Shoshone National Forest

Forest Plan Monitoring Report

for fiscal year 2006

Prepared by the
Shoshone National Forest
Planning Staff
September 2007

Table of contents

Introduction

This report is the Shoshone National Forest's Forest Plan Monitoring and Evaluation Report for fiscal year 2006. The Forest started its 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 discussions for various resource areas. Each resource discussion includes a summary of trend data components that relate to Forest Plan direction and monitoring, including the latest information for fiscal year 2006. The trend discussions provide context for what has happened to the resource during Forest Plan implementation.

The assessment of what changes, if any, 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.

Watersheds

Activity and condition trends

The science of wildland watershed management has evolved considerably since the Forest Plan was developed. The evolution of the science and the results of Plan monitoring are reflected in annual monitoring reports and certain amendments to the Plan, specifically the oil and gas leasing (USDA Forest Service 1996) and allowable sale quantity (USDA Forest Service 1994) amendments.

The oil and gas leasing and allowable sale quantity efforts incorporated a first generation watershed cumulative effects analysis screening process using best available information at that time. Model assumptions and weaknesses were identified as part of the process. Modeling results were presented in tabular form because spatial presentation opportunities were limited.

The modeling identified three categories: validated, unvalidated, and potential watersheds of concern. Watersheds of concern are those where impacts have reached a level of disturbance at which watershed condition and stream health are degraded beyond their abilities to recover in the short term. Validated watersheds of concern are those where field data and observation have verified this determination. Unvalidated watersheds of concern appear to have reached this level of concern but this has not been verified by field data and observation. Potential watersheds of concern appear to be approaching this level of concern but the impacts and conditions are not yet verified. This latter group is being monitored.

On the Clarks Fork Ranger District, there were ten validated, two unvalidated, and two potential watersheds of concern. On the Wapiti Ranger District, there were three validated, one unvalidated, and two potential watersheds of concern. On these two districts, the large Yellowstone fires of 1988 were a major impact leading to identification of these watersheds as areas of concern. On the Wind River Ranger District, two potential watersheds of concern were identified, mainly due to logging in the 1960s through early 1980s. This identification led to monitoring and inventory of watershed condition across the Forest and to implementation of watershed improvement projects in targeted areas. Best Management Practice reviews are providing valuable information on whether implementation is occurring and, if so, its effectiveness. If implementation is not occurring, or is found to be ineffective, the review identifies the reasons. Overall, implementation is occurring and is effective in protecting soil and water resources. Concerns with proper riparian area management and proper road drainage have been identified, resulting in changes in allotment management and road design.

Through these inventory, monitoring, and improvement project efforts, there is a better understanding of overall watershed health across the Forest.

Figure 1. Best Management Practice reviews.

Year	Activity
1999	Bear Creek allotment
1999	Burroughs Creek Salvage Sale
2001	Lodgepole II Timber Sale
2001	Dick Creek allotment
2002	Rock Creek allotment
2002	Wood River/Kirwin allotments
2002	East Fork allotment
2002	Enos Creek allotment
2003	West Goose Timber Sale
2003	Union Pass allotment
2003	Wolf Creek I & II Sales/Unit 40 Fire
2004	Atlantic Creek Salvage
2004	Rattlesnake II Timber Sale
2004	Maxon Basin allotment
2004	Belknap allotment
2005	Fish Lake Creek allotment
2005	Spring Mountain Timber Sale
2005	Carter and Marquette Timber Sales
2006	Rainbow Lake Timber Sale
2006	Wiggins Fork allotment
2007	Middle North Fork Timber Sale
2007	Pearson allotment
2007	Warm Springs allotment
2007	Bachelor Creek Timber Sale

Air quality

Activity and condition trends

Program management has evolved over time and includes budget planning and execution, intra- and interagency coordination, membership with the Greater Yellowstone Area Clean Air Partnership and, when necessary, reviews of Prevention of Significant Deterioration permits. Program management is supported by an air quality specialist located on the Pinedale Ranger District of the Bridger-Teton National Forest. This individual assists with annual updates to agreements, database management (Natural Resource Information System), technical review of Prevention of Significant Deterioration permits, and project level environmental (National Environmental Policy Act) analyses.

Monitoring activities include weekly monitoring of the South Pass National Atmospheric Deposition Program site and thrice-yearly monitoring of air quality related values at Ross and Saddlebag Lakes.

Other monitoring is accomplished through supporting the Dead Indian Pass Interagency Monitoring of Protected Visual Environment site, which is maintained by the Wyoming Department of Environmental Quality Air Quality Division, and bulk deposition monitoring conducted on the Bridger-Teton National Forest.

On the Shoshone, the Fitzpatrick, Washakie, and North Absaroka Wilderness areas are Class I airsheds where no deterioration of air quality is allowed. All other areas on the Forest 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 1985. [1]

[1] Data are available at http://nadp.sws.uiuc.edu.

Data have been collected at Ross Lake in the Class I Fitzpatrick Wilderness and at Saddlebag Lake in the Class II Popo Agie Wilderness since 1982. This monitoring is being conducted to assess the effects of acid deposition on air quality related values such as water quality.

Data have been collected at the Dead Indian Pass Interagency Monitoring of Protected Visual Environment site since 2000 to monitor air quality and visibility in the North Absaroka Wilderness. [2]

Since 1986, bulk deposition data have been collected at Hobbs and Black Joe Lakes on the Bridger-Teton National Forest. These data, which are used as a surrogate for conditions on the Shoshone National Forest, are displayed in annual summary reports submitted to the Wyoming Department of Environmental Quality.

The greatest potential for effects to air quality on the Shoshone is from upwind sources such as industrial/energy development and urban emissions, and from smoke (wildfires and fire use fires). Air quality issues and concerns on the Shoshone are expected to increase as oil and gas developments in southwest Wyoming progress and the population increases in other states (Utah, Arizona, and California).

The Forest, through technical support from the Bridger-Teton National Forest, continues to be involved in environmental review of projects being analyzed by the Bureau of Land Management in southwest Wyoming. This off-Forest support also provides monitoring of active industrial development in the area.

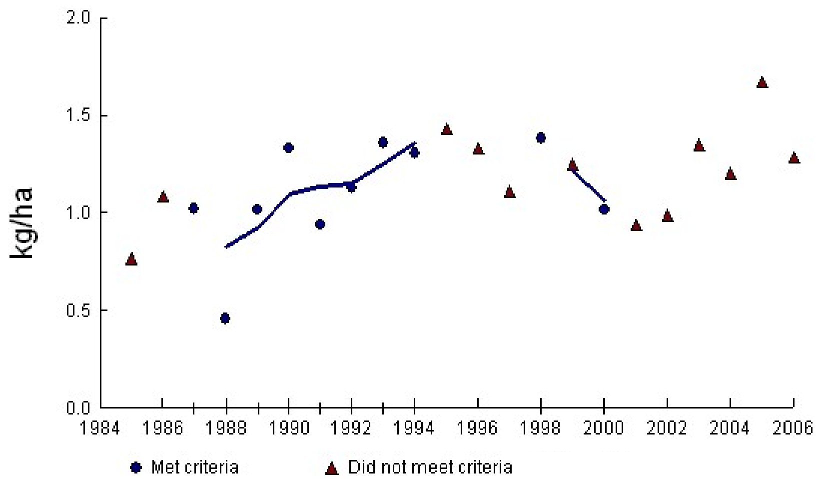
Air quality monitoring

Analysis of National Atmospheric Deposition Program data collected between 1985 and 2006 shows a slight trend toward increasing levels of nitrate and inorganic nitrogen in recent years, as shown in Figure 2 and Figure 3. In addition to Forest Service needs, Wyoming Department of Environmental Quality and other agencies continually analyze 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 Water Act.

Data from the Bridger-Teton National Forest's bulk deposition sampling indicate a general trend of increasing total nitrate deposition as shown in Figure 4.

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

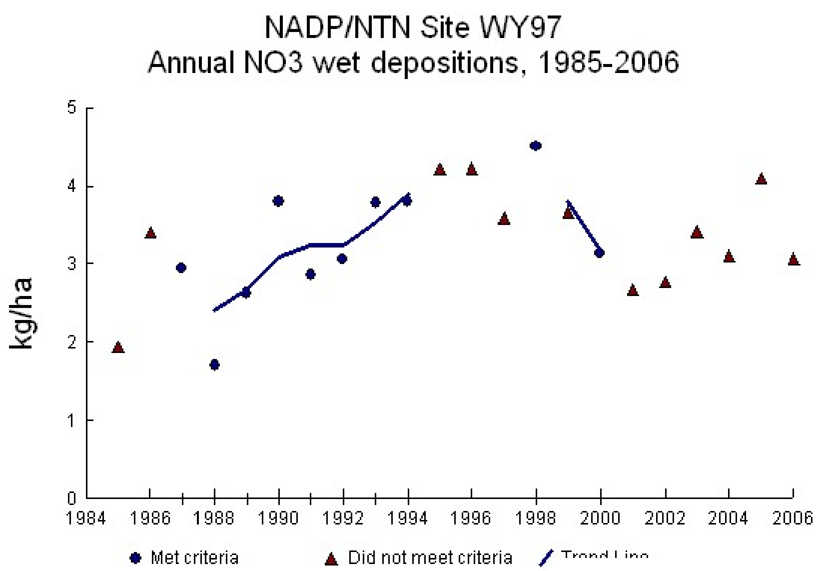
Figure 2. National Atmospheric Deposition Program/National Trends Network site (WY97 South Pass City) annual inorganic nitrogen wet deposition, 1985 through 2006. [3]



● ***Samples taken at the site met four criteria for the summary period (in this case one year).***

▲***Samples taken at the site did not meet four criteria for the summary period.***

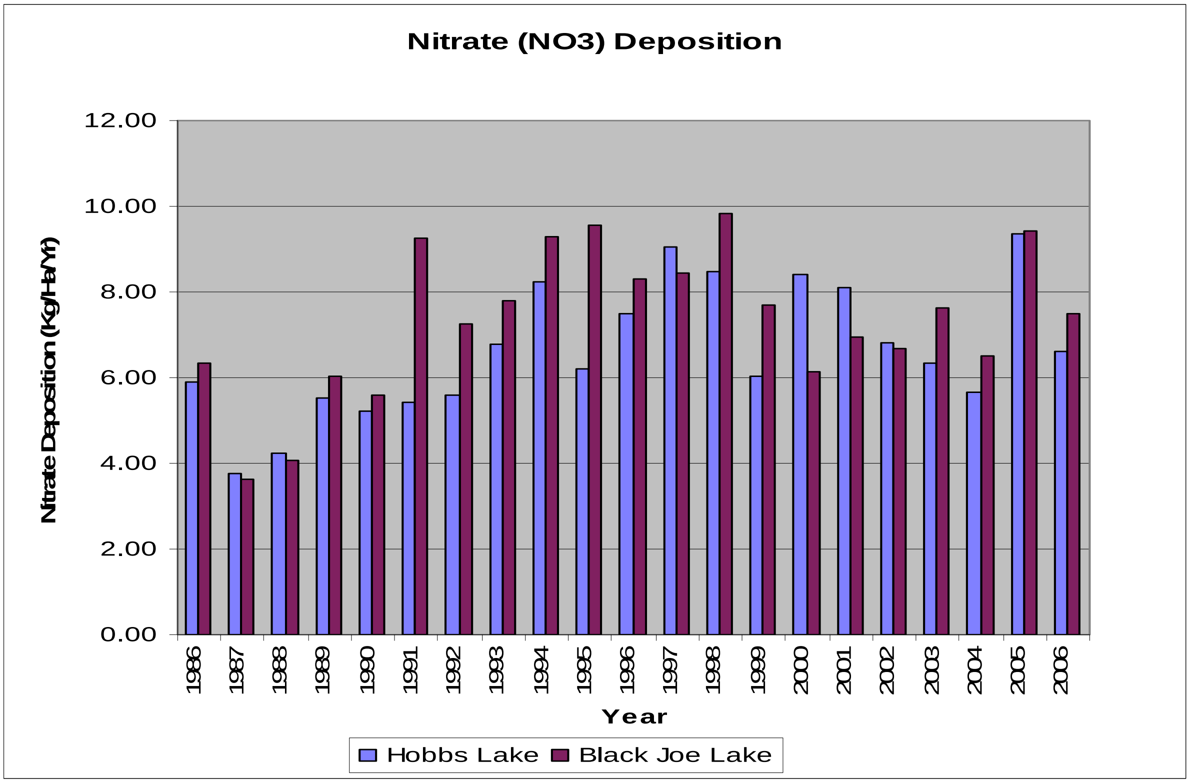
Figure 3. National Atmospheric Deposition Program/National Trends Network site (WY97 South Pass City) annual nitrate wet depositions, 1985 through 2006. [4]



[3] Source http://nadp.sws.uiuc.edu/sites/siteinfo.asp?net=NTN&id=WY97

[4] Source http://nadp.sws.uiuc.edu/sites/siteinfo.asp?net=NTN&id=WY97

Figure 4. Nitrate deposition data, Bridger-Teton National Forest, 1986 through 2006.



Analysis of lake data collected between 1984 and 1993 (Baron 1996) for air quality related values indicates there does not appear to be a trend in chemical composition. Even though a trend was not identified, a decision was made after receipt of the report to continue the monitoring program because these lakes are susceptible to change from acid deposition due to their low buffering capacity. Data collected between 1994 and 2003 are being analyzed.

Analysis of Interagency Monitoring of Protected Visual Environment site data collected at Dead Indian Pass from 2000 through 2003 is occurring and will be used as a baseline as additional data are collected in the future. Continued monitoring will help detect changes in air quality and visibility once the baseline has been established. It is too early in the monitoring program to determine trends in air quality.[5]

Wildlife

Activity and condition trends

Wildlife habitat on the Shoshone National Forest is likely the one of the most intact and unaltered in the lower 48 states. Due to the abundance of wilderness and roadless areas, most connectivity corridors for wildlife have not been impacted by management activities. As with most of the western United States, there has been an expansion of development along the Forest boundary; this is currently impacting wintering wildlife. Currently, most winter range is only minimally impacted by exotic species or loss of forage. Approximately 90 percent or more of the watersheds of the Shoshone National Forest provide ample security for all species of wildlife. Riparian areas constitute approximately 1 percent of the Forest, yet provide some form of habitat for a majority of wildlife species. Grazing impacts from early in the 20th century altered some of these riparian areas and empirical information suggests that the beaver population has declined (Emme and Jellison 2004).

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

Wildlife population data for 1986 management indicator species

Grizzly bear

The grizzly bear was listed as a threatened species under the Endangered Species Act in 1975. The Grizzly Bear Recovery Plan (USDI Fish and Wildlife Service 1982 and 1993), first approved in 1982 and revised in 1993, defined a recovered grizzly bear population as one that could sustain a defined level of mortality and is well distributed throughout the recovery zone. On March 22, 2007, the U.S. Fish and Wildlife Service announced the delisting of the Yellowstone distinct population segment of grizzly bears from protection under the Endangered Species Act.

The Interagency Grizzly Bear Study Team monitors recovery parameters in cooperation with the Forest Service. The general trend in the grizzly bear population within the Greater Yellowstone Ecosystem has been upward since the species came under the protection of the Endangered Species Act. Current population estimates are two to three times greater than when the bear was listed in 1975. Bears have continued to expand into new areas both within and outside the original recovery zone, with the greatest expansion south on the Bridger-Teton National Forest and east on the Shoshone National Forest. All recovery targets, except female mortality, have been met since 1998. All 18 bear management units in the Greater Yellowstone Area have been occupied at least five times in the last six years by females with young.

Habitat management and management of grizzly bear/human and grizzly bear/livestock conflicts have been directed by the Interagency Grizzly Bear Guidelines (Guidelines) that were incorporated into the Forest Plan (Interagency Grizzly Bear Committee 1986 and USDA Forest Service 1991). Adherence to the Guidelines has been instrumental in achieving the demographic recovery of the grizzly bear in the Greater Yellowstone Area and on the Shoshone National Forest. The Shoshone has made a concerted effort to educate users of proper behavior in bear country. A special order requiring that all attractants be kept unavailable to bears has been in place on most of the Forest since 1990. The order has been expanded several times to include occupied grizzly bear habitat. Grizzly bear/human conflicts and associated bear mortality still occur, vary by year, and are correlated with the availability of natural food sources. In years where these food sources are low, grizzly bear/human conflicts increase. Often these conflicts result in relocation or even death of grizzly bears. High levels of grizzly bear mortality from 1994 through1996 were associated with poor food years for bears. Recent increases in mortality are a result of several factors, including poor food years, bears expanding into marginal habitats, and more bears in the public/private land interface.

The Conservation Strategy for the Grizzly Bear in the Greater Yellowstone Area (Conservation Strategy) (Interagency Conservation Strategy Team 2003) was completed in 2003 and is the document that guides management and monitoring of the Yellowstone grizzly bear. This document describes a Primary Conservation Area where stipulations to protect grizzlies are applied. The Primary Conservation Area is the same as the original recovery zone and much of this occurs on the Shoshone (1,230,000 acres). Forest plan amendments for the six Greater Yellowstone Area national forests have incorporated the Conservation Strategy into existing forest plans (USDA Forest Service 2006).

Figure 5. Six-year average of unduplicated female grizzly bears, 1978 through 2006.

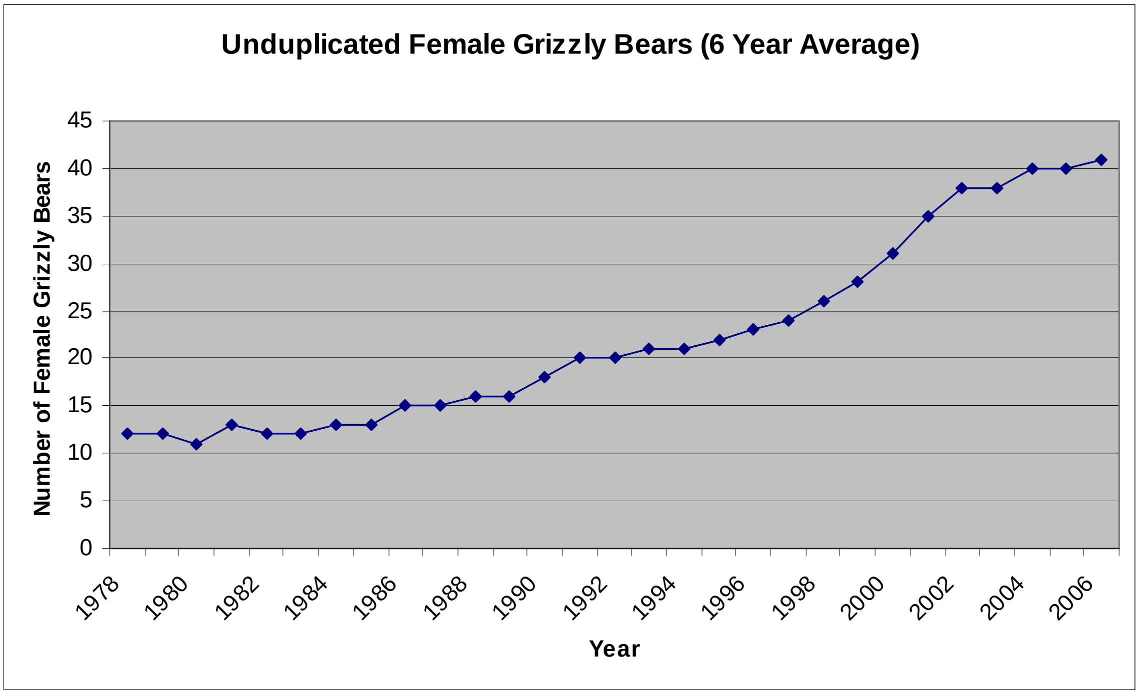


Figure 6. Female grizzly bears with cubs-of-the-year, known human-caused female mortalities, and all grizzly bear mortalities in the Greater Yellowstone Area, 1973 through 2006.

Year	Females with cubs-of-the-year[6]		Female mortalities[7]			All bear mortalities[8]		
	Annual	Six-year average	Annual	Six-year average	30% of total mortality	Annual	Six-year average	4% of minimum population
1973	14	--	6	--	--	14	--	--
1974	15	--	6	--	--	15	--	--
1975	4	--	1	--	--	3	--	--
1976	17	--	1	--	--	6	--	--
1977	13	--	5	--	--	14	--	--
1978	9	12	1	3.3	1.4	7	10.2	4.5
1979	13	12	1	2.5	1.2	7	9.2	3.9
1980	12	11	3	2	1.4	6	7.7	4.5
1981	13	13	2	2.2	1.5	10	8.8	4.8
1982	11	12	5	2.8	1.2	14	10.2	4.1
1983	13	12	3	2.5	1.2	6	8.5	4.1
1984	17	13	3	2.8	1.5	9	8.8	4.8
1985	9	13	4	3.3	1.5	5	8.5	4.8
1986	25	15	4	3.5	2	5	9	6.6
1987	13	15	2	3.5	1.8	3	7.8	6
1988	19	16	2	3	2.3	5	6.3	7.7
1989	15	16	0	2.5	2	2	5.7	6.7
1990	25	18	6	3	2.5	9	5.7	8.2
1991	24	20	0	2.3	2.6	0	4.7	8.8
1992	25	20	1	1.8	3.1	4	3.8	10.2
1993	19	21	2	1.8	2.9	3	3.8	9.6
1994	20	21	3	2	2.6	10	4.7	8.6
1995	17	22	7	3.2	2.1	17	7.2	7
1996	33	23	4	2.8	2.7	10	7.3	8.9
1997	31	24	3	3.3	3.2	7	8.5	10.7
1998	35	26	1	3.3	4.1	1	8	13.6
1999	32	28	1	3.2	4.1	5	8.3	13.7
2000	35	31	5[9]	3.5	4.2	16	9.3	14.2
2001	42	35	8	3.7	4.3	17	9.3	14.5
2002	50	38	7	4.2	5	15	10.2	16.6
2003	35	38	6	4.7	5	10	10.7	16.6
2004	46	40	9	6	5.2	17	13.3	17.2
2005	29	40	2	6.2	4.3	7	13.7	14.5
2006	45	41	1	5.5	4.9	8	12.3	16.2

[6] Data from Schwartz and Haroldson 2006.
[7] Data for 1973 through 1992 from Knight et al. 1997. Data for 1993 from Schwartz and Haroldson 2004. Data for 1994-2005 from Schwartz and Haroldson 2006.
[8] Data for 1973 through 1992 from Knight et al. 1997. Data for 1993 from Schwartz and Haroldson 2004. Data for 1994-2005 from Schwartz and Haroldson 2006.
[9] Beginning in 2000, mortalities include both known and probable human-caused mortalities.

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 have been classified as a non-essential experimental population, as per provisions of the Endangered Species Act. The U.S. Fish and Wildlife Service and National Park Service monitor wolves with assistance from other agencies, groups, and individuals.

Wolves first made brief visits to 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 National Forest 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 National Forest. 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 all 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.

The Washakie, Beartooth, Sunlight, Southfork, Gooseberry, and Greybull packs successfully reproduced in 2006. Several of these packs include part of the Shoshone in their home ranges. It is uncertain if the remaining packs reproduced in 2006.

Figure 7. Gray wolf population in Wyoming and on the Shoshone, 1999 through 2006.

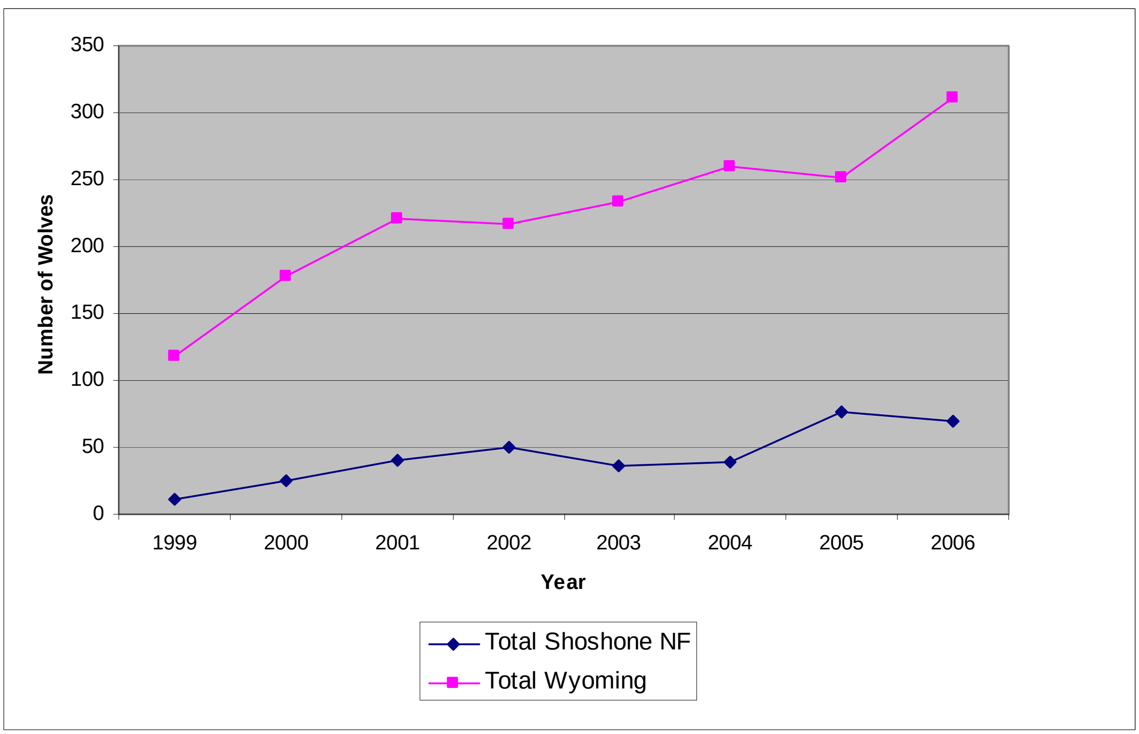


Figure 8. Wolf population in Wyoming and on the Shoshone, 1999 through 2006. [10]

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

Brewer's sparrow

Brewer's sparrows appear to be common where high quality habitat exists. Data from 2002 to 2006 from the Monitoring Wyoming's Birds project for the Shoshone indicate the species is at high densities in grassland, shrub, and juniper habitat types, and at lower densities in mid-elevation conifer and montane riparian. Grassland and shrub habitats are plentiful on the Forest, although the recent drought has reduced quality somewhat.

Figure 9. Densities of Brewer's sparrows (birds/km) in various habitats.

Year	Shoshone National Forest montane grasslands	Wyoming statewide grasslands
2002	53	71
2003	45	134
2004	67	262
2005	19	246
2006	98	220

Dusky grouse (formerly blue grouse)

The blue and spruce grouse were recently reclassified into the dusky grouse, due to DNA evidence.

Data for dusky grouse are limited. Harvest data from the Wyoming Game and Fish Department are variable from year to year and actual harvest numbers are a poor estimate of population size. Rocky Mountain Bird Observatory data from 2002 through 2006 generally indicate a low population on the Shoshone. It should be noted that dusky grouse are generally non-vocal and these observations are generally taken between observation points.

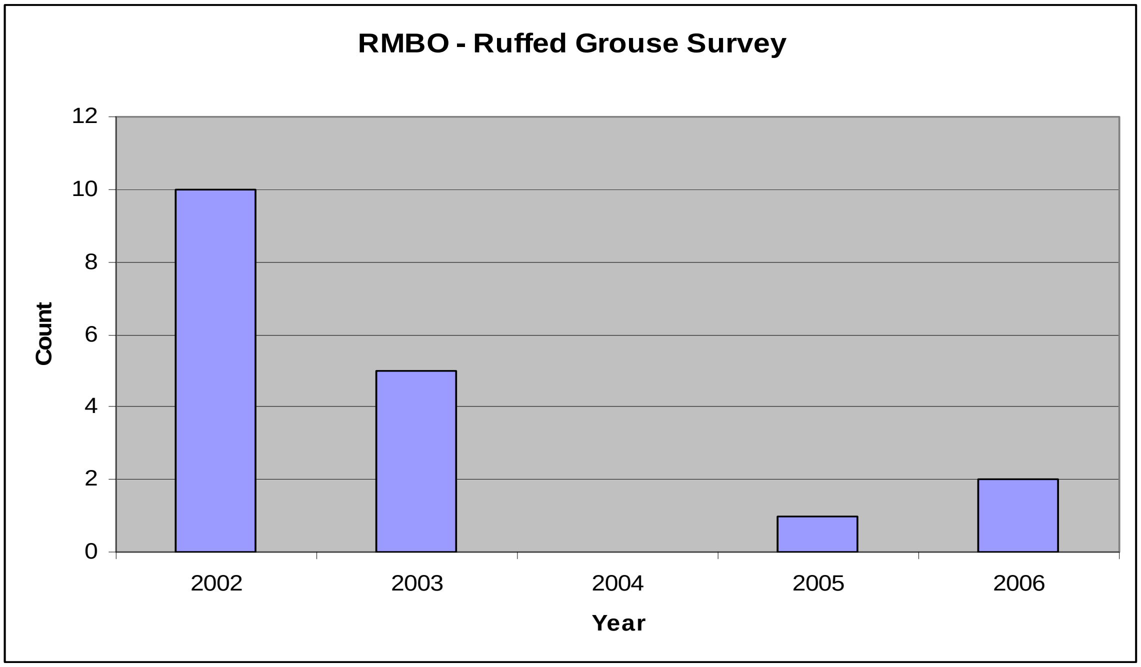
Ruffed grouse

Harvest data are collected by the Wyoming Game and Fish Department and are variable from year to year. Generally, harvest numbers are a poor estimate of population size. Birds harvested per hunter effort are a somewhat better estimate of population numbers for this species, as it indicates how plentiful birds are and how available they are to hunters. Ruffed grouse brood rearing and winter habitat is declining across the Forest with conifer encroachment into many aspen areas, especially on the north end of the Shoshone.

Ruffed grouse observations through the Rocky Mountain Bird Observatory are only incidental. The Rocky Mountain Bird Observatory surveys are generally auditory, with visual counts from fixed points. Most observations of ruffed grouse are along transect routes between the points.

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

Figure 10. Ruffed grouse survey data from the Rocky Mountain Bird Observatory.



Big game

The Wyoming Department of Game and Fish sets herd unit objectives for big game species based on habitat conditions, public opinion, and cooperating agency input. Post-season population estimates were generated from the most recent (and considered most reliable) Wyoming Department of Game and Fish population simulation model for each herd unit. Not all species/herd units have population models; thus, not all species/herd units have population estimates. Due to modeling revisions, use of standardized modeling parameters, and refined data collection/analysis, current estimates may or may not agree with previously published population estimates, e.g., Annual Job Completion Reports. Beyond the earliest year for which population estimates are made, or if no estimates were available, a narrative discussion addresses population trends, as perceived by Wyoming Department of Game and Fish managers, with particular comments directed at the segment(s) of each herd unit that spend part or all of the year on the Shoshone National Forest.

Elk

The most reliable population estimates for the Gooseberry elk herd date back to 1995. Prior to 1995, this population increased slightly until about 1999, when it peaked at about 4,200 elk. This upward trend was likely the result of improved forage quality and quantity due to increased moisture, as well as both prescribed and natural fires that have occurred on much of this herd's winter range. In recent years, the population has been stable with the population slightly above the population objective.

Following a comprehensive telemetry project that revealed significant interchange between the Carter Mountain and North Fork Shoshone River elk herd units, the two herds were combined in 1993 to create the Cody elk herd unit. The objective for the Cody herd unit is the combined total of the two herds. The current simulation model produces reliable estimates through 1997. Although no figures are given for 1986 through 1996, the general trend was a population near or slightly above the objective in 1986 that grew prolifically following the 1988 fires to approach perhaps 10,000 elk by 1993. Since 1993, elk numbers have gradually declined but remain above the herd objective.

The current simulation model produces reliable estimates since 1997 for the Clarks Fork elk herd unit. Although no figures are given for 1986 through 1996, the general trend was a population above the objective in 1986 that grew following the 1988 fires to approach perhaps 6,300 elk by 1993. Since 1993, elk numbers have gradually declined. The population in this herd is still above objective.

For several years, personnel have used winter trend counts to estimate the population of the Wiggins Fork elk herd unit. Trend counts are conducted on three sub-segments within the herd unit including

East Fork, Dunoir/Spring Mountain, and South Dubois. These sub-segments represent groups of elk that follow three distinct movement/migration patterns detailed in the Wiggins Fork Elk Movement Study. As part of an objective change in 2002, the Wyoming Department of Game and Fish committed to maintain 6,000 to 7,000 wintering elk in the area. The total includes 2,400 to 2,800 elk in the East Fork segment, 2,300 to 2,700 elk in the Dunoir/Spring Mountain segment, and 1,300 to 1,500 elk in the South Dubois segment. The actual number of elk counted in each herd segment is divided by a sightability factor to calculate the low and high population estimates.

The population in the Wiggins Fork herd unit has declined since 1997. Counts performed in 2002 produced numbers so much lower than the previous years that they were considered unreasonable and the trend counts were deemed invalid. The winter of 2002/2003 was extremely mild with little snow cover. It is likely more elk wintered off traditional winter ranges where the counts were conducted. In 2003, personnel observed 4,418 elk and believe the trend count was more reliable. The elk population is currently at the lower end of the objective range set in 2002. Last year's estimates of the Wiggins Fork elk herd show an increase that might be attributed to the snowfall bringing the elk lower in elevation to an area where they are more easily counted.

Population numbers starting in 1996 for the South Wind River elk herd unit are from the POP-II model (a population simulation model) revised in 2003. Estimates for 1986 through1995 are from previous Annual Job Completion Reports. Herd numbers rose significantly in the mid-1990s, most likely due to mild winters and now are down to very near objective. As the population rose above objective, more liberal hunting regulations were introduced and were effective at reducing this herd to near objective numbers.

Figure 11. Elk population estimates. Herd unit objectives are shown in parentheses.

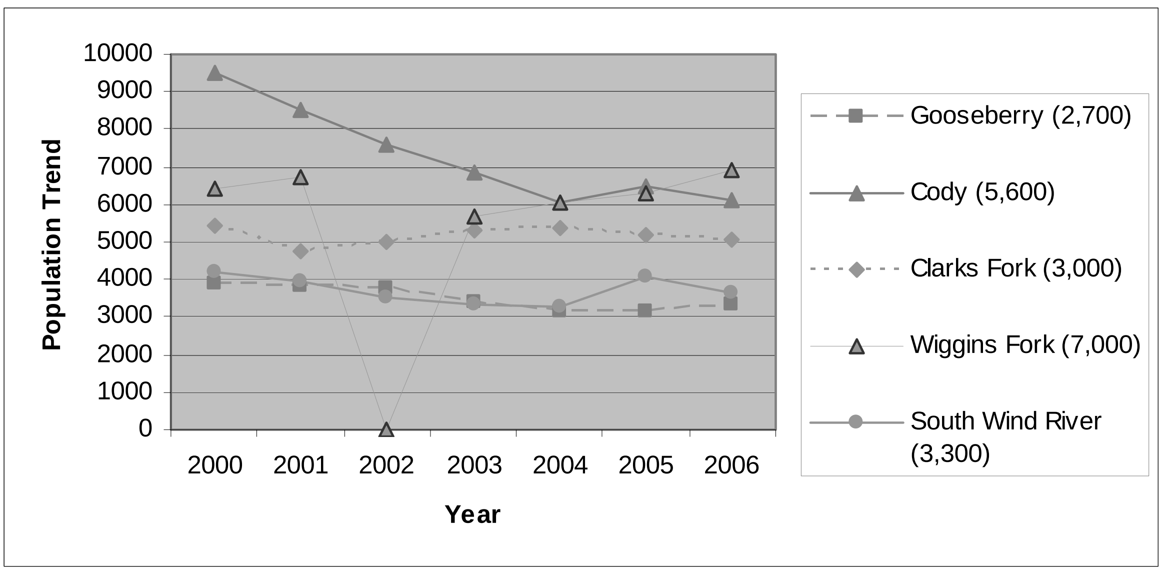
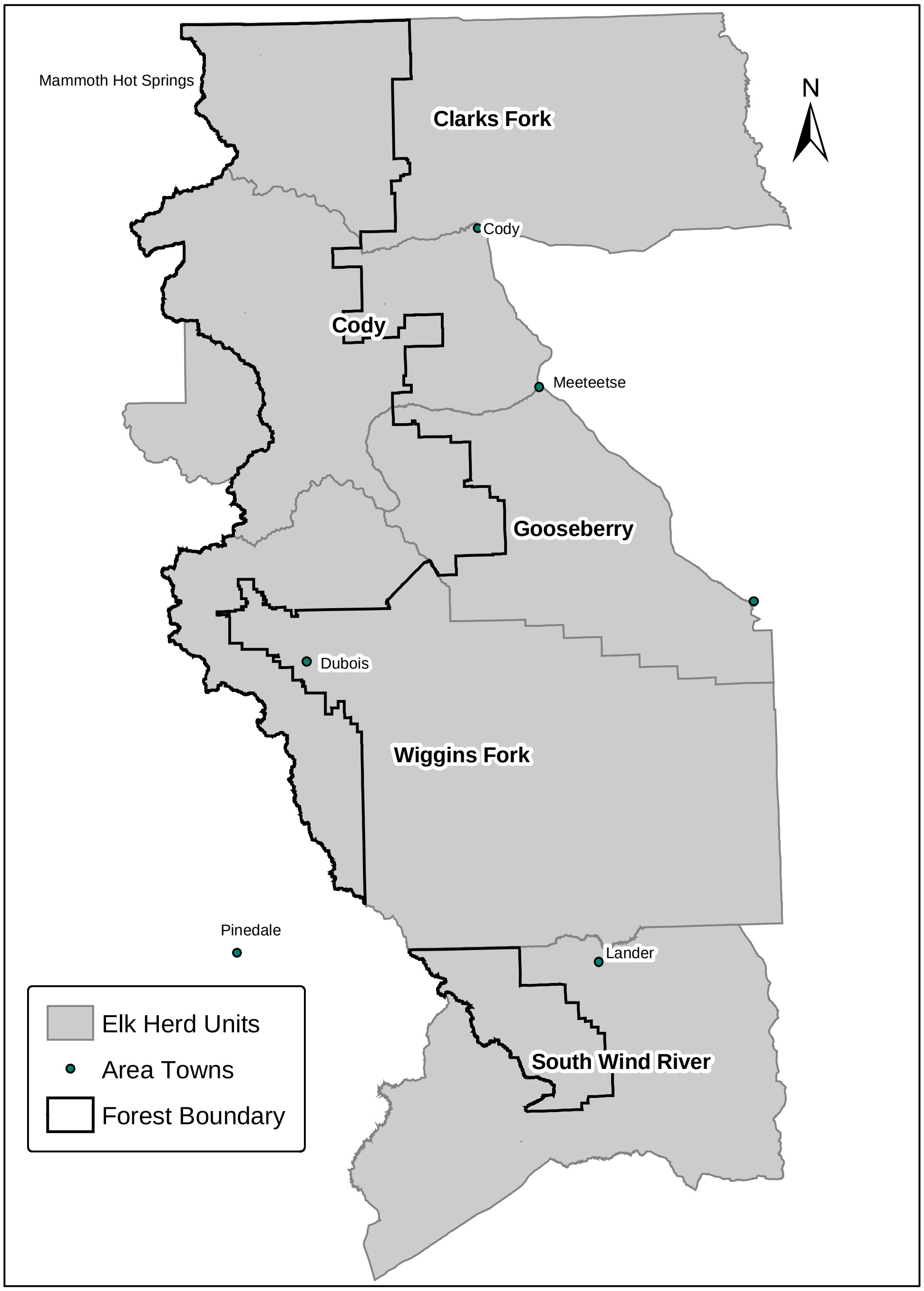


Figure 12. Elk herd units.



Mule deer

The most reliable population estimates for the Owl Creek/Meeteetse deer herd date back to 1995. Based on population estimates before 1995, it appears this deer herd increased slightly until about 1999, when the population began to stabilize. Drought conditions may have caused a decline in fawn production from 2000 to 2004, but fawn production has increased slightly in recent years. Overall, the herd appears to be stable.

The current simulation model produces reliable estimates through 1990 for the Upper Shoshone mule deer herd unit. Although no figures are given for 1986 through 1990, the general trend was a population generally at the objective of 12,000 deer. Currently the trend has been slightly increasing for the last several years to the point where this herd has met its population objective.

The current simulation model produces reliable estimates through 1990 for the Clarks Fork mule deer herd unit. The general trend was a population below the objective of 9,000 for this herd unit. Although this herd has been managed conservatively, the population trend has been stable.

The population of the Dubois mule deer herd unit is climbing toward its population objective. Based on current habitat conditions, the herd will probably stabilize at these numbers. Fawn recruitment was excellent in 2004 and very good in 2005.

For the South Wind River mule deer herd unit, population numbers after 1992 are from the POP-II model revised in 2003. Numbers before 1993 are from the previous Annual Job Completion Report. The Lander and Hall Creek herd units were combined in 1993. This herd is fairly stable, although below objective. Habitat conditions are at a lower value because of several years of drought.

Figure 13. Mule deer population estimates. Herd unit objectives are shown in parentheses.

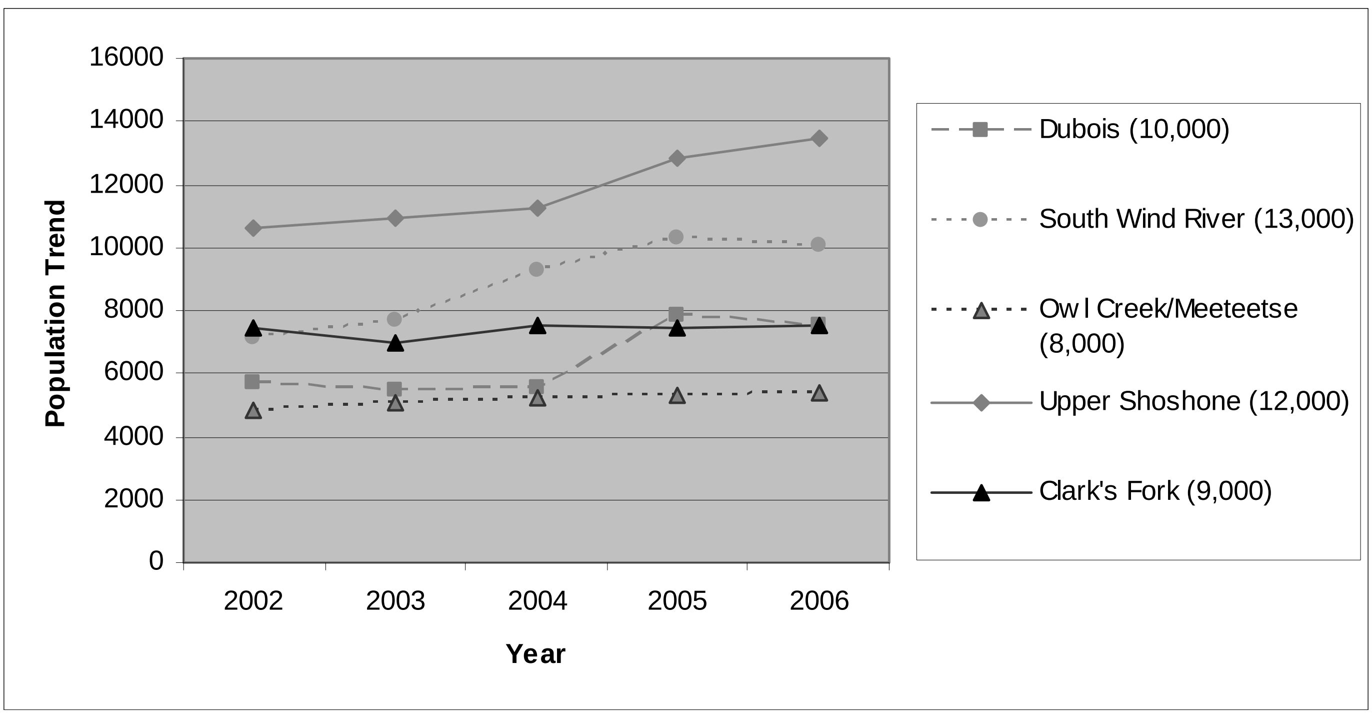
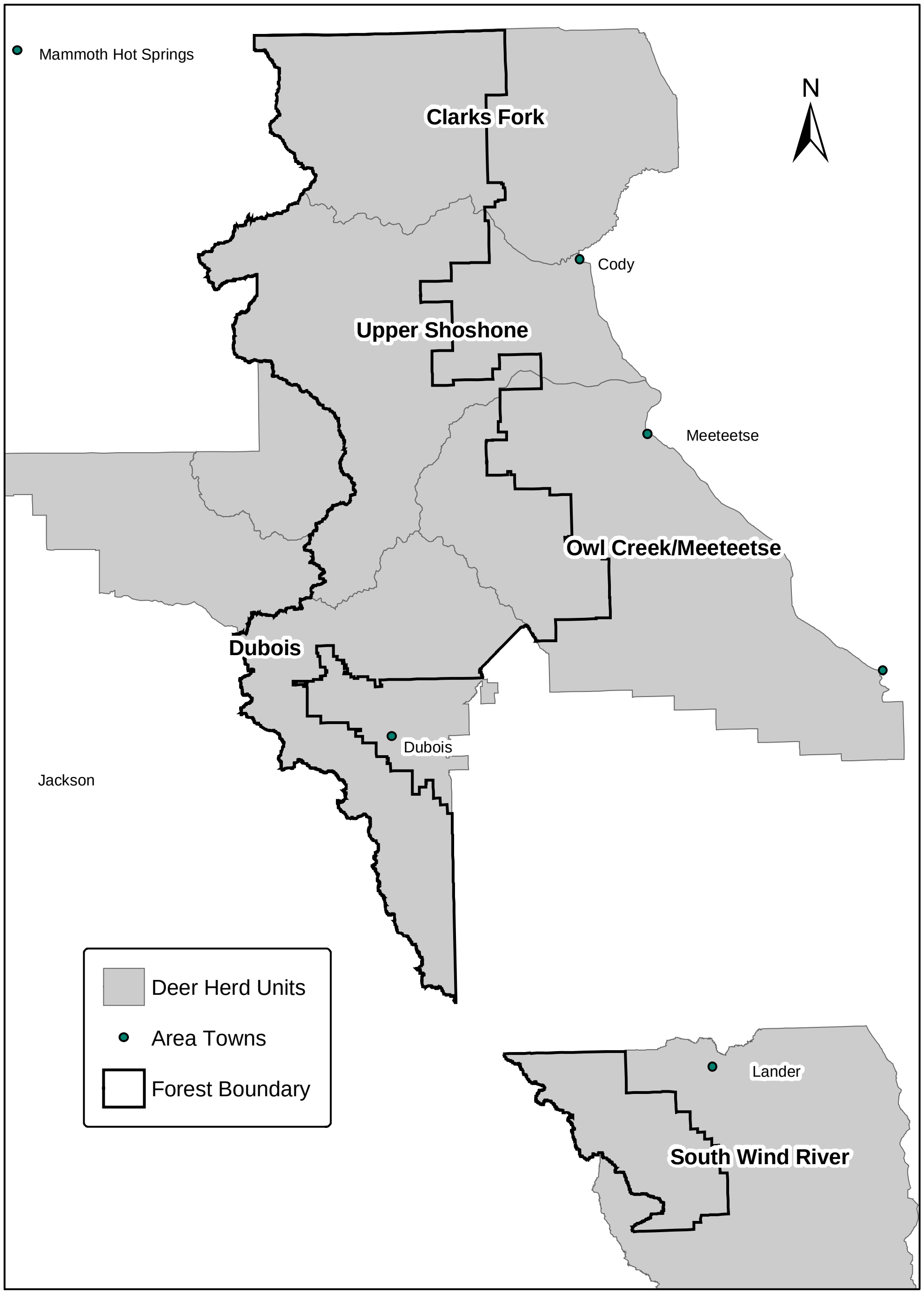


Figure 14. Mule deer herd units.



Moose

Moose populations have traditionally been managed using relatively small, single hunt area herd units, consisting of the Crandall, Sunlight, North Fork Shoshone River (North Fork), South Fork Shoshone River (South Fork), Greybull/Gooseberry, and Thorofare moose herd units. Population objectives for these herd units were 100 for Crandall, 75 for Sunlight, 75 for North Fork, 75 for South Fork, 85 for Greybull/Gooseberry, and 325 for Thorofare. These units were combined to form the Absaroka Moose Management Unit in 2004. Moose data in this area are extremely difficult to collect, and therefore attempts at estimating population size have always been tenuous. Harvest data (hunter success, hunter effort) are the only pieces of information with which to assess population status in the Absaroka unit.

For similar reasons, the North Fork and South Fork herd units were combined in 1999 to create the Shoshone herd unit. The objective of 150 was a result of the combined objectives of the North and South Fork herd units. Again, for similar reasons as those stated above and to simplify Annual Job Completion Report record keeping, the Clarks Fork, Shoshone, Greybull/Gooseberry, and Thorofare herd units were combined in 2004 to create the Absaroka moose herd unit. The new objective derived from the combination of previous herd units is 830 moose. Examination of moose harvest information indicates that moose numbers in the North and South Fork and Sunlight and Crandall areas remained relatively stable until the mid- to late 1990s, when numbers declined. Moose numbers in the Greybull/Gooseberry herd unit continue to be stable. Recently collected movement information has shown connectivity between the Buffalo Valley area of the Jackson herd unit and the Thorofare. It is likely the Thorofare herd unit will be included in the Jackson herd unit in the near future. It is probably safe to say that from 1986 through 2003, moose numbers in all areas (except the Greybull/Gooseberry herd unit) have declined from near objective levels to a point substantially below objective. The most likely factors for the decline are prolonged drought, reduction of habitat from the 1988 fires, and increased predation.

The population estimates for the Dubois moose herd unit are not considered reliable. The estimates are based on small classification samples most years. For some years, there are no empirical data on the population due to a lack of flight money for classifications. Anecdotal information suggests this moose population declined in the late 1990s and early 2000s. Several individuals of this herd were found dead in 2000 of unknown causes and it is possible a disease came through the population, which might account for the decline. Other potential factors are drought conditions and increased levels of predation.

Figure 15. Dubois moose herd unit population estimates, 1986 through 2006. The objective for this herd is 400 moose.

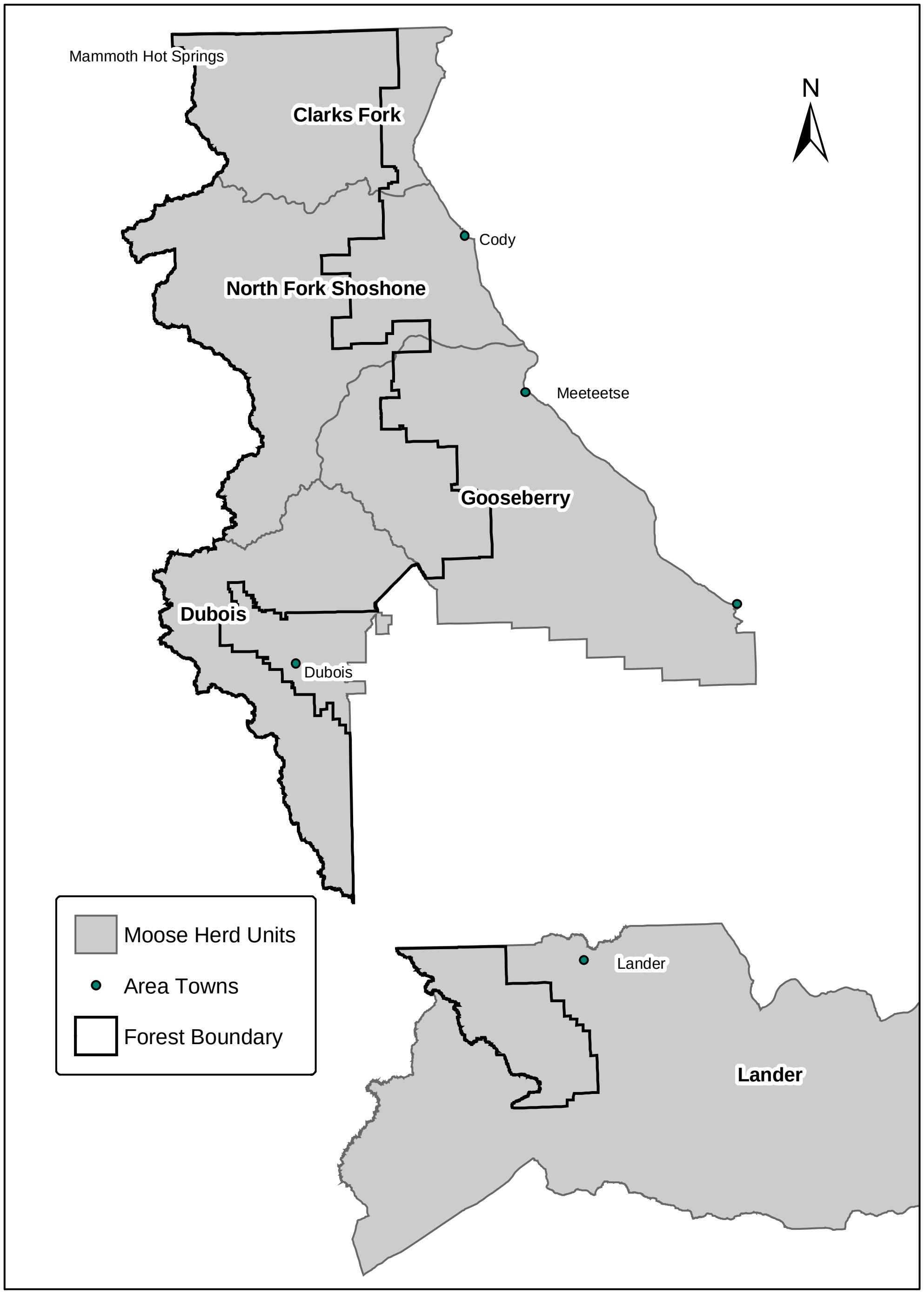
1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
625	654	699	715	686	672	697	663	674	649	583
1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	
538	547	565	557	558	585	557	400	400	400	

Lander moose herd unit population numbers from 1995 are from the POP-II model revised in 2003. This herd has trended somewhat downward perhaps due to the effects of drought conditions on willow and other deciduous vegetation food sources. Harvest of females will be reduced in hopes of reversing this downward trend.

Figure 16. Lander moose herd unit population estimates, 1986 through 2006. The objective for this herd is 450 moose.

1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
371	381	388	364	363	359	338	407	395	520	499
1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	
475	475	477	451	421	410	393	417	314	339	

Figure 17. Moose herd units.



Bighorn sheep

A reliable population simulation model does not exist for the Clarks Fork herd unit. This herd is thought to have been near the objective of 500 sheep from 1986 through the mid-1990s. Particularly severe late winter snowstorms in 1995 and 1996 caused significant mortality in the northern portion of this herd unit. Since then, numbers have been steadily increasing, and are at the objective of 500 as of 2006.

A reliable population simulation model was recently developed for the Trout Peak bighorn sheep herd unit. Estimates place this herd substantially below the objective of 750 sheep. Only in the early 1990s was this herd thought to be near the population objective. Following the early 1990s, this herd is felt to have fluctuated below objective levels. Data collection in this herd unit has been sporadic; therefore, population dynamics in this herd are poorly understood.

A reliable population simulation model was recently developed for the Wapiti Ridge bighorn sheep herd unit. Estimates place this herd essentially at the objective of 1,000 sheep. This herd has been steadily improving and is currently meeting the herd population objective.

Good population data have been collected from the Younts Peak bighorn sheep herd since 1991, when the herd appeared somewhat stable. From 1986 through1990, sheep numbers dropped from 1,000 to 900 sheep to a point near where they are estimated to have been in 1991. The herd has been at its population objective of 900 since 2000.

The most reliable population estimates for the Francs Peak bighorn sheep herd unit date to 1996. Based on hunter harvest statistics and annual herd classification counts dating to the mid-1980s, it appears this population has remained relatively stable.

The absolute value of these estimates is in all likelihood an underestimate of the Whiskey Mountain sheep population. The estimates provide an accurate trend of what has occurred in the population. Since a disease outbreak in the early 1990s, this population has declined substantially. The population is currently well below objective.

No population model has been available for the Temple Peak bighorn sheep herd since 1995. Numbers up to 1995 are from previous Annual Job Completion Reports. Numbers for 1999 through 2003 are from the 2003 Annual Job Completion Reports. The population trend appears to be stable over the last several years.

Figure 18. Bighorn sheep population estimates. Herd unit objectives are shown in parentheses.

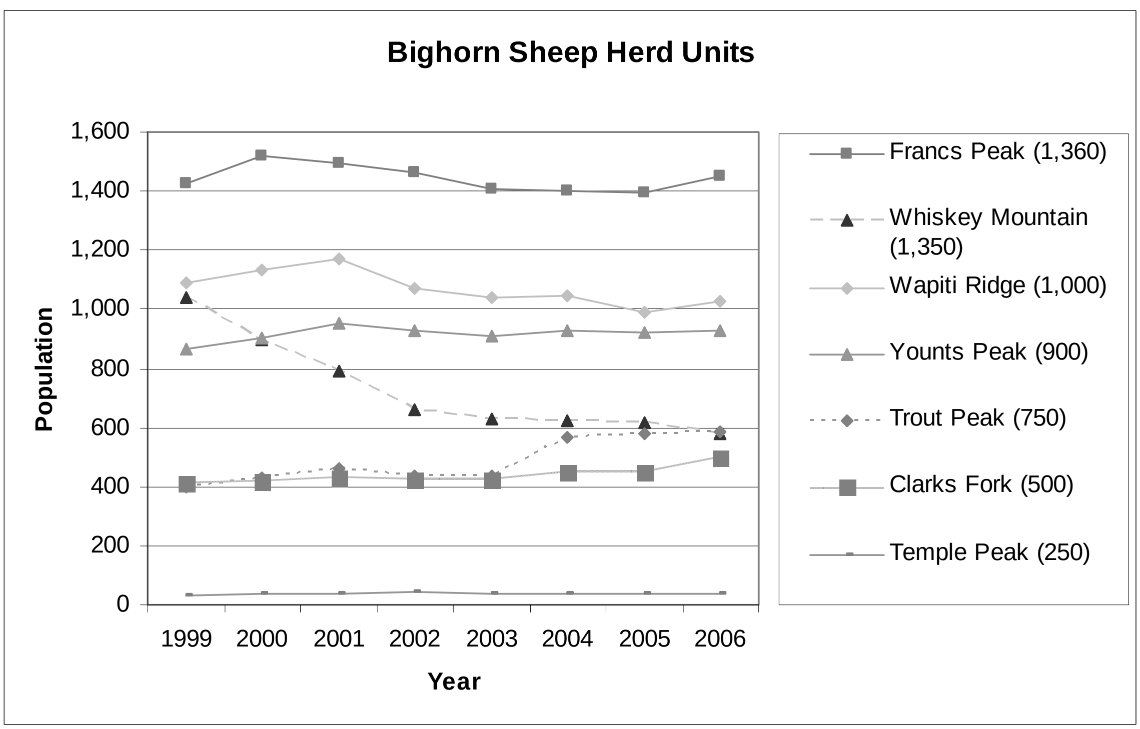
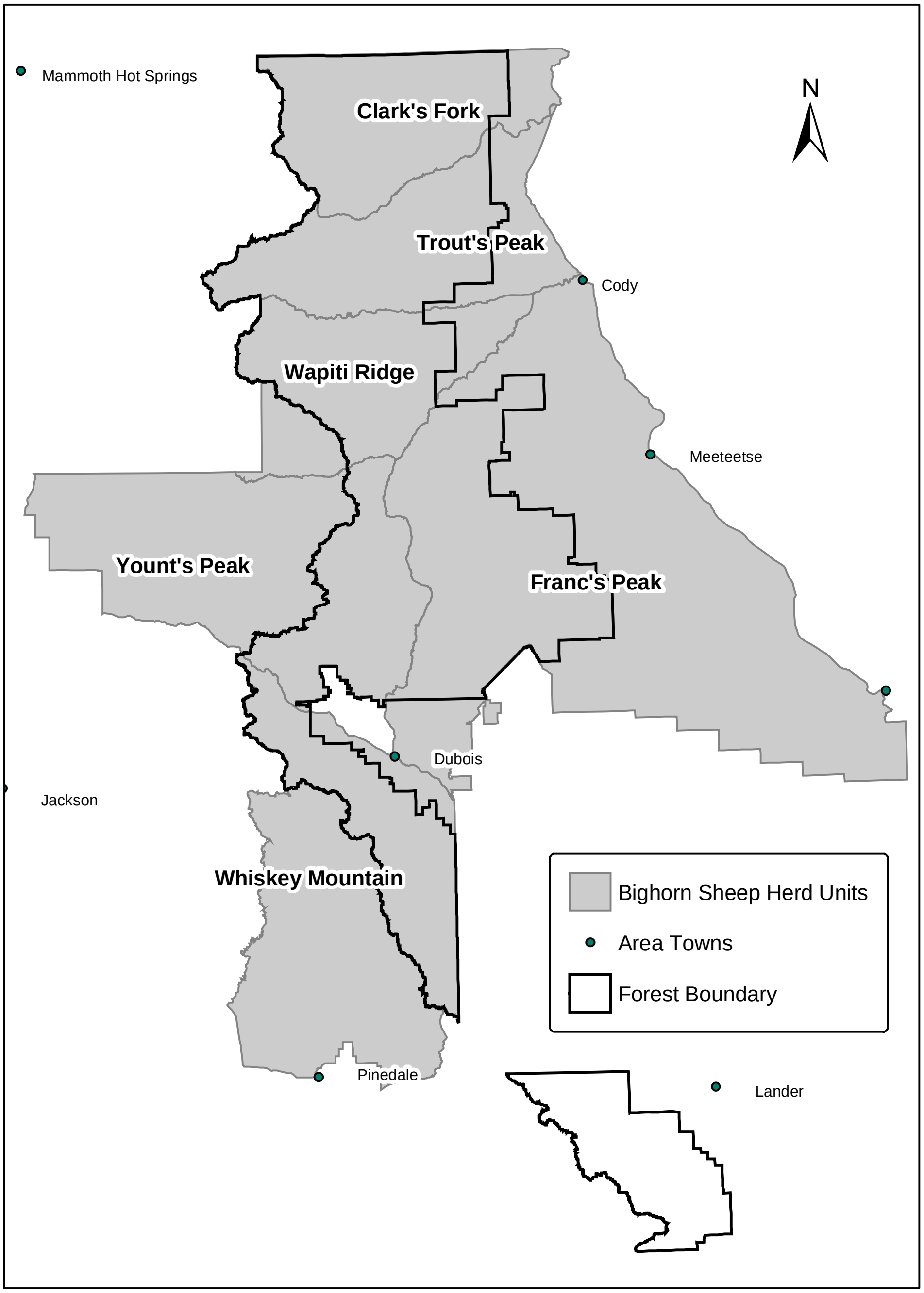


Figure 19. Bighorn sheep herd units (Temple Peak herd unit map is pending).



Mountain goats

The Beartooth herd is the only mountain goat herd on the Forest. Population estimates indicate the herd is at the objective level of 200 animals. It has been stable at this level for many years.

Figure 20. Mountain goat population estimates.

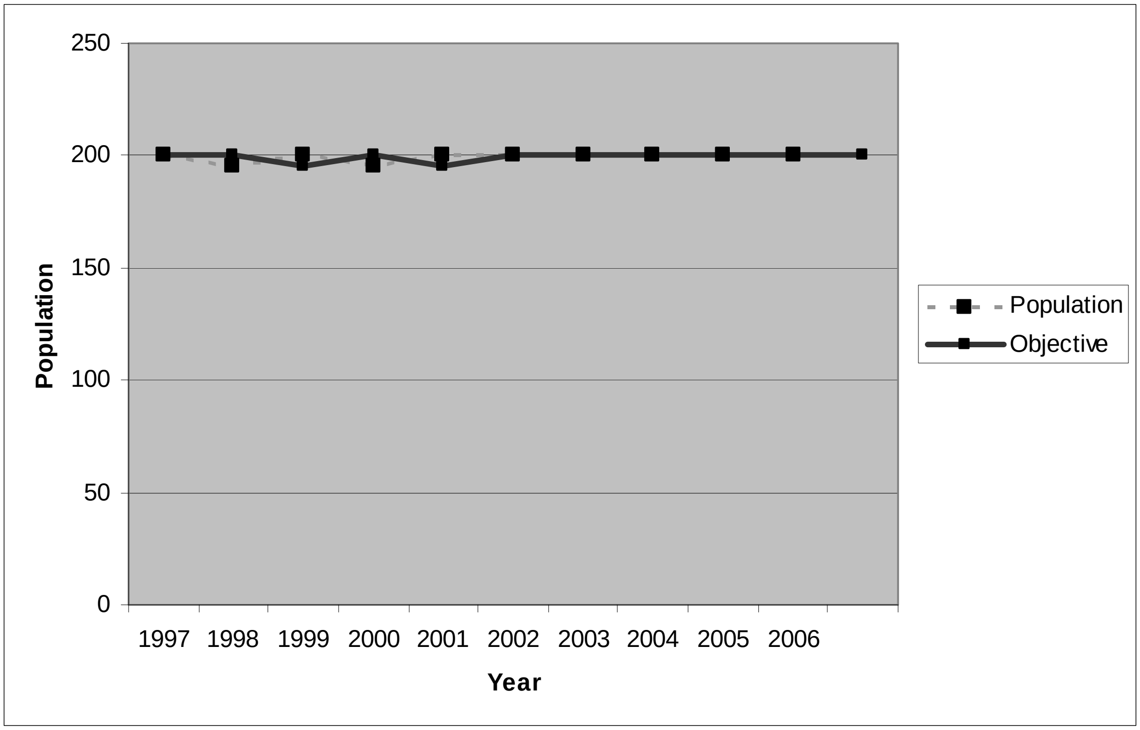
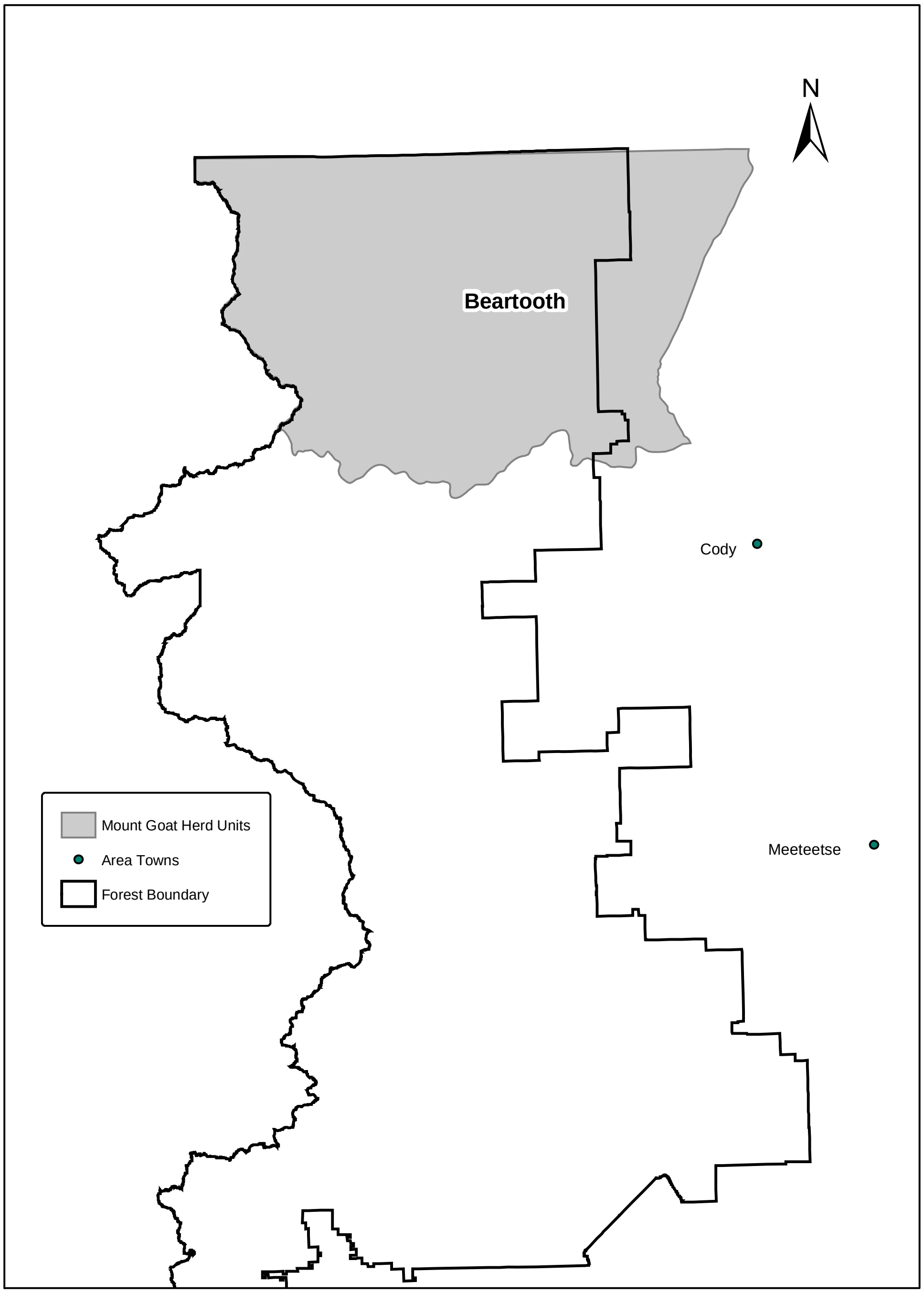


Figure 21. Mountain goat herd unit location.



Bird survey program

Birds are excellent indicators of environmental quality and change. They are one of the most highly visible and valued components of our native wildlife. Monitoring birds provides data needed not only to effectively manage bird populations, but also to understand the effects of human activities on ecosystems and to gauge their sustainability. Because bird communities reflect a broad array of ecosystem conditions, monitoring bird communities at the habitat level offers a cost-effective means for monitoring biological integrity at a variety of scales.

In 2006, the Shoshone National Forest concluded its fifth year of bird surveys with the Rocky Mountain Bird Observatory. The survey is designed to provide statistically rigorous, long-term trend data for populations for most diurnal, regularly breeding bird species in Wyoming. The three habitat types surveyed on the Forest include mid-elevation conifer, montane grassland, and montane riparian.

Figure 22. Rocky Mountain Bird Observatory data for 2006.

Year	Transects	Point counts	Species
2002	28	412	74
2003	25	344	71
2004	27	---	78
2005	25	365	83
2006	25	357	91

Eighteen species were detected in sufficient numbers to estimate density in at least one habitat, and some of those species were detected in sufficient numbers to estimate density in multiple habitats.

Of the three Shoshone habitats surveyed between 2002 and 2006, the average species richness was greatest in montane riparian, and least in montane grassland. [11]

Fire and fuels management

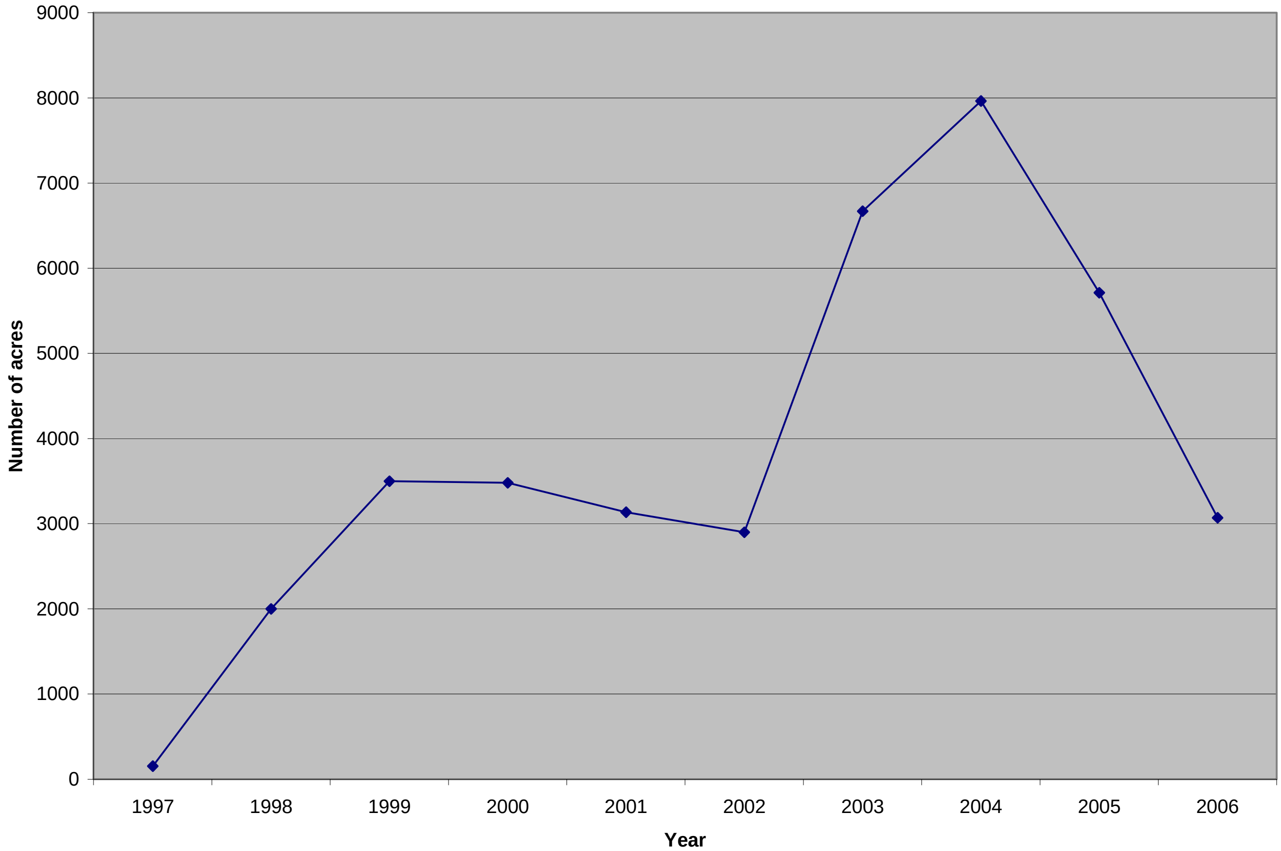
Activity and condition trends

In 1998, the Forest increased its prescribed burn program as part of the overall fire management program. With the 2000 National Fire Plan, funding increased to facilitate increases in staffing and equipment to further support the fire program. During the fall of 2002, the Forest engaged in a Forest-wide vegetation analysis, resulting in an integrated vegetation management program. The 2003 Healthy Forests Initiative and the Healthy Forests Restoration Act combined to provide the tools, funding, and expectation to treat hazardous fuels and improve fire regime condition class (Figure 23).

High fuel conditions are present throughout much of the Forest. Some conditions are a result of fire exclusion and have resulted in changes in vegetation type and structure, such as sagebrush-grasslands that are being overgrown with juniper and other conifers or aspen stands that are now dominated by conifers. Middle elevation conifer stands have become mature and are homogeneous on a landscape scale. They lack diversity in age or size classes and are more prone to large-scale, high severity stand replacement wildfires rather than mixed severity fires. The natural fuel conditions of the spruce-fir forest and high elevation subalpine forests are typically considered to be in a state of high hazard. Hazardous fuel conditions are also being augmented by an insect outbreak that has resulted in tree mortality on thousands of acres. New areas of infestations continue to develop throughout the Forest.

[11] Rocky Mountain Bird Observatory information is available at http://www.rmbo.org/default.html

Figure 23. Acres of fuels treated, 1997 through 2006.



Since 1970, the Forest has averaged 25 wildfires annually. 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. Due to persistent drought, the trend in acreage burned since 1998 has been increasing Figure 26.

Figure 24. Number of fires by size, 1970 through 2006.

Size in acres	Number of fires
0 to 0.25	688
0.25 to 9.9	166
10 to 99.9	34
100 to 299.9	9
300 to 999.9	4
1,000 to 4999.9	10
> 5,000	6

Figure 25. Annual number of wildfires, 1970 through 2006.

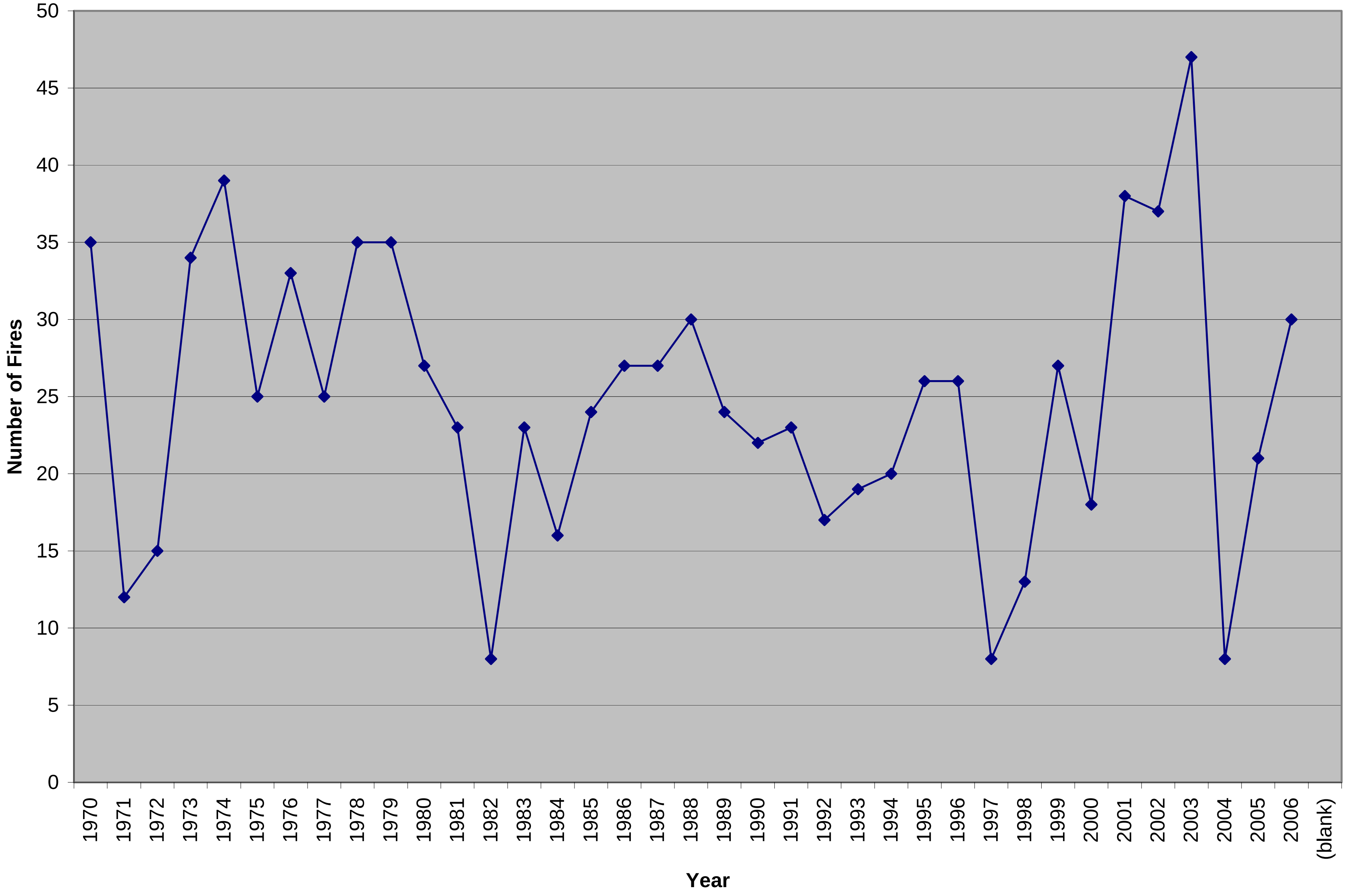


Figure 26. Annual acreage burned, 1970 through 2006.

Year	Acres[12]	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	34,782
1988	197,228		

Forest products

Activity and condition trends

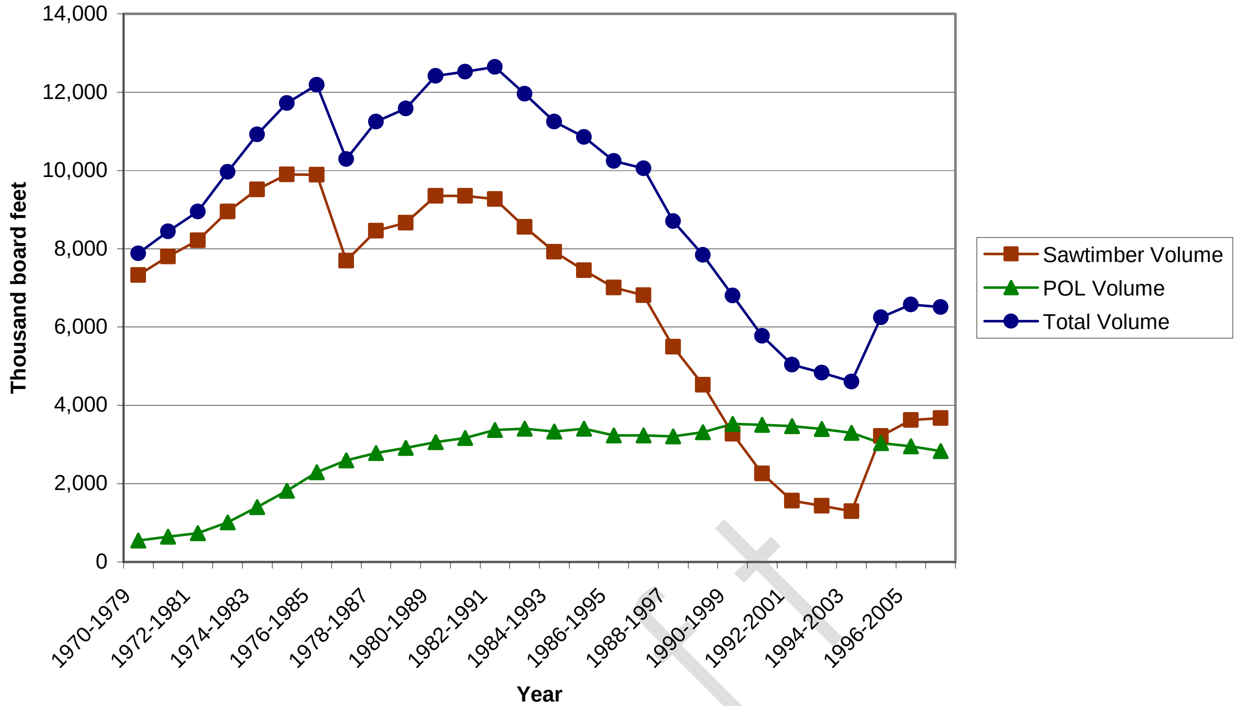
The 1986 Forest Plan set an average annual Allowable Sale Quantity (ASQ) volume of 11.2 million board feet. The Forest Plan set this amount as the maximum allowable harvest of timber from the suitable timber land base of approximately 86,000 acres. The 1986 decision indicated that all this volume would be sawtimber. The 1986 decision predicted an additional 1.2 million board feet of products other than logs[13] would be sold annually. This additional volume would not count toward the ASQ.

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 ASQ. The amendment changed the annual average volume to 4.5 million board feet. The amended amount included 4.3 million board feet of sawtimber and 0.2 million board feet of products other than logs. The amendment also predicted an additional 3.0 million board feet of products other than logs would be sold annually. The amendment directed that all salvage volumes offered for sale would count toward ASQ. This decision was made to address events such as the 1988 wildfires.

Based on data shown in Figure 28, it is possible to look at some general trends on the Forest by certain periods.

[12] Acres were rounded to the nearest whole acre.
[13] Products other than logs includes posts, poles, firewood, etc.

Figure 27. Average annual volume sold for rolling ten-year periods.



Data from Figure 28 are displayed in Figure 27 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 sold fell steadily from the mid 1980 until 1990. Starting in 2004 sawtimber volume sold increased. The graph also shows that products other than logs volume has remained relatively stable during that period. The majority of the decline has occurred in the form of reduced sawtimber harvest.

The large fluctuations in total sawtimber volume are related to the offering of salvage sales in response to large disturbance events such as the 1988 wildfires and the recent insect epidemic.

Figure 28. Volume sold and harvested, by product, in thousand board feet.[14]

Fiscal year	Sawtimber sold	POL 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[15]	--	--	1,177	--	--	3,678
1973	--	--	3,777	--	--	7,798
1974	--	--	3,335	--	--	6,121
1975	--	--	5,200	--	--	2,852
1976[16]	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

Livestock grazing

Activity and condition trends

A number of changes in commercial livestock grazing activities have occurred on the Forest over the past 70 years and have accelerated in the past 10.

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

From a high point in the early 1900s, commercial sheep grazing has been in a steady decline on the Forest. The initial decline in sheep numbers was primarily due to adjustments to stocking rates that reflected a more sustained use of the range resource. The decline in sheep animal unit months continued through the 1970s and continued to decline in subsequent decades, though at a slower rate, reflecting declining demand and increased importation of wool and mutton from overseas. The last 10 years have seen the removal of all but one commercial sheep-grazing permit due to an increase in predator/livestock conflicts and concern over the potential for disease transmission from domestic sheep to bighorn sheep.

In contrast to commercial sheep use, the levels of permitted[17] cattle grazing and demand for allotments have changed little for many decades. The influence of cattle grazing on the rangeland resource has lessened considerably. Improved livestock management, consolidation with vacant sheep allotments, where applicable, and construction of off site water sources have led to improved conditions of both upland and riparian rangeland.

In the past five years, drought has resulted in a decrease in actual use animal unit months—a trend reflected in Figure 29. Permitted cattle use animal unit months are not affected by this.

Figure 29. Authorized commercial livestock grazing use since 1986, 1,000 animal unit months (some numbers were rounded).

Year	Cattle/horse AUM	% Forest Plan	Sheep AUM	% Forest Plan	Total AUM	% Forest Plan
Forest Plan	78	100	25	100	103	100
1986	55	70	4	17	58*	56
1987	59	75	2	10	61	59
1988	56	72	2	11	59*	57
1989	58	74	2	11	60	58
1990	64	82	2	11	67*	64
1991	58	75	2	8	59*	57
1992	49	62	1	5	50	48
1993	56	71	1	7	57	56
1994	54	68	0	2	54	52
1995	57	72	0	1	57	55
1996	57	72	1	7	58	56
1997	54	69	2	8	56	54
1998	58	74	1	7	60*	58
1999	57	72	1	7	58	56
2000	57	72	1	7	58	56
2001	48	62	1	4	49	48
2002	37	47	0	2	37	36
2003	36	45	0	2	36	35
2004	45	58	1	2	45*	44
2005	44	56	0.5	2	44.5	43
2006	43	55	0.6	2	43.6	42

*These numbers do not add up due to rounding.

Vegetative condition and trend

Figure 30 and Figure 31 reflect the vegetative condition and trend of the suitable acres found within active livestock grazing allotments. Rangelands outside grazing allotments have been determined to be in similar or better condition due to the lack of livestock related impacts. As a result of range management, rangelands within commercial livestock allotments show the same general trend toward desired conditions and/or a stable vegetative state. There are isolated locations where the vegetation is

[17] Permitted levels are set for a ten-year period in the allotment management plan. Authorized use levels are set annually in the permittees' operating instructions and may or may not be the same as the permitted use. The difference between permitted and authorized use constitutes non-use.

not moving toward desired conditions or a stable vegetative state because the site is heavily impacted. These impacts occur for a variety of reasons, including:

- Concentrated use by commercial livestock around human-made and natural water sources (springs, seeps, riparian areas, stock tanks/ponds, etc.), salt grounds, and containment structures (fence corners, corrals, etc.)
- Concentrated use by recreational livestock near natural water sources, popular campsites, and high country meadows where available grazing is limited
- Concentrated use by wildlife in highly preferred upland winter ranges and riparian areas or winter range that has been reduced due to urban development

Figure 30. Summary of vegetation condition transects in domestic livestock use areas.

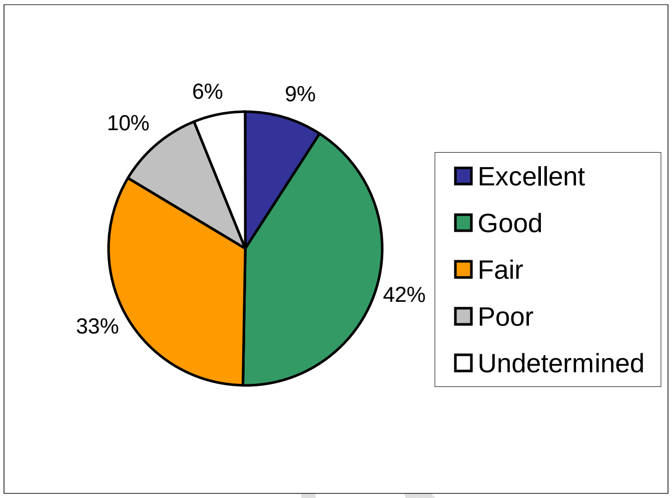
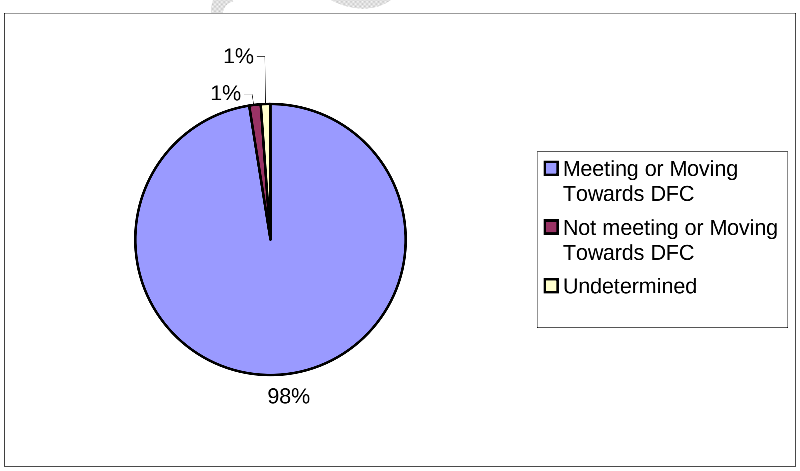


Figure 31. Vegetation condition trend.



Minerals

Activity and condition trends

The Forest Service's role in minerals management is to protect and manage surface resources while encouraging and facilitating mineral and energy exploration and development.

In the last decade, activities in mineral materials[18] averaged less than 30 permits per year and resulted in the removal of several hundred tons of rock. Some free use is allowed. Management of mineral materials is expected to continue at a low level for the Forest, with interest increasing in the use of decorative rock.

For locatable minerals[19], Notices of Intent and Plans of Operations are the mechanisms used to authorize mining ventures. In the past six years, the Forest has averaged less than one Notice of Intent per year. Recreational activities for locatables, such as panning for gold, have increased in the past several years. There is a growing interest in recreational dredging.

Most oil and gas wells near the Shoshone National Forest would be considered mature wells (over 40 years old). Often these wells are involved in tertiary recovery (the last phase of recovery), which requires stimulation materials to increase or maintain production. Stimulation materials, such as carbon dioxide, help increase the flow of oil underground. These wells have an additional recovery expectancy of over 20 years. To enhance recovery, companies are now directional drilling from the original drilling pad. Directional drilling requires less infrastructure, such as new roads and pipelines. Recently, due to high oil and gas prices, drilling has increased adjacent to the Forest. Less than 10 percent of exploratory wells result in production of oil and gas. Some success in the Clark, Wyoming area has initiated interest in seismic exploration on and adjacent to the Forest.

There are no active wells on the Forest. Of the 34 wells drilled, 31 have not produced and three have been capped due to low production. Nonetheless, with recent increases in oil and gas prices, interest in leasing on the Forest has increased in the form of several new lease applications.

Figure 32. Acres of oil and gas leased per year, 1970, 1973 through 2003,2005, and 2006.

Year	Acres leased	Year	Acres leased	Year	Acres leased
1970	6,719	1981	111,424	1990	2,119
1973	33,883	1982	129,628	1998	2,775
1974	6,375	1983	94,086	1999	0
1975	5,168	1984	37,032	2000	1,950
1976	16,609	1985	6,329	2001	0
1977	11,289	1986	27,694	2002	0
1978	6,858	1987	28,000	2003	0
1979	3,093	1988	70,934	2005	8,800
1980	34,903	1989	56,520	2006	8,600

Access and travel management

Activity and condition trends

The following set of definitions will help the reader better understand this section.

Transportation definitions

Forest road. A forest road is one that is wholly or partly 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.

Forest transportation atlas. A display of the system of roads, trails, and airfields of a forest.

Unauthorized road. An unauthorized road is a road that is not a forest road or a temporary road and is not included in the forest transportation atlas.

Temporary road. A road necessary for emergency operations or authorized by contract, permit, lease, or other written authorization that is not a forest road and is not included in the forest transportation atlas.

[18] Mineral materials (or salable minerals) are common materials such as stone, sand, gravel, clay, cinders, and decorative rock.
[19] Locatable minerals include gold, silver, copper, and other metals.

Functional class. A road may be classified as one of three categories.

- Arterial roads provide service to large land areas and connect with other arterials or public highways.
- Collector roads serve smaller land areas than arterials and connect arterials to local roads or terminal facilities.
- Local roads are single purpose roads that connect terminal facilities with collectors or arterials.

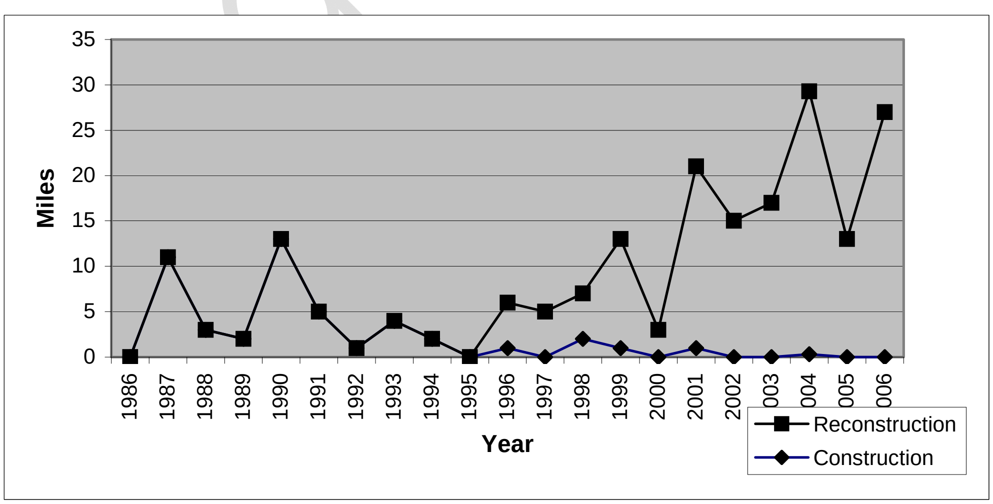
Maintenance level is the level of service provided by, and maintenance required for, a specific road.

- Level 1 is assigned to intermittent service roads during the time they are closed to vehicular traffic. The closure period must exceed one year. Basic custodial maintenance is performed.
- Level 2 is assigned to roads open for use by high-clearance vehicles. Traffic is normally minor.
- Level 3 is assigned to roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience not considered priorities. Level 3 roads are generally low speed, single lane, with spot surfacing.
- Level 4 is assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most are double lane and aggregate surfaced.
- Level 5 is assigned to roads that provide a high degree of user comfort and convenience. Normally level 5 roads are double lane, paved facilities.

Since 1986, new road construction has remained at a fairly consistent level, under four miles per year. Vegetative treatment activities generate the primary need for new road construction. Existing roads were decommissioned to balance the miles of new roads, or the newly constructed roads were closed to highway vehicles upon completion of the activity for which they were constructed. Most of the new roads constructed on the Forest are local roads.

In the same period, levels of reconstruction have fluctuated. Reconstruction is directly related to activities such as timber sales and the capital investment and deferred maintenance programs. Vegetation management programs have experienced an increase in funding recently, which accounts for the majority of miles of road reconstruction. The majority of reconstruction work has been on local and collector type roads.

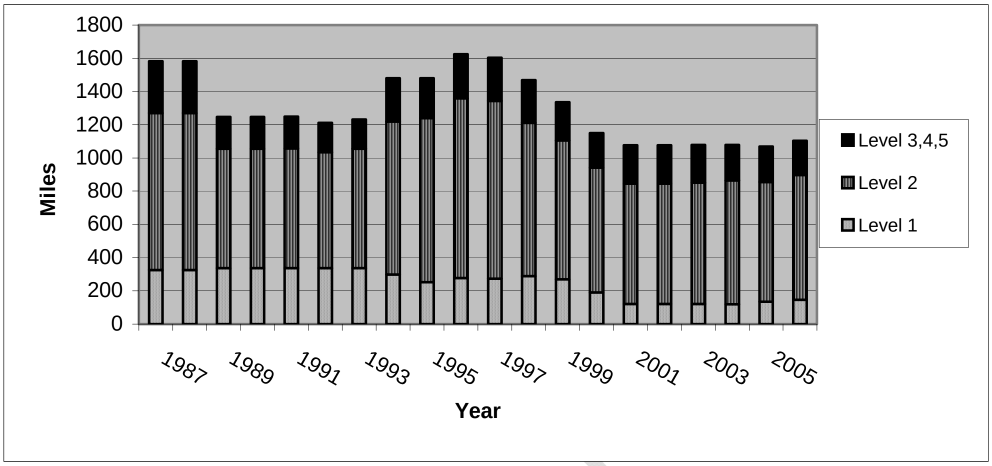
Figure 33. Annual miles of road constructed/reconstructed, 1996 through 2006.



The overall miles of forest roads have declined since 1987, although the ratio of miles in each maintenance level has remained fairly consistent. 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 unauthorized road.

Annual road maintenance activities continue to be performed, with roads in maintenance levels 3, 4 and 5 receiving the majority of funding due to their use as primary routes and access ways to Forest facilities and uses. The majority of roads on the Forest are within the maintenance level 2 classification.

Figure 34. Total miles of road, by maintenance level, 1987 through 2006.



In 2002, Forest personnel completed a Forestwide roads analysis designed to evaluate the Forest's road system. The objective of the roads analysis process was to provide decision makers with critical information they may use to develop road systems that are safe and responsive to public needs and desires, are affordable and efficiently managed, have minimal negative ecological effects on the land, and are in balance with available funding for needed management actions (USDA Forest Service 2004). The results of the analysis include:

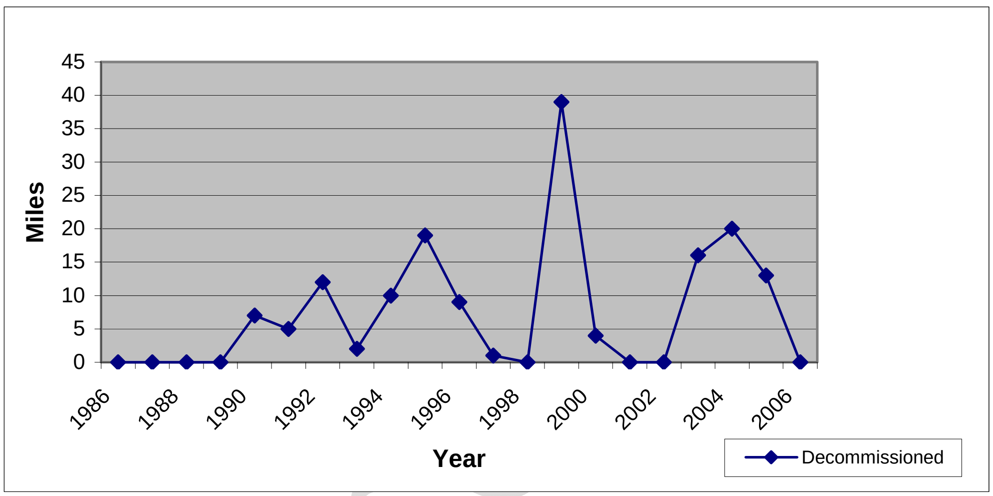
- The existing roads designed for passenger cars (maintenance levels 3, 4 and 5) are adequate for access to and within the Forest, although there are areas where increased public access is a goal.
- Adequate funding for maintaining this basic subset of roads is lacking.
- There are environmental issues involving roads that include wildlife, watershed, and soil resources largely due to the age of the roads system and the maintenance backlog.
- Though there may be needs for additional access for resource management, it is not expected that those additions will be to the main (maintenance level 3, 4 and 5) road system.

An emphasis on decommissioning roads not needed for resource management, administrative use, or public access and roads causing resource damage in the 1990s resulted in fairly consistent achievement of goals during that decade. Decommissioning strategies range from complete removal of the template and corridor from the landscape, which is essentially obliteration, to constructing closure devices, to eliminating use by highway vehicles and restoring the template to natural drainage patterns and vegetation. Decommissioning occurred on both forest and unauthorized roads and will continue as needed to eliminate resource damage and remove routes that are not needed for access for the short or long term.

The purpose of the Forest's strategy of not increasing net miles of roads is to mitigate cumulative impacts, which were a significant issue in the oil and gas leasing analysis (1992) and the ASQ analysis (1994). Implementation of the strategy requires that the number of miles of new construction not exceed the number of miles of road decommissioned Forest-wide. For each running five-year period beginning October 1, 1994, the cumulative number of new miles of forest road constructed should not exceed the cumulative number of miles of road decommissioned. Therefore, as new construction is planned, decommissioning of other roads is planned and implemented. Additionally, any temporary roads constructed or utilized for vegetative treatment activities must be closed upon completion of the activity.

Since the no net gain of roads policy was adopted in 1994 (USDA Forest Service 1994), a total of seven miles of new roads were built, and 105 miles of road were decommissioned, totaling 98 more miles of road decommissioned than constructed. For the latest five year period from 2002 to 2006 no roads were constructed. The five-year average of roads decommissioned for the same period is 9.8 miles. The trend since the 1994 Forest Plan amendment is illustrated in Figure 35. Though the total number of roads increased in the middle to late 1990s, a decrease followed. The inventory has been stable for the last several years.

Figure 35. Annual miles of road decommissioned, 1986 through 2006.



Literature cited

Baron, J. 1996. Precipitation and lake chemical composition in the Wind River Mountains of Wyoming: analysis of U.S. Forest Service and NADP data sets. Fort Collins, Colorado.

Eilers, ML. 2006. Timber cut and sold on national forests under sales and land exchanges, fiscal years 1970-2006.

Emme, TJ and BA Jellison. 2004. Managing for beaver on the Bighorn National forest. Wyoming Game and Fish Department publication.

Interagency Conservation Strategy Team. 2003. Final conservation strategy for the grizzly bear in the Greater Yellowstone Area.

Interagency Grizzly Bear Committee. 1986. Interagency grizzly bear guidelines. Missoula, Montana.

Interagency Grizzly Bear Study Team reports and publications are available online at http://www.nrmsc.usgs.gov/research/igbst-home.htm

Knight, R R, B M Blanchard, and M A Haroldson. 1997. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 1996. U.S. Geological Survey, Biological Resources Division report.

Schwartz, C C and M A Haroldson. 2004. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2003. U.S. Geological Survey. Bozeman, MT.

Schwartz, C C, M A Haroldson, and K West, editors. 2006. Yellowstone grizzly bear investigations: annual report of the Interagency Grizzly Bear Study Team, 2005. U.S. Geological Survey. Bozeman, MT.

USDA Forest Service. 1991. Decision memo and amendment number 91-002 to the Shoshone land and resource management plan. Shoshone National Forest. Cody, Wyoming.

USDA Forest Service. 1994. Record of decision, allowable timber sale quantity, Shoshone National Forest. Shoshone National Forest. Cody, Wyoming.

USDA Forest Service. 1996. Record of decision, oil and gas leasing, Shoshone National Forest. Shoshone National Forest. Cody, Wyoming.

USDA Forest Service. 2004. Forest roads analysis: Shoshone National Forest. Shoshone National Forest. Cody, WY.

USDA Forest Service. 2006. Forest plan amendment for grizzly bear habitat conservation for the Greater Yellowstone Area national forests record of decision. Shoshone National Forest. Cody, WY.

USDI Fish and Wildlife Service. 1982. Grizzly bear recovery plan. Denver, Colorado.

USDI Fish and Wildlife Service. 1993. Grizzly bear recovery plan. Missoula, Montana.