains, including the Shoshone National Forest. Over the past 10 years, widespread bark beetle epidemics have occurred on the Forest. All major bark beetles have been in epidemic status on at least parts of the Forest during this time.

In the late 1990s, bark beetle activity on the Forest was limited or non-existent. Since 2000, almost all the Douglas-fir cover type has been affected by Douglas fir-beetle to some degree; the exception is the far southern portion of the Shoshone, where the considerable Douglas-fir cover type has not been significantly impacted. Since 2000, most spruce beetle activity has been located in the central part of the Forest and has not been found extensively in either the far northern or the southern parts. Since 2000, there has been a continual upward trend in the number of acres affected by mountain pine beetle. White pine blister rust, an exotic disease, may be playing a part in areas where five-needle pines are being affected.

Projections

Looking ahead, acres affected by Douglas-fir beetle activity should decrease in the next 10 years, though there will still be some areas that experience high levels of mortality over this period. Over the next 10 years, all the spruce stands in the Clarks Fork area on the northern end of the Forest are at high risk and will likely be affected by spruce beetle, especially the stands with older and larger trees. To this point, there has not been a high level of spruce beetle activity on the southern end of the Forest and barring any other environmental damage, such as more fires or windthrow, the spruce there should be fairly safe in the near future. Mountain pine beetle impacts are expected to increase in the next 10 years.

The result of insect epidemics may be greater than during the last 20 plus years. The current beetle activity will result in the reduction of canopy closure and age class over a large portion of the Forest. Treatments planned to respond to the beetle activity will limit spread in some areas, but the limited amount of the Forest that is open for management and the finite number of dollars available mean the general pattern of impacts across the Forest will be the same regardless of any activities.

Species diversity

Peregrine falcon

In 1999, the peregrine falcon was removed from protection under the Endangered Species Act. The Shoshone National Forest participated heavily in the activities that led to delisting. Over 131 peregrines were successfully released on the Forest or in adjacent areas between 1987 and 1995. The Wyoming Game and Fish Department monitors nest sites in cooperation with the Forest Service. Figure 4 shows the number of nests and fledglings produced over the last several years. Both measures show an upward trend for peregrines. Biologists monitoring peregrine falcons believe these nests represent only a portion of the birds nesting in the area of the Forest because when new areas of suitable habitat are checked, they quite often find new nesting pairs. In 2005, the Wyoming Game and Fish Department began surveying fewer nest sites, which accounts for the lower number of occupied nests in the 2005 -2007 data.

Figure 4—Number of occupied peregrine falcon nests 1999 through 2007

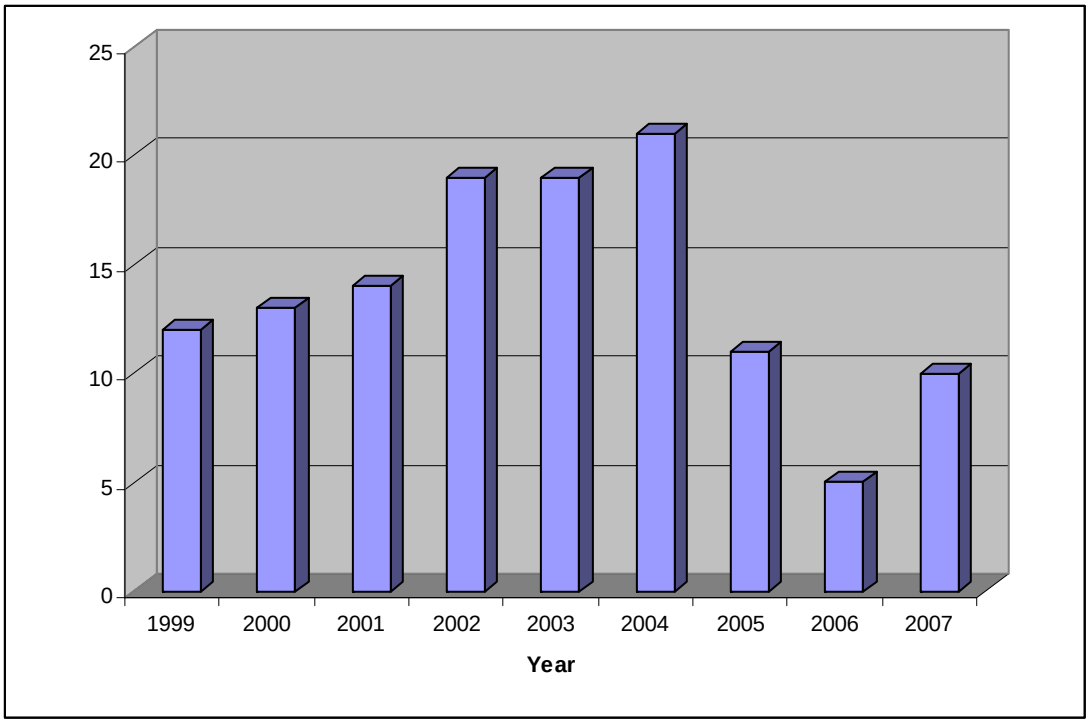
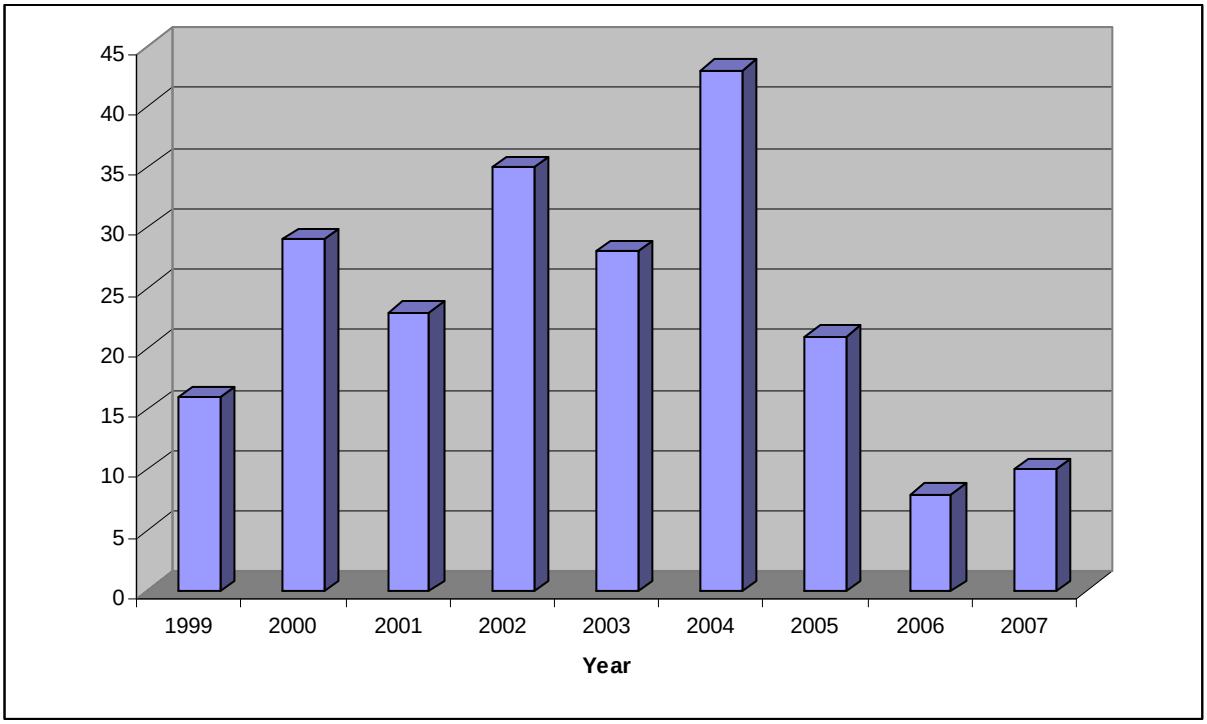


Figure 5—Number of peregrine fledglings produced, 1999 through 2007



Projections

The population trend of peregrine falcons will probably increase as the species is still spreading out into new, unoccupied habitat on the Forest. Peregrine falcon nesting habitat is unlikely to be impacted by current Forest Plan activities. Foraging habitat is sometimes impacted by vegetation management activities. A Forest Plan standard that management activities cannot occur within 300 feet of a raptor nest affords protection to this species at a critical time.

