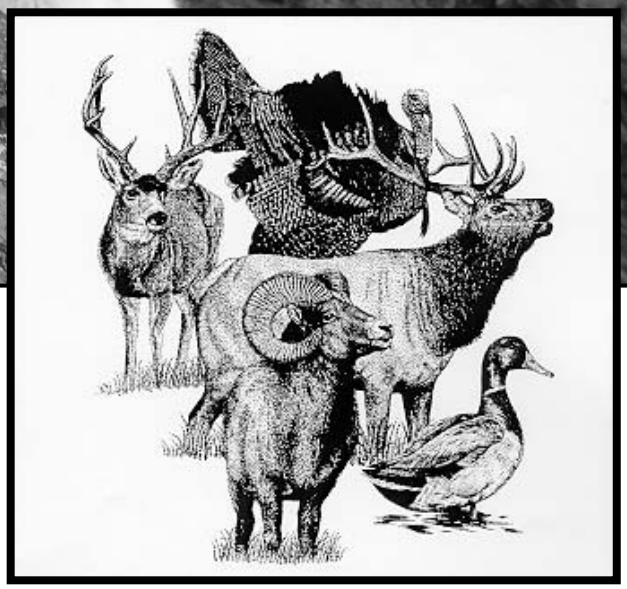
STATE OF WASHINGTON

2004 Game Status and Trend Report



Washington Department of FISH and WILDLIFE

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2004 GAME STATUS AND TREND REPORT

July 1, 2003 – June 30, 2004

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This Program Receives Federal Aid in Wildlife Restoration, Project W-96-R-12, Statewide Wildlife Management.

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Deer

DEER STATUS AND TREND REPORT: STATEWIDE

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Population Objectives and Guidelines

This report covers the time period July 2003 to June 2004. The goal set by Washington Department of Fish and Wildlife (WDFW) for the management of black-tailed deer (*Odocoileus hemionus columbianus*), mule deer (*O. h. hemionus*), and white-tailed deer (*O. virginianus*) populations in Washington is to maintain numbers within habitat limitations. Landowner tolerance, a sustained harvest, and non-consumptive deer opportunities are considered within the land base framework. Specific population objectives call for a post-hunt buck:doe ratio of 15:100 (WDFW 2003). Some Game Management Units (GMUs) are managed for limited entry buck only harvest, providing higher quality animals for harvest on a limited basis. Limited entry GMU objectives for post-hunt buck ratios vary but can range as high as 20 to 25 bucks:100 does. The desired post-hunt fawn:doe ratio is approximately 40 to 45:100 depending on the overall mortality of the population in question and the desire to have a particular population grow or remain stable. In the case of extreme deer damage situations, a reduced local sub-population may be the goal.

Hunting Seasons and Harvest Trends

Total deer harvest for 2003 for the general season and special permit hunts combined was estimated at 40,806 (Figure 1, Table 1).

The estimated statewide deer harvest has fluctuated around 40,000 animals for the last 4 years. Black-tailed deer, mule deer, and white-tailed deer generally make up a third of the statewide harvest with some variation between years. Black-tailed deer have accounted for as much as 41 % of the statewide harvest in recent years. The estimated number of mule deer in the harvest has been fairly strong the last four years and is substantially higher than the mid to late 1990s. The estimated number of white-tailed deer in the total harvest has remained relatively stable for the last 3 years averaging about 12,600 animals per year. From a statewide perspective, antlered white-tailed deer harvest has increase slightly each year for the last three years (Table 2).

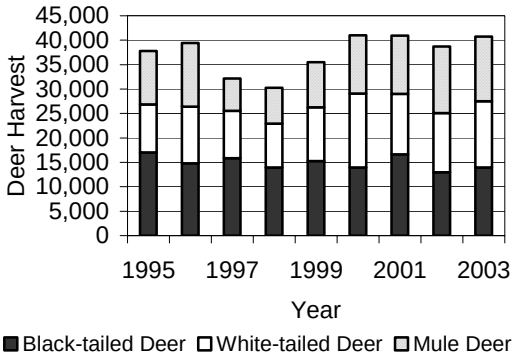

Figure 1. Figure 1. Estimated statewide deer harvest by species for 1995 to 2003 based on hunter report card percentages (1995-2000) or mandatory reporting (2001-2003).

Historically, Washington deer hunting was managed under any legal buck, hunting seasons with licenses sold over the counter with no quotas. As hunting pressure became more intense over the years, the harvest, crowding, and hunter pressure were managed in a variety of new ways. Currently deer licenses are sold over the

Table 1. Estimated statewide deer harvest for general season and special permit season by weapon type and deer class for 2003.

General Season	Antlered	Antlerless	Total
Modern Firearm	25,646	2,376	28,022
Muzzleloader	1,355	1,071	2,426
Archery	2,181	2,230	4,411
Sub-Total	29,182	5,677	34,859
Special Permits			
Modern Firearm	1,404	3,592	4,996
Muzzleloader	77	150	227
Archery	13	4	17
Unspecified Tag	162	545	707
Grand Total	30,838	9,968	40,806

Table 2. Estimated statewide deer harvest by deer type and class for 2001-2003.

Year 2001	Antlered	Antlerless	Total
Black-tailed deer	14,277	2,381	16,658
Mule deer	9,211	2,704	11,915
White-tailed deer	8,589	3,777	12,366
Year 2002	Antlered	Antlerless	Total
Black-tailed deer	11,103	1,865	12,968
Mule deer	10,363	3,276	13,639
White-tailed deer	8,783	3,304	12,087
Year 2003	Antlered	Antlerless	Total
Black-tailed deer	11,761	2,172	13,933
Mule deer	9,825	3,455	13,280
White-tailed deer	9,252	4,301	13,553

counter and there is no quota on licenses sold. Deer hunters are required to choose a weapon type and hunt only during that hunting season. General season modern firearm, archery, and muzzleloader success rates have all varied depending on the year. For the 2003 general hunting season, modern firearm hunter success was 25.8 %. Muzzleloader hunter success was 28.3 % and archery hunter success was 26.6 % for the general hunting season.

Surveys

WDFW conducts composition surveys from the air and the ground to index buck, doe, and fawn ratios. Depending on the species, location and terrain involved, deer composition surveys are conducted in the spring, the summer, pre-hunt in the early fall and post-hunt in the early winter prior to deer shedding their antlers. Population estimates are also conducted for mule deer using the visibility bias model initially developed in Idaho for elk (Samuel et al. 1987). Variants of the model have been developed for a variety of other species including mule deer.

In western Washington, black-tailed deer surveys are coupled with hunter check station information and harvest data to model populations.

Pre-hunt and post-hunt surveys are conducted in eastern Washington for both white-tailed deer and mule deer. Deer populations in selected areas are surveyed again in March and April to assess winter survival and recruitment.

White-tailed deer are surveyed in summer to determine pre-hunting season fawn and buck ratios and again in spring to determine recruitment. Hunter check stations and harvest report cards are used to monitor age distribution of whitetail bucks in the harvest.

Population Status and Trend Analysis

White-tailed deer and mule deer populations are influenced significantly by winter severity in central and eastern Washington. Populations tend to build during mild winters and experience major declines in severe winters or protracted winters with below normal temperatures and above normal snow depths.

Deer populations in central and eastern Washington have recovered from the most recent severe winter of 1996-97. Mule deer and white-tailed deer populations have been increasing. Mule deer populations are doing well along the Snake River breaks and the foothills of the Blue Mountains. Mule deer in the Blue Mountains also seem to be increasing but at a slower rate. White-tailed deer in eastern Washington did experience some localized declines due to outbreaks of epizootic hemorrhagic disease (EHD) but for the most part seem to be doing well and are probably increasing slightly. Mule deer in Okanogan County continued to do well during the time period of this report. Mule deer numbers in Chelan and Douglas Counties also improved during this time period.

Black-tailed deer in western Washington are negatively influenced by loss of habitat to human development, the reduction in timber harvest, and habitat progressing in successional age and becoming less able to provide high quality forage. Black-tailed deer experience some winter loss during a normal winter even though extreme cold temperatures or snow depth may not be an issue. Deer on low quality forage and constantly exposed to cold, rainy conditions can become hypothermic and die.

Black-tailed deer continue to suffer mortalities due to hair loss syndrome. Hair loss syndrome is not fully understood at this time. New evidence suggests that there may be a link to hair loss syndrome and non-native, Old World lice that have been found on afflicted black-tailed deer. Deer groom excessively in response to the lice, which causes the hair loss. Deer suffering from hair loss typically weaken and lose weight dramatically. Some deer survive but many die from hypothermia or from pneumonia caused by internal parasites that deer also commonly carry. Fawns seem to be the first age class impacted by the syndrome. The next most susceptible age/sex class is adult does, and lastly adult bucks may exhibit hair loss. Because young of the year and adult does seem to be the first to be impacted by hair loss syndrome, there is a potential that mortalities caused by this syndrome may be having an impact on population growth or decline. Recruitment of young and survival of reproductive age females are two of the most important rates that influence ungulate population dynamics. Despite all of these negative impacts on black-tailed deer, the estimated number of animals harvested for the last six years has been relatively stable (Figure 1).

Augmentations

No augmentation efforts for deer were conducted by WDFW during the time period covered by this report.

Habitat Condition and Trend

In general deer benefit from habitat in early to mid-successional stages. Deer herds in western Washington benefited from new growth after timber harvest in the 1960s, 70s, and early 80s. Much of the U. S. Forest Service land in western Washington is now shifting toward late successional reserves (LSR) and mature growth forest. This change will greatly diminish the carrying capacity of these habitats for deer. The long-term trend in deer carrying capacity is down on public lands managed by state and federal agencies.

Timber management on industry-owned forest is generally shifting toward smaller scale cuts and selective cuts. While this may be beneficial to deer, restrictive understory management and other silvicultural practices may be having a negative impact on deer forage and it's availability.

One of the major benefits to mule deer and white-tailed deer has been the Conservation Reserve program (CRP). The benefits to deer from CRP include taking agricultural land out of production, planting sites with native vegetation, and allowing vegetation on sites to grow taller and thicker providing both forage and sometimes security cover for fawning.

Excessive road density limits habitat suitability for deer on most managed public and private forests. High road densities increase disturbance during fawning and breeding. High road densities also make deer more vulnerable during the hunting season as well as to poaching. In general, when all other necessary habitat components are in place, active road management programs that limit road density to approximately one linear mile of road per square mile or less create conditions more favorable for deer.

WDFW is conducting a cooperative mule deer research project in central and eastern Washington with other agencies, public utilities, and universities. One aspect of this multi-faceted project is to investigate the influence of habitat quality as it relates to deer body condition, fawn production, and recruitment.

Wildlife Damage

WDFW is mandated by law to address agricultural damage caused by deer. In response to landowner complaints, WDFW tries to alleviate damage problems without reducing deer populations. One of the biggest challenges the Department faces is managing deer populations in balance with landowner tolerance. Regardless of deer densities, wherever deer and agriculture overlap there are going to be some damage complaints. The level of deer damage is usually a function of local deer densities all year and the intensity of winter when snow and cold temperatures force deer to use agricultural lands at a higher rate.

White-tailed deer and mule deer have been increasing in numbers in several locations in central and eastern Washington and as a result agricultural damage complaints due to deer have been increasing slightly. New vineyards are being established in southeastern Washington and have the potential to host new conflicts between deer and agriculture. Mule deer activity in Whitman and Garfield Counties seems to be increasing and damage complaints may increase in those areas in the near future. In northeastern Washington, damage to alfalfa fields by white-tailed deer is the most prominent problem. Damage by black-tailed deer in western Washington also occurs but is less of a problem.

Management Conclusions

Black-tailed deer management by WDFW in western Washington generally tries to achieve a sustained yield of 2-point or better bucks or any bucks where appropriate without negatively impacting the population's health and viability. Limited antlerless tags are issued through the special permit process to keep those populations in check that may be causing some local damage concerns. Deer management in eastern and central Washington, which deals with both mule deer and white-tailed deer, is more dependent on climate. Mule deer and white-tailed deer populations tend to do well in central and eastern Washington when average and below average winter severity allows. Severe climatic events are somewhat cyclic, happening every 5 to 8 years. Severe winter effects are sometimes localized but often times more broad in scale. Sever winters result in high winter die-offs. Several years are then required for deer populations to rebound from those depressed levels. Currently the mule deer and white-tailed deer populations in eastern and central Washington have rebounded from recent weather events. Both species will probably continue to do well until the next climatic event that depresses populations to some lower level.

In many locations in the state, Native American Tribal members exercise their hunting rights as spelled out in various treaties on open and unclaimed lands as defined by the state Supreme Court. These lands are for the most part public lands managed by the U. S. Forest Service, Bureau of Land Management, the Department of Natural Resources and WDFW. Some of that Tribal hunting effort involves deer. When possible, the State attempts to obtain harvest records each year for deer harvested by Tribal members. State and Tribal wildlife managers are continually working toward improved co-management agreements that ensure conservation of deer populations, a sustainable harvest, and habitat improvements.

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DEER STATUS AND TREND REPORT: REGION 1
PMU 11 – GMU 101
PMU 13 - GMUs 105, 108, 111, 113, 117, 121, 124

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Population objectives and guidelines

White-tailed deer (*Odocoileus virginianus*) are the most abundant deer in northeast Washington. Mule deer (*O. hemionus*) are present, especially in the higher elevations and predominantly in Ferry County, but their overall numbers are low compared to white-tailed deer.

The white-tailed deer harvest management objective is to provide antlered and antlerless hunting opportunity for all user groups whenever possible. The buck escapement goal is to maintain at least 15 bucks per 100 does in the post-hunting season population. Antlerless hunting opportunity will be managed to maintain healthy white-tailed deer populations within landowner tolerance.

The management goal for mule deer is to provide conservative hunting opportunity, maintain at least 15 bucks per 100 does in the post-hunting season population, and increase productivity and population levels.

Hunting seasons and harvest trends

Figure 1 depicts the trend in total estimated deer harvested by hunters within Game Management Units (GMUs) 101 - 124 from 1996 through 2003. Weather conditions for hunting were much better in 2003 than 2002, which likely contributed to the increased harvest.

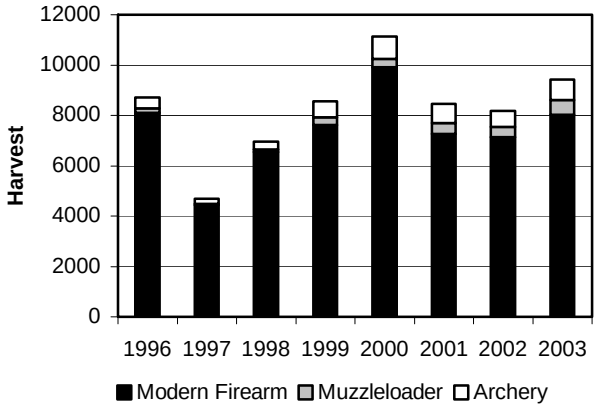

Figure 1. Trend in total deer harvest for GMUs 101-124 from 1996-2003.

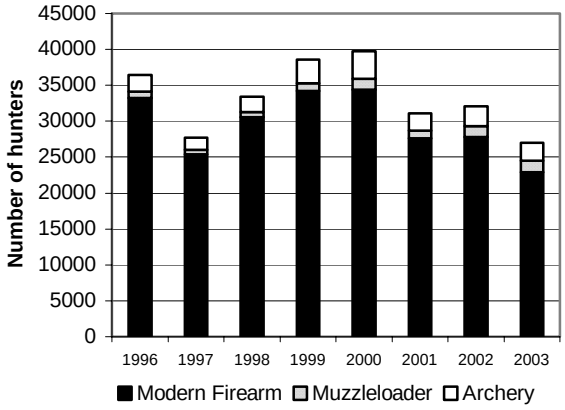

Figure 2. Trend in the number of deer hunters for GMUs 101-124 from 1996-2003.

While the deer harvest was up, the number of hunters declined in 2003 (Figure 2). Mule deer bucks legal for harvest have been limited to a three-point (high antler side) minimum since 1997. (Note that in Washington an antler point is defined as a projection off any part of the antler measuring at least one inch in length. Antler points include eye-guards, if at least one inch long.) The most significant mule deer harvest in the Colville District occurs in GMU 101, which is primarily northern Ferry County. The mule deer buck harvest has increased considerably in the past 3 years, as well as those bucks with 4 points or better on the high antler side (Table 1).

The antlered whitetail buck harvest increased

Table 1. Mule deer buck harvest trend by user group within GMU 101 (A=Archery; MZL=Muzzleloader; MF=Modern Firearm hunter harvest).

Year	A	MZL	MF	Total	%4pt+
2001	6	N/A	184	190	45%
2002	13	N/A	227	240	53%
2003	20	15	281	316	56%

again in 2003, by 9% over 2002, with a total buck kill of 6,222 for GMU's 101-124. Youth, Senior, and Hunters with Disabilities (Y/S/D) hunts were offered for whitetails of either sex in GMUs 101-124 again during the early general modern firearm hunt. The estimated harvest of antlerless whitetails by Y/S/D had declined by 27% from 2001 to 2002, but came back with an increase of 28% in 2003, possibly due to the improved hunting weather. There was insignificant change in the archery antlerless harvest with 291 antlerless deer taken (Table 2). Two new units, GMU's 101 & 121, were added for muzzleloaders and this likely contributed to this user group's 44% increase in antlerless harvest (325 total).

There were 1,950 antlerless white-tailed deer permits issued for modern firearm hunters within GMUs 101-124 in 2003, a reduction of about 43% from 2002 (3450 permits). A new kind of permit was created, however, offering 550 "Second Deer Tags" for two specific units, GMUs 121 and 124. These Second Deer Tags allowed the permittee to take antlerless white-tailed deer in addition to their regular deer tag opportunity. These tags provide a supplemental management tool as well as a useful means for increasing hunter opportunity. The total antlerless whitetail harvest from permits increased close to 14% from 696 in 2002 to 790 in 2003 (Table 2). Questionnaires were returned by 93% of the permittees. Of those, 24% did not hunt which is similar to the reported 22% of permittees who did not hunt in 2002. Of those that hunted, 59% were successful in 2003 vs. only 46% in 2002. Permittees took 805 deer, but 230 (29%) of the deer they took were antlered bucks, which is up from the 24% bucks taken by this group in 2002. The Second Deer Tags accounted for a reported 215 antlerless whitetails. The "any white-tailed deer" special permits legal in the general modern firearm season continue to be a relatively inefficient means of managing doe harvests. As a consequence, "any white-tailed deer" opportunities have been created for archers, muzzleloaders, modern firearm youth, senior, and hunters with disabilities. These hunts accounted for approximately 71% of the antlerless harvest in northeastern Washington in 2003 (Table 2).

Surveys

Age, antler and sex ratio data are collected from harvested deer for monitoring deer populations and developing season recommendations. The ratio of mature white-tailed bucks in the population is monitored by determining the percentage of adult bucks (yearlings excluded) that are 5 years or greater. In 2003 we were encouraged to see this percentage increase to 12% from a low of 0% in 2001 and 1% in 2002 (Figure 3). Buck antler data are also collected at both check stations and mandatory hunter reports including the number of bucks with 5 points or more on the high side of their antlers. Both check stations and hunter reports yielded 15% of all bucks harvested as having 5 points or more for the overall whitetail harvest within Population Management Unit (PMU) 13. This percentage represents an improving trend since a low of 10% in 1999 (Table 3 and Figure 4). The percentage of yearlings increased in 2003. All checks combined yielded 47% (*n=108)* yearling white-

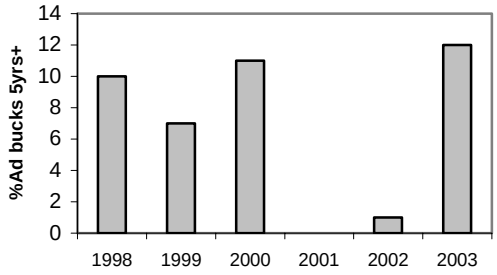

Figure 3. Percent of adult whitetail bucks 5 years and older from hunter check stations for 1998-2003.

Table 2. Hunter harvest of antlered and antlerless white-tailed deer by Population Management Unit in 2003.

		Antlerless						
PMU	GMU	Archery	Permit	Y/S/D	Muzzleloader	Total	Antlered	Antlerless/100 Antlered
11	101	45	31	265	36	377	511	74
13	105	14	39	72	NA	125	323	39
	108	5	63	62	17	147	352	42
	111	4	39	54	29	126	309	41
	113	4	12	58	100	180	434	41
	117	38	55	152	47	292	992	29
	121	78	283	350	67	778	1,637	48
	124	103	268	232	65	668	1,664	40
Total		291	790	1,245	325	2,693	6,222	43

Y/S/D = Youth/Senior/Hunter with Disability

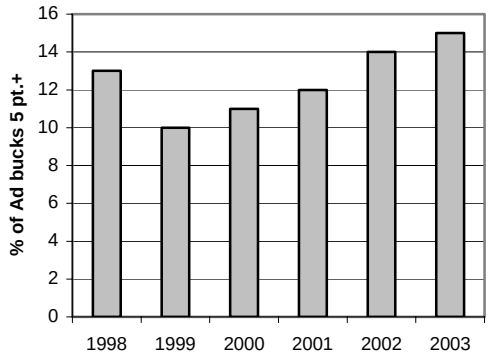

Figure 4. Percent of PMU 13 whitetail bucks 5 point or better from hunter reports, 1998-2003.

tailed bucks and 32% (*n*=39) yearling white-tailed does. Fawns made up 22% of the total antlerless harvest checked. The mean age of the adults only (yearlings excluded) was 3.5 years (n=49) for bucks and 4.9 (n=23) for does in 2003 which is up for bucks and down for does from 2002.

Post-winter "green-up" surveys for deer provide fawn per adult ratios and give an index to realized recruitment for the year. Reduced emphasis is placed on these surveys following a relatively mild winter such as 2003/04 (USDC ; National Weather Service 2004). Post-winter mule deer ratios for spring 2004 were 36 fawns per 100 adults (*n*=166). Post-winter whitetails surveyed over wide areas from GMUs 101-121 yielded a fawn:adult ratio of 48:100 (*n* = 142). These ratios are low for deer fawn survival and reflect no significant change for mule deer from 2002, however, a modest improvement for whitetails.

Whitetail buck:doe ratios for summer 2003 were 31 bucks per 100 does in PMU 13 (Table 4) vs. 47:100 in PMU 11 (i.e. GMU 101) where there is no late modern firearm season. The fawn ratio was low at 51:100 for PMU 13, our major whitetail area. There were 59% yearling whitetail bucks in the August, 2003 surveys vs. 60% for the previous 5 year mean.

A special effort by WDFW and U.S. Forest Service personnel classified 801 mule deer, primarily within western Ferry County (part of PMU 11), during the late summer of 2003. The buck ratio was almost unchanged from 2002 at 34 per 100 does but the fawn ratio improved to 66:100 vs. 52:100 in 2002 (Table 5).

Population status and trend analysis

The percentage of yearling whitetail bucks in the 2003 hunter harvest was near the long-term average (47% vs. 45%). The percentage of 5 point or better bucks reported taken by hunters continued to increase in 2003. All our data on antler points and ages suggest improved numbers of mature bucks in the whitetail population for 2003 (Figures 3&4).

Because of depressed fawn ratios, the antlerless whitetail permit levels were reduced for 2003. The harvest, however, ended up increasing about 14% from 2002 partly attributed to the increased opportunity for muzzleloaders and the Second Deer Tag offered in GMU's 121 & 124. The primary increase in the 2003 antlerless whitetail harvest came from the Youth/Senior/Disability hunt opportunity, which implies that either there were more deer available or harvesting any deer was easier. The 2003 season did offer much better hunting weather than in 2002 with cooler temperatures and early snowfall.

For 2003 the ratio for white-tailed deer taken by hunters within PMU 13 was 41 antlerless per 100 antlered. In PMU 11, this ratio was 74 antlerless per 100 antlered. Here the buck harvest is lower due to no late modern firearm season. Hence, the proportion of antlerless whitetails becomes inflated.

In 2003 archers were allowed to take antlerless mule deer during their early general season in GMU 101 only. We did not expect much effort toward mule deer does and fawns, but did want to provide increased opportunity for archers, and hoped some pressure would be put on mule deer causing problems in the town of Republic along with some alfalfa fields in the upper Kettle River area. As expected, this archery harvest was very low with only 15 antlerless mule deer taken in the entire unit.

The summer mule deer fawn ratios continue to improve within the Colville District (Table 5). Mule deer populations should expand with 66 fawns per 100 does as sampled in 2003.

The late summer whitetail fawn ratios were relatively poor again for the 2003 summer with 51 fawns per 100 does sampled in GMUs 105-121. We speculate that the exceptionally low amounts of summer and fall precipitation through 2003 may have contributed to the low fawn recruitment rate. So far in 2004 there has been good late spring and summer precipitation so we hope to see improved fawn survival this year. The whitetail pre-season buck ratio improved from 22 bucks per 100 does in 2002 to 31:100 in our major whitetail units for 2003 (Table 4, PMU 13).

Disease and Predators

There were no reports of deer lost to Epizootic Hemorrhagic Disease in the Colville District during the summer of 2004 and by late August we received greater than normal rainfall so the threat was likely eliminated. WDFW continues to test harvested deer statewide for Chronic Wasting Disease (CWD); and

Table 3. Whitetail yearling buck and 5+ antler point harvest trends from field checks and hunter reports for GMUs 105-124.

	Early Check Station		Late Check Stations		All Field Checks		Hunter Reports
Year	Sample	%Yrlg	Sample	%Yrlg	%Yrlg	%5pt+	%5pt+
1991	62	61%	106	29%	41%	24%	15%
1992	88	68%	34	37%	52%	16%	17%
1993	21	52%	44	27%	31%	28%	16%
1994	50	46%	61	23%	35%	20%	18%
1995	29	83%	No late chk.	---	---	---	16%
1996	53	64%	No late chk.	---	---	---	16%
1997	40	65%	63	30%	39%	22%	12%
1998	51	72%	92	47%	58%	9%	13%
1999	57	68%	77	42%	53%	16%	10%
2000	30	50%	88	40%	42%	17%	11%
2001	20	60%	63	44%	45%	13%	12%
2002	39	44%	37	11%	36%	16%	14%
2003	26	54%	73	42%	47%	15%	15%

many deer have been included in the sample from throughout northeast Washington. No deer have tested positive for CWD through 2003.

Cougar populations in northeast Washington were exceptionally high in the mid to late 1990's but hunter harvests and special harvest permits to reduce populations for human safety concerns have significantly reduced cougar numbers in recent years.

Habitat condition and trend

The impacts of drought are not as obvious as a severe winter, but we speculate that the hot, dry summers and drought-stressed deer forage vegetation may be a significant factor contributing to the poor white-tailed deer population recovery after the 1996 winter losses. The effects of the drought are readily visible in the loss of trees in the forest along with over-grazed pastures and rangeland. White-tailed deer, especially pre-weaned fawns, may be impacted by these conditions.

Mule deer populations are showing some signs of stabilizing or recovering. Land managers, especially the USFS, have begun an aggressive program to restore the historic park-like forest environment that mule deer seem to prefer, relative to decades of fire suppression and logging of large diameter trees which led to dense, young thickets of conifers. Maintaining adequate deer winter and spring transition ranges may become increasingly difficult as rural landscapes within northeastern Washington are fragmented by human developments.

Wildlife damage

Deer foraging in alfalfa and damage to automobiles by highway collisions are the primary economic losses reported. Antlerless permits and either-sex hunting opportunity by youth, senior, and hunters with disabilities are part of the management strategy to stabilize deer populations, and control excessive damage. While deer continue to be a problem for farmers, the population and the damage complaints are presently at a reasonably tolerable level. Landowner Access Permits are issued to some farmers with a history of chronic damage. These permits allow licensed hunters to take antlerless whitetails on specific farms outside of general hunting seasons. This small-scale program has proven popular and effective, especially in providing landowner satisfaction. Landowner Preference and Depredation Permits are also tools Wildlife Officers may use to deal with specific complaints regarding deer.

Table 4. White-tailed deer late summer composition surveys by Population Management Unit (PMU).

		August		September	
PMU	Year	Sample Size	Bucks per 100 Does	Sample Size	Fawns per 100 Does
11	1999	220	46	232	49
	2000	207	38	99	74
	2001	241	35	311	50
	2002	190	35	328	63
	2003	113	47	228	69
13	1999	761	31	756	49
	2000	1,033	30	803	65
	2001	1,185	29	720	57
	2002	955	22	779	55
	2003	1,064	31	927	51

Management conclusions

Mule deer populations continue to improve. The mule deer buck harvest has increased in the Colville

District by 42% from 2001 to 2003 (343 to 486 bucks for GMU's 101-124) and by 66% just within GMU 101 (190 to 316 bucks). During the same period, the percentage of 4 point or better mule deer bucks has increased from 45% to 56% for GMU 101 (Table 1).

The whitetail population appears to be stagnated with poor recruitment. Nevertheless, we continue to make it through the winters with minimal losses. Winter severity has been below average and we have not had a "deer killing" winter since 1996-97 (Figure 5). The poor whitetail fawn ratios through 2003 suggest there may be habitat limitations, however, and a prolonged drought that is obviously impacting other ecological systems has likely stressed whitetail populations as well. In calculating the 10-year mean summer (July-September) rainfall for 1984-1993 and 1994-2003 there are striking differences. First, there was 35% more rain on the average during the earlier ten-year period than the later. Secondly, there were four summers that exceeded the 25-year average in summer rainfall from 1984-1993 and only one summer for 1994-2003. In addition there was only one summer that was below the 25-year average in rainfall for 1984-93 and five summers that were below average for 1994-2003 (USDC, Nat. Weather Serv. 2004). The 2004 late spring and late summer were relatively wet so we see encouraging signs of increased forage production and hopefully improved whitetail fawn ratios.

While the total whitetail population is not as high as in the past, it is at a level that is relatively tolerable to landowners. The 2003 whitetail harvest in the primary whitetail units of PMU 13 increased 13% from 2001 to 2003. The whitetail buck harvest within this PMU was a respectable 5,711 bucks in 2003. The good news is that the conservative late modern firearm season closure (set at November 19) has resulted in improved recruitment of mature bucks into the population. The percentage of 5 point or greater bucks in the harvest has increased in PMU 13 from 10% in 1999 to 15% in 2003 (Figure 4). The ratio of antlerless to antlered whitetails killed has also increased from 36:100 in 2002 to 43:100 in 2003 for the Colville District.

The 2003 age data may indicate a continued increase in the percentage of yearling whitetail does within the population from 21% in 2001 to 25% in 2002 and 36% in 2003. Sample sizes are low, however, suggesting caution in reaching this conclusion. Populations that are heavily impacted by hunter harvest would be expected to have few older aged animals. Of the 23 adult does (older than 2 years) that were aged in 2003, 52% were 5 years or older (vs. 16% for 2001 and 40% for 2002). For whitetail bucks in which the harvest rate is much higher, we had 12% of the adults that were 5 years or older. Nevertheless, if the apparent trend in the percentage of yearlings in the doe harvest is increasing, it could mean that hunter harvest is finally having a visible effect on the doe segment of the white-tailed deer population.

Given the relatively low whitetail fawn ratios for fall 2003, we will likely not be looking at much change in the fall population and hunter harvest for 2004. As always, hunter success has a lot to do with the weather, especially during the later portion of the season.

Table 5. Mule deer buck and fawn ratios per 100 does from summer composition surveys within the Colville District from 1998 through 2003.

Year	Buck:Doe	Fawn:Doe	Total Classified
1998	21:100	68:100	138
1999	25:100	47:100	88
2000	49:100	43:100	160
2001	42:100	46:100	286
2002	33:100	53:100	330
2003	34:100	66:100	801

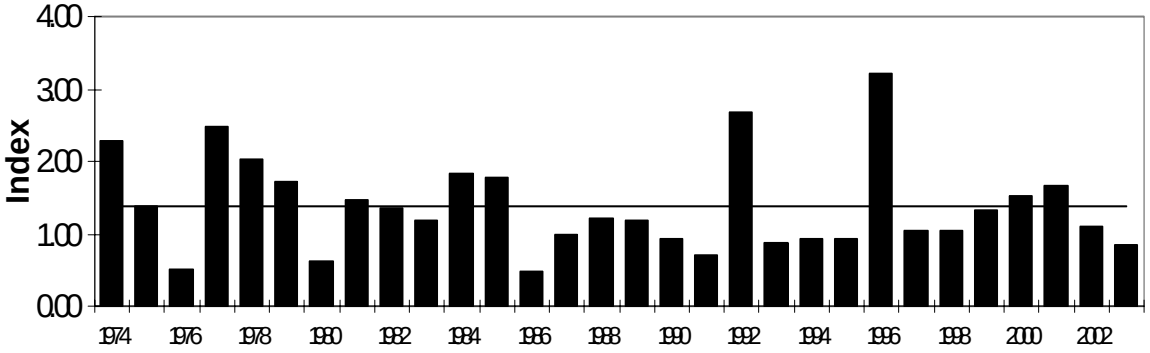

Figure 5. Chewelah winter severity index, based on mean temperature and total snowfall, 1974-2003 (USDC; National Weather Service 2004).

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DEER STATUS AND TREND REPORT: REGION 1
PMU 14 – GMUs 127, 130, 133,
PMU 15 – GMUs 136, 139, 142

HOWARD FERGUSON, District Wildlife Biologist
DAVID P. VOLSEN, Wildlife Biologist

Population objectives and guidelines

Our deer management goals are to maintain both white-tailed deer (*Odocoileus virginianus*) and mule deer (*O. hemionus*) numbers at levels compatible with landowners and urban expansion and provide as much recreational use of the resource for hunting and aesthetic appreciation as possible. Further objectives are to meet the state guidelines for buck escapement, at least 15 bucks per 100 does post-season, (WDFW 2003) and to maintain healthy buck:doe:fawn ratios while minimizing agricultural damage from deer.

Hunting seasons and harvest trends

The Game Management Units (GMUs) numbered 127 through 142 make up the Population Management Units (PMUs) 14 and 15. These PMUs provide quality recreation in relatively open shrub-steppe and agricultural habitats. Species distribution between PMUs is approximately equal, with slightly more mule deer harvested in PMU 15 and slightly more white-tailed deer harvested in PMU 14.

Populations of both species are stable under our current management strategies. WDFW offers a short nine-day modern firearm season with a three point minimum regulation for both deer species, plus a seventeen-day late whitetail buck hunt, which is also restricted to 3-point minimum. Archery mule deer seasons were 3-point minimum September 1-30 in GMU 127, 3-point minimum and antlerless in GMU 142, and in GMUs 130-139 the season was three-point minimum September 1-15, and 3-point minimum or antlerless from September 16-30. For whitetail, the season was extended to September 1-30, for three point minimum or antler less. Late archery was limited to GMUs 124 and 127, and hunters could take mule deer, whitetail 3-point minimum or antlerless deer. Muzzleloader hunts are offered in GMUs 133 and 142 in the early season (Oct. 4 – 10), and GMUs 130 and 139 in the late season (Nov. 20-Dec. 8).

Harvest of whitetail bucks has increased since the implementation of the November late buck hunt. Harvest figures (Table 1.) indicate a trend of increased hunter take during the previous 6 years. The buck harvest in 2003 was slightly higher than an average of the previous 3 years in PMU 14 and slightly lower in 2003 for PMU 15. Hunter success was greater in 2003 than previous years in all GMUs (Tables 2 and 3).

Current habitat conditions support existing populations, however, severe winters or a significant drought have shown to increase mortality across sex and age classes. An outbreak of EHD/Bluetongue in GMUs 127, 130 and 139 in 2003 caused increased mortality amongst white-tailed deer. As with previous outbreaks of the disease in District 2, drought conditions were coincident with white-tailed deer mortality. When deer numbers are shown to be impacting commercial agricultural operations, harvest pressure is increased on antlerless deer through youth/senior/disabled/AHE seasons, antlerless permits and B-tags.

Surveys

Deer populations in the PMU 14 and 15 have been surveyed by both ground and aerial methods. The post-season ratios more accurately reflect composition and harvest of these herds than the pre-season survey data; however, pre-season surveys are accurate reflections doe to fawn ratios. Bucks are often difficult to survey because of nocturnal behavior and the hunting pressure of the late archery/rifle/muzzleloader buck seasons. As a result, the post-season buck:doe ratio figure is probably a conservative measure of composition.

Whitetail ratios in 2003 averaged 36 bucks: 100 does: 87 fawns pre-season, an increase 50% for bucks and 74% for fawns over 2002. Pre-season mule deer ratios in 2003 differed little from 2002 with for bucks at 36 bucks: 100 does, however, fawns numbers dropped from 64 to 54 fawns:100 does (Tables 4 and 5).

Post-season aerial surveys were not conducted during 2003 due to budget constraints. Pre-season surveys were implemented during August and September 2003.

Population status and trend analysis

Although whitetail post-season buck ratios are probably underestimated by surveys, ratios for both whitetail and mule deer exceed guidelines (15 bucks

per 100 does) for post-season herd composition (Tables 4 and 5). Doe:fawn ratios are reduced from 1999 values in most units and indicate a need for continued monitoring.

These GMUs are largely private lands, and although WDFW has little control of management practices on private lands, the recent mild winters and general fertile nature of these soils have helped produce healthy populations of both deer species in past years. Populations of mule deer in GMUs 139 and 142 responded to heavy snow depths during winter 2003 with a seasonal migration towards the Snake River. The cumulative effects of several years of drought may also be contributing to seasonal impacts by reducing habitat quality. Mule deer management continues to be conservative in the PMUs 14 and 15, although more aggressive management is used to mitigate agricultural damage in certain areas.

Management conclusions

Deer populations in the PMU 14 and 15 are stable and productive and current season structures are addressing management issues. White-tailed deer are frequently still a social problem especially in Whitman County near Colfax and some other urban centers. It has been necessary to increase the harvest of antlerless component of both deer species in the certain GMUs to control herd levels.

It appears that with 3-point regulations, WDFW can continue to emphasize white-tailed deer harvest in the Central District. Due to the vulnerability of bucks to harvest in the open habitat of GMUs 127-142 close monitoring sex and ages classes is imperative. Recreational opportunities to harvest older age class bucks may be enhanced by switching to a permit only opportunity during the late season. Those units near urban centers continue to receive high hunting pressure and will need to be closely watched to avoid over harvest.

Thus far, we have not experienced excessive urban deer problems in Spokane. The public perceives high numbers of vehicle collisions with white-tailed deer as a problem in parts of GMUs 124 and 127. Currently, crop damage is reported annually in portions of GMUs 124 through 142. Intensive recreational harvest with a wide range of seasons and opportunities has helped mitigate some damage claims. When a damage problem arises, a concerted effort is made by WDFW personnel to coordinate the hunters with the landowner. This seems to be the most successful tool to help control damage and to provide recreational opportunity.

Because of the EHD outbreak in 1998, 1999 and 2003 in both PMU 14 and 15, it will be necessary to monitor the white-tailed deer populations in this area carefully with extra effort during the post-season herd composition surveys in Spokane, Whitman and Lincoln counties. Because of landowner requests and the health of this herd, WDFW will continue to offer antlerless hunts by modern firearm permit, and general whitetail antlerless opportunity for archery, muzzleloader, youth, senior, and persons of disability seasons in units near the urban area of Spokane for white-tailed deer.

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Table 1. Antlered and antlerless harvest.

Year	PMU	Antlered	Antlerless
1996	14	1,098	520
1997	14	1,438	155
1998	14	962	229
1999	14	1,228	347
2000	14	1,561	472
2001	14	1,195	295
2002	14	1,391	252
2003	14	1,395	383
1996	15	1,162	497
1997	15	2,106	169
1998	15	1,048	185
1999	15	1,432	209
2000	15	1,774	346
2001	15	1,543	358
2002	15	1,639	344
2003	15	1,451	501

Table 2. Comparison of hunter numbers and effort (general season days/harvest).

		Game Management Unit					
	Year	127	130	133	136	139	142
	1996	1,696	1,864	3,614	1,804	3,470	2,718
	1997	2,202	2,531	3,593	2,376	3,645	2,537
	1998	1,693	2,727	3,093	2,412	2,598	1,860
No. of	1999	2,337	2,664	3,460	2,670	2,671	2,064
Hunters	2000	2,234	3,189	3,290	2,272	3,146	2,227
	2001	1,717	1,785	2,049	1,192	2,054	2,135
	2002	1,679	2,099	2,199	1,256	2,230	2,584
	2003	1,635	2,069	2,228	1,207	2,201	2,482
	1996	29	15	11	16	16	12
	1997	22	20	21	15	15	9
	1998	31	30	19	23	20	14
Days/	1999	36	35	25	33	21	13
Harvest	2000	17	25	15	21	11	8
	2001	18	16	16	12	11	8
	2002	18	17	16	11	12	10
	2003	17	14	14	12	11	10

Table 3. Percent hunter success by GMU.

GMU	1996	1997	1998	1999	2000	2001	2002	2003
127	15	23	17	18	29	28	30	37
130	21	21	13	17	18	29	28	32
133	27	21	17	20	24	24	26	35
136	20	20	14	14	15	28	33	30
139	20	29	18	24	31	35	32	37
142	22	39	22	30	36	39	33	34

Table 4. Deer surveys results, Central District.

		Pre-season			Post-season		
Species	Year	Buck	Doe	Fawn	Buck	Doe	Fawn
Mule Deer	1996	32	80	56	90	398	330
	1997	67	199	139	96	389	467
	1998	45	104	90	55	357	325
	1999	45	69	57	33	90	112
	2002	101	310	197	41	202	135
	2003	85	223	125	*	*	*
White-tailed Deer	1996	9	119	88	24	117	127
	1997	26	113	87	64	219	231
	1998	58	175	147	30	160	219
	1999	28	63	55	21	133	162
	2002	54	228	114	*	*	*
	2003	78	215	186	*	*	*

* No post-season survey.

Table 5. Deer composition ratios for 1999, 2002 and 2003.

		(Buck:Doe:Fawn)	
Species	Year	Pre-season	Post-season
Mule Deer	1999	65:100:83	37:100:124
	2002	33:100:64	20:100:67
	2003	36:100:54	*
White-tailed Deer	1999	44:100:87	16:100:122
	2002	24:100:50	*
	2003	36:100:87	*

* No post-season surveys.

DEER STATUS AND TREND REPORT: REGION 1

PMU 16 - GMUs 145, 149, 154, 178, 181
PMU 17 - GMUs 162, 163, 166, 169, 172, 175, 186

PAT FOWLER, District Wildlife Biologist
PAUL WIK, Wildlife Biologist

Population Objectives and Guidelines

Mule deer (*Odocoileus hemionus*) populations are near management objective along the breaks of the Snake River, but have started to decline due to lower fawn production and antlerless harvest. Mule deer populations in the mountains are still depressed. White-tailed deer populations have increased in the foothills areas, but antlerless permit levels appear to be stabilizing the population. An EHD outbreak in August-Sept. of 2004 may have reduced white-tailed deer populations along the Tucannon and Walla Walla rivers.

Hunting seasons and harvest trends

The general buck seasons in the Blue Mountains district has been under a three-point regulation since 1990 for mule deer and 1991 for white-tailed deer. The objective of this regulation was to improve buck survival and increase the post-season buck to doe ratio, which was extremely low (2-5 bucks/100 does).

Mandatory hunter reporting replaced the Hunter Questionnaire for determining the deer harvest in 2001. From 1994-02 the District-3 buck harvest averaged 2,336 bucks/year, and compares favorably with the 1985-89 (pre three-point) average of 2,340 bucks/year. The 2003 buck
harvest was 4% below the 1994-2002 average (2,336) at 2,254 bucks (Table1).

Three user groups have general seasons in the Blue Mtns.; archery, muzzleloader, and modern rifle. Over the last three years, modern firearm hunter numbers have averaged 8,701 for the general season, with an average harvest of 2,208 bucks. Modern firearm hunters harvested 2,036 bucks and 1,297 antlerless deer in 2003. Modern firearm hunter participation has increased 9% since 2001. General season hunters had a success rate of 23%.

Muzzleloader hunter numbers have increased annually since the general season was established in 2000. The first year, only 117 ML hunters participated in the Blue Mtns. , but by 2003 that number increased to 474 hunters, an increase of 305%. The buck harvest increased from 24 in 2000 to 130 in 2003, an increase of 442%. Muzzleloader hunters also harvested 78 antlerless deer in 2003. Over the last four years, muzzleloaders have enjoyed the highest success rate of all user groups, averaging 35%.

Archery hunter numbers are fairly stable, averaging 995 hunters over the last four years, with 1,015 participating in 2003. From 2000-2003, archers harvested an average of 228 deer per year in the Blue Mtns, with an average success rate of 23%. In 2003, 1,015 archers harvested 210 deer, for a success rate of 21%.

Species composition of the harvest changes little from year to year, with the 2003 buck harvest consisting of 61% mule deer and 39% white-tailed deer, which is comparable to the long term trend (60%md, 40% wtd). The antlerless harvest consisted of 55% mule deer and 45% white-tailed deer.

The antlerless deