Wyoming Black Bear Management Plan

Prepared by: Trophy Game Section
Management/Research Branch
Final

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EXECUTIVE SUMMARY

This plan updates the 1994 Wyoming Black Bear Management Plan. The goal is to provide direction for future management of black bears in Wyoming. This plan does not make specific recommendations for managing black bears by management unit. Rather, it establishes the framework regional personnel can apply to manage populations of black bears based on an adaptive process. Much of the overall structure and timing of black bear seasons will change little from the 1994 plan. However, new harvest criteria will be used to monitor status and trend of black bear populations in the state. Also, all human-caused mortality of independent age female black bears will be used to develop female mortality quotas in each bear management unit (BMU).

Bears in general, and black bears in particular, are very susceptible to extreme changes in environmental conditions due to drought or human use patterns. Because most habitats occupied by black bears in Wyoming are administered by government agencies, the Wyoming Game and Fish Department (Department) will continue to coordinate with appropriate federal, state, and county governments to conserve bear habitats. The Department will also encourage habitat conservation on private lands.

The Department will employ a range of harvest criteria to assess harvest impacts on black bears in Wyoming. These include the percent of adult males in the harvest, the percent of females in the harvest and the percent of adults in the female segment of the harvest. All data will be analyzed using 3-year averages compiled over a 10-year period to assess long-term trends.

The Department will continue to employ a female quota system to regulate harvest of black bears in Wyoming. All human-caused mortality has an effect on black bear populations and female non-harvest mortality comprises up to 9.8% (mean 3.2%) of all human-caused female mortality in Wyoming. Therefore, all human-caused female mortalities will be used for consideration of total desired removal but will not be counted toward annual female harvest quotas.

In addition to harvest criteria, the Department will monitor annual average human-caused black bear mortality per area of suitable habitat (bears harvested/100 km^2/yr) for each hunt area. This density will provide an index of more localized impacts of human-caused mortality on black bear populations. With future population density estimates, this metric may also be used to gauge the proportion of the black bear population harvested annually.

The Department will continue to provide hunting opportunities in both spring and fall seasons. Harvest data indicate the percent females in the black bear harvest is lower during spring than fall, especially prior to June 1.

The Department will continue to allow baiting for black bears where it is currently allowed. A lower percentage of female black bears in the total harvest and adult females in the female harvest are taken over bait because of their more cautious behavior and the potential for greater hunter selectivity while using baits.

All management actions addressing black bear damage will be conducted according to the protocols outlined in the "Statewide Protocol for Managing Aggressive Wildlife/Human Interactions" (Wyoming Game & Fish Dept. 1999). The Department will continue to employ a variety of options to deal with black bear damage. These include no action, information and education, proper storage of food and/or garbage, repellents, electric fencing, aversive conditioning, translocation and lethal removal. Additionally, all conflicts will be documented in the Department's Trophy Game Incident Database.

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The Department will focus information and education efforts on assessing public attitudes toward black bear management in Wyoming, educating the public on techniques to reduce human/bear conflicts, and on the Department's black bear management strategies and objectives.

Future research priorities for black bear management in Wyoming should focus on testing the validity of current harvest criteria used to monitor population trends as well as develop new techniques that may more accurately measure population trend. Possible techniques include adjusting the mortality quotas in specific BMUs to increase or decrease harvest and monitor the ability of the harvest criteria to detect these changes in harvest intensity, using DNA or other methods to estimate black bear populations, or using GPS collar data to investigate black bear habitat use patterns in relation to hunting and other human activities.

INTRODUCTION

While they are often not the first species to come to mind when people think of Wyoming wildlife, the black bear (*Ursus americanus*) is an integral component of many of the state's ecosystems. However, black bear management has become the focus of more widespread attention across North America as human development and activities expand into black bear habitats and, in some places, when bear populations expand into areas of human development. In addition, some segments of the public have demanded that states demonstrate that black bear management is based on scientific data and that current management is not endangering populations. Black bear management issues, for example hunting, have even been placed on public referendum ballots in states like Colorado and Washington.

The Wyoming Game and Fish Department (Department) is responsible for managing wildlife populations of Wyoming, including black bears. As part of routine management, the Department drafts management plans for wildlife and fish species in the state. In 1994 the Department completed the first Wyoming Black Bear Management Plan (Wyoming Game and Fish Dept. 1994). That plan established bear management units (BMUs) based on geographically isolated "populations." It also implemented black bear seasons, dividing annual female quotas between spring and fall seasons, and provided guidance on other aspects of black bear management in Wyoming.

It is customary to revisit management plans and revise them as new data and management methods become available. This management plan updates the predecessor plan with information from an additional 12 years of black bear research and management in Wyoming and across North America. It also includes some changes in the methods used to analyze black bear harvest data and identifies types of bear mortalities that will count toward the female mortality quotas. However, the overall management philosophy and direction will not change. Black bear populations will be maintained in all suitable habitats in Wyoming, and will be managed to provide public hunting opportunity and to minimize black bear damage and human/black bear conflicts.

BLACK BEARS IN WYOMING

Management History and Legal Status

Management strategies for black bears in the western United States have fluctuated based primarily on public attitudes. As human populations increased and information on black bears improved, stricter hunting regulations have been enacted. Black bear status has evolved from predator to game animal to big-game animal to trophy game animal. Bear management has always been strongly influenced by livestock interests. In recent years, other public sectors have asserted their influence on black bear management.

There was no mention of bears in the 1899 Game and Fish Law of Wyoming, the earliest document reviewed. A 1903 State Game Warden Report stated it was a misdemeanor to hunt, kill or trap bears upon any of the National Forest Reserves in the State except during the open

game (ungulate) season which ran from September 15th to November 15th. As implied in 1903, and specifically stated in 1937, bears were classified as game animals on most of the National Forests and in the Black Hills. They were classified as predators throughout the remainder of the state. Game animals could not be trapped or hunted with dogs without the approval of the local game warden. Predatory animals could be taken at any time by most means. Except where otherwise indicated, bear hunting seasons corresponded to the elk and/or deer-hunting season. A resident or nonresident elk and/or deer license holder could kill one bear annually. Until 1968, Commission regulations made no distinction between black and grizzly bears (*Ursus arctos*). Historically, a property owner, employee or lessee was able to kill any black bear doing damage to private property. In 1981, a mandatory check by Department personnel of any harvested black bear was established to document take and increase the amount of biological data to assist in monitoring age and sex structure of the harvest.

Wyoming's 1994 Black Bear Management Plan (Wyoming Game and Fish Dept. 1994) precipitated several changes in regulations. Black bear management units (BMUs) were developed and hunt area boundaries were modified (Figure 1) so that data could be collected and assessed by discrete bear population. Female mortality quotas were established to limit the harvest of females in recognition of the key role females play in population regulation. Baiting continued to be allowed, but the number of baits was restricted to one per section. All bait sites on federal and state lands, including lands owned and/or administered by the Wyoming Game and Fish Commission, were required to be registered at Regional offices of the Department.

Appendix A provides a chronological summary of black bear regulations in Wyoming from 1903 to 2006.

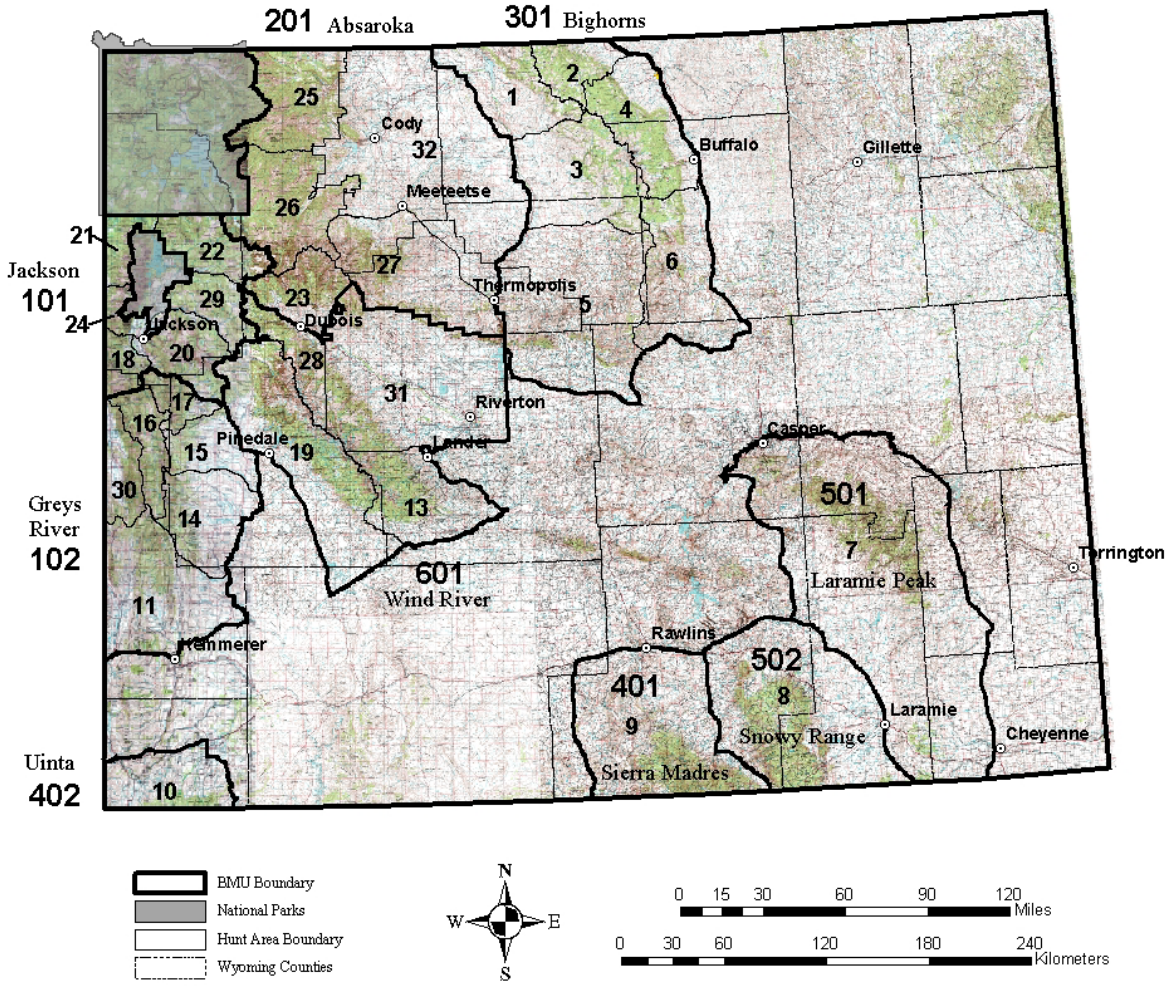

Figure 1. 2007 black bear management units (BMU) and hunt areas in Wyoming.

LIFE HISTORY

Black bears are found in forested areas of all major mountain ranges in Wyoming. Populations are presumed highest in northwestern Wyoming, where higher seasonal moisture creates more abundant forage. The Bighorn Mountains in northern Wyoming also contain a robust black bear population. The Snowy, Sierra Madre, Laramie Peak, and Uinta mountain ranges of southern Wyoming all contain black bear populations, although in lower densities.

Black bears range in color from blond to black in Wyoming. Light brown, chocolate brown and cinnamon are common colorations. Combinations of color phases can occur, such as light brown body with darker brown legs. Weights of 57 adult male and 39 adult female black bears captured during Department research and damage operations from 1988 – 2005 ranged from 120 to 440 pounds (average 248 pounds) for males and from 85 to 250 pounds (average 160) for females.

Black bear ages and the reproductive efforts of females can be determined by analyzing the annual rings of cementum deposited on teeth as bears age (McLaughlin et al. 1990, Coy and Garshelis 1992, Harshyne et al. 1998, Costello et al. 2004). Based on Department analysis of

teeth from 384 female black bears harvested in Wyoming from 1988 – 2005, the average age of first reproduction of female black bears is 5.2 (Table 1). These data show that by their 5th summer, 70% of female black bears have produced a litter (Figure 2). Using the same cementum annuli technique, the average of 632 birth intervals of the 384 females was 2.2 years (Table 1). Although in more productive habitats female black bears may produce up to 5 cubs per litter, females usually produce between 1 and 3 cubs per litter in Wyoming. Mean litter production from 16 female black bears handled in winter dens from 1995 – 2005 was 1.9 cubs per litter. The young will stay with the female into their second year until the spring/summer breeding season when they will disperse and she will breed again.

Table 1. Average age of first reproduction and birth interval for female black bears harvested in Wyoming, 1988 – 2005.

	Age of 1st Reproduction		Birth Interval (yrs)	
BMU	Mean	*n*	Mean	*n*
Jackson – 101	5.2	94	2.2	163
Grey's River – 102	5.0	67	2.2	96
Absaroka – 201	5.5	73	2.3	151
Bighorns – 301	5.1	59	2.2	92
Sierra Madre – 401	4.8	5	2.7	3
Uinta – 402	5.0	2	2.0	1
Laramie Peak – 501	5.4	12	2.3	14
Snowy Range – 502	5.2	17	2.1	25
Wind River – 601	5.2	54	2.2	82
Statewide Avg.	5.2	384[a]	2.2	632[b]

[a]Statewide average age of 1st reproduction includes 1 female harvested outside established BMU boundaries.
[b]Statewide average birth interval includes 5 intervals from female harvested outside established BMU boundaries.

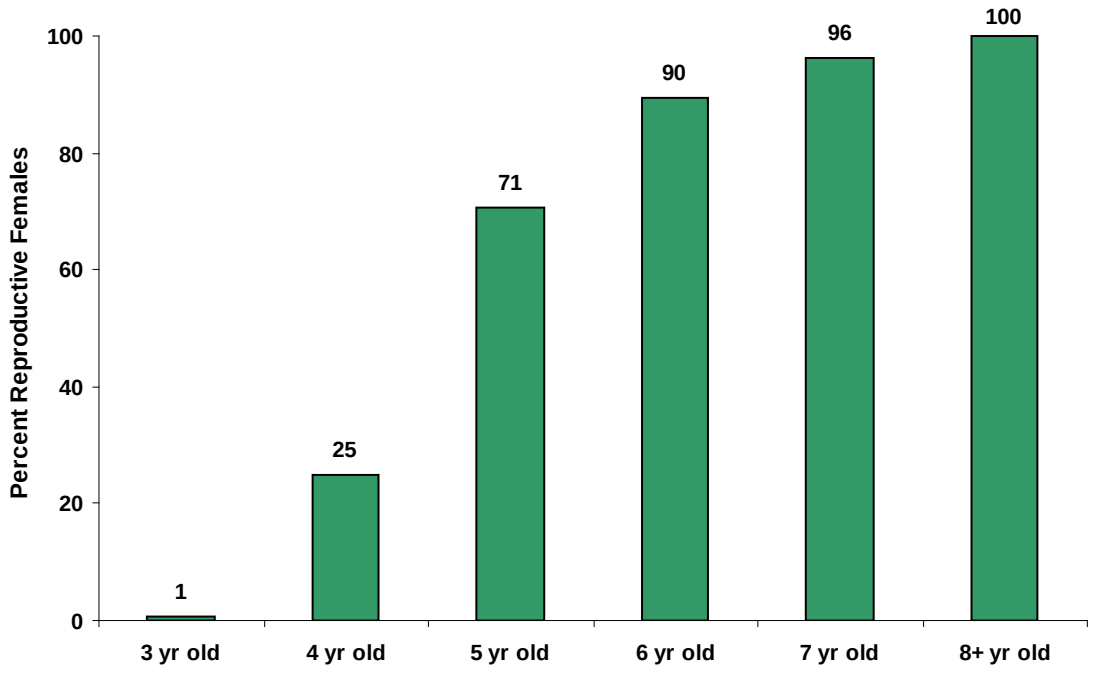

Figure 2. The cumulative percent of the age of first reproduction of female black bears in Wyoming. Data are from 384 female black bears harvested in Wyoming, 1988 – 2005.

Female black bears are first to enter dens in fall, usually in October. Males enter dens later, with all but a few adult males denned by late November. Adult males are first to leave dens in spring, usually in late March to early April, with females with newborn cubs the last to leave, usually in late April or early May (Beecham and Rohlman 1994, Grogan 1997, Costello et al. 2001).

Black bear food habits vary widely with season and location. In the Rocky Mountain West, black bears emerging from dens consume early season grasses and forbs. As temperatures rise, they follow snowmelt to higher elevations focusing on newly greening vegetation (Beecham and Rohlman 1994). When more nutritious late summer and fall mast crops (berries and nuts) ripen, black bears focus intently on these foods (Beecham and Rohlman 1994, Costello et al. 2001). Ants, bees, and larvae make up the majority of non-vegetation diets of black bears (Beecham and Rohlman 1994). However, during early summer, newborn ungulates such as elk calves become a key food source for black bears in the West (Smith and Anderson 1996, Zager et al. 2005, Zager and Beecham 2006). Managers should consider potential effects of black bear predation on depressed ungulate populations and may maintain black bears at lower density in specific hunt areas when it has been documented they are known to depress an ungulate population. Irwin and Hammond (1985) found that, depending upon annual and seasonal variation, 83–94% of the volume of black bear diets in the Grey's River area of western Wyoming consisted of vegetable matter. The bulk of remaining animal matter came from carrion in spring and insects in summer and fall.

Black bear populations are very susceptible to changing environmental conditions. Significant reproductive declines have been documented in association with failure of preferred black bear food crops (Beecham and Rohlman 1994). Costello et al. (2001) also documented increased harvest and higher proportions of females in the harvest in years of oak mast crop failure in New Mexico. Wyoming harvest and damage data also show that numbers of black bear incidents in Wyoming and numbers of black bears killed during the hunting season increase during very dry years and years of poor production of critical bear foods, especially fall mast crops, as bears move greater distances in search of food, sometimes in human-inhabited areas.

HABITAT PROTECTION/MANAGEMENT

The distribution and abundance of black bears is somewhat limited in Wyoming. Black bears primarily utilize habitats on lands administered by USFS, NPS, and BLM, although some habitat does exist on private lands, either directly adjacent to public lands or along riparian habitats. Suitable habitat in Wyoming is typically more arid than in other western states. As such, the production and availability of preferred bear foods is lower, resulting in larger home ranges and lower bear densities (Mack 1988, Goodrich 1990, Beck 1991, Beecham and Rohlman 1994, Grogan 1997). Although black bear densities in some areas of Wyoming appear to be lower than surrounding states (Beecham and Rohlman 1994, Beck 1991, Grogan 1997), it appears black bears in Wyoming are meeting their nutritional requirements as age at first reproduction, breeding interval, cub production and body weight are comparable to other western states (Jonkel and Cowen 1971, Beecham and Rohlman 1994, Costello et al. 2001). Grizzly bears occupy some portions of Wyoming that also support black bears. Holm (1998) found that while there is overlapping use of available habitats by both species, different activity patterns (diurnal and nocturnal for black and grizzly bears, respectively) permit both species to use available habitats within common areas.

It is important to identify and manage important black bear habitats to maintain or increase their value to black bears. Holm (1998) found that black bear home ranges and core use areas contained proportionally less non-forested habitats and more lodgepole pine and spruce-fir than expected in northwest Wyoming. Grogan (1997) found black bears in the Snowy Range of south-central Wyoming used proportionally more non-timbered habitats and lodgepole pine than was expected. Spruce-fir habitats were used in proportion to availability. The authors felt high use of non-timbered areas actually occurred along the edge of timber/meadow habitats. Bears avoided open habitats lacking hiding cover.

Healthy stands of timber, especially lodgepole pine and spruce-fir in different stages of succession, are essential to provide suitable habitats for black bears. These habitat types provide forage, cover and bedding areas. The Department should encourage land management agencies to consider the needs of black bears in any habitat alteration or modification projects. Clearcuts should be restricted to less than 10 acres in size on north and east facing slopes to maximize benefits to bears (Irwin and Hammond 1985). Cover strips should be maintained between cuts to promote use of these areas until suitable hiding cover develops, 15-20 years post cutting (Lindzey and Meslow 1977, Young and Beecham 1986). Negative impacts to important bear habitats may be more detrimental to bear populations than man-induced mortalities, particularly

if the impacts are irreversible. The Department should continue to encourage land management agencies to maintain average road densities of one mile per square mile of habitat or less for optimum bear use. This goal is identical to standards the Department requests for elk and grizzly bears.

The Department will continue to coordinate with appropriate federal, state and county governments in an effort to conserve habitats occupied by black bears. Conservation of black bear habitat on private lands will also be encouraged.

POPULATION MANAGEMENT

Because of the difficulty in observing black bears, estimating their abundance is an ongoing management challenge. Therefore, Wyoming, along with most other states, uses proportions of sex and age classes in the annual harvest to monitor trends in black bear populations. These data can be effective in revealing population trends over a five-year period or longer, but are not effective in determining annual changes, due to differences in survival and birth rates associated with seasonal or annual food availability (Beecham and Rohlman 1994, Costello et al. 2001).

All reported black bear mortalities in Wyoming are recorded by the Department using a Black Bear Mortality Record form (Appendix B). This form provides information on type of mortality, location, hunter identification and activity and bear sex, age and condition. The form will continue to be used to record all black bear mortalities in Wyoming. The form has been modified several times since the Department began recording black bear harvest and will continue to be changed during the life of this plan as data requirements change.

Age and Sex of Harvested Bears

The technique of counting annual rings in cementum of bear teeth is a reliable method for determining ages of black bears (Harshyne et al. 1998, Costello et al. 2004). This is especially true for bears less than five years of age. For bears five years of age or older, errors increased with the age of the bear (McLaughlin et al. 1990, Harshyne et al. 1998, Costello et al. 2004). Since most female black bears in Wyoming do not reproduce until their 5^{th} year, classification of females into subadult (non-reproducing) and adult (reproducing) age classes using cementum annuli is quite reliable. Therefore, all female black bears age five and over are considered adults for the purposes of Department harvest data analyses.

While male black bears may reach sexual maturity earlier than females, young males often do not contribute to the breeding effort due to competition with older males (Beecham and Rohlman 1994, Garshelis and Hellgren 1994). Many states do not classify black bears into adults and subadult for the purposes of management; however, Montana (Olson 2005), Idaho (Idaho Dept of Fish and Game 1998) and New Mexico (Costello et al. 2001) classify male and female bears age five and older as adults. In addition, the harvest criterion for male black bears was based upon males five years and older (Idaho Dept. of Fish and Game 1998). Therefore, all male black bears five and older will be considered adults.

Department black bear harvest regulations state that all bears may be legally harvested except for cubs and female black bears with cubs at side. The definition of a cub in the regulations is any bear less than one year old. Yearling black bears disperse from their mothers during the spring or early summer (Beecham and Rohlman 1994). Therefore, all bears older than one year of age are considered independent.

Management Criteria

The Department has been recording black bear harvest data in Wyoming since 1979 (Figure 3). Since that time, annual harvest mortality has ranged from 124 in 1979 to 331 in 2002. In addition, all other black bear mortalities identified by the Department are recorded and used in assessments of human-caused mortality. However, these numbers alone tell us very little about the status of the black bear population in Wyoming, or more importantly, the trend of the population. Therefore, more detailed analyses of harvest data are necessary to evaluate the status of Wyoming black bear populations.

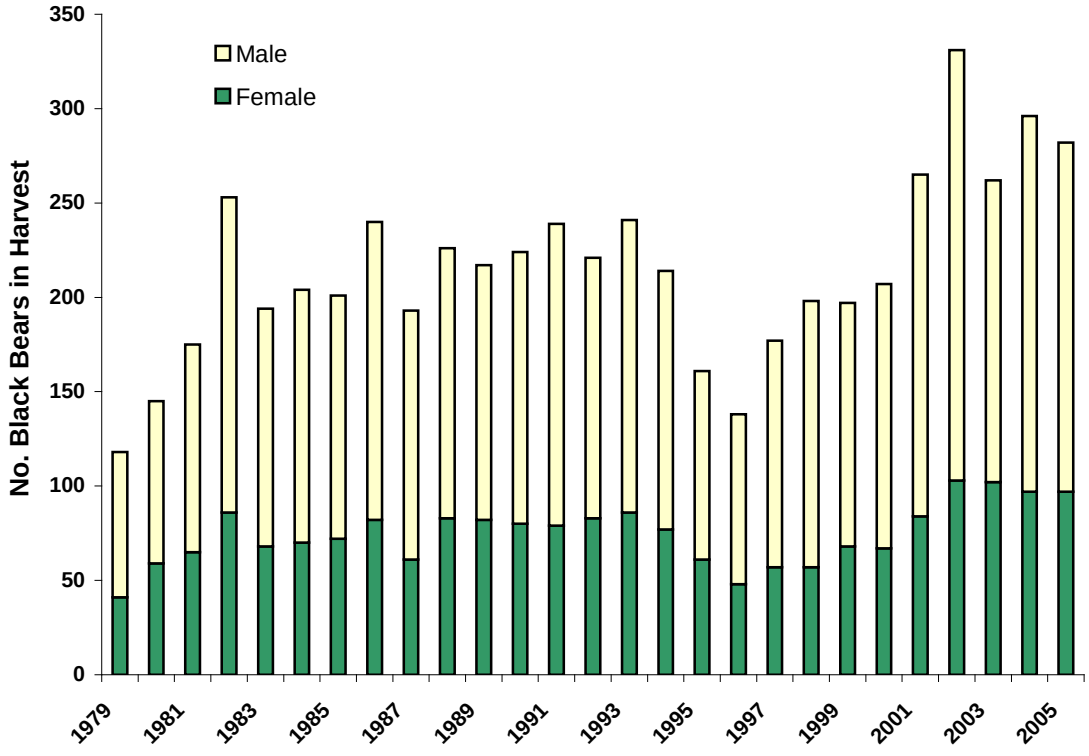

Figure 3. Total hunter harvest mortality for male and female black bears in Wyoming, 1979 – 2005.

To provide hunting opportunity and continue to maintain healthy black bear populations, management strategies are intended to focus harvest on male black bears and protect adult

females. It is well documented that there is a range of vulnerability of black bears to hunter harvest (Bunnell and Tait 1980, Harris 1984, Kolenosky 1986, Beecham and Rohlman 1994, Koehler and Pierce 2005). The bold behavior and larger home ranges of adult males make them more likely to encounter hunters and thus, they are most vulnerable to harvest (Bunnell and Tait 1980, Beecham and Rohlman 1994). Subadult males are more vulnerable than subadult females because they tend to disperse farther from their natal home range (Beecham and Rohlman 1994, Costello et al. 2001). Adult females are least vulnerable to harvest due to their more cautious behavior, smaller home ranges and potential to be accompanied by cubs (Beecham and Rohlman 1994). Females accompanied by cubs are protected under Department regulations.

Because adult male black bears are most vulnerable to hunting, monitoring the percent of adult males in the harvest should provide data on the level of harvest of the population. A high proportion of adult males in the harvest may indicate a lightly harvested population, whereas a low proportion of adult males may indicate higher harvest where adult males have been depleted and younger males predominate (Beecham and Rohlman 1994). This criterion is a more sensitive indicator of black bear population levels than median age (Idaho Dept. of Fish and Game 1998). The mean percent of adult males in the harvest in relatively stable populations in Idaho (Beecham and Rohlman 1994) and New Mexico (Costello et al. 2001) under moderate to high harvest levels was 30% and 28%, respectively. Therefore, 25% to 35% adult males in the harvest indicates a stable black bear population (Table 2). Levels lower than 25% indicate a higher level of harvest, which has reduced the adult male segment of the population. Levels higher than 35% indicate a lighter harvest level. The percentages of adult males in the Wyoming harvest from 1979 – 2005 are summarized in Appendix C.

As harvest levels increase and additional adult and subadult males are removed from an area, the proportion of females in the harvest begins to increase (Fraser et al. 1982, Kolenosky 1986, Beecham and Rohlman 1994). Monitoring the proportion of females in the total harvest is another effective method of assessing the level of bear harvest. The average percent females in the harvest of black bear populations under moderate and high hunting pressure in Idaho (Beecham and Rohlman 1994) and New Mexico (Costello et al. 2001) was 35% and 40%, respectively. Beecham and Rohlman (1994) suggest a desired proportion of female harvest of 35% to maintain a stable population. Therefore, a range of 30% to 40% females in the total harvest will indicate a stable black bear population in Wyoming (Table 2). Proportions higher than 40% will suggest reduction of the number of females in the population. Monitoring this criterion will help ensure a stable reproductive portion of the population and maintain the ability of the population to rebound in the event of a decline due to environmental factors. The percentages of females in the hunter harvest in Wyoming from 1979 – 2005 are summarized in Appendix C.

With increasing harvest of a black bear population, younger females are removed and older females become more common in the harvest. Thus, the proportion of adults in the female harvest will rise with harvest rates, increasing mean age of females in the harvest (Kolenosky 1986, Beecham and Rohlman 1994). This phenomenon is especially important with late-reproducing species like bears, since removing adult females has the enhanced effect of not only reducing the number of bears in the population, but also decreasing reproductive potential of the population and, thus, its ability to respond to declines. The delayed response of slow

reproducing populations to reductions was noted by Harris (1984) and was demonstrated in modeling efforts by Miller (1990), who predicted black bear populations reduced by 50% would take an average of 17 years to recover if hunting pressure was reduced by 25%.

The percent of adults in the female harvest, rather than a mean or median age of the females in the harvest, will be used to gauge the overall age of harvested females. Averaged over a three-year period, this criterion will provide a more meaningful measurement of female harvest age structure, especially in areas with small sample sizes. The mean percent of adult females in the harvest of two New Mexico black bear populations under moderate and high harvest pressure was 55% and 70%, respectively (Costello et al. 2001). The mean percent adult females in the Wyoming statewide female black bear harvest from 1994 (year of female quota implementation) through 2005 was 47%, with a range of 32% – 57% (Appendix C), suggesting that 45 – 55% adult female harvest provides a stable proportion of adult females (Table 2). Additional data on the proportion of adults in the female harvest in Wyoming from 1979 – 2005 are given by BMU in Appendix C.

Harvest criteria (Table 2) will take advantage of the different sex and age class harvest vulnerability to help determine trend of black bear populations in Wyoming. Because the criteria were based on vulnerability to hunter harvest, only legally harvested black bears will be included in the harvest criteria analyses. These criteria will reflect changes in the overall black bear population in relation to harvest. However, they should be viewed as thresholds and are not meant to indicate a linear relationship between changes in harvest and changes in the population. For example, a 20% reduction in the proportion of adult males in the harvest for a particular BMU does not necessarily mean that the population has been reduced by 20%. It does indicate that harvest is at a level that is limiting adult males, the most vulnerable cohort of the population. As long as harvest continues to be relatively light, harvest composition may still consist of predominantly males and limitation of females in the population may not occur. However, under higher hunting pressure, the number of adult and subadult males will be reduced and the proportion of females in the harvest will begin to increase. Continued harvest at high levels will begin to reduce the subadult female cohort until the next threshold is met and the proportion of adults in the female harvest begins to increase.

Table 2. Harvest criteria for Wyoming black bear management. Criteria will be evaluated on a 3-year running average.

	Population Objective		
Criteria	**Population Reduction**	**Stable Population**	**Population Increase**
Percent Adult Males in Total Harvest	< 25%	25 – 35%	> 35%
Percent Females	> 40%	30 – 40%	< 30%
Percent Adult Females in Female Harvest	> 55%	45 – 55%	< 45%

These criteria should not be assessed independently, but viewed collectively as a composite of the harvest level for a given BMU. For instance, looking only at a reduced percentage of adult males in the harvest may indicate a population is moving from light to moderate harvest. However, evaluating the other criteria may show an increased proportion of females and higher proportion of adult females in the harvest, indicating a much higher level of harvest than looking at males alone. Alternatively, a high percentage of adults in the female harvest, assessed independently, would indicate population reduction. However, when the percent adult males and percent females in the harvest are both in the population increase or stable range, the population might actually be thriving. This situation might occur when the BMU in question is adjacent to an area providing a source of immigrating black bears. Looking at either criterion independently would give very different results than when considering them together. In addition, monitoring more traditional harvest statistics such as the success rates of hunters as well as hunter effort and days of hunting per bear harvested are useful in understanding harvest levels as they relate to population trends.

Source areas can be defined as areas of suitable habitat with little to no human-caused mortality that may provide dispersing bears to surrounding areas (Beecham and Rohlman 1994, Powell et al. 1996). Proximity to these source areas may alter the interpretation of some harvest data, especially the proportion of adult males in the harvest. Areas adjacent to sources may have a lower proportion of adults in the harvest due to subadults dispersing to occupy vacant home ranges of harvested bears. These areas may also be able to rebound more quickly from overharvest (Beecham and Rohlman 1994). These dispersing subadult males may also supplement surrounding populations and absorb much of the harvest to the point where female harvest remains low and adult females comprise a higher proportion of the population. However, if the area is not near a source and population reduction occurs, it may not be repopulated by immigrating subadult females because of their inability to disperse over long distances. These areas are especially susceptible to reductions in population due to human-caused mortality. This effect has been documented in Idaho, Alaska, Virginia, and Arizona (Beecham and Rohlman 1994) and may be particularly relevant in some areas of Wyoming where black bear populations are isolated in peninsular or island mountain ranges with little immigration.

In order to better evaluate harvest data, black bear quotas and seasons are set for three-year periods. This process allows for a more complete analysis of the effects of harvest by holding dates and quotas the same for each three-year season cycle. In addition, in order to increase harvest data sample sizes and reduce the influence of abnormally high or low harvest rates due to environmental or other factors, three-year running averages will be used in harvest data analyses rather than analyzing annual data independently. While the evaluation of harvest criteria will occur every three years and will be analyzed on a three-year average, data from the previous 10 years (two black bear generations) or longer should be analyzed to illustrate longer-term trends in harvest and related population trends.

Harvest criteria will be assessed at the BMU level, with each BMU management objective set to achieve the criteria for reduced, stable, or increasing black bear numbers. Each Department region has the option to choose a management strategy that best suits the biological and social needs of black bear management for each BMU. However, because of their particularly low

reproductive rate, black bear populations cannot sustain high harvest levels over a prolonged period. Research has shown that high harvest levels can quickly reduce black bear populations to levels where severe reductions in harvest quotas and season lengths may be necessary for greater than 10 years for full recovery of a population (Miller 1990, Beecham and Rohlman 1994). Therefore, when the three-year average black bear harvest criteria for a BMU indicate heavy harvest of ≥ 50% females in the total harvest and ≥ 60% adult females in the female harvest for two of the three years of the three-year season cycle, local managers should develop season proposals to reduce or stabilize harvest for the next cycle. This will allow for maintenance of a lower density, but still viable black bear population.

The overall goal of black bear management in Wyoming is to sustain black bear populations throughout all suitable habitats while maintaining recreational opportunity and managing black bear damage. Managers should consider potential effects of black bear predation on depressed ungulate populations and may maintain black bears at lower density where they are know to depress ungulate populations. Under this guidance, local managers will be responsible to select and justify the appropriate population objective after considering the black bear population status, public input, and issues of black bear damage management. These objectives may be met by altering quotas, season length, or season timing. Final approval rests with the Wyoming Game and Fish Commission. Once chosen, justified, and approved, a BMU population objective and the resulting harvest criteria will be assessed using three-year running average data during the black bear season-setting cycle. The trophy game section will conduct preliminary analyses and interpretation. Using this input, local managers will prepare hunting season recommendations.

Quotas

Prior to 1994, there was no limit on the total number of bears of either sex that could be harvested by hunters. Harvest was limited by the length of the season and the annual bag limit of one bear per person. With implementation of the female quota system in 1994, each BMU is allotted a specific number of female black bears that can be taken in each year. This total is divided between spring and fall seasons and, in some BMUs, among hunt areas within the BMU. Hunters are required to submit the skull and hide of any black bear harvested to a Department official for registration within 72 hours of the kill. Department personnel record all bears harvested. When the female quota for that hunt area or BMU is filled, the season closes in that hunt area or BMU. Hunters are responsible for calling a Department hotline to check for closed areas before hunting.

Currently, the Department sets female harvest quotas for three-year periods. Harvest data are evaluated annually and at the end of the three-year period, quotas may be changed to meet the objective of the hunt area or BMU. The female quota system has given the Department better ability to control harvest of female black bears. This ability, and the use of harvest criteria, public input, and black bear damage management allows for better data analysis and more effective management of black bears in Wyoming. Therefore, the Department will continue the female quota system for black bears.

Depending upon annual environmental conditions, non-harvest black bear mortality can contribute a significant proportion of the total human-caused mortality for a black bear population. From 1979 – 2005, annual non-harvest human-caused mortality (damage removals, human interactions, and road kills) accounted for between 0% and 9.8% (mean = 3.2%, *n* = 0-28) of the total human-caused black bear mortality of independent age bears (> 1 year). For independent age females, the range was also between 0% and 9.8% (mean = 2.3 %, *n* = 0-9) of all human-caused female mortality. To appropriately manage black bear populations, the impacts of all forms of human-caused mortality should be included in management decisions. Therefore, all human-caused mortality of independent-age females will be considered when assessing population trends and will be taken into account when developing female annual mortality quotas. They will not be included in the harvest criteria analyses, which only includes legally harvested bears, and will not count against annual female harvest mortality quotas. Current female mortality quotas are based exclusively on legal and illegal harvest mortalities.

Mortality Density

The amount of human-caused mortality in relation to the amount of suitable habitat available can be another method to gauge impacts of human-caused mortality on black bear populations. This can be useful in illustrating impacts on a more local scale and standardizing mortality between BMUs with varying habitat suitability. The number of human-caused mortalities of independent age black bears in each hunt area for the past 10 years (1996 – 2005) was divided by the area of suitable habitat for each hunt area using Gap Analysis Program (GAP) GIS data (Gap Analysis Program, Reston, Virginia, http://gapanalysis.nbii.gov) to produce a density of human-caused mortality (Table 3). For this analysis, suitable habitat was subjectively defined as any forested habitats within a BMU where a black bear could be expected to be found. Areas of pinyon/juniper and shrub communities were not considered suitable. There was no attempt to divide these habitats into high and low quality.

While there are few reference values for human-caused mortality density in the literature, these values may be used to assess relative trends of harvest in each hunt area through time. Evaluating densities in relation to published population densities for black bears throughout the Rocky Mountain West gives some context with which to interpret these data. Beck (1991) estimated a density of 8 bears/100 km^2 in western Colorado, Beecham and Rohlman (1994) presented estimates of between 31 and 77 bears/100 km^2 in the more productive habitats of Idaho, Grogan (1997) estimated densities in the Snowy Range of southern Wyoming at 2.5 to 2.8 bears/100 km^2, and Costello et al. (2001) estimated densities between 9.4 and 17 bears/100 km^2 in New Mexico. If we assume a prolonged 10% harvest is possible for the above estimates this suggest harvest densities of 0.3 bears/100 km^2/year in the Wyoming Study to 1.7 bears/100 km^2/year in the New Mexico study.

Miller (1990) demonstrated that under optimal conditions of reproduction and survival, maximum sustainable mortality for black bears could be as high as 14.2%. However, due to drier habitats, optimal reproduction and mortality conditions do not likely occur in Wyoming. Therefore, assuming a more conservative 10% sustainable mortality for Wyoming and using the above bear density estimate from above yields estimates of sustainable harvest density of 0.3

bears/100 km^2/year to 1.7 bears/100 km^2/year, depending upon habitat quality and the overall population density. This range may be useful in gauging current human-caused mortality levels.

Table 3. The average annual density of human-caused black bear mortality in Wyoming. Data are based on all locations of human-caused mortality of independent age bears from 1996 – 2005.

BMU	Hunt Area	Area of Suitable Habitat (km^2)	Mortality Density (bears/100 km^2/year)
Jackson – 101	Overall Avg.	5875	0.9
	18	571	1.1
	20	1396	0.9
	21	714	1.6
	22	1653	0.3
	24	353	2.0
	29	1189	0.7
Grey's River – 102	Overall Avg.	4381	1.0
	11	1402	0.5
	14	600	1.2
	15	443	0.5
	16	886	1.2
	17	568	1.3
	30	483	2.3
Absaroka – 201	Overall Avg.	7331	0.5
	23	1033	0.1
	25	2126	0.7
	26	2266	0.2
	27	1446	0.6
	32	461	1.1
Bighorns – 301	Overall Avg.	4573	0.9
	1	386	2.2
	2	564	2.9
	3	842	0.5
	4	1565	0.5
	5	468	0.2
	6	749	0.3
Sierra Madre – 401	9	1621	0.7
Uinta – 402	10	459	0.1
Laramie Peak – 501	7	2904	0.3
Snowy Range – 502	8	2403	0.5
Wind River – 601	Overall Avg.	5033	0.8
	13	1154	1.0
	19	1986	0.8
	28	677	1.3
	31	1215	0.2

Seasons

The timing and length of hunting seasons can have an effect on sex and age of black bears harvested. Males are more vulnerable in early spring seasons because they are first to leave their winter dens. As the season progresses, adult females become more available for harvest (Figure 4). Generally, fewer bears are taken in the fall season and, thus, fewer total females (1994 – 2005 spring avg. = 42.5, fall avg. = 30.9). However, female black bears are more active throughout fall and most fall bears are harvested incidental to other hunting activities and without the use of bait. This results in a higher proportion of females in the harvest during fall (spring avg. = 31.4%, fall avg. = 37.1%, Chi-square $p = 0.0062$) and higher vulnerability to harvest throughout the season (Figure 4). Carefully managed, spring and fall black bear seasons can provide an opportunity to hunt bears over an extended period while minimizing risk to the population. Thus, the Department will continue to provide black bear hunting opportunities in both spring and fall seasons.

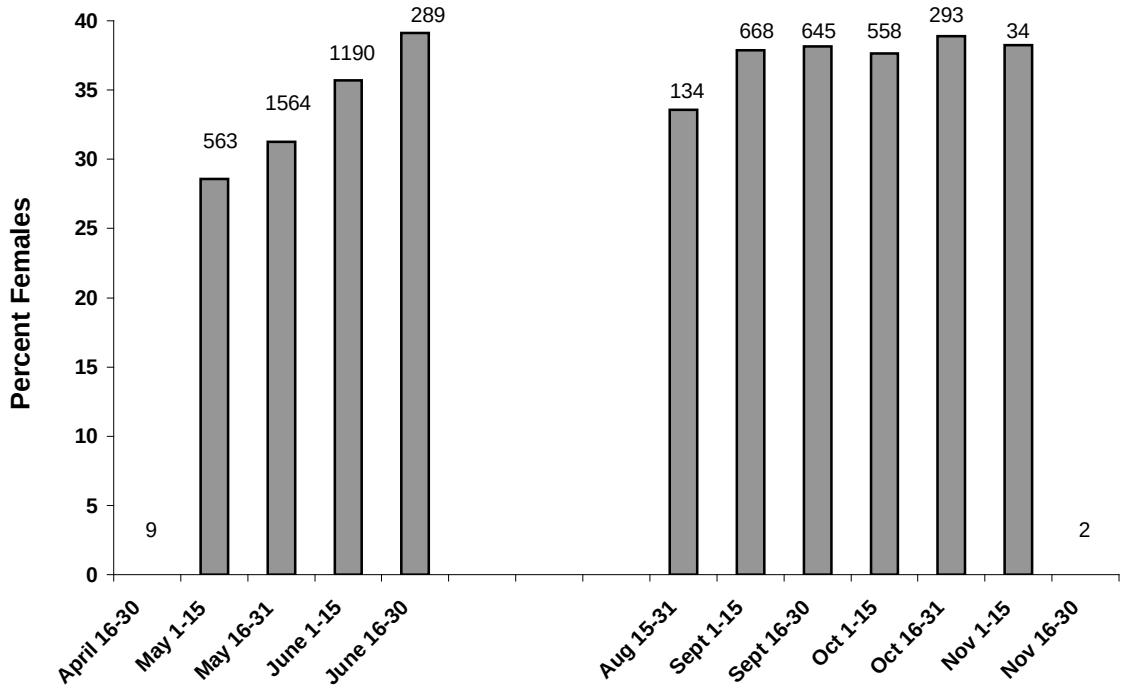

Figure 4. Percent of legally harvested female black bears in the Wyoming black bear harvest by 2-week period, 1994 – 2005. Numbers above each period represent the total number of bears harvested in each period.

Hunting with Bait

The use of bait for black bear hunting in Wyoming is defined by the Game and Fish Commission as "placing or utilizing a processed bait or an unprocessed bait as a lure or attractant for the purpose of taking black bear." In Wyoming, processed bait is defined as "a nontoxic, biodegradable substance". Unprocessed bait is defined as "livestock or livestock parts that have

not been processed for human consumption, or wildlife or wildlife parts" that are not prohibited game animals or protected animals. Chemicals used as attractants or masks are not considered bait. In Wyoming, 57% of black bears are taken using baits. However, bait is most commonly used in the spring season, where 81% of bears are taken using bait. In the fall season, only 18% of bears are taken with bait.

Baiting is currently permitted in all hunt areas except those within and surrounding the Grizzly Bear Primary Conservation Area in northwestern Wyoming. In addition, baiting is prohibited in all designated wilderness areas on U.S. Forest Service lands in Wyoming. Processed baits are not permitted in most northwestern Wyoming hunt areas where baiting is allowed. Additional baiting restrictions are listed in annual black bear hunting regulations.

Because female bears leave dens later in spring than males and tend to be less bold, and because of the potential for greater hunter selectivity with baits, fewer females are harvested while hunting with bait (Litvaitis and Kane 1994). Harvest data from Wyoming show a smaller percentage of females in the harvest and adults in the female harvest are taken using baits in most BMUs (Table 5). Therefore, the Department will continue to allow baiting for black bears in areas where it is currently allowed.

Table 5. Percent females in the total harvest and percent adults in the female harvest taken in Wyoming with and without bait, by BMU, 1994 – 2005.

BMU	Baiting Status	*n*	Percent Females	Percent Adult Females
Jackson-101	Bait	221	29.0	50.8
	No Bait	339	36.0	58.2
Grey's River-102	Bait	346	33.5	40.9
	No Bait	160	37.5	47.4
Absaroka-201	Bait	80	40.0	50.0
	No Bait	340	34.1	63.1
Bighorns-301	Bait	347	31.7	38.2
	No Bait	100	43.0	48.8
Sierra Madre-401	Bait	84	28.6	33.3
	No Bait	41	34.2	7.7
Uinta-402	Bait	2	Insufficient Data	Insufficient Data
	No Bait	2	Insufficient Data	Insufficient Data
Laramie Peak-501	Bait	75	29.3	36.4
	No Bait	16	43.8	14.3
Snowy Range-502	Bait	101	29.7	44.8
	No Bait	29	37.9	60.0
Wind River-601	Bait	274	26.6	52.8
	No Bait	130	43.9	43.6
Statewide	Bait	1530	30.9	43.8
	No Bait	1156	37.3	53.0

BLACK BEAR DAMAGE MANAGEMENT

Black bears occasionally damage private property, kill livestock, and come into conflict with humans at dispersed campsites, cabins, and campgrounds. Wyoming statutes currently provide monetary compensation for damage to livestock, bees, honey, and hives caused by black bears (23-1-901) and allow a property owner, employee, or lessee to kill a bear causing damage to private property. They must immediately notify the nearest game warden of the kill and care for the hide.

Damage to sheep and beehives account for the majority of Department reimbursements since 1998, though the amount of payments fluctuates annually (Figure 6). Payments for cattle peaked in fiscal year 2000 and have decreased since that time. Horses accounted for most of the remaining reimbursements, but at a very low level, with the exception of fiscal year 2001. Payments in the "other" category include one guard dog and one swine.

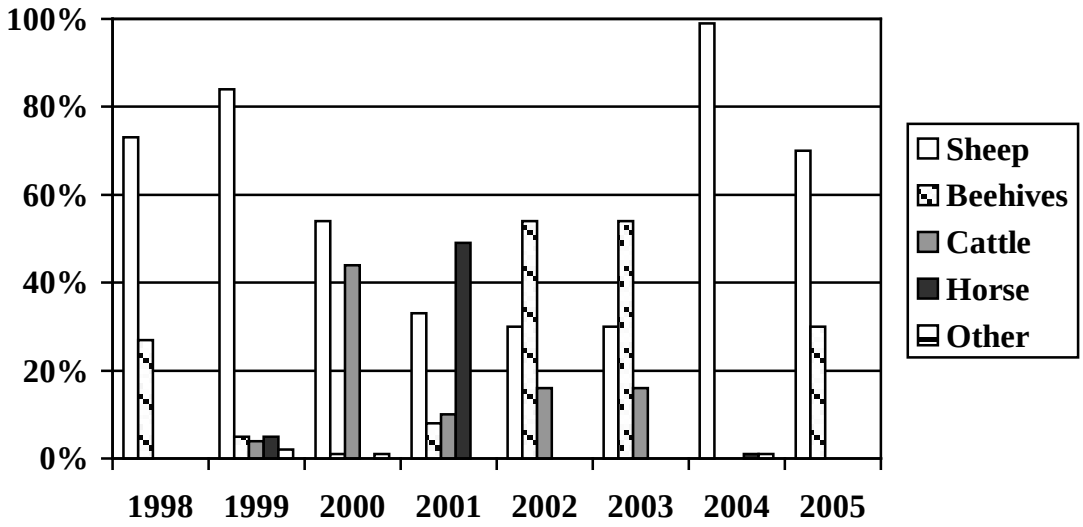

Figure 6. Percentage of damage compensation payments due to black bears by type, FY 1998-2005.

The total number of claims submitted to the Department for damages caused by black bears has also fluctuated over the last 20 years (Figure 7). While the number of claims has ranged between 5 and 24, there is an increasing trend over the same time period.

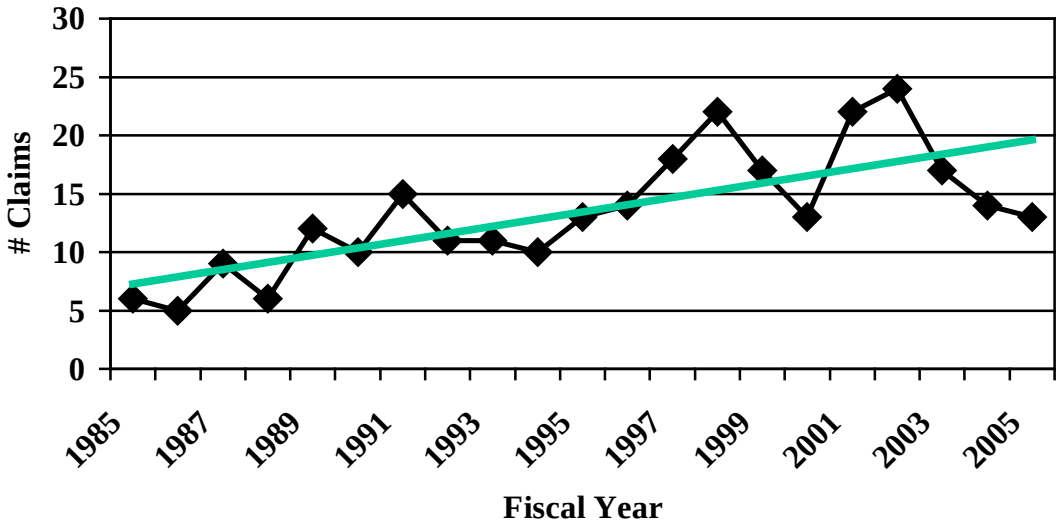

Figure 7. Trend in the number of damage claims submitted for black bear, 1985-2005.

As would be expected, the amount of compensation requested and final compensation payments from 1985 to 2005 have also increased when compared to the number of claims (Figure 8). Possible explanations for this increase are the adverse habitat effects resulting from prolonged drought conditions that have forced black bears to search for alternative food sources, increased human development and activity in black bear habitat, expanding black bear populations in some areas, and increased reporting of conflicts. Most increased damage is occurring in northwest Wyoming, especially the Jackson/Pinedale Region.

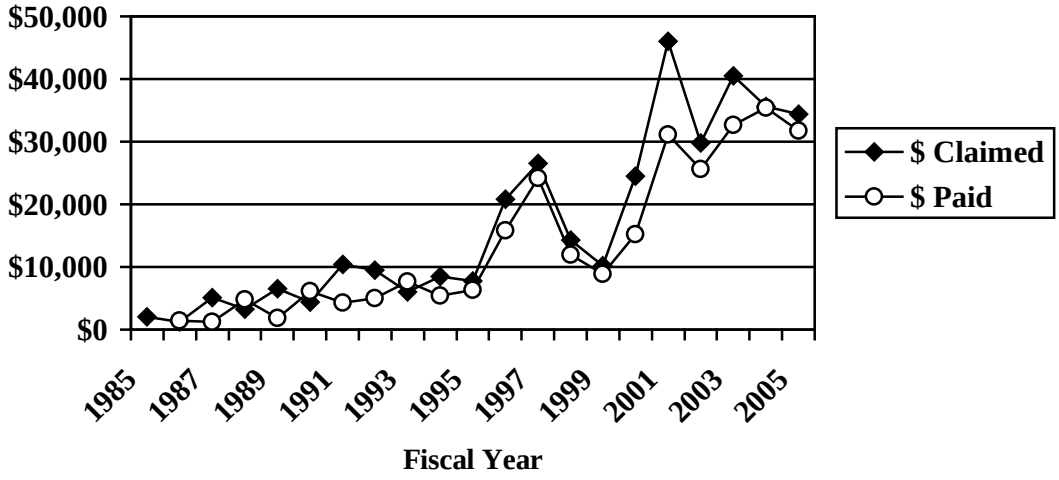

Figure 8. Black Bear damage claims versus payments, 1985-2005

There are several techniques available to the Department to manage conflicts caused by black bears, including no action, information and education, proper storage of food and/or garbage, repellents, electric fencing, aversive conditioning, translocation, and lethal removal. Selection of the appropriate technique depends on the type of conflict activity for a specific situation. All of these techniques have their specific pros and cons, but all should remain available to Department personnel.

The Department also utilizes personnel from Wildlife Services to assist in managing bear conflicts primarily associated with livestock depredation. For the most part, lethal control by either private property owners or agency personnel, trapping and transplanting, and electric fencing have been used by state or federal wildlife personnel to address livestock depredations by black bears. Licensed hunters are occasionally directed to areas with human/bear conflicts when problems occur during an open hunting season. The U.S. Forest Service and Department both provide educational materials and programs designed to avoid or minimize human/bear conflicts. The Department's primary goal is to minimize losses to private property, including livestock, while maintaining viable populations of black bears and hunting opportunities. Non-lethal control measures will be used whenever the techniques are appropriate and practical, while providing for public safety. Location, cause and severity of the incident, along with history, age, and sex of the offending animal will be considered prior to implementing a specific management action.

Where applicable, the Department may promote the establishment of regulations to reduce the potential for human/bear conflicts in areas with high incidences of conflicts. Both Teton and Park counties in northwestern Wyoming currently have guidelines to make new developments less prone to human/bear conflicts.

All Department human/bear conflict management actions will be conducted according to the protocols outlined in the "Statewide Protocol For Managing Aggressive Wildlife/Human Interactions" (Wyoming Game and Fish Dept. 1999). Additionally all conflicts will be documented in the Department's Trophy Game Incident Database.

INFORMATION AND EDUCATION

Recent experience with management of large predators suggests there is a high public interest that is often polarized. Therefore, management efforts are not likely to succeed without adequate public support. The Department has recognized the importance of these efforts. Information and education (I & E), along with public meetings, have been valuable in developing public consensus on management programs. Implementation of this plan will require similar I & E efforts if it is to be successful.

The Department contracted the Survey Research Center (SRC) at the University of Wyoming to conduct an attitude survey of bear hunters in 1992 (University of Wyoming 1992). Approximately 70% of respondents indicated they hunted bears in 1991. It's important to note that during the 1991 fall season a black bear tag was automatically included on an elk hunting license. Fewer than half of respondents (48.6%) hunted in the spring season and baiting was the

most prevalent means of hunting during this period. Success rates were five times higher in spring than in fall. Over 60% of hunters opposed eliminating the use of baits. Nonresidents were more willing to eliminate baiting than residents. Over 50% of bear hunters supported shorter spring seasons if it was necessary to reduce the female harvest and protect bear populations.

In 1994 the Department again contracted with SRC to conduct an attitude survey for Wyoming residents that included all residents, not just bear hunters (University of Wyoming 1994). This survey was conducted following the U.S. Forest Service's ban on issuing bait permits during the fall of 1993. The majority of the respondents were not hunters, and only half had ever hunted before. Approximately half of the respondents had no knowledge of black bear management or harvest strategies in Wyoming and were not aware of the controversy surrounding bear baiting and spring seasons. Only 37% were aware that most black bears harvested annually were killed in spring. Approximately 13% incorrectly thought it was legal to take two bears per year. Over half (53.2%) agreed or strongly agreed that black bear hunting should continue in Wyoming. One third (32%) felt that spring hunting should continue, but only 16% agreed that the use of baits should continue. Over 75% supported shortening the spring season to reduce take of females. Fewer than 5% of respondents were bear hunters.

Several comparisons can be made between the 1992 and 1994 surveys. Only 20% of black bear hunters favored elimination of baits for hunting, while 68% of the general public was in favor of eliminating baiting. Approximately 52% of black bear hunters supported shortening the spring season to reduce take of adult females, while 76% of general respondents supported shorter seasons.

These surveys clearly highlighted the need for improved education efforts to ensure widespread understanding of the issues associated with managing black bears in Wyoming. The Department should contract a similar survey in the near future to gauge the public's attitudes toward current black bear management and ascertain if they have changed since 1994.

The Department should focus future I & E efforts on management needs for black bears, management objectives and strategies, and how the public can reduce the potential for human/bear conflicts. These objectives can be accomplished by educating outdoor recreationists, homeowners, and other constituents to reduce conflicts with black bears. Several publications and videos have been developed and distributed to county libraries, Department Regional offices, and other sites throughout the state. The Department has worked closely with The Center for Wildlife Information to integrate this material into existing programs that have traditionally focused on grizzly bears. Black bear information has been included in the Department's "Living in Bear and Lion Country" workshops that are presented every spring around the state. These workshops include information on black bear biology and how to reduce human/bear conflicts. In an effort to reduce the mistaken identity take of grizzly bears, the Department developed a bear identification test on its web site. A brief introduction explains characteristics that differentiate black bears from grizzly bears and then allows the viewer to take an ID test. The public views the web site extensively. Additionally, the Department has modified several state regulations to improve negative public connotations associated with baiting, including restricting the amount and type of bait that can be used.

Management and removal of black bears in residential areas and garbage-related damage have increasingly become issues in some areas of Wyoming. In the Jackson BMU most non-hunter harvest mortalities are garbage related. To address this, the Department works with local communities and has instituted bear-wise community programs in some of the most impacted areas to educate the public on ways to prevent human/bear conflicts.

The Department will continue to utilize all the techniques described above to educate the public. As new or more refined techniques become available, they will be implemented, as warranted, by the Department.

FUTURE RESEARCH AND MANAGEMENT PRIORITIES

Future research priorities for black bear management in Wyoming should focus on testing the validity of current harvest criteria used to monitor population trends as well as develop new techniques that may more accurately measure population trends. Some of these techniques may include:

- **Population Estimation**
  Investigate the feasibility of using DNA hair snares in conjunction with harvest in a mark-recapture population estimate. Samples from individuals captured in DNA hair snares would serve as the "marks," while the DNA samples taken from harvested black bears would serve as the "recaptures." This technique has already been applied in Montana.

  Investigate the potential for using remote camera sets to estimate black bear population size or density. This technique could also be used in conjunction with previous techniques as a way to verify effectiveness.

- **Management Techniques**
  Investigate the feasibility of using DNA hair snares to determine sex and age composition of the standing black bear population and how it relates to sex and age composition of the harvest. While many studies have shown there is variable vulnerability to harvest by sex and age class, the harvest composition does not often reflect the composition of the population (Beecham and Rohlman 1994, Koehler and Pierce 2005). However, simple telemetry studies would not likely answer this question as the same sex and age class vulnerabilities to harvest also apply to capture (Koehler and Pierce 2005). While sex and age class heterogeneity still exists with DNA hair snares, it is usually less than capture or harvest and can be mitigated with higher hair snare densities (Boulanger et al. 2004).

  Investigate the potential of using cell telomere length as a method for aging bears (or other mammals) with hair samples. If proven to be valid, then a simple and less expensive analysis of hair samples could provide sex and age of bears and may be a more cost effective way to assess sex and age composition of black bear populations.

Complete the construction of a black bear aging guide to assist field personnel in accurately aging black bears checked in by hunters.

- **Habitat**
  Conduct capture and GPS collaring studies in various BMUs around the state in an effort to create a more detailed habitat suitability model and better understand black bear habitat use and how it varies between occupied habitats in Wyoming.

- **Adaptive Management**
  Adjust harvest levels in specific hunt areas to test proposed management criteria (e.g. raise or lower harvest quotas to examine predicted changes in harvest composition).

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APPENDIX A

Chronological summary of black bear management regulations in Wyoming.

1903-10 Bear hunting season established. Bear legal for any deer/elk license holder: September 15-November 15, on National Forests. Anytime elsewhere. No limit. Nonresident hunters must have a guide.

1911-20 Bear given game status in 1911. Nonresident bear license $10, allowed to kill bear with no closed season. Hunting license fees: Resident: $2.50, Nonresident: $50. Deer season: September 1-November 15. Bears could be taken by Biological Survey trappers as predatory animals.

1921-24 Nonresident bag limit 3 bear, September 15-November 15, on a Nonresident hunting and fishing license. Nonresident bear permit: $25, 3 bear anytime. Can use dogs. National Forest (NF) trappers permit: $5, hunt and kill bear. Bear separated from other predatory wild animals.

1925-28 Bear not included in game animal definition. Elk season: September 15-November 30.

1929-36 Black bear again given game status in 1929. Additional bear license (unlimited number). Resident hunting and fishing license: $5. Nonresident hunting and fishing license: $60, limit 1 bear. Special elk license: Resident: $2.50, Nonresident: $40 for 1929 and 1930. Season: September 15-November 15.

1937-38 Nonresident hunting and fishing license: $50. Special bear permit, 1 bear; Resident: $5, Nonresident: $25. Additional bear $4, limit 1 with Resident or Nonresident hunting or bear license. National Forest Resident trappers license allows taking any bear classed as a predatory animal, cost: $1. Bear a game animal on most national forests and Black Hills, all other areas a predatory animal. Game status, cubs and females with cubs protected. First spring and fall bear hunting seasons: April 15-June 15 and September 15-November 15. Dogs can be used only for predatory bear during the closed season with Game Warden approval. Washakie NF closed to bear hunting in 1938. Big Horn NF had separate spring and fall season: October 15-November 6.

1939 Additional Bear license discontinued. Bag limit: 2 for Nonresident special bear. Bear given statewide game animal status. Season dates: May 1-June 15 and September 15-November 15, except in Teton State Game Preserve and Big Horn NF (fall season only: September 15-November 15).

1940-44 In 1940, the spring black bear season opened April 15; April 1 in 1941. Spring and fall hunting allowed in Teton Game Preserve. Fall seasons varied with elk, deer, and moose seasons. A resident hunting and fishing license holder could take an additional bear with a special bear permit. A Nonresident could harvest two

additional bear. Nonresident hunting and fishing license: $25. No spring season in 1942. The spring season in 1943 was April 1-June 30. Fall season restricted to deer and elk hunting areas in certain counties.

1945-65 Archery legal for bear. Spring season in 1949: April 1-June 20, only in certain counties and special areas. Fall season: almost statewide during deer and elk seasons. Deer and elk special permit areas only open for bear to those permit holders. Grand Teton National Park closed. Nonresident hunting and fishing license: $100. In 1951, spring season closed June 30. In 1957, Commission empowered to establish zones wherein bears shall be classified as game or predatory animals. In 1961, black bear still classified as both game animal and predator depending on status of hunt areas. Cubs and females with cubs protected in all seasons in 1964.

Public interests and governmental agencies, other than livestock and agriculture, started to influence bear management. Two results were the complete protection of cubs and females with cubs and statewide concurrence in the regulations by the Commission.

1966-69 Nonresident hunting and fishing license: $125. In 1967, black bear classified as a big game animal statewide. Statewide spring season: April 1-June 30. Black bear and grizzly bears were separated and managed as separate species in 1968. In 1969, spring and fall black bear statewide, except National Park lands, Federal Refuges, and Wind River Indian Reservation.

Regulations separated the grizzly bear and the black bear to protect grizzly bears, which were thought to be declining.

1970-73 Black bear cubs and females with cubs only protected during spring season. Elk pastures closed April 1-May 31. Fall season: September 1 through November 15, statewide except for Park, Refuge, and Reservation lands. Additional bag limit on Nonresident Black Bear (Special) reduced to one. In 1971, the Shirley Mountains and parts of Medicine Bow National Forest closed October 16-November 15. Nonresident black bear permit: $30, resident elk and black bear: $15.00

The Shirley Mountains were closed in the fall for two reasons; limited bear numbers and to eliminate the potential for illegal big game harvest, as those seasons had closed. In an effort to know more about the harvest and age distribution of populations, the Department started collecting tooth data.

1974-78 Starting in 1975, pelts must be retained and removed from the field. Bag limit: 1 black bear. First black bear hunting areas. Fall season in 5 western counties: September 1-November 15, remainder of state during deer and/elk seasons. Archery season: August 17-August 31 in 5 western counties. 1976,

bows legal with 40-lbs draw weight. Black bears given Trophy Game Animal status. 1978, spring season: May 1-June 30.

Minimum bow weights were legally defined in response to concerns about the potential for high wounding loss. Black bears were given Trophy status, which committed the Department to reimburse landowners for livestock depredation.

1979-81 Skull and pelt must be presented within 10 days to the Department for examination and reporting. Resident elk and black bear: $25, Resident black bear: $10, Nonresident black bear: $50. Spring season: May-June 15 in 1980. Cubs and females with cubs protected in all seasons. Nonresident elk and fishing: $250. In 1981 the state was divided into 31 hunt areas. Seasons variable: Spring: May 1-June 15/30; Fall: September 1-November 1 and October 14-November 30. Archery only season for 15 days prior to spring and fall opening dates.

To improve collection of age and sex data, regulations stipulated that the skull and pelt of any harvested bear must be presented to the Department for inspection. The Department developed black bear hunt areas to obtain more site-specific harvest data. Due to public concern, cubs and females with cubs were protected in all seasons.

1982-87 Use of bait limited in one hunt area during fall archery season. 1984, bag limit: 2 black bear. Baiting limited in Hunt Area 25 with a long season, May 1-November 15, due to concerns with grizzly bears. Archery only seasons varied from August 1-September 30. 1986, fall season variable: August 15-October 15 and September 30-November 30. Spring seasons were shortened in northwestern Wyoming over concerns about excessive female harvest.

1988-91 Black bear tag removed from resident elk license. Black bear license must be purchased separately. Bag limit: 1 black bear per year. Fall season closing ranged from October 20-November 30. In 1990, the spring season was May 1-June 30 (except in Hunt Area 25 which was May 1-November 15). Fall season: September 1-November 15.

1992 Pelt, with evidence of sex attached, and skull must be presented to the Department in an unfrozen condition for examination and tooth removal. Numerous restrictions on the use of baits were implemented. Spring season variable: May 1-June 1/30. Resident black bear license: $11, Nonresident: $70.

State regulations dealing with baiting restrictions were increased because of the elimination of baiting permits by the U.S. Forest Service. Items addressed included: restrictions adjacent to water sources, roads, and developed sites; weight limitations on the amount of bait that can be placed; and baits must be of nontoxic biodegradable substances. The length of the spring season was shortened in a number of areas to reduce female harvest.

1993 Baiting eliminated in all of the grizzly bear Recovery Zone. The number of baits was limited to one per section. Baits not allowed prior to seven days before opening date of season and must be removed within seven days after closing date. Hunt areas were changed.

1994 First black bear management plan was written. Hunt areas were reorganized to more closely correspond with known black bear distribution and bear management units (BMU) were created to monitor discrete black bear populations. Female harvest mortality quotas were established to more closely regulate female harvest mortality.

1997 Baiting eliminated in Hunt Area 22.

1998 Baiting eliminated in portions of Hunt Areas 23, 27, and 28. Also eliminated on all designated Wilderness Areas and those lands administered by Federal Land Use Agencies and the Department where human access has been restricted to protect wintering wildlife.

The use of unprocessed baits restricted to Hunt Areas 18, 19, 20, 21, 24, 27, 28, and 29. Processed and unprocessed baits may be used in the remaining Hunt Areas.

2002 Hunt Area 31 created to address management and quotas for non-Indian lands within the boundaries of the Wind River Reservation.

2003 Hunt Area 32 established in the Cody Region. Baiting eliminated in Hunt Area 32. Season structure and female mortality quotas set for three consecutive years to assist in harvest analysis.

APPENDIX B

BLACK BEAR MORTALITY RECORD

Date of kill_____ WGFD Region_____ Hunt Area_____

Type of kill: Legal_____ Damage Control_____ Illegal_____ Road Kill_____ Other_____

If 'Other" or 'Unknown', (probable) cause of death_____

Location/Drainage_____

Sec_____ Township_____ Range_____ Lat/Long (optional)_____

UTM: Zone_____ East_____North_____

Sex_____ Color_____ Est. age_____ Were teeth collected? (Y/N)_____

Name_____ No. days hunted_____

Address_____ Was bait used? (Y/N)_____

City_____ State_____ Was a guide used?_____

Zip_____ Phone No._____ Name of guide_____

No. of bears seen, including one killed_____ Color of teats (female): Pink___ Brown___ Lactating___

Weapon used: Rifle_____ Pistol_____ Muzzleloader_____ Archery_____ Shotgun_____

Were you primarily hunting bear (Y/N)?_____ If No, what other species_____

Condition of bear (presence of fat), Circle one: Excellent Good Fair Poor Bad

Remarks (include degree of rubbing and previous marks;ear tag, tattoo etc.):_____

_____

_____

Date entered in WOF book:_____ Date Bio. Serv. called (Females only)_____

I, _____ of _____

being duly sworn, depose and say that I am the holder of Wyoming Black Bear License # _____, and lawfully took the above bear on _____, 20_____ in Hunt Area # _____.

_____ _____ _____

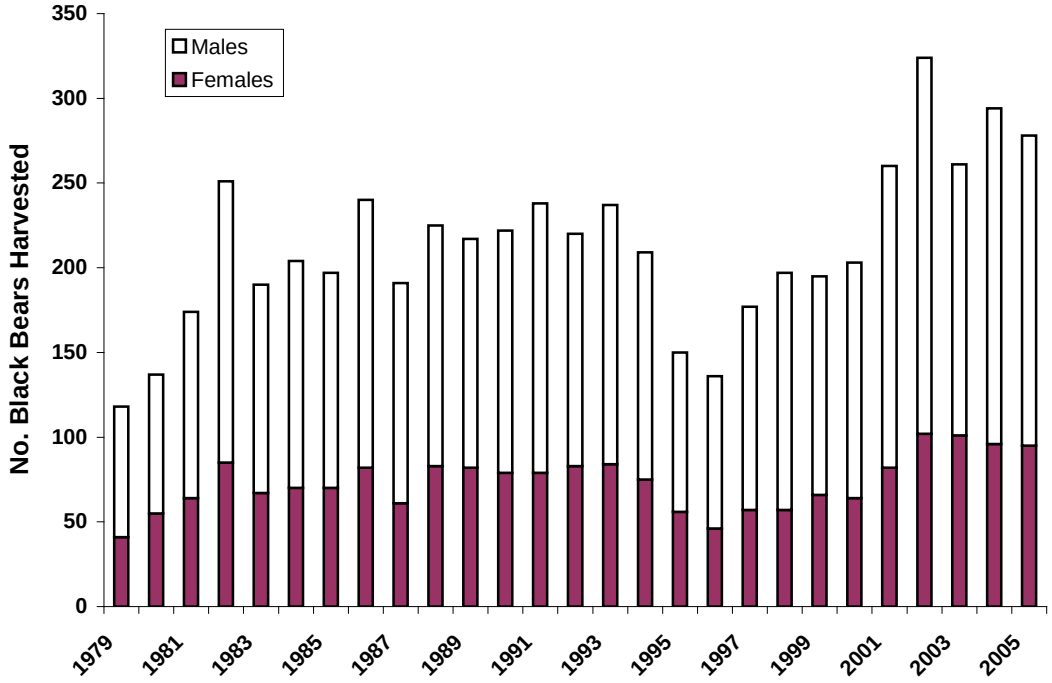
Inspected By Date Hunter's Signature

Any person who makes a false statement on the registration form regarding the date the black bear was taken or the hunt area in which it was taken shall be in violation of this regulation. Such violation shall be punishable as provided by Title 23, Wyoming statutes for violation of Commission regulations.

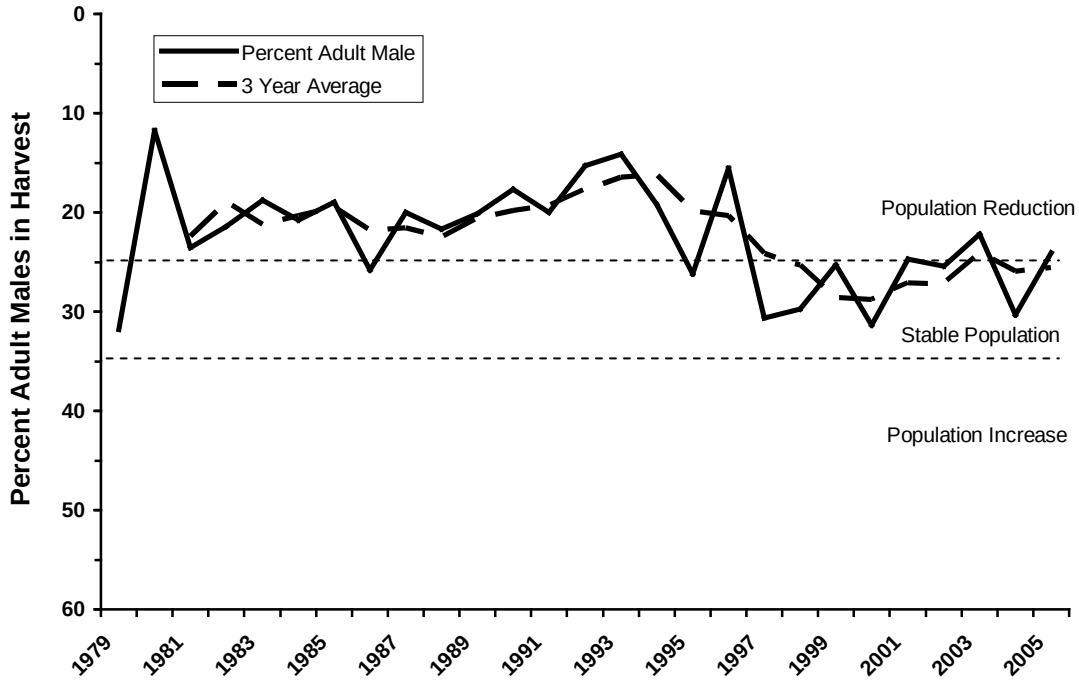
Note: Forward completed form and tooth sample to District Office of registration. District Office will then send original form, hair and tooth sample to Trophy Game Section (TGS), distribute a copy to District Office of harvest, and call Biological Services to update quota status. TGS will send Biological Services a copy of the kill record.

APPENDIX C – Statewide and BMU black bear harvest criteria data for Wyoming, 1979 – 2005.

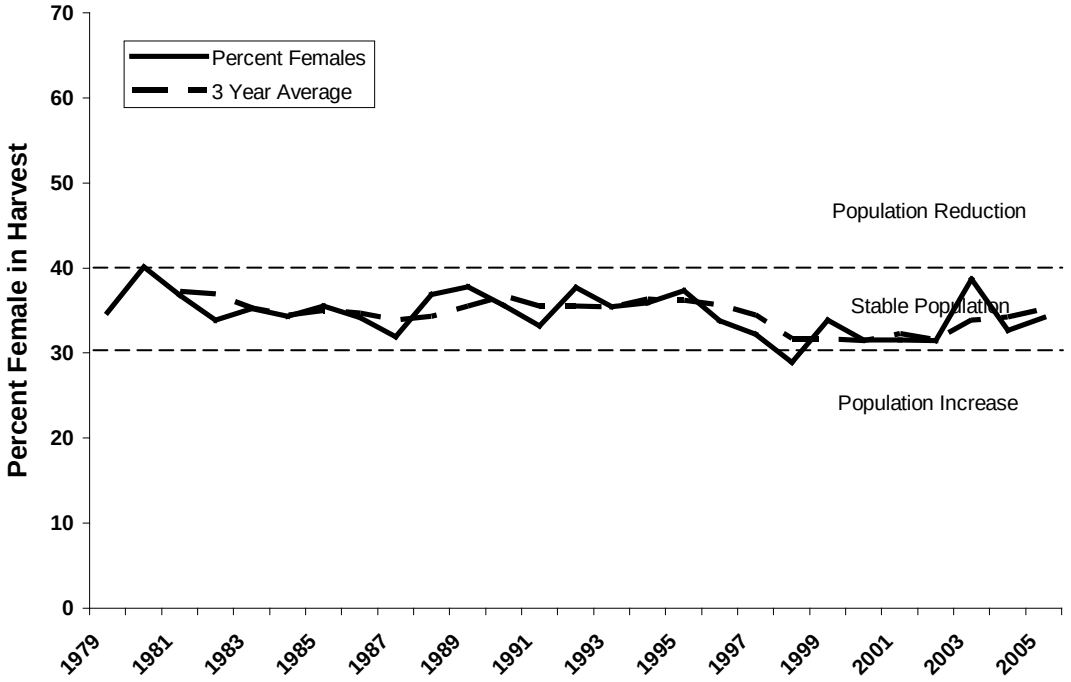
Statewide



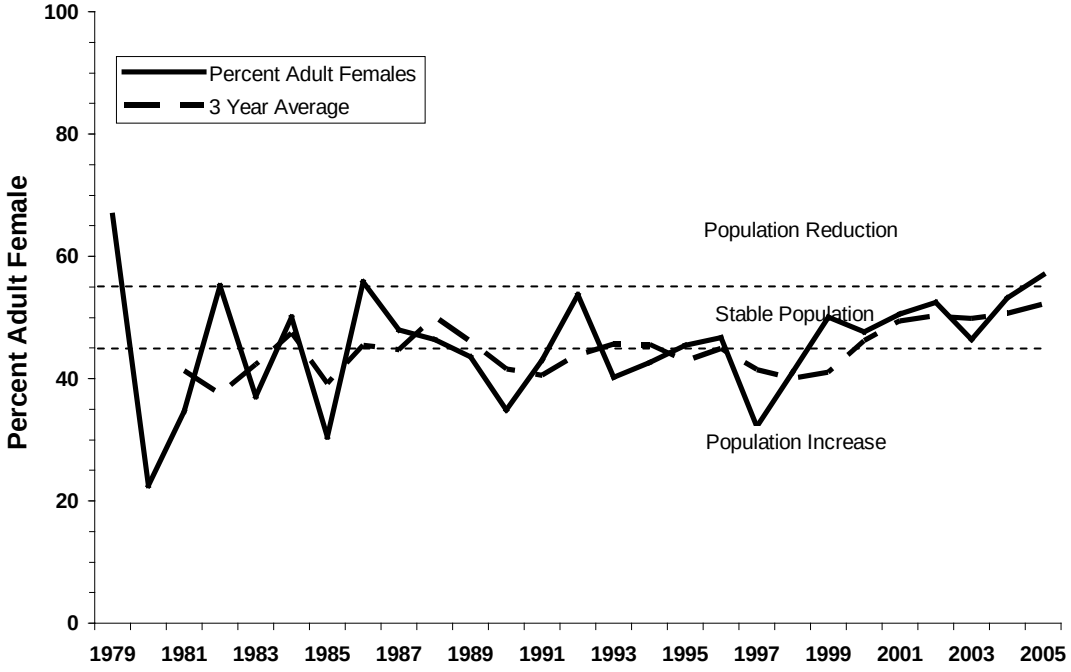
Legally harvested black bears in Wyoming by sex, 1979 – 2005.



Percent adult male black bears in the Wyoming black bear harvest, 1979 – 2005.



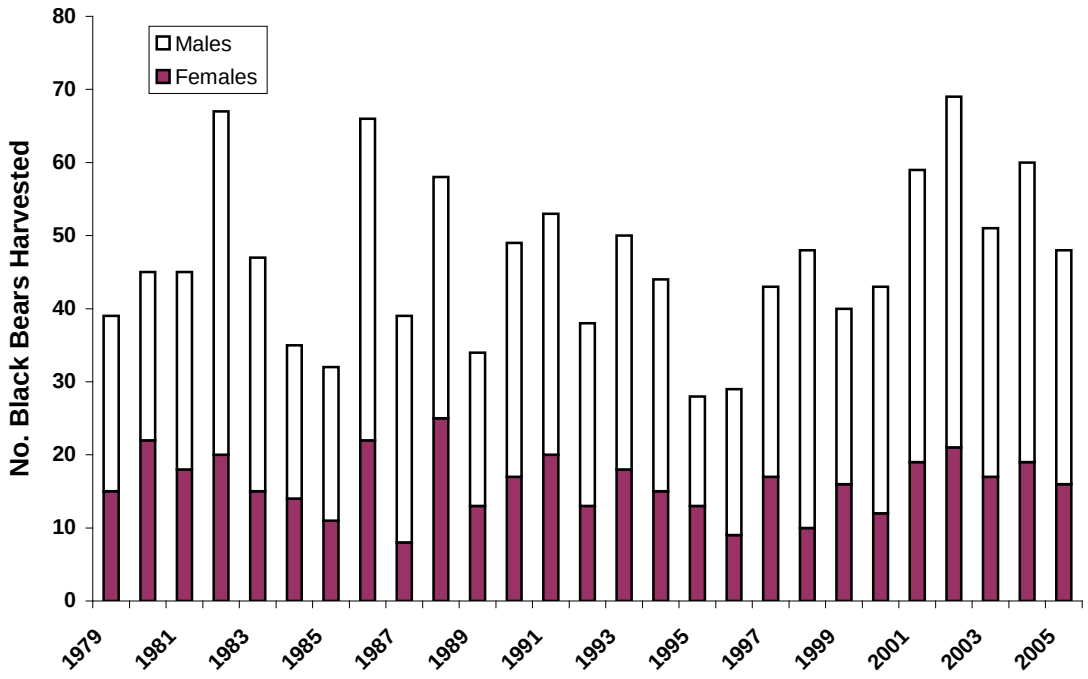
Percent female black bears in the Wyoming black bear harvest, 1979 – 2005.



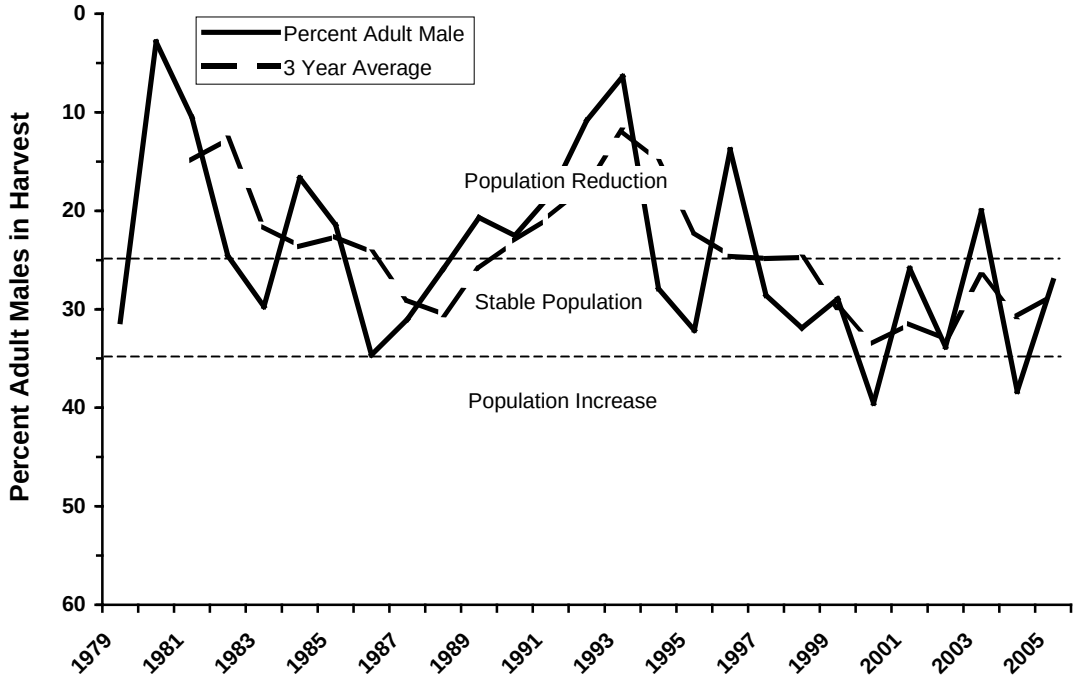
Percent adult female black bears in the Wyoming female black bear harvest, 1979 – 2005.

The statewide harvest graph shows harvest has increased since 1996, with a peak in 2002, which was a year of drought and very poor food conditions. However, the harvest criteria for statewide black bear data show an overall stability in the population. The percent adult males criterion moved from the population reduction area into the stable population area shortly after female quotas were instituted in 1994. Although the annual data for each criterion occasionally fluctuates outside the stable population range, the 3-year averages for all 3 criteria have been within the stable range for the last 6 – 8 years, with a possible trend to adult males moving into the population reduction range. This trend may be the first sign that statewide harvest has increased enough to reduce the adult male cohort on a statewide average.

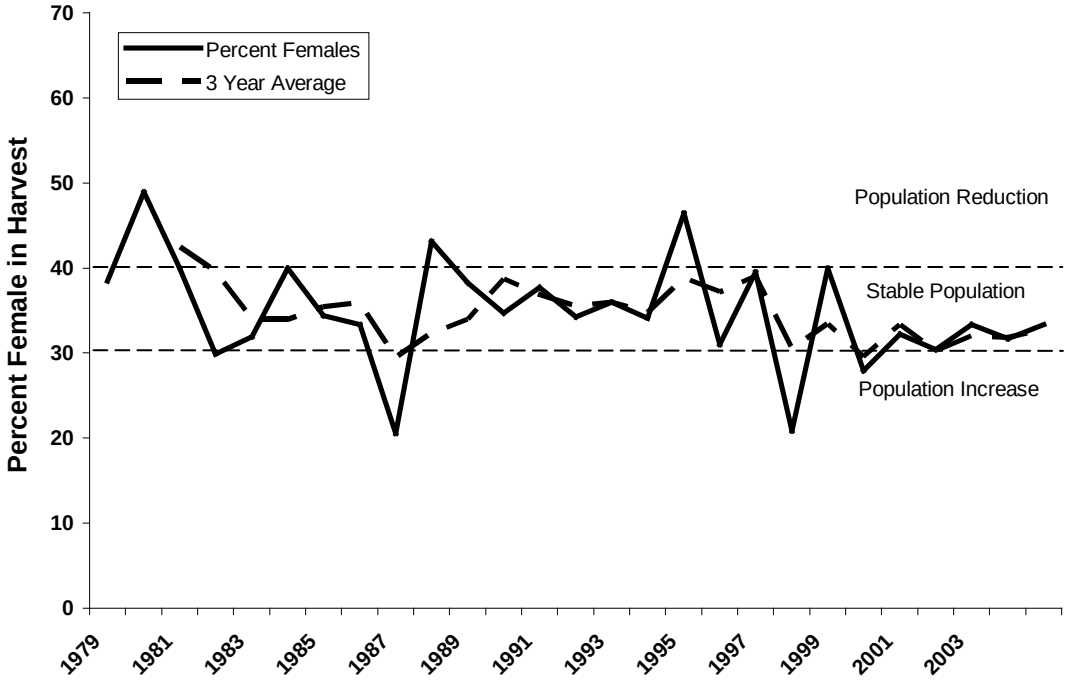
BMU 101 – Jackson



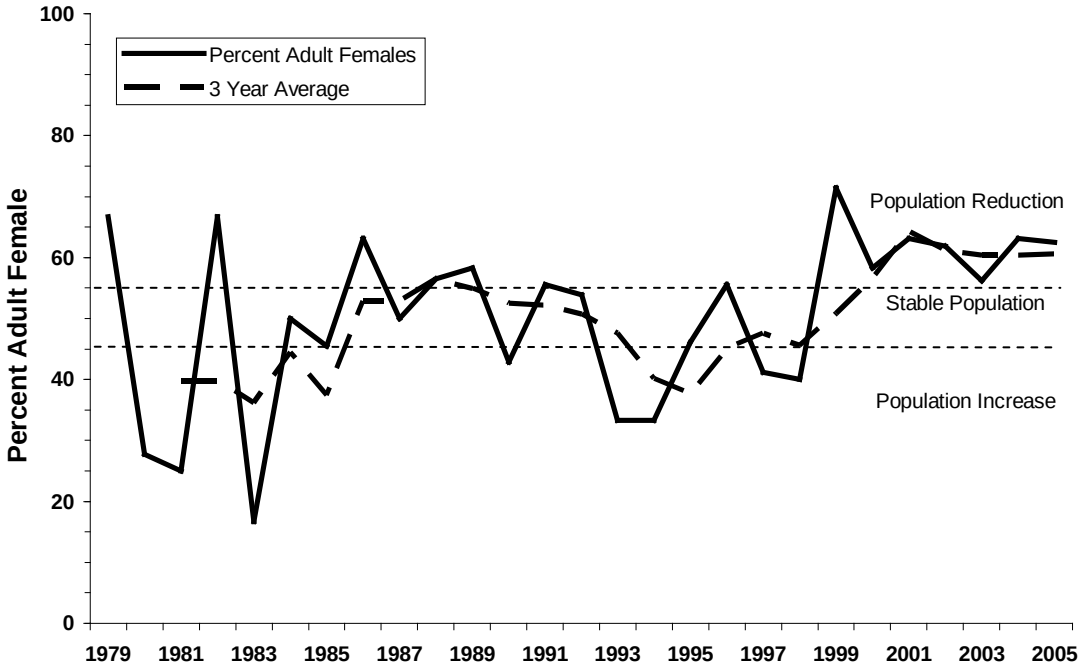
Legally harvested black bears in Jackson BMU, Wyoming by sex, 1979 – 2005.



Percent adult male black bears in the Wyoming black bear harvest, Jackson BMU, 1979 – 2005.



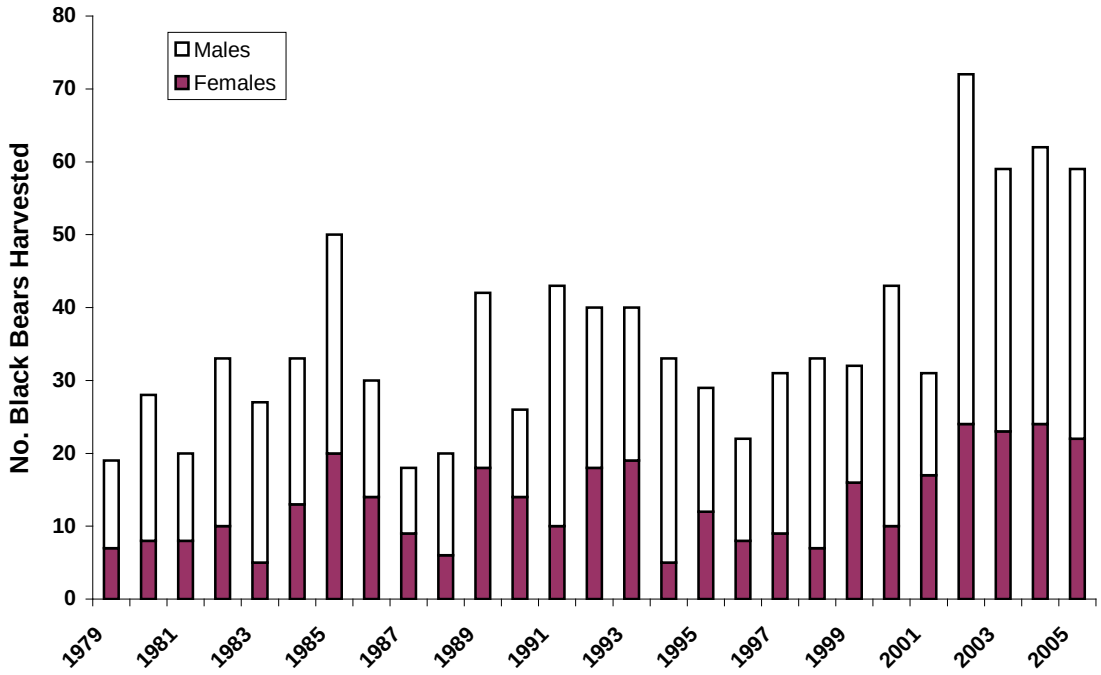
Percent female black bears in the Wyoming black bear harvest, Jackson BMU, 1979 – 2005.



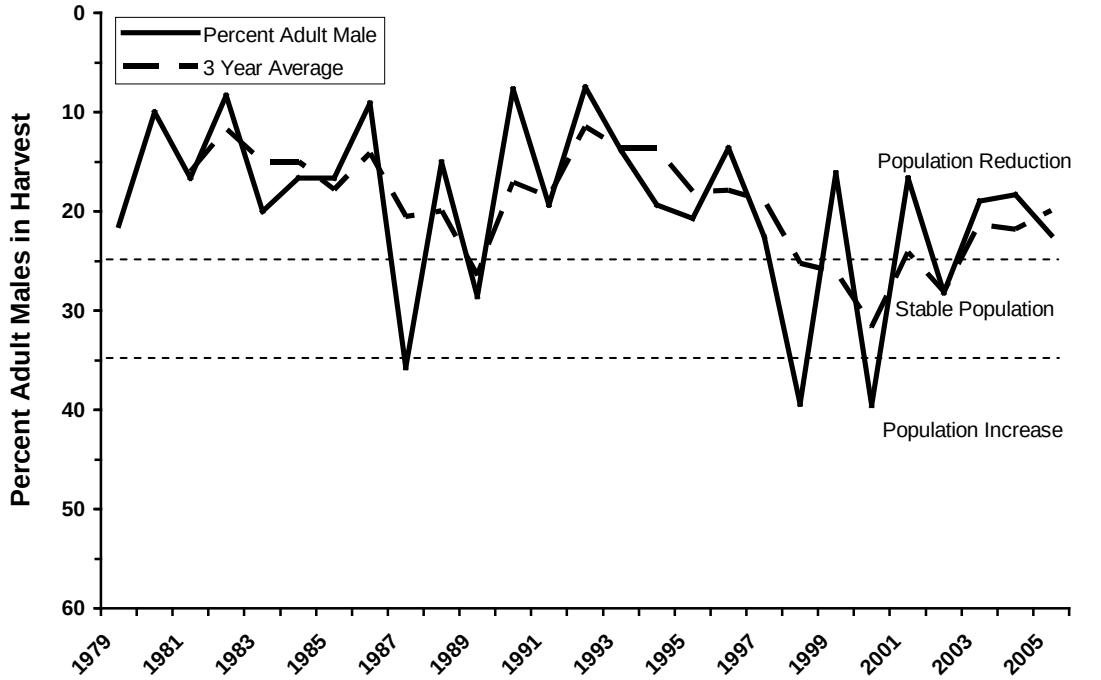
Percent adult female black bears in the Wyoming female black bear harvest, Jackson BMU, 1979 – 2005.

Harvest data from Jackson BMU shows a fluctuating level of harvest and criteria that appear to be currently stable in the percent adult males and percent females in the harvest data. Both these criteria have shown a trend toward stable or increasing since the late 1990s. The percent adult females in the female harvest is trending toward population reduction. However, because both adult male and female percentages are still within the stable population region, it is likely that the high percent of adult females is not an indication of high harvest levels, but a result of dispersal from the National Parks bordering the BMU that has supplemented the black bear population. In addition, baiting is prohibited in approximately half of this BMU, reducing the selectivity that normally reduces the percent of adults in the female harvest. The harvest density for this BMU is relatively high compared to other BMUs in the state (Table 3). However, the dispersal of bears from the surrounding National Parks likely mitigates that density to some degree. All these factors taken as a whole suggest a moderate level of harvest for this BMU.

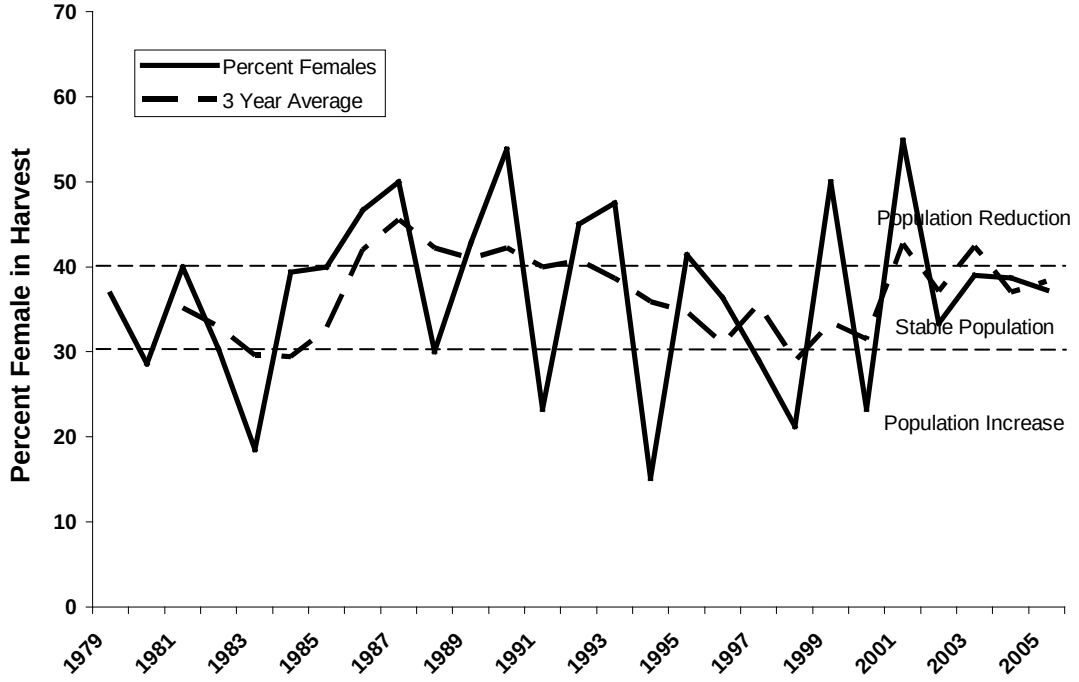
BMU 102 – Grey's River



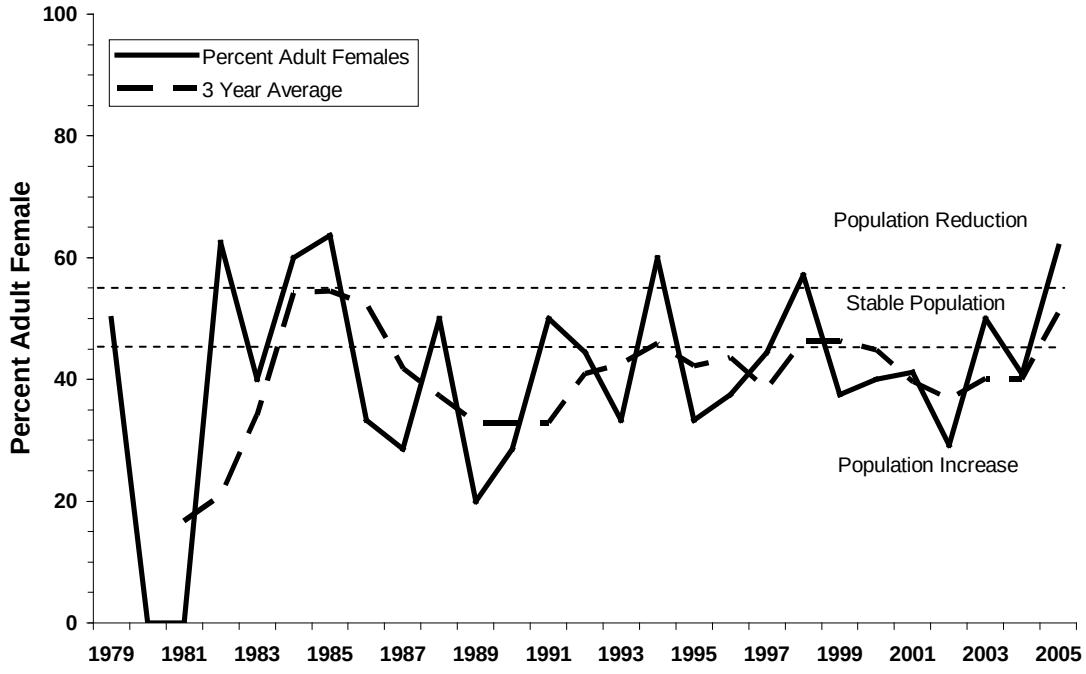
Legally harvested black bears in Grey's River BMU, Wyoming by sex, 1979 – 2005.



Percent adult male black bears in the Wyoming black bear harvest, Grey's River BMU, 1979 – 2005.



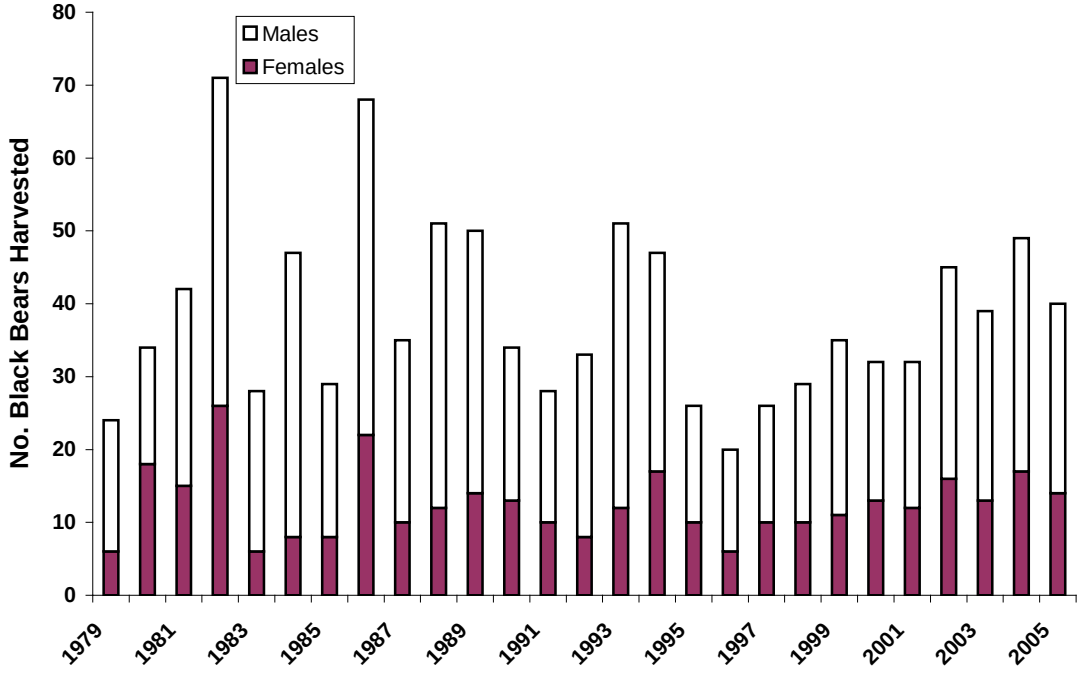
Percent female black bears in the Wyoming black bear harvest, Grey's River BMU, 1979 – 2005.



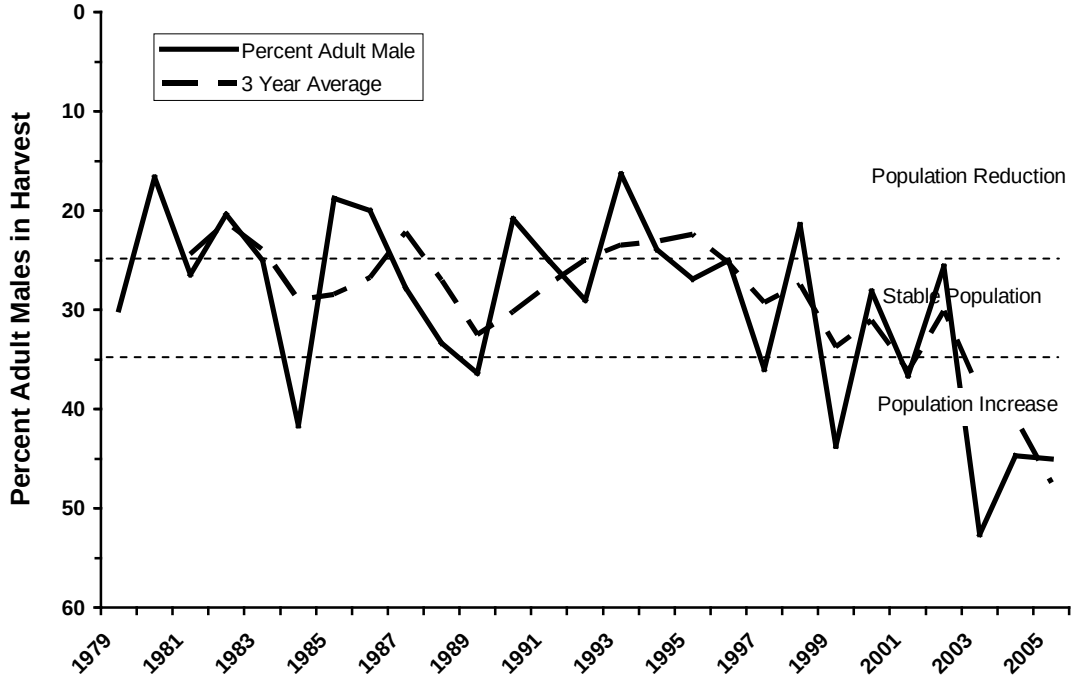
Percent adult female black bears in the Wyoming female black bear harvest, Grey's River BMU, 1979 – 2005.

Total legal harvest in the Grey's River BMU has increased since 2001 from a relatively steady level in the previous 20 years. The harvest criteria indicate that harvest is affecting the black bear population at a moderate level. The percent adult males in the harvest is currently in the population reduction range. The percent females in the harvest is on the upper edge of the stable population range, but is trending toward population reduction. The percent adults in the female harvest has increased to the stable population range. In addition, the average harvest density for this BMU is 1.0 bears/100km^2/year (Table 3), which is the highest of all BMUs. All these criteria indicate a limitation of males in the population.

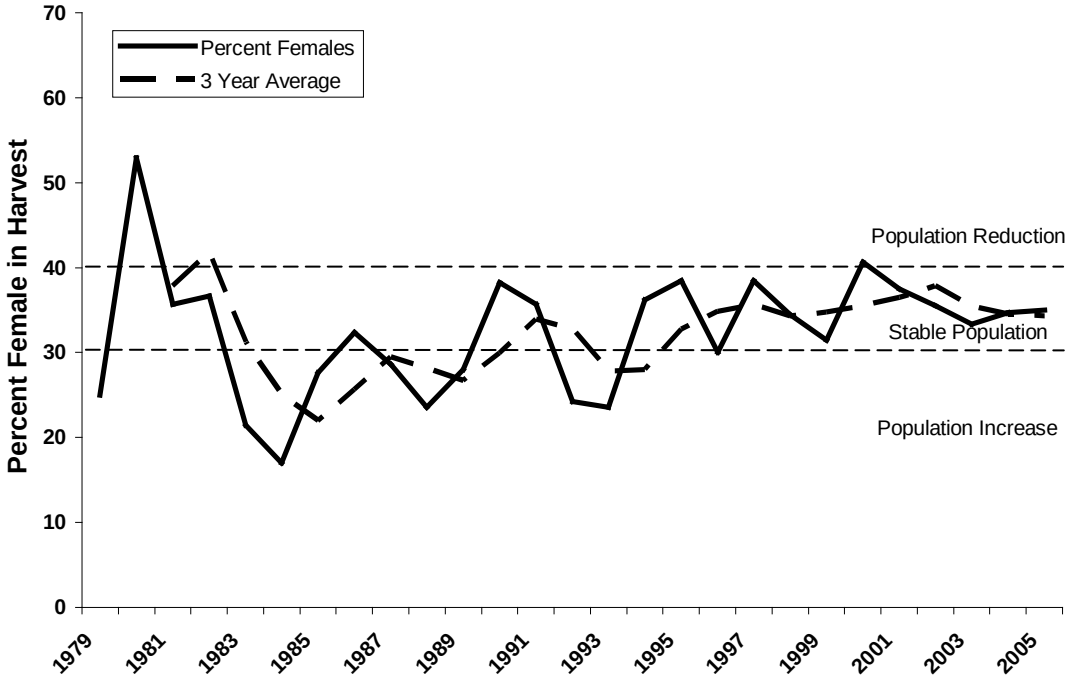
BMU 201 – Absaroka



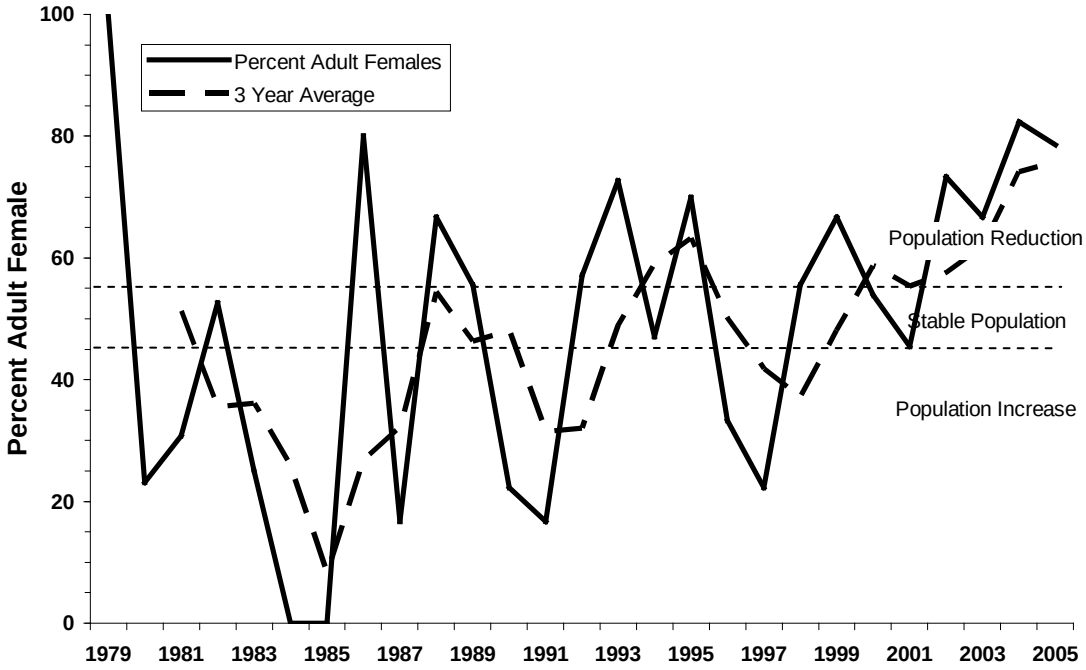
Legally harvested black bears in Absaroka BMU, Wyoming by sex, 1979 – 2005.



Percent adult male black bears in the Wyoming black bear harvest, Absaroka BMU, 1979 – 2005.



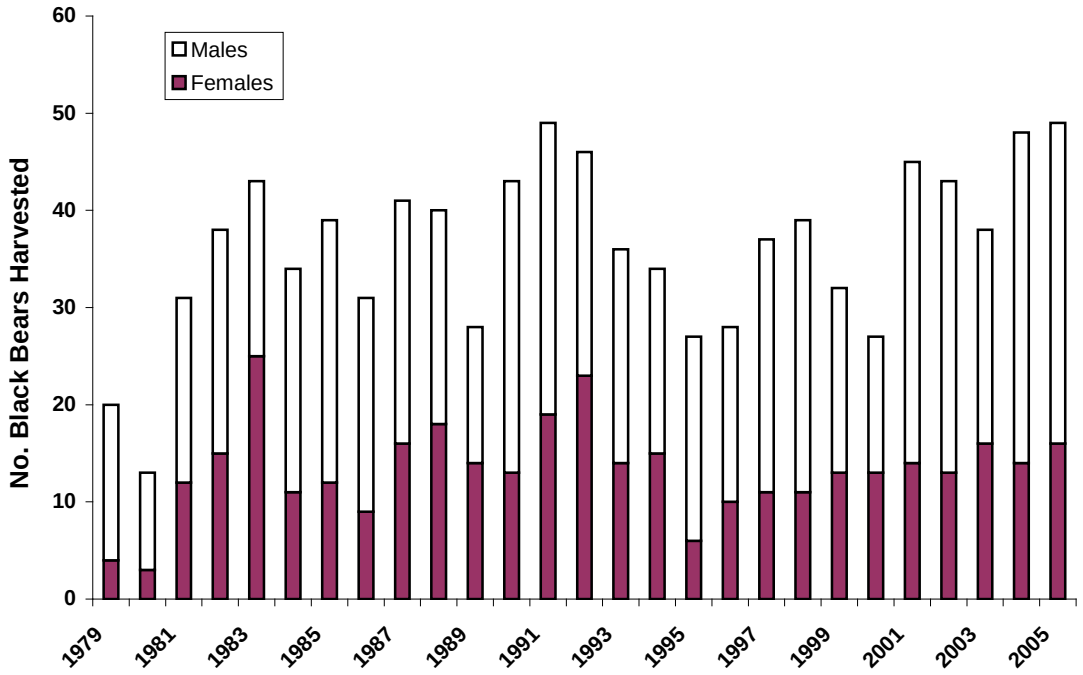
Percent female black bears in the Wyoming black bear harvest, Absaroka BMU, 1979 – 2005.



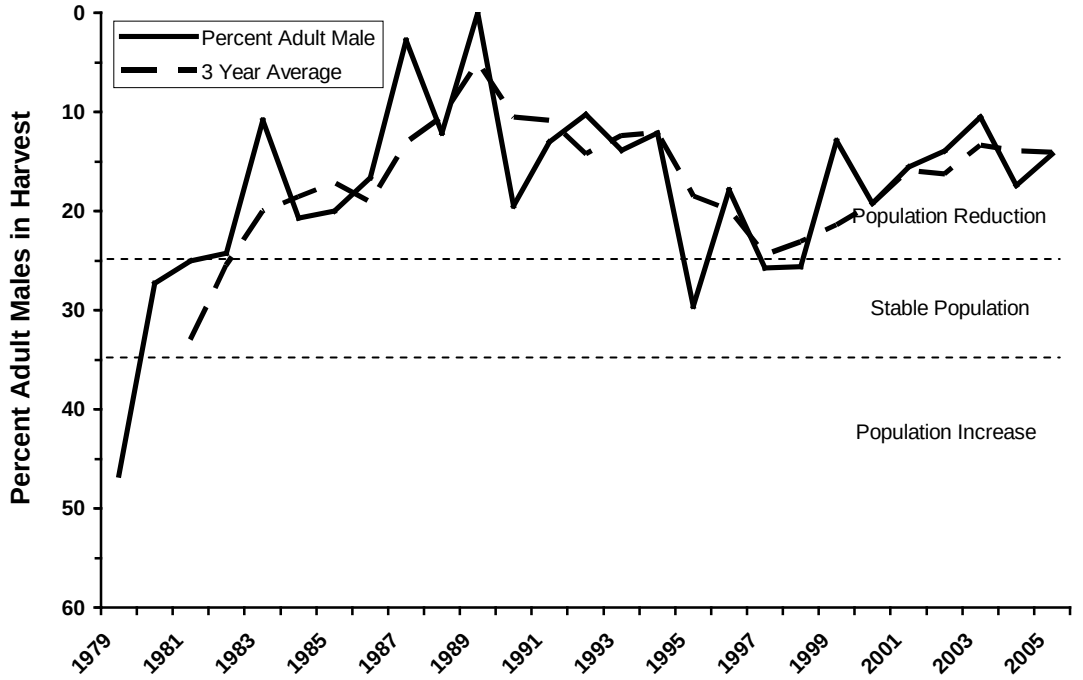
Percent adult female black bears in the Wyoming female black bear harvest, Absaroka BMU, 1979 – 2005.

Annual legal harvest totals for the Absaroka BMU show that harvest is lower since the implementation of female quotas in 1994 than in previous years. The harvest criteria appear to show seemingly conflicting data. The percent adult males is in the population increase range and the percent females are in the stable range. However, the percent adult females in the female harvest is in the population reduction range. The harvest densities (Table 3) for this BMU are quite low with the exception of hunt area 32, which has very little suitable habitat. Therefore, the likely reason that the percent adult females are high is that the population is at high density and most females in the standing population are adults. Also, immigration from Yellowstone Park on the western boundary of this BMU is likely supplementing the population. Baiting is prohibited in nearly all of the BMU. Thus, there is less hunter selectivity and a higher chance of harvesting adult females. These factors taken as a whole indicate that this BMU experiences light hunter harvest and contains a stable or increasing black bear population.

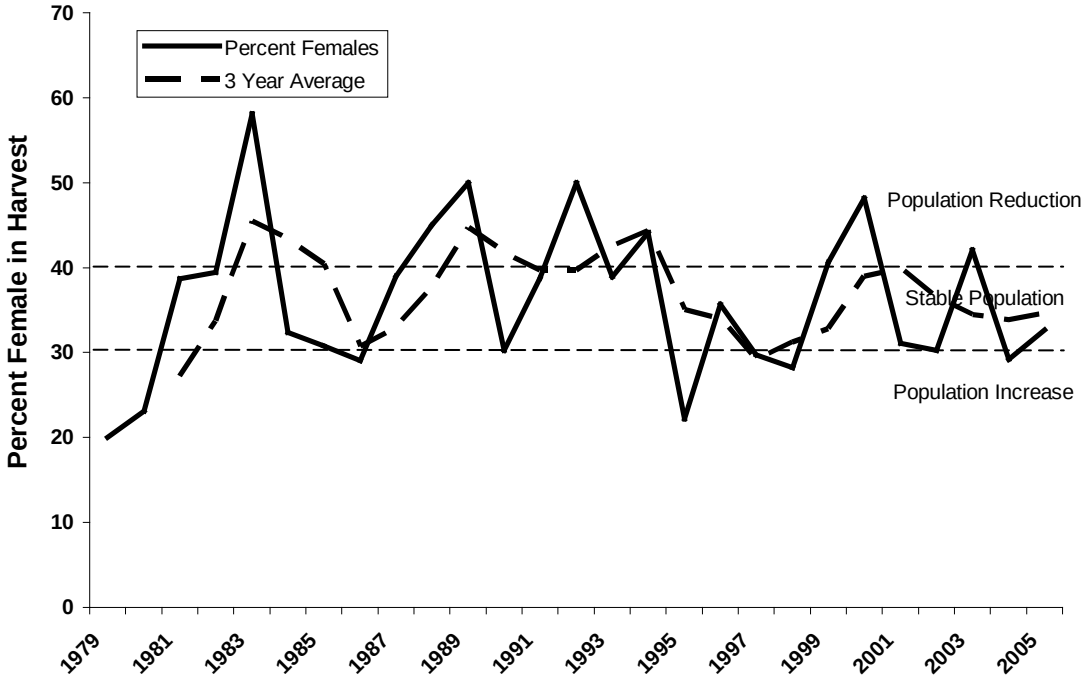
BMU 301 – Bighorns



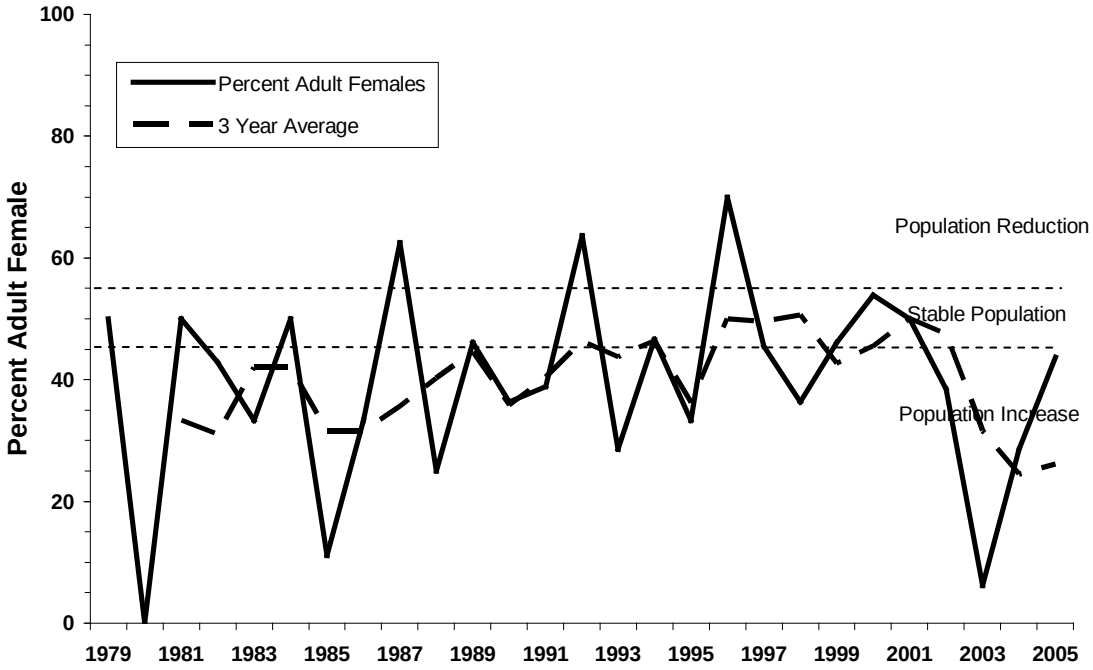
Legally harvested black bears in Bighorns BMU, Wyoming by sex, 1979 – 2005.



Percent adult male black bears in the Wyoming black bear harvest, Bighorns BMU, 1979 – 2005.



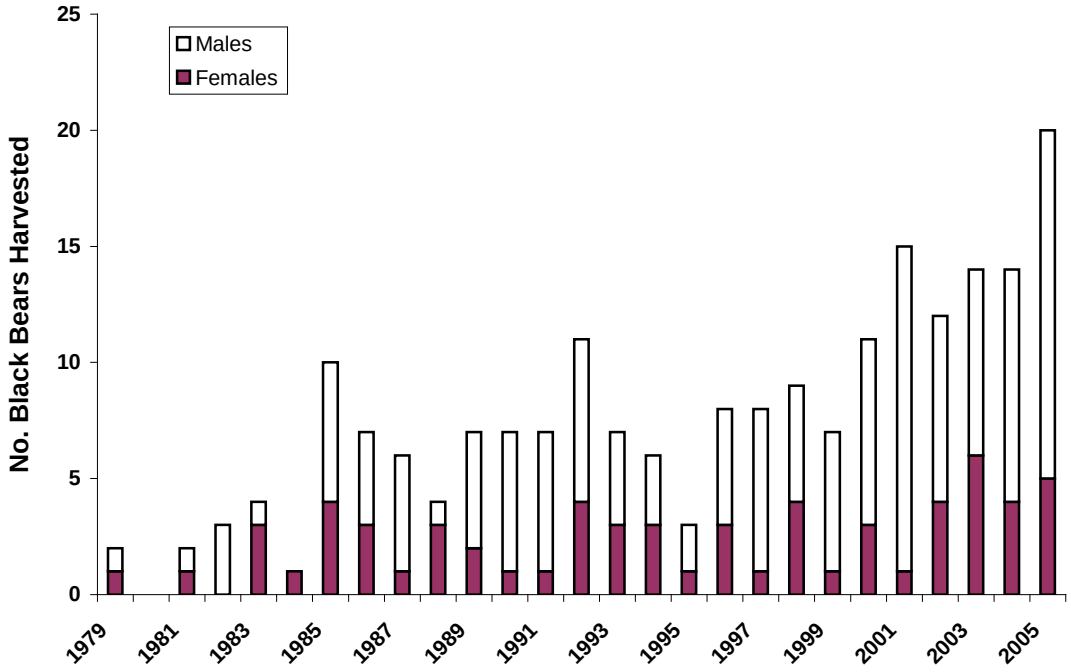
Percent female black bears in the Wyoming black bear harvest, Bighorns BMU, 1979 – 2005.



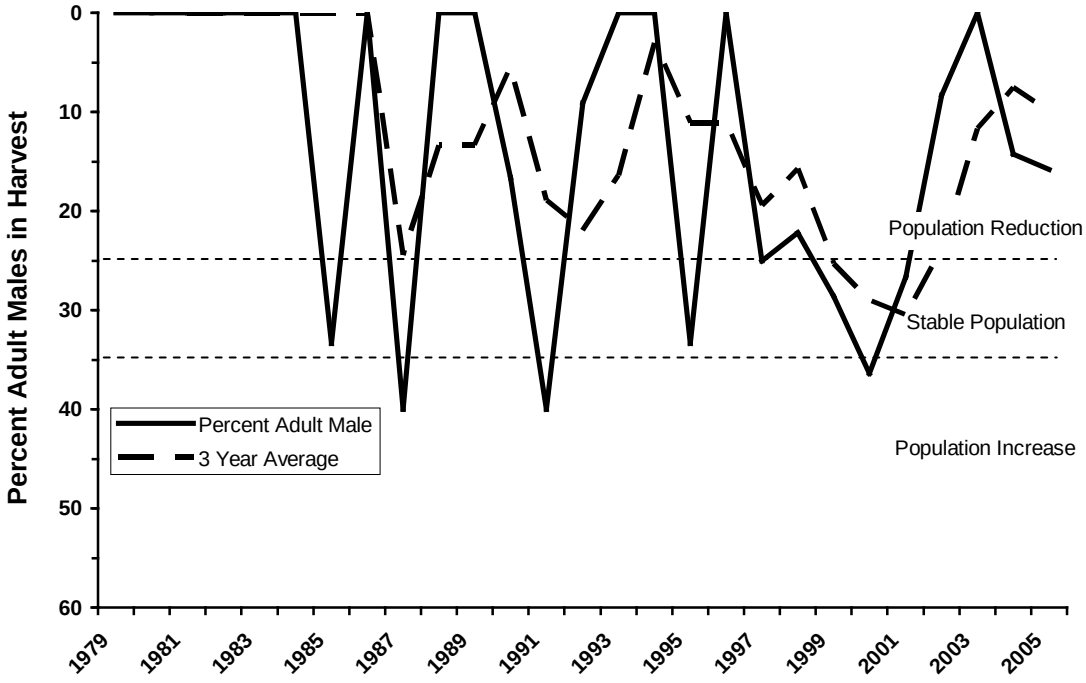
Percent adult female black bears in the Wyoming female black bear harvest, Bighorns BMU, 1979 – 2005.

Annual harvest totals for the Bighorns BMU show a relatively steady rate of harvest since 1979, with a decline shortly after female quotas began in 1994. Harvest criteria indicate that harvest is beginning to affect the black bear population in this BMU. The percent adult males in the harvest decreased in the late 1990s and then increased into the population reduction range. The percent females in the total harvest has remained in the stable range since the mid-1990s, and the percent adults in the female harvest has moved from the stable range to the population increase range. The harvest densities for hunt areas in this BMU are high in the 2 northern hunt areas (Table 3), but low in the remaining areas. This, along with the data above indicates, that the BMU as a whole is likely experiencing moderate harvest levels, while hunt areas 1 and 2 are likely in the population reduction range.

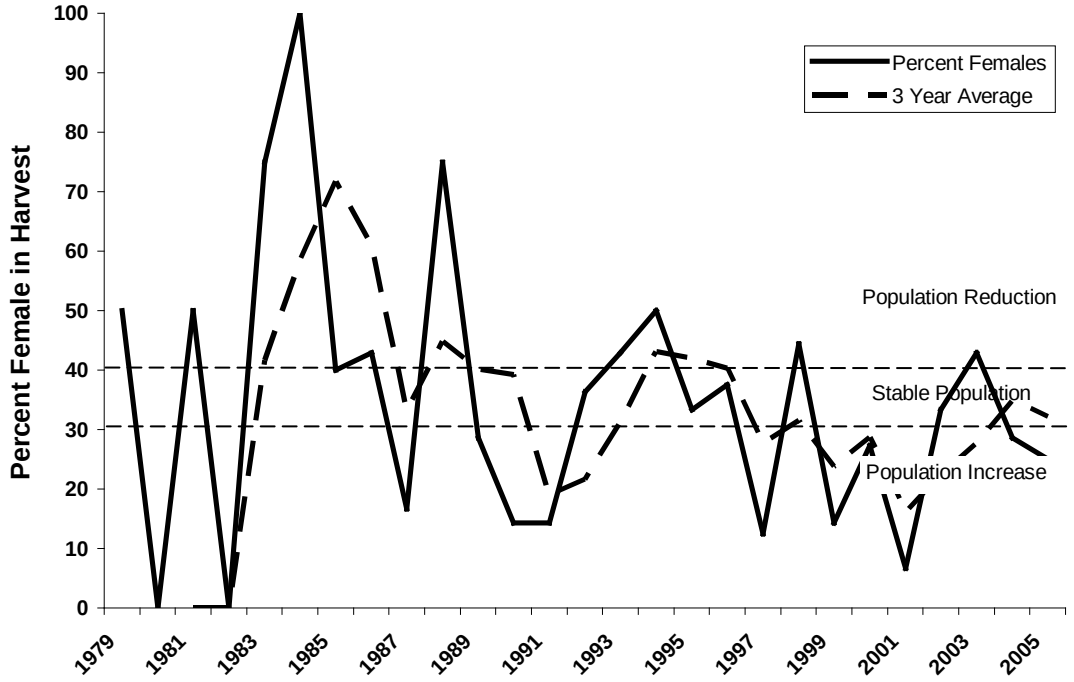
BMU 401 – Sierra Madre



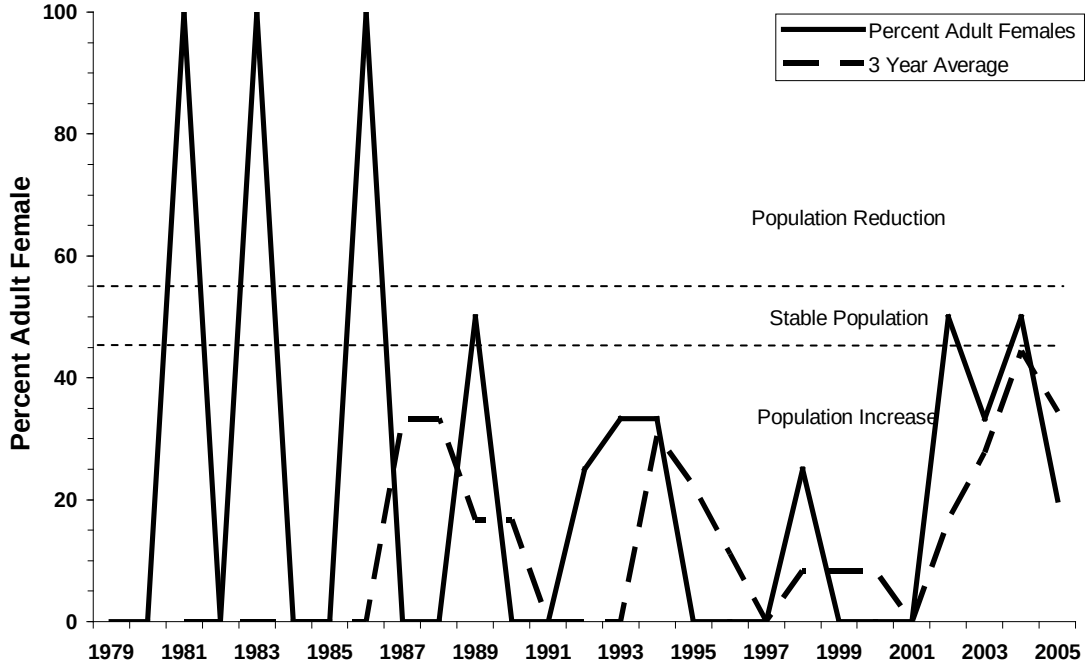
Legally harvested black bears in Sierra Madre BMU, Wyoming by sex, 1979 – 2005.



Percent adult male black bears in the Wyoming black bear harvest, Sierra Madre BMU, 1979 – 2005.



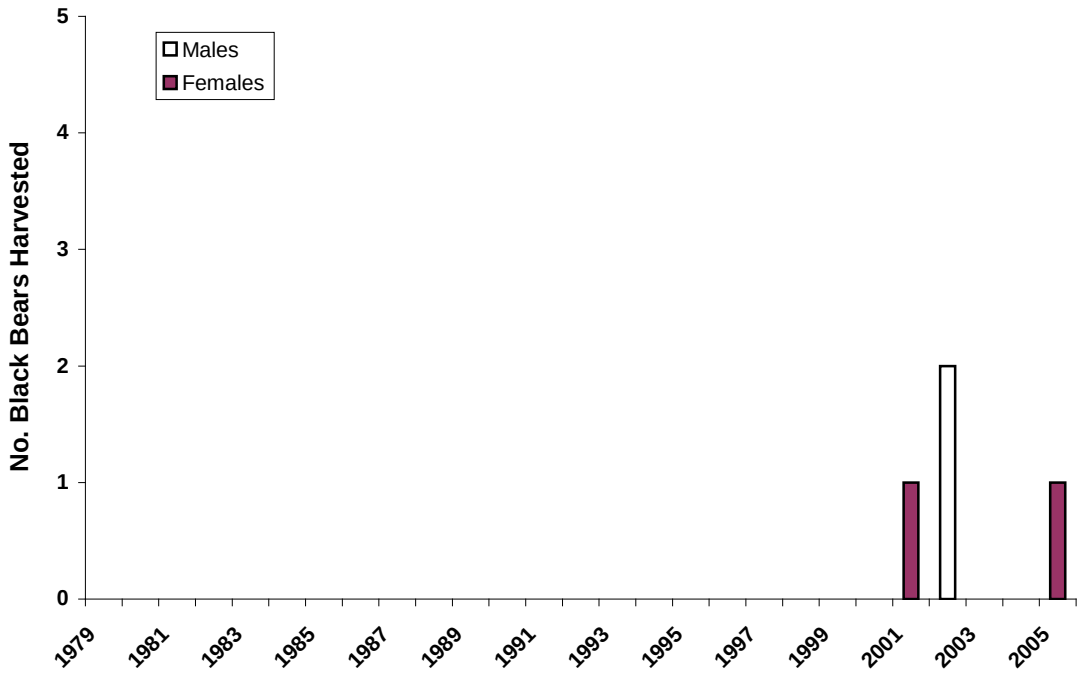
Percent female black bears in the Wyoming black bear harvest, Sierra Madre BMU, 1979 – 2005.



Percent adult female black bears in the Wyoming female black bear harvest, Sierra Madre BMU, 1979 – 2005.

Annual harvest totals for the Sierra Madre BMU show a steady increase since 1979. Because of the low harvest levels, especially prior to 1990, the annual harvest criteria fluctuate widely. However, the overall trend in harvest criteria indicate a moderate level of harvest for this BMU. The percent adult males in the harvest decreased from the population reduction range into the stable range in the late 1990s and then increased back to the reduction range in recent years. The percent females in the harvest has fluctuated around the stable range, while the percent adults in the female harvest has moved from population increase to stable population in the past few years. The harvest density of 0.7 bears/100 km^2/year for this BMU is moderate relative to other BMUs in the state (Table 3). These data, taken as a composite, indicate that black bear harvest in the Sierra Madre BMU is moderate and may be limiting the adult male cohort of the population.

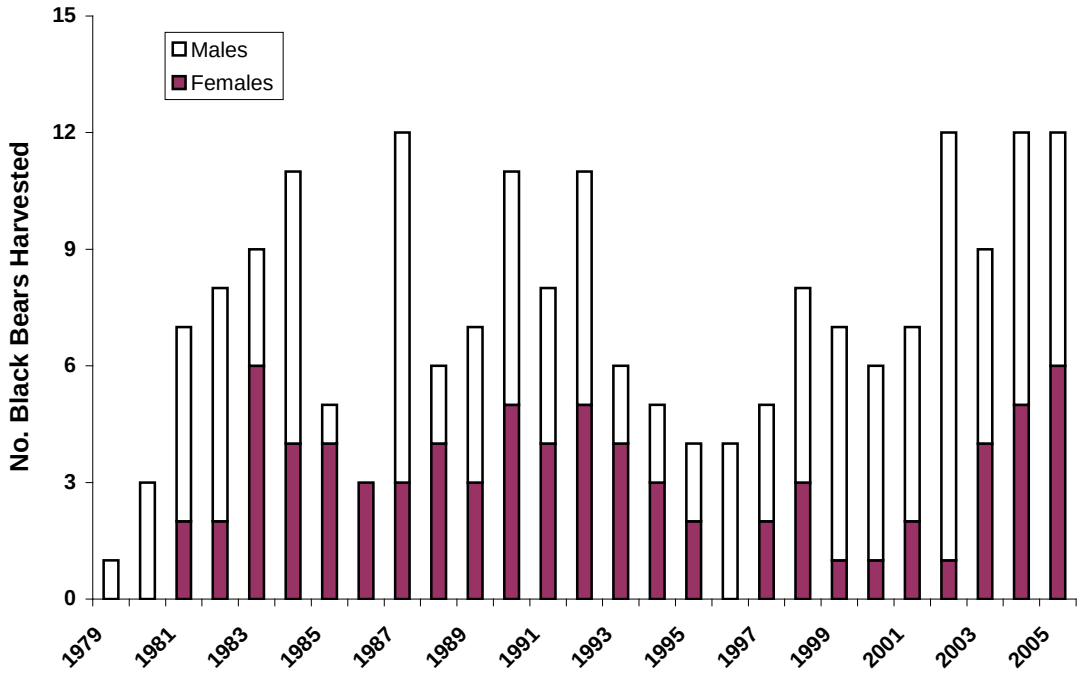
BMU 402 – Uinta



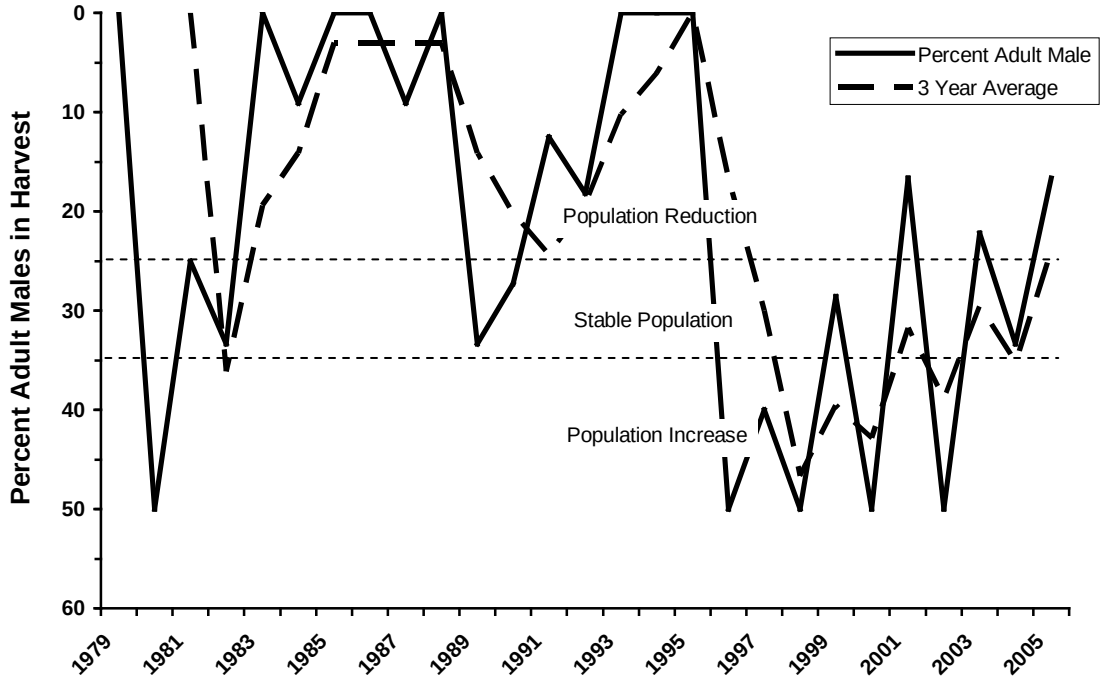
Legally harvested black bears in Uinta BMU, Wyoming by sex, 1979 – 2005.

The Uinta BMU was closed to black bear hunting until 2001 and has insufficient harvest data to conduct harvest criteria analyses.

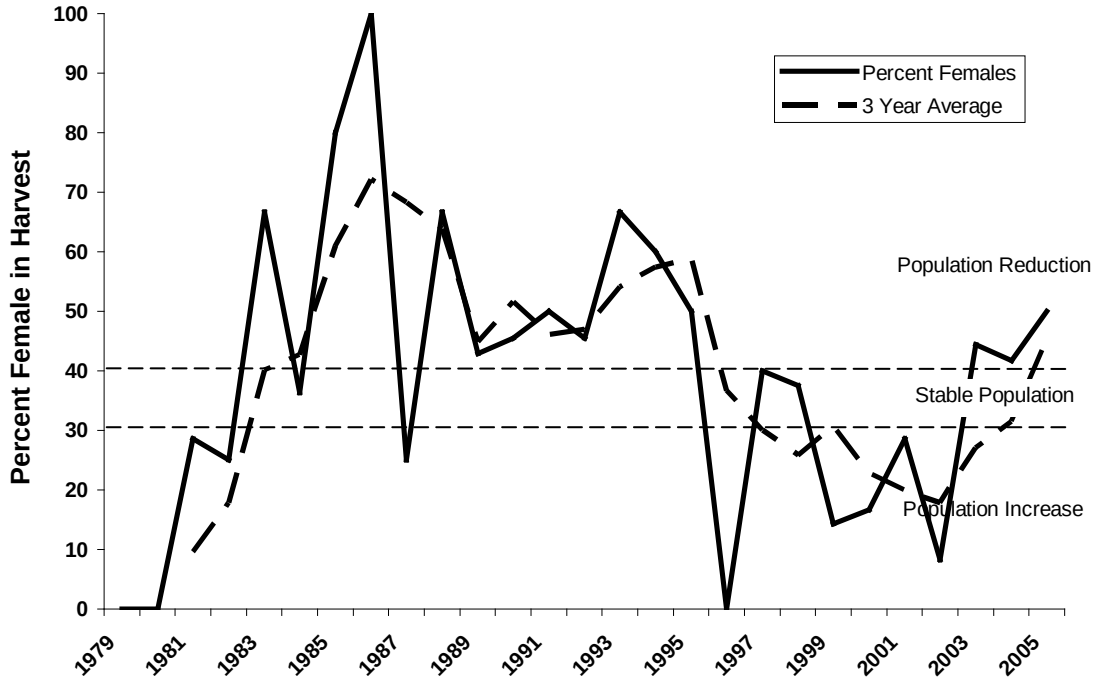
BMU 501 – Laramie Peak



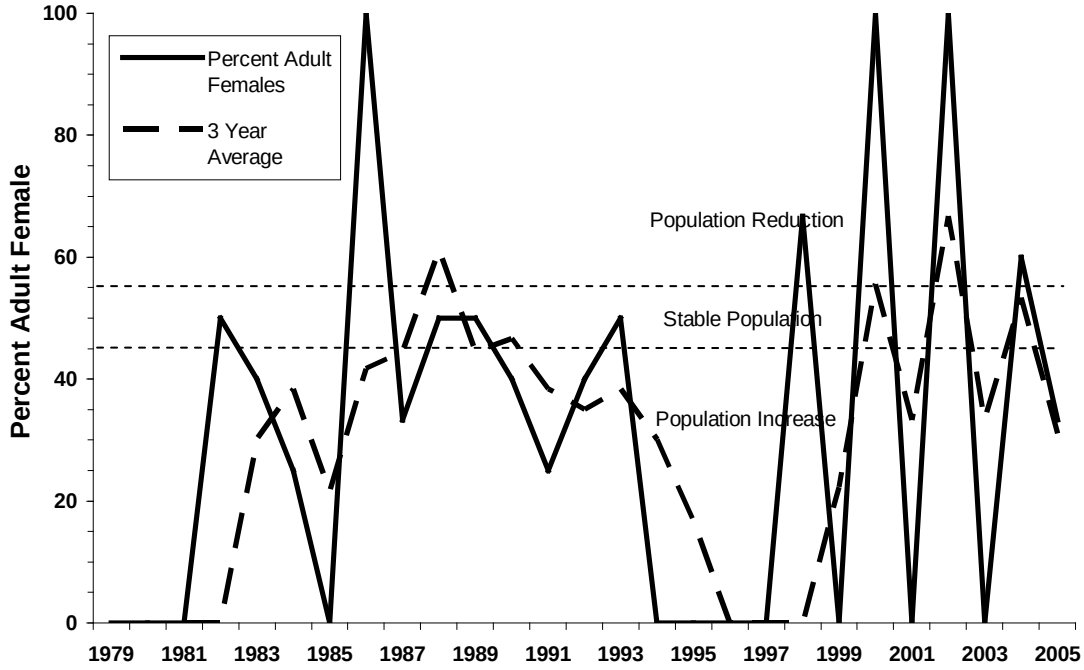
Legally harvested black bears in Laramie Peak BMU, Wyoming by sex, 1979 – 2005.



Percent adult male black bears in the Wyoming black bear harvest, Laramie Peak BMU, 1979 – 2005.



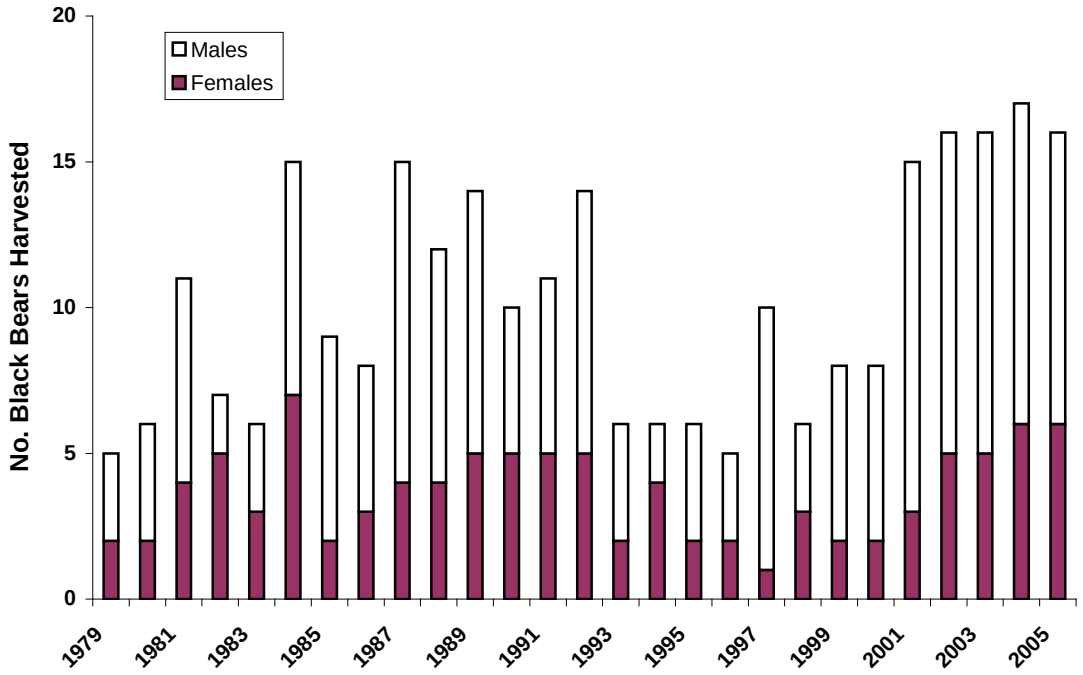
Percent female black bears in the Wyoming black bear harvest, Laramie Peak BMU, 1979 – 2005.



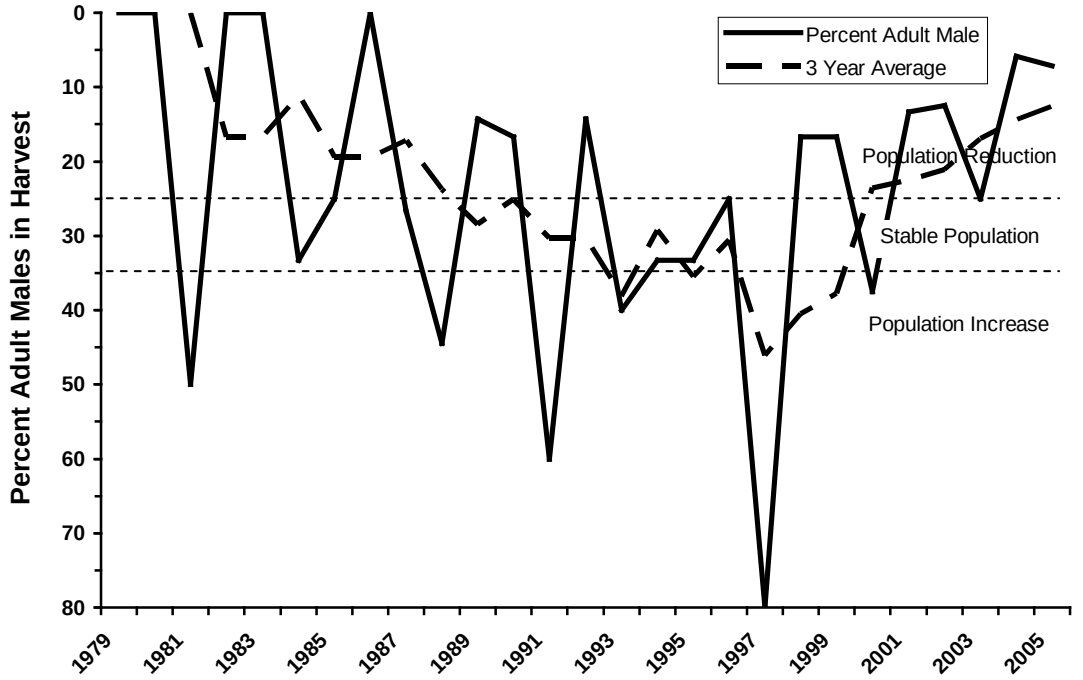
Percent adult female black bears in the Wyoming female black bear harvest, Laramie Peak BMU, 1979 – 2005.

Annual legal harvest totals show a steady rate of harvest in the Laramie Peak BMU, with a decline in the mid-1990s after the implementation of the female quota system in 1994. The harvest criteria reflect the decline and then increase in harvest beginning the late 1990s. Because of the small amount of harvest data available for this BMU, there are large fluctuations in the data. All three criteria indicate a reduction in harvest to the population increase range followed by an increase to the stable range. It appears that continuation of current harvest levels may bring the percent adult male and percent female criteria into the reduction range. The harvest density for this BMU is 0.3 bears/100 km^2/year (Table 3), which is low relative to other BMU averages. However, the overall trends for all 3 criteria appear to be in the stable range with a trend toward the beginning of reduction.

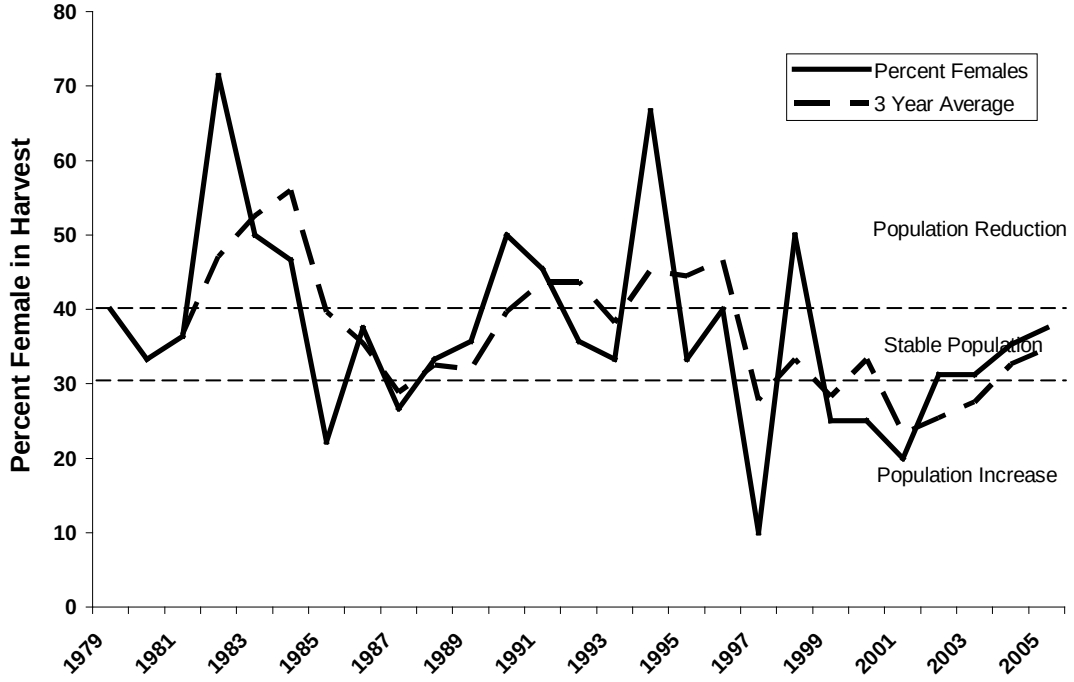
BMU 502 – Snowy Range



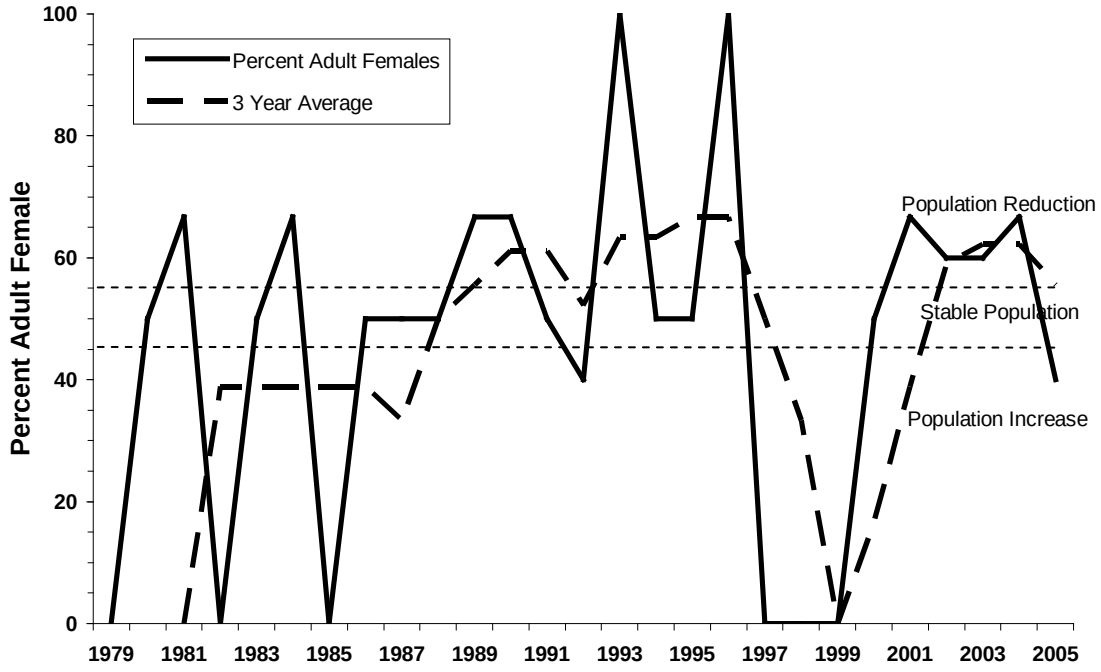
Legally harvested black bears in Snowy Range BMU, Wyoming by sex, 1979 – 2005.



Percent adult male black bears in the Wyoming black bear harvest, Snowy Range BMU, 1979 – 2005.



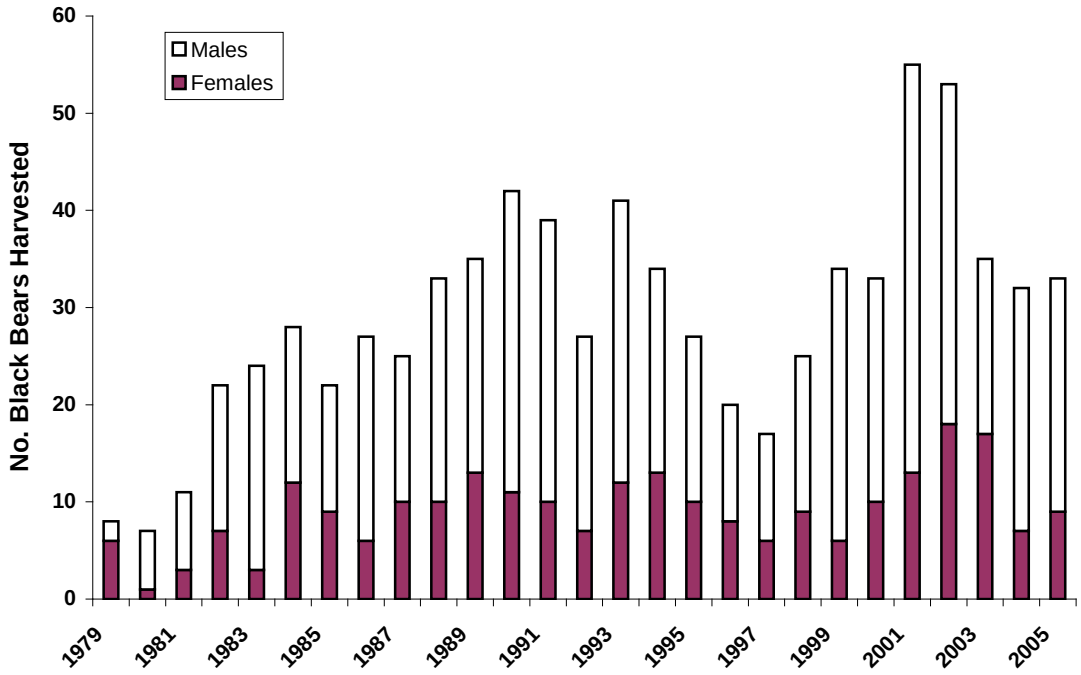
Percent female black bears in the Wyoming black bear harvest, Snowy Range BMU, 1979 – 2005.



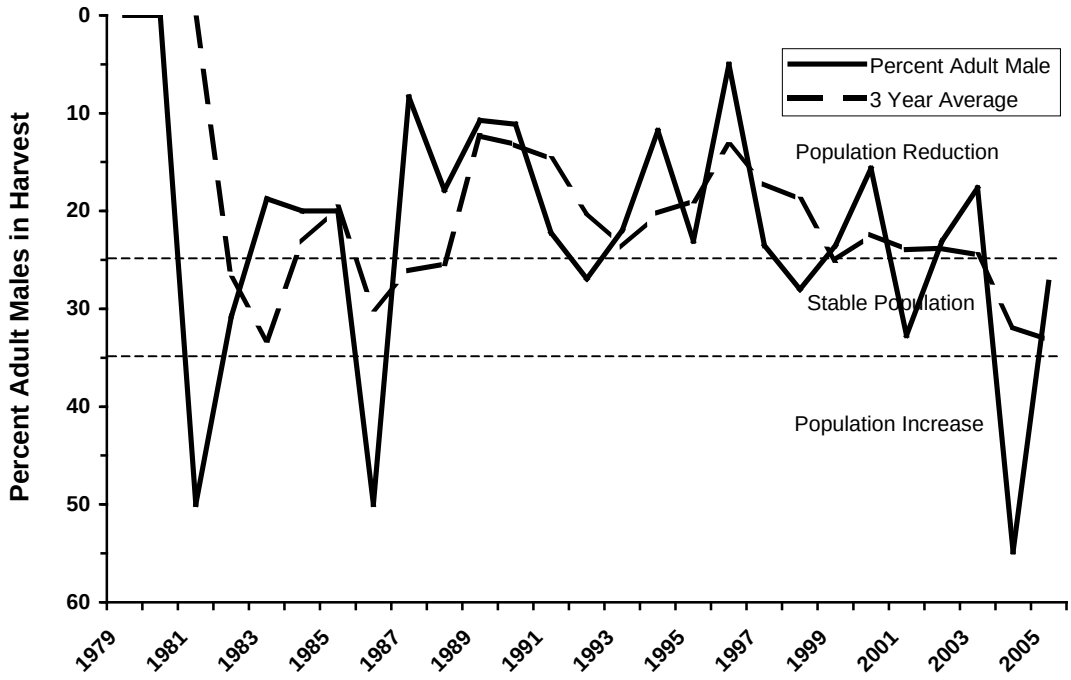
Percent adult female black bears in the Wyoming female black bear harvest, Snowy Range BMU, 1979 – 2005.

Annual harvest totals for the Snowy Range BMU show a slight increase in harvest in recent years compared to harvest in the 1980s and early 1990s. This increase is reflected in the harvest criteria for this BMU. The percent adult males in the total harvest has increased to the population reduction range and is trending upward after fluctuating around the stable range since the late 1980s. The percent females in the total harvest has moved around the stable range since 1979. The percent adults in the female harvest has varied widely due to low sample sizes, but has been around the stable range. The harvest density for this BMU is 0.5 bears/100 km^2/year (Table 3) is in the middle of the range of densities for all BMUs. These factors taken as a whole indicate a moderate level of harvest for this BMU that may be limiting the adult male segment of the population.

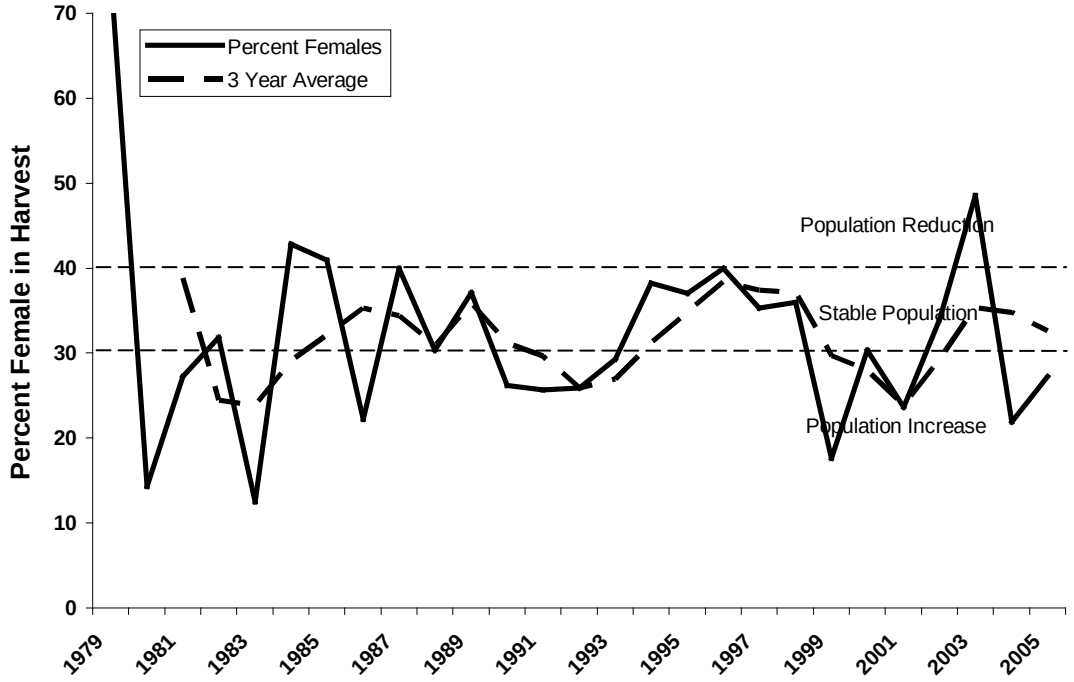
BMU 601 – Wind River



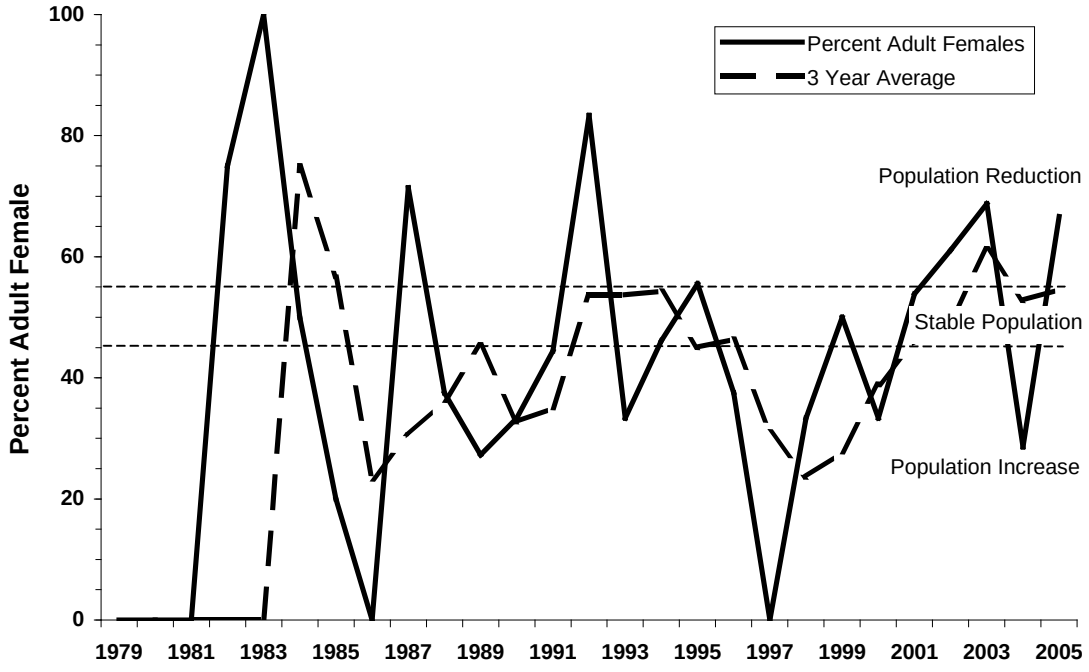
Legally harvested black bears in Wind River BMU, Wyoming by sex, 1979 – 2005.



Percent adult male black bears in the Wyoming black bear harvest, Wind River BMU, 1979 – 2005.



Percent female black bears in the Wyoming black bear harvest, Wind River BMU, 1979 – 2005.



Percent adult female black bears in the Wyoming female black bear harvest, Wind River BMU, 1979 – 2005.

With the exception of spikes in 2001 and 2002, which were years of very poor food availability, the annual harvest data for the Wind River BMU show a relatively steady trend in harvest since the early 1980s. The percent adult males in the harvest has decreased from the population reduction range to the stable population range, with a trend toward increasing population. The percent females in the harvest has fluctuated around the stable range since 1980. The percent adults in the female harvest varied widely, but has been around the stable range. The harvest density of 0.8 bears/100 km^2/year (Table 3) is at the higher end of the range of values for all BMUs. However, the southwestern corner of hunt area 31 on the Wind River Reservation is an area of potential black bear population source and may augment the surrounding hunt areas in the BMU. Overall, the harvest criteria suggest that the black bear population in this BMU is stable to increasing.