Gray wolf

Fourteen gray wolves from Alberta, Canada were reintroduced into Yellowstone National Park in January 1995. The following year, 17 additional wolves from British Columbia were brought to the reintroduced population. These animals and any other native wolves that might have remained in the Greater Yellowstone Area were classified as a non-essential experimental population, as per provisions of the Endangered Species Act. In March 2008, the gray wolf was delisted. In July 2008, its delisting was overturned by the courts.

Wolves first started moving onto the Shoshone National Forest in 1995. Numerous sightings occurred on the Forest in 1996 and one of the original packs, the Soda Butte Pack, included part of the northeast corner of the Clarks Fork Ranger District in its home range. In late 1996, the Washakie Pack formed, denned, and produced five pups in the Six Mile drainage on the Shoshone National Forest. This was the first pack to den outside Yellowstone National Park in Wyoming. The Sunlight pair began using the Shoshone in the spring of 1998 in the Trail Creek and East Painter Creek area on the Clarks Fork Ranger District but did not produce pups until 1999. By 2000, there were four packs (Beartooth, Absaroka, Sunlight, and Washakie) using areas primarily on the Shoshone. Another pack (Greybull River) formed in 2001. All but the Greybull River pack were known to have pups in 2001. The Sunlight, Beartooth, Absaroka, Washakie, and Greybull packs had pups in 2002 and 2003. An additional pack of four wolves, the Dubois Pack, appears to be using

areas primarily on the Forest and did not produce pups in 2003. At the end of 2003 there were six known packs using areas mostly on the Shoshone for a total of 36 wolves. Several other packs include part of the Shoshone National Forest in their home ranges.

Each year more wolf packs have been established on the Shoshone, although the last few years the total numbers of wolves has stabilized, mostly because of management removals (Figure 6 and Table 5).

Figure 6–Gray wolf population in Wyoming and on the Shoshone National Forest, 1999 through 2007

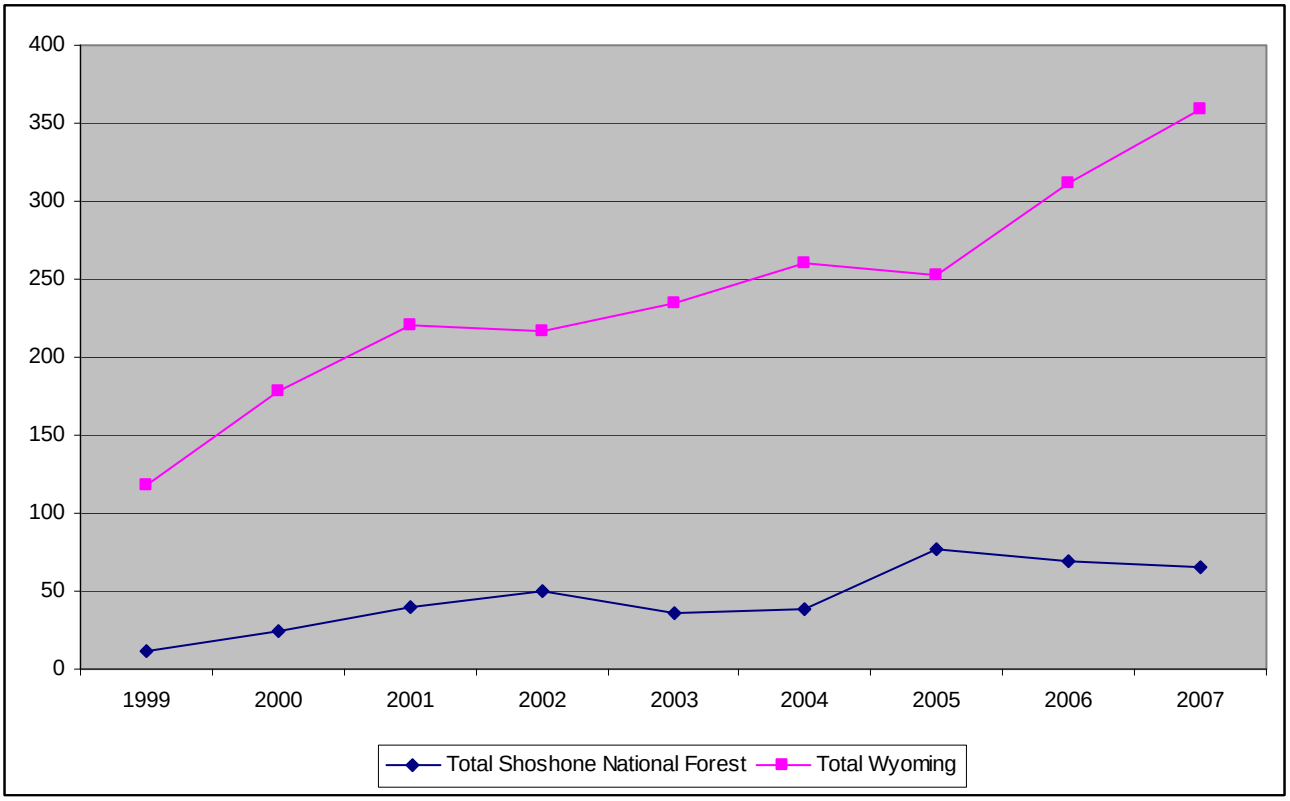


Table 5–Gray wolf population in Wyoming and on the Shoshone, 1999 through 2006[6]

	1999	2000	2001	2002	2003	2004	2005	2006	2007
Shoshone National Forest	**11**	**25**	**40**	**50**	**36**	**39**	**77**	**69**	**66**
Total Wyoming	**118**	**178**	**221**	**217**	**234**	**260**	**252**	**311**	**359**

Projections

For the last several years, many wolves have been removed each year by management control, which has stabilized numbers. That trend is expected to continue.

Beaver

Bank dwelling beaver are scattered through most major drainages on the Shoshone where suitable habitat occurs. In 1996, observations of lodges, dams, or colonies were made by Mark McKinistry and Carter Kruse in the following locations: Sweetwater drainage (Rock and Beaver Creeks), Little Popo Agie (Pass, Snow, and Cherry Creeks), Middle Fork Popo Agie (Sawmill, Townsend, and Roaring Fork Creeks), North Fork Popo Agie (Sanford Park), Wind River (Torrey, Jakey's Fork, Horse, Sixmile, Trout, South Fork Fish, and

[6] Data obtained at http://westerngraywolf.fws.gov/

Sheridan Creeks, and Upper Wind River), Clarks Fork (Sunlight, Gilbert, and Lake Creeks, and Libby Lake area), and Greybull River (West Timber Creek) (USDA Forest Service 1996).

In 2004, surveys on the southern part of the Forest revealed signs of beaver in Brooks Lake Creek, Warm Spring Creek, Coyote Creek, Sheridan Creek, Wind River, Horse Creek, Willow Creek, and Beaver Creek.

In the fall of 2007, almost 900 miles of streams were surveyed for beaver and 149 locations of beaver activity were observed, with the majority observed on the Washakie Ranger District. Beaver activity appears to be linked strongly with willow communities. Beavers have declined over time due to drought, lack of dominant deciduous vegetation in riparian areas, and perhaps trapping.

Projections

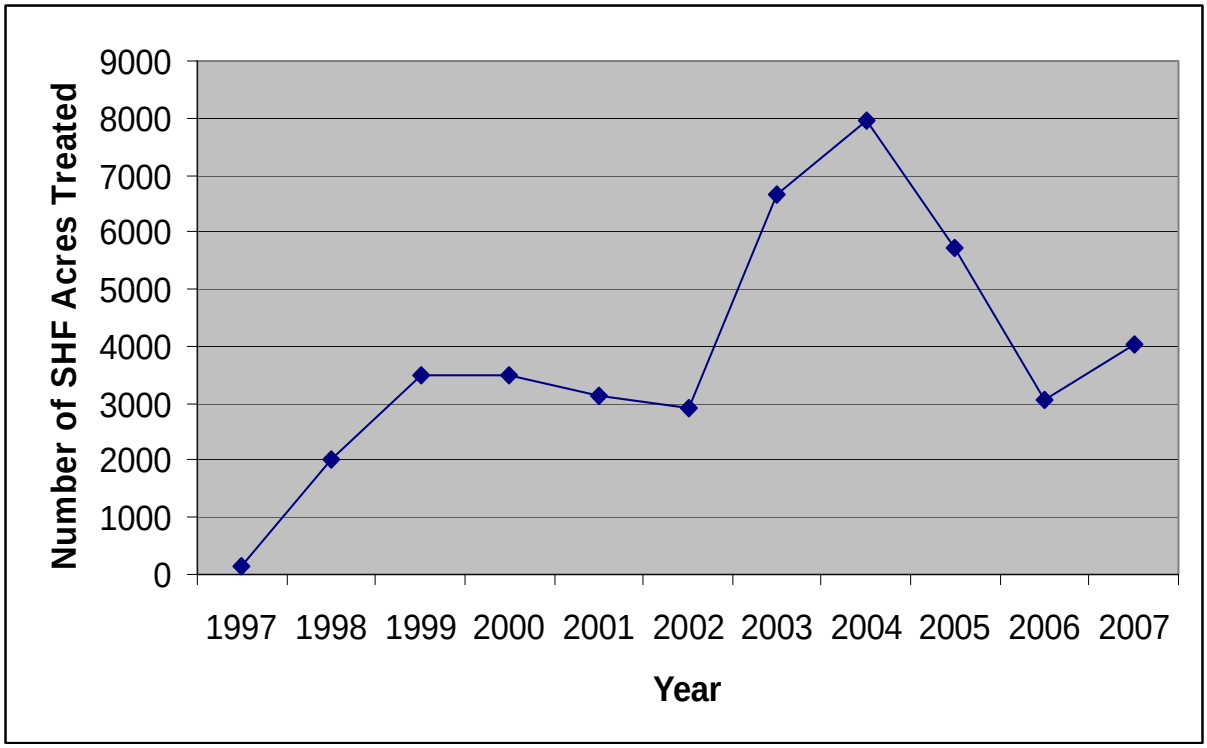
Beaver will most likely continue to decline on the Forest because of the uneven age class distribution of the current riparian vegetation. Drought and perhaps past overgrazing of riparian areas have left insufficient habitat for beaver in some areas of the Forest. Vegetation treatment projects are being implemented to improve riparian habitat, though this will take many years and the end of drought conditions to have enough suitable habitat for beaver to increase in population.

Fire and fuels management

Currently, the Shoshone is experiencing a beetle epidemic composed primarily of Douglas-fir and mountain pine beetles. Reconnaissance flights since 1999 have mapped approximately 400,000 acres of infestation. These beetles kill trees by girdling and introducing blue stain fungus. First, an increase in canopy fuels (dead needles) perpetuates crown fires, then as the needles drop the probability of crown fire decreases and ground fires increase as dead material accumulates.

Over the past 10 years, over 34,000 acres have been treated by prescribed fire or mechanical treatments that reduced the accumulation of fuels (Figure 7). The five-year plan for cumulative fuels management for the Shoshone is to average approximately 6,000 acres of treatment per year.

Figure 7–Acres of fuels treated, 1997 through 2008



Since 1970, the Forest has averaged 26 wildfires annually (Figure 8), averaging 49 percent from natural ignition, 32 percent from escaped campfires, and 19 percent from other causes. Excluding 1988, lightning-caused fires burned 87 percent of the acreage, campfires burned 5 percent, and other human causes burned 8 percent.

Over the last century, the Forest's fire management program has been focused on fire suppression, with efforts to keep fires as small as possible (Table 6). Due to persistent drought, the trend in acreage burned since 1998 has been increasing (Table 7), with the exception of 2004, which was cooler and wetter than previous years.

Table 6–Number of fires by size, 1970 through 2007

Size in acres	Number of fires
0 to 0.25	704
0.25 to 9.9	172
10 to 99.9	34
100 to 299.9	9
300 to 999.9	4
1,000 to 4999.9	11
> 5,000	8

Figure 8–Annual number of wildfires, 1970 through 2007

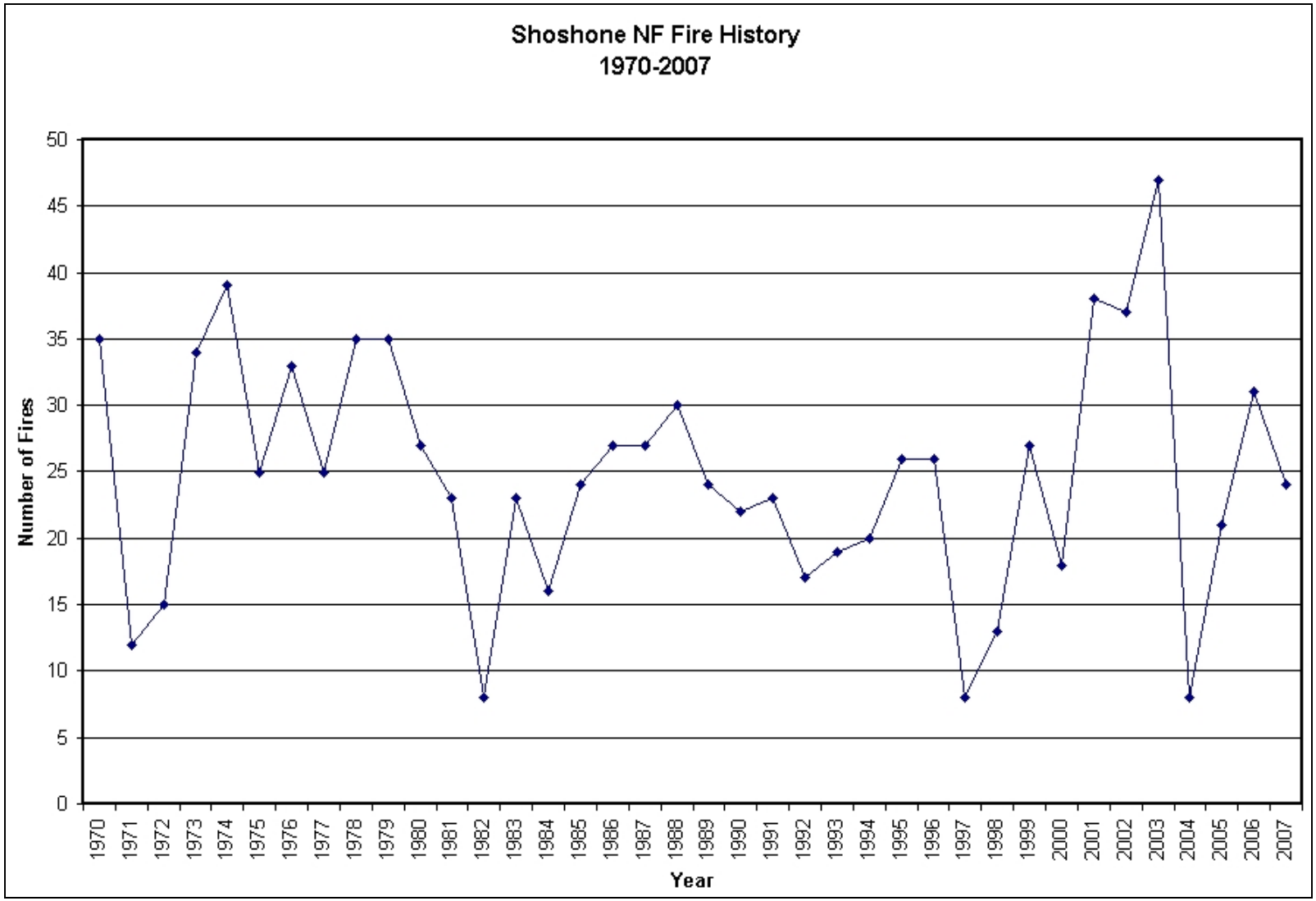


Table 7—Annual acreage burned, 1970 through 2007

Year	Acres[7]	Year	Acres
1970	1,358	1989	5
1971	55	1990	5
1972	2	1991	12
1973	90	1992	33
1974	189	1993	3
1975	467	1994	10
1976	1992	1995	104
1977	15	1996	1,935
1978	54	1997	1
1979	1,204	1998	3
1980	236	1999	190
1981	83	2000	1,725
1982	3	2001	5,416
1983	135	2002	13,451
1984	10	2003	16,079
1985	118	2004	2
1986	15	2005	15
1987	7	2006	40,489
1988	197,228	2007	5,700

Projections

The use of wildland fire for resource benefit is expected to become a major component in the future. Under the amended 1986 Forest Plan, fires across the Forest could be managed for resource benefit when and where conditions permit. As a result, the number of acres that receive a resource benefit from a wildland fire is expected to increase. Approximately 1.5 million acres of the Forest are in stand replacement burn severity. By increasing the opportunity for using fire as a natural process, a mosaic of burned and unburned areas would occur, producing a more natural patchwork of vegetation.

Fires across the Forest would be managed appropriate to the fire environment and location for any given year. The opportunity for fires to be managed for longer-term benefits would be expected to reduce the size and number of large unwanted wildfires in the future. In the last 10 years, about 90,000 acres of the Shoshone have burned; most of these acres were in designated wilderness. Under the amended 1986 Forest Plan, a similar amount of fire is anticipated on the Forest, but the distribution of those fires could change. More acres outside wilderness areas are likely to burn. It is also possible the amount of acres in a 10-year period could increase with this additional flexibility with fire use. It is expected that some fires previously categorized as unwanted would be managed for resource benefit.

Hazardous fuel reduction using prescribed fire and mechanical means would likely continue at the lower elevations near the wildland urban interface and other areas with high resource values that are accessible to crews and mechanized equipment. Some reduction would also occur in wilderness where wildland fire use is permitted. Large wildfires would result in some fuel reductions as well. Reductions in hazardous fuels from prescribed fire and mechanical treatments are expected to average about 6,000 acres per year. Reductions in hazardous fuels from unplanned ignitions are estimated at 90,000 acres or more for the next 10 years.

Forest products

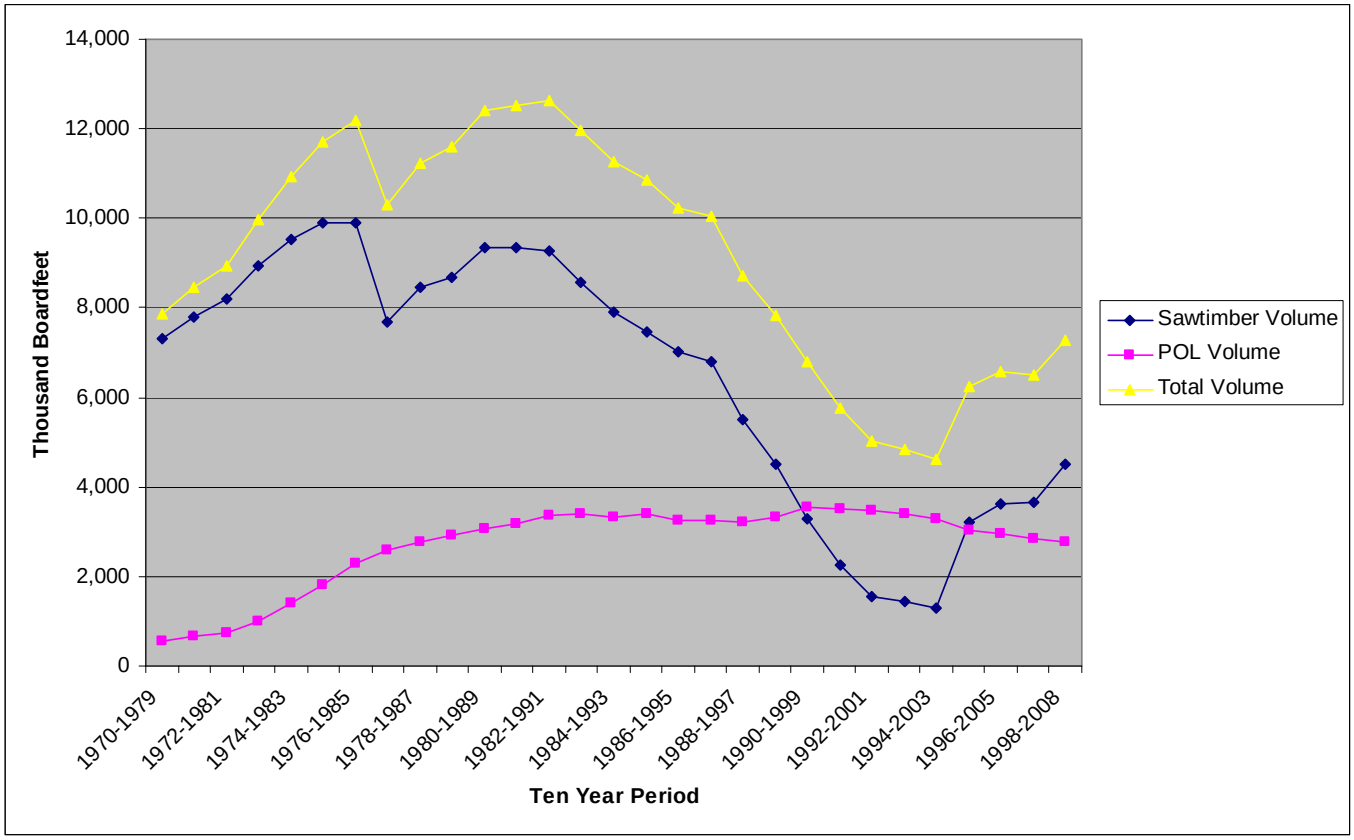
The 1986 Forest Plan set an average annual allowable sale quantity volume of 11.2 million board feet. The Forest Plan set this amount as the maximum allowable harvest of timber

[7] Acres were rounded to the nearest whole acre.

from the suitable timber land base of approximately 86,000 acres. The 1986 decision indicated all this volume would be saw timber. The 1986 decision predicted an additional 1.2 million board feet of products other than logs[8] would be sold annually. This additional volume would not count toward the allowable sale quantity.

In the early 1990s, monitoring indicated that timber data and assumptions used in the Forest Plan analysis had overestimated the amount of timber the Forest could produce. This, combined with the 1988 fires that burned over 9,000 acres of suitable timber land, resulted in the need to amend the Forest Plan. The Forest Plan was amended in August 1994 (USDA Forest Service 1994) with a recalculated allowable sale quantity. The amendment changed the annual average volume to 4.5 million board feet of saw timber and products other than logs. The 4.5 million board feet includes 3.5 of saw timber volume and 1.0 million board feet of standing dead trees that are cut for personal use firewood from suitable lands. Volume in addition to the allowable sale quantity is obtained from the unsuited base. One million board feet of personal use firewood and 1 million board feet of saw timber are cut for other vegetation management purposes. Other reasons include wildlife habitat improvement, enhancement of scenic views, hazard tree removal, or other ecosystem management reasons. The amendment directed that all salvage volumes offered for sale would count toward allowable sale quantity.

Figure 9—Average annual harvest for rolling ten-year periods



Data from Table 8 are displayed in Figure 9 using a rolling 10-year average to smooth out the year-to-year fluctuations that make it difficult to discern trends. Total average annual volume harvested fell steadily through the1990s, until the increase in 2004. The graph also shows that products other than logs volume has remained relatively stable during that period. The majority of the decline occurred in the form of reduced saw timber harvest.

[8] Products other than logs includes posts, poles, firewood, etc.

The volume of products other than logs sold since 1986 has averaged slightly over 3.0 million board feet per year. Saw timber volume sold has fluctuated greatly since 1986. Saw timber volume has averaged 5.5 million board feet since 1986. Since 1997, saw timber volume has averaged 4.3 million board feet. During the late 1990s and early 2000s, saw timber volume was as low as one hundred thousand board feet.

The large fluctuations in total saw timber volume were driven by salvage sales in response to large disturbance events such as the 1988 wildfires and the recent insect epidemic.

Projections

Due to the insect epidemic, it is anticipated that harvest levels will be temporarily higher than average until the epidemic subsides, fuel levels are reduced, and the volume of damaged timber is salvaged. The increased harvest levels should continue until areas of wildland urban interface can be protected. It is anticipated the demand for products other than logs will continue at or above the current levels of 2.5 million board feet. Once the salvage effort is completed, it is anticipated the Forest will return to a harvest level near 4.5 million board feet of saw timber and 2.5 million board feet of products other than logs.

Table 8—Volume sold and harvested, by product, in thousand board feet[9]

Fiscal year	Sawtimber sold	Products other than logs sold	Total		Sawtimber harvested	Products other than logs harvested	Total
1970	5,777	427	6,203		11,519	501	12,020
1971	3,735	348	4,083		11,569	388	11,957
1972[10]	--	--	1,177		--	--	3,678
1973	--	--	3,777		--	--	7,798
1974	--	--	3,335		--	--	6,121
1975	--	--	5,200		--	--	2,852
1976[11]	26,731	796	27,527		3,996	341	4,337
1977	7,723	1,370	9,093		5,557	998	6,555
1978	9,999	969	10,968		5,108	1,107	6,216
1979	6,784	635	7,419		17,187	351	17,538
1980	10,479	1,404	11,883		7,682	842	8,525
1981	7,911	1,213	9,123		10,653	1,574	12,227
1982	8,466	2,884	11,350		3,625	2,415	6,040
1983	9,107	4,174	13,281		5,366	1,749	7,115
1984	6,978	4,421	11,398		6,490	4,052	10,542
1985	4,720	5,103	9,823		11,575	4,345	15,920
1986	4,743	3,806	8,549		8,799	4,360	13,159
1987	15,410	3,262	18,672		14,639	4,824	19,463
1988	12,054	2,270	14,324		12,351	3,509	15,860
1989	13,620	2,106	15,726		5,982	2,109	8,091
1990	10,516	2,437	12,953		14,709	2,360	17,069
1991	7,104	3,292	10,395		10,055	2,489	12,544
1992	1,327	3,170	4,497		6,926	3,300	10,226
1993	2,730	3,441	6,172		4,222	2,975	7,197
1994	2,254	5,176	7,430		3,965	3,790	7,755
1995	284	3,420	3,705		1,141	3,796	4,936
1996	2,850	3,784	6,634		2,234	3,627	5,861
1997	2,241	2,970	5,211		1,732	3,975	5,707
1998	2,315	3,359	5,674		385	5,230	5,615
1999	1,158	4,250	5,408		1,289	4,092	5,380
2000	400	2,202	2,602		2,020	1,611	3,631
2001	112	2,923	3,035		1,068	2,895	3,962
2002	4	2,466	2,471		630	2,619	3,250
2003	1,410	2,458	3,868		1,044	2,591	3,635
2004	21,373	2,538	23,911		5,762	2,465	8,226
2005	4,369	2,596	6,965		11,939	2,731	14,670
2006	3,352	2,589	5,941		7,947	2,914	10,861
2007	10,713	2,145	12,857		3,724	2,271	5,995

Access and travel management

The overall miles of forest roads have declined since 1987. A peak in the mid-1990s of total road miles was likely due to active inventorying of two-track roads existing at the time and a lack of guidance on how to categorize this new set of routes, e.g., forest road versus

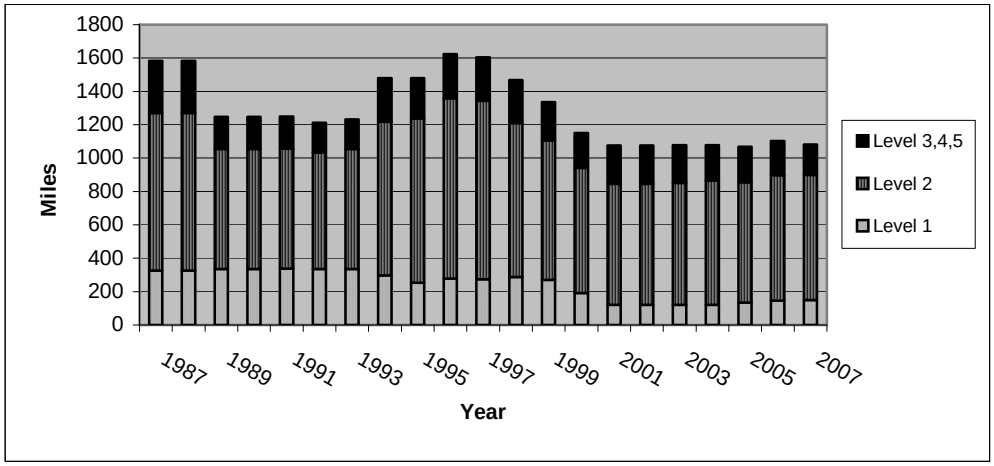
[9] Data from Eilers 2006. Numbers in this table were rounded up to the next whole number.
[10] Cut and sold data by product are not available for fiscal years 1972 through 1975 (totals only).
[11] Fiscal year 1976 data include the transition quarter.

unauthorized road.[12] The forest is currently conducting a new inventory of the road system using Global Positioning System technology to provide a more accurate accounting of road mileages and locations. This new inventory will provide the base road system for the revised forest plan. Preliminary results indicate the new mapping will display a higher number of miles than is shown in Figure 10, though we do not believe the increase is the result of more miles of roads on the ground, but rather a better accounting of what is there.

Miles of road construction and reconstruction are shown in Figure 11. Miles of road construction have decreased since 1986. For the first 10 years after plan initiation an average of 4.2 miles of new road were constructed each year. Since 1996, the average has decreased to less than 0.5 mile per year. This decrease parallels the reductions that occurred in timber harvest. Vegetation treatments are the primary reason for road construction and reconstruction. The increased miles of reconstruction since 2000 are directly related to the increased salvage harvests conducted in response to the ongoing insect epidemic. A corresponding increase has not occurred in road construction because the harvests have occurred primarily within roaded portions of the Shoshone.

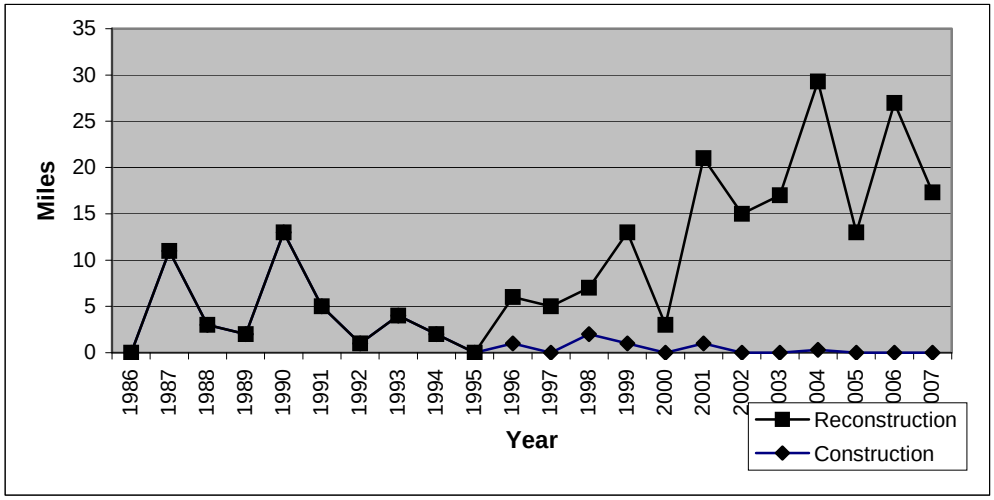
In November 2005, the Forest Service published a new travel management regulation governing the use of motor vehicles on National Forest System lands. This regulation directs the agency to provide sustainable access for motor vehicle use on national forests. The regulations require each forest to designate, on a motor vehicle use map, roads, trails, and areas that are open to motorized use. The Shoshone will implement this regulation by the end of 2009.

Figure 10—Total miles of road, by maintenance level, 1987 through 2007



[12] A forest road is a road wholly or partially within or adjacent to and serving the National Forest System that the Forest Service determines is necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.

Figure 11—Annual miles of road constructed/reconstructed, 1996 through 2007



Projections

The trend for new construction is expected to remain at or slightly above current levels, as long as there is emphasis on higher levels of vegetation treatment, which may result in greater access needs, especially in areas where current access is limited. The trend for reconstruction should remain similar to the current situation. Efforts will continue to properly classify all routes on the Forest. It expected that forest road miles will remain substantially the same in the future.

Economics

The following economic information is from “An Economic Profile of the Shoshone National Forest” (Taylor et al. 2008).

Table 9 provides a summary of the economy of the three-county region and the impact of the Shoshone on the region’s economy. This summary includes information on 1) regional totals for employment and earnings, 2) the economic importance of forest related industries, and 3) estimates of the Shoshone’s impact on the area’s economy. All information is from 2004 to be consistent with the IMPLAN model used in the analysis.

Resource-specific economic information is included. Based on the information for other resources, the forest planning team concluded that livestock and special uses economic contributions have been relatively stable over time, timber economic contributions have declined, and recreation economic contributions have increased.

Regional totals

In terms of regional totals, Table 9 indicates there were 44,173 jobs in the three-county area in 2004. Fifty percent of this employment was in Fremont County with 43 percent in Park County and 7 percent in Hot Springs County. Total labor earnings for the three-county area were $1.2 billion in 2004. Forty-nine percent of this income was in Fremont County, 45 percent in Park County, and 6 percent in Hot Springs County. The average earnings per job for the area were $27,680. County averages ranged from $24,650 in Hot Springs County to $28,825 in Park County, with Fremont County at $27,096.

Forest related industries

One way of considering the impact of the Shoshone on the economy of the three-county area is through forest related industries, which are industries that are at least partially dependent on national forest resources. In other words, a portion of the economic activity associated with these industries is dependent on the use of natural resources within the

Shoshone National Forest. For this analysis, forest related industries were defined as agriculture, logging and wood products manufacturing, travel, and non-labor income above the average of the state and national percentages. In this section, the percentage of non-labor income above the average of the state and national percentage was used as a proxy for amenity residents. Amenity residents are those residents who live in the area specifically because of the area's amenities. Some unknown portion of the attractiveness of the area is associated with the Shoshone.

Total direct regional employment for the forest related industries was 8,914 jobs in 2004 (Table 9). This represented 20 percent of the total employment in the three-county area. Travel was the largest in terms of employment (59 percent), followed by agriculture (24 percent), non-labor income (14 percent), and logging/wood products manufacturing (2 percent). Among individual counties, the percent of total employment from forest related industries ranged from 15 percent in Fremont County to 26 percent in Park County, with Hot Springs County at 20 percent. In all three counties, the largest forest related industries in terms of employment were travel and agriculture.

Total direct regional labor earnings for forest related industries were $148.8 million in 2004 (Table 10). This represented 12 percent of total labor earnings in the three-county area. Travel was the largest forest related industry in terms of labor earnings (62 percent), followed by non-labor income (18 percent), agriculture (16 percent), and logging/wood products manufacturing (3 percent). Among individual counties, the percent of total employment from forest related industries ranged from 9 percent in Fremont County to 15 percent in Park County, with Hot Springs County at 12 percent.

Average earnings per job for forest related industries employment were below the regional average. In 2004, average earnings per job for forest related industries were $16,695, which was 40 percent below the area's average ($27,680). Much of this difference was due to the low labor earnings in agriculture in 2004, although average earnings per job for the other three industries were also below the regional average in 2004. Among individual counties, average earnings per job for forest related industries were also approximately 40 percent below the county average.

Shoshone National Forest economic impact

For some forest related industries, it was possible to estimate the specific impact of the Shoshone on the three-county economy. For those industries, it is estimated that economic activity on the Shoshone generated 936 jobs in the three-county economy (Table 9). This estimate is based on the IMPLAN model for the region and includes both direct and secondary jobs. The total jobs from the Forest represent 2 percent of the total jobs and 11 percent of the total forest related industry jobs in the region. Approximately 70 percent of the forest related jobs were associated with recreation with 20 percent in livestock grazing and 9 percent in timber. It was not possible to estimate the proportion of non-labor income that was strictly related to the Shoshone.

Forest related employment was estimated to generate a total of $18.9 million in labor earnings in the region. These labor earnings represented 2 percent of total labor earnings and 13 percent of total forest related industries labor earnings in the region. Average earnings per job for forest related employment was $20,179, which was 27 percent below the regional average.

While the economic impacts of the Shoshone are not a large percentage of total employment and labor earnings in the region, they are important. This is particularly true for the forest related industries where forest related employment and labor earnings were a significant part of the total employment and earnings. At the national level, the specific economic impact of the Shoshone that can be quantified on the three-county area would be equivalent to 3.7 million jobs and $121.1 billion in labor earnings in 2004.

Table 9—Economic impact summary for the Shoshone National Forest, 2004 (U.S. Department of Commerce)

Regional totals (U.S. Department of Commerce)			
County	Employment (jobs)	Labor earnings (thousands of dollars)	Average earnings per job (dollars)
Fremont	22,027	596,852	27,096
Hot Springs	2,995	73,828	24,650
Park	19,151	552,036	28,825
Totals	44,173	1,222,716	27,680

Table 10—Forest related industries (U.S. Department of Commerce, IMPLAN, and Dean Runyan Associates)

Industry	Fremont County (jobs)	Hot Springs County (jobs)	Park County (jobs)	Area (jobs)
Agriculture	1,159	196	798	2,153
Logging and wood products manufacturing	73	0	122	195
Travel	1,470	330	3,500	5,300
Non-labor income above the average state and national percentages	625	74	567	1,266
Totals	3,327	600	4,987	8,914
Industry	**Fremont County (earnings) (thousands of dollars)**	**Hot Springs County (earnings) (thousands of dollars)**	**Park County (earnings) (thousands of dollars)**	**Area (earnings) (thousands of dollars)**
Agriculture	11,439	2,237	10,588	24,264
Logging & wood products manufacturing	1,844	0	3,136	4,980
Travel	29,400	5,200	57,600	92,200
Non-labor income above the average state and national percentages	13,816	1,390	12,163	27,369
Totals	56,499	8,827	83,487	148,813
Average earnings per job	16,984	14,712	16,741	16,695

Table 11—Shoshone National Forest economic impact (2004 three-county IMPLAN model)

	Area employment (jobs)	Area Earnings (thousands of dollars)	Average earnings per job (dollars)
Livestock grazing	157.5	5,260	33,396
Timber	90.2	2,097	23,253
Non-labor forest visitors	263.7	4,799	18,198
Commercial recreation	424.3	6,725	15,850
Non-labor income	N.A.	N.A.	N.A.
Totals	935.7	18,882	20,179

Recreation economics

The following economic information is from "An Economic Profile of the Shoshone National Forest" (Taylor et al, 2008).

Dean Runyan Associates estimate total visitor spending in the three-county area during 2006 was $355.1 million. These expenditures represented overnight trips and day trips to the area that were not of a local or commuting nature and presumably included trips to the Shoshone National Forest. Of the total spending, $217.2 million were in Park County (61 percent), $111.1 million in Fremont County (31 percent), and $26.8 million in Hot Springs County (8 percent). After adjusting for inflation, total visitor spending in the three-county region increased from $243.3 million in 1997 to $304.6 million in 2006 (plus 25 percent). This represents an annual compound growth of 2.5 percent per year. Growth for the individual counties was 4.5 percent annually for Hot Springs County, 3.9 percent for Fremont County, and 1.7 percent for Park County.

Changes in monthly private employment in the leisure and hospitality sector suggest the travel industry in the three-county area is seasonal in nature. In 2006, area employment in the sector peaked in July at 5,517 jobs, which was 60 percent higher than the lowest monthly level of 3,308 in January. The differences for each of the counties varied with the higher months being 100 percent, 40 percent, and 30 percent higher than the lowest month for Park, Hot Springs, and Fremont Counties respectively.

Visitor estimates to the Shoshone National Forest are based on National Visitor Use Monitoring conducted on the Shoshone in 2003.[13] In terms of participation rates, the top 10 recreation activities were viewing natural features, viewing wildlife, relaxing, hiking/walking, driving for pleasure, picnicking, fishing, nature study, visiting historical sites, and hunting. In terms of facilities and areas on the Forest, the most frequently used were forest roads, forest trails, scenic byways, picnic areas, developed campgrounds, snowmobile areas/trails, and wilderness. Total visits on the Forest were estimated to be more than 528,000. Nearly half these visits were from non-local residents. Total spending from all visitors to the Forest was estimated to be $20.1 million. Of this total, $13.8 million were from non-local residents. Spending by non-local visitors represents new money to the three-county area's economy. The $13.8 million in non-local visitor expenditures supported more than 260 jobs and $4.8 million in labor earnings within the economy of the three-county area.

Timber economics

The following economic information is from "An Economic Profile of the Shoshone National Forest" (Taylor et al. 2008). Additional information on the timber industry in Wyoming is found in "The Dynamic Wyoming Timber Economy" (Rideout 2003).

[13] This information will be updated with a new survey in 2009.

The lumber and wood products industry in the three-county area has declined. After peaking in 1978, labor earnings from lumber and wood products declined steadily from $14.3 million to $2 million dollars in 2000. With the recent closure of the sawmill in Cody, labor earnings from lumber and wood products in the region may have declined further. Most of the decline in labor earnings for the lumber and wood products sector in the three-county region occurred in Fremont County when a major sawmill closed in Dubois. In Fremont County, labor earnings from the lumber and wood products sector peaked at $13.4 million in 1978 and had declined to less than $1 million in 2000.

The 1986 Forest Plan as amended established an allowable sale quantity of 4.5 million board feet of timber. The volumes have fluctuated greatly since 1986 and have recently been increasing; the average for that period is near the 1986 Forest Plan allowable sale quantity amount. For purposes of an average economic projection, calculations were based on a saw timber harvest of 4.5 million board feet and a products other than logs harvest of 2.5 million board feet. This is slightly above the amounts in the allowable sale quantity amendment, but are in line with recent harvest levels.

Because there is no major timber processor in the three-county region, the majority of saw timber harvest on the Forest is exported outside the area for processing. As a result, the major economic impact to the region's economy from the harvest of saw timber on the Forest is logging. For the three-county region, the economic impact of the combined timber harvest is estimated at 90 jobs and $2 million in labor earnings. Ninety jobs includes direct logging jobs and additional jobs that are generated as a result of the direct jobs.

Livestock economics

The following economic information is from "An Economic Profile of the Shoshone National Forest" (Taylor et al. 2008).

The gross income for agriculture in the three-county area totaled $168.9 million in 2005. Of this total, $97.2 million (58 percent) were from livestock marketing, $44.5 million (26 percent) from crop marketing, and $27.2 million (16 percent) from other sources. In the three-county area, Park, Fremont, and Hot Springs Counties had 49 percent, 44 percent, and 7 percent of the agriculture gross income respectively. Livestock stock marketing was the largest source of gross income for agriculture in all three counties: 81 percent in Hot Springs, 68 percent in Fremont, and 44 percent in Park. Between 1970 and 2005, the gross income from agriculture for the three-county area averaged $180.8 million, ranging from a high of $287.3 million in 1979 to a low of $137.6 million in 1996. The 2005 gross income from agriculture in the region ($151.3 million) was only slightly less than the gross income in 1970 ($164.6 million) after accounting for inflation.

In 2005, there were 2,147 agricultural jobs in the three-county region. Fifty-four percent of these jobs were in Fremont County, 37 percent in Park County, and 9 percent in Hot Springs County. Despite the fluctuations in gross income, agricultural employment in the region remained fairly stable between 1970 and 2005. There were, however, some substantial changes in agricultural employment by county. In Fremont County, agricultural employment increased by 23 percent between 1970 and 2000, while agricultural employment declined in Park County by 19 percent.

In 2005, the beef cow inventory in the region was slightly more than 100,000 head. Sixty percent was in Fremont County, with 17 percent and 23 percent in Hot Springs and Park Counties, respectively. From 1970 through 2007, the beef cow herd in the three-county area averaged slightly more than 95,800 head, varying from 76,300 head in 1985 to 116,900 head in 2000. In the three-county region, numbers are similar between 1970 and 2007, but there have been changes within individual counties. Between 1970 and 2007, inventory was up by 24 percent in Fremont County and down by 14 percent and 27 percent in Hot Springs and Park Counties, respectively.

In 2007, 62,569 animal unit months of commercial livestock grazing were permitted on the Shoshone. The following projections are based on that amount. Although most ranches are typically only partially dependent on federal land for forage, this forage source is a critical part of their livestock operations. The effects of the reduction from federal grazing have a greater impact on potential reductions in income and net ranch returns than just the direct dollars associated with loss of forage. These impacts can affect the open space adjacent to the Forest if ranching becomes unprofitable. The total economic impact estimates for Shoshone livestock grazing range from 52 to 158 jobs and $1.7 to $5.3 million in labor earnings. Which of these values is the most relevant depends on a number of factors, including the individual ranch's level of dependency on Forest Service grazing, the magnitude of the proposed change in grazing, the financial solvency of the ranch, the availability of alternative sources of forage, and the desire of the rancher to remain in ranching. For small changes in permitted grazing, the lower numbers may be the most appropriate. For larger changes where the economic viability of the ranching operation is uncertain, the larger number may be the most appropriate.

Special uses economics

The following economic information is from "An Economic Profile of the Shoshone National Forest" (Taylor et al. 2008).

A number of commercial recreation businesses operate on the Forest. In 2006, there were 460 special use permits, including 230 for recreation-related activities: 101 outfitter guides, 18 resort permits, three organization camps, two ski areas, and 100 recreational residences. Though many of these authorizations provide some economic benefit to the three-county region, we are focusing on the outfitter guide and resort authorizations that provide the majority of the economic benefit. Of the 98 outfitter guide authorizations active in 2006, gross revenue was $7.8 million; gross revenue from the 18 resorts was $6.7 million. These amounts are conservative estimates of the spending by visitors using these recreation services, since the figures include only expenditures to the permittee and do not consider other expenditures while visitors are in the area. The estimated economic impact of this visitor spending supports more than 424 jobs and $6.7 million in labor earnings.

Social

Demographics

The following demographic information is from "An Economic Profile of the Shoshone National Forest" (Taylor et al. 2008).

The population in the three-county region has generally been increasing. The region's population increased by 8 percent from 1990 to 2000. Park County was the fastest growing at 11 percent, while Fremont and Hot Springs Counties grew at 6 and 2 percent, respectively. The region's population increased 2 percent from 2000 to 2005 and is expected to increase another 6 percent by 2020. Future growth is projected to be fastest in Fremont County at 9 percent, followed by Park County at 6 percent. Hot Springs County is projected to lose 8 percent of its population by 2020.

Historically, with the exception of Fremont County, the region has had an older population than either Wyoming or the nation and this trend is increasing. The percentage of the region's population aged 65 and over increased from 13 percent in 1990 to 15 percent in 2005. This compares to 12 percent for Wyoming and the nation. Hot Springs County has the oldest population with 21 percent of the population aged 65 and over. Fremont County has the youngest population with 14 percent aged 65 and over. In Park County, 15 percent of the population is aged 65 and over. By 2020, it is projected that over 20 percent of the region's population will be aged 65 and over. This population shift will manifest itself in

many ways, from preferred outdoor recreation activities on public lands to services provided by local government to the business mix on Main Street.

Except for American Indians, the region is not very ethnically diverse with 84 percent of the population being classified as white in 2000. Due to the presence of the Wind River Indian Reservation, 19 percent of the population in Fremont County was classified as American Indian in 2000.

Lifestyles

In this region, some segments of the community have strong traditional cultures, based on ranching or agriculture. Most residents are connected to their local communities and enjoy the rural lifestyle. For these counties, Casper, Wyoming and Billings, Montana are the closest, largest metropolitan areas with extensive shopping opportunities and additional professional services that may not be available locally.

As with so many rural places throughout the country, the declining population of younger people is a concern. It is difficult for many young people to grow up in a rural community and then find a meaningful career path in the local area. Counties in the analysis area are working with economic development plans to bring more industry and opportunities to their areas, to encourage people to stay, and to encourage others to move in and join their communities. Tourism is often considered, but it is difficult to develop high wage, full time positions in the tourism sector.

Preferences and values

While revising a forest plan, it is desirable to ask the public how they would like to see the national forest managed and for their opinions on natural resource issues. Such information is commonly generated through scoping and public meetings, but those sources are rarely representative of populations as a whole. In 2007, the State of Wyoming, acting as a cooperating agency, commissioned a preferences and values study on the Shoshone National Forest. The researchers conducted a random household survey through the mail to households in Fremont, Hot Springs, Teton, and Park Counties. The complete survey results are compiled in “Report: Study of Preferences and Values on the Shoshone National Forest” (Clement and Cheng 2008). In this section, we present a synopsis of some of the findings.

Over 90 percent of the respondents had visited the Forest in the last 12 months. Two-thirds of the respondents had lived in Wyoming for over 25 years. The survey respondents were 79 percent male, 82 percent were over 45 years old, and 43 percent were retired. Seventy-four percent of the respondents said they were very interested in what happens to the Shoshone National Forest in the next 10 to15 years.

A number of survey questions focused on recreation. Table 12 displays the recreation activities that survey respondents participate in on the Shoshone. The activities that at least 45 percent of the respondents participate in include driving for pleasure, nature enjoyment, wildlife viewing, sport fishing, picnicking, hiking/backpacking, and sport hunting. Sixty-three percent of the respondents indicated they participate in some form of motorized recreation. Table 13 provides a breakdown of the different forms of motorized use. When asked about the level of existing open roads on the Forest, 19 percent said more motorized road access is needed, 30 percent said new roads should be built only when necessary to meet other objectives, 39 percent said the level of existing roads is appropriate, 8 percent said the level of open roads should be reduced, and 5 percent did not know.

A number of questions focused on management of the Forest. One question asked whether timber harvest activity for fire mitigation, forest health, forest products, and other purposes should change or stay the same. Forty-six percent of respondents said there should be more activity, 38 percent said there should be the same level, 7 percent said there should be less activity, 2 percent said there should be no harvesting, and 9 percent

did not know. Of the different management purposes for logging, approximately 90 percent of respondents supported activity related to fire prevention to protect life and property, salvage of dead or dying trees, and creation or improvement of wildlife habitat. Sixty-two percent supported logging for forest products. Only 5 percent did not support logging for any reason.

Respondents were asked whether any of the Shoshone's roadless areas should be recommended to Congress for wilderness designation. Forty percent responded that none of the roadless should be recommended, 25 percent responded that some should be recommended, 21 percent responded that all should be recommended, and 15 percent did not know.

Respondents were asked about the level of commercial outfitter and guide operations on the forest. Seventy-two percent said to maintain the current level of use, 13 percent said use should be reduced, 8 percent said it should be increased, and 6 percent did not know.

Two other resource uses of the Forest are minerals and livestock grazing. Less than 25 percent of respondents support commercial mining and oil/gas drilling on the Forest. Through an oversight, livestock grazing was not included in the survey.

The survey results reflect a diversity of preferences and values similar to what was received at public meetings and other public input. None of the results of the survey appears to be significantly different from what we heard during other public involvement activities. Based on public involvement, the planning team estimated what the public response would have been to questions on grazing. The planning team believes grazing would be supported by more people than supported timber harvesting for forest products (62 percent), while some people would state they do not want any livestock grazing on the Forest. Though there are no sampling numbers, these statements are based on what was said at public meetings about livestock grazing and the other uses that were included in the survey.

Table 12 recreational activities in which respondents participate on the Shoshone National Forest

Activity	Percentage	Activity	Percentage
Driving for pleasure	79	Sport hunting	47
Horse riding/packing	27	RV camping	29
Four wheeling/jeeping	24	Nature enjoyment	69
Ice climbing	1	Sport fishing	60
Wildlife viewing	67	Picnicking	54
ATVing	23	Single track motorcycle	6
Hiking/backpacking	49	Snowmobiling	17
Tent camping	36	Mountaineering	7
Rock climbing	5	Rafting/kayaking	5
Mountain biking	9	Other	12

Table 13. Forms of motorized recreation respondents participate in

Activity	Percentage	Activity	Percentage
Driving for pleasure (passenger car)	82	Four wheeling/jeeping	40
ATVing	37	Snowmobiling	28
Motorcycling	11	Other (boat, jet ski, motor home)	4

Assessments, evaluations, and reports

A number of assessments completed in the past year provide additional information on forest resources. These assessments, evaluations, and reports are available on the Internet or at the Shoshone National Forest Supervisor's Office in Cody, Wyoming.

- Assessment of Recent Bark Beetle Outbreaks on the Shoshone National Forest—documents bark beetle activity on the Shoshone National Forest over the past 10 years and provides some expectation of what could occur into the future
- An Economic Profile of the Shoshone National Forest—examines the present economic conditions and forecasts for the counties that both influence and are influenced by the Shoshone National Forest
- Report: Study of Preferences and Values on the Shoshone National Forest—documents the results of a 2007 survey of public values and preferences in counties bordering the Shoshone
- Watershed Condition Assessment—an evaluation of current watershed conditions on the Shoshone

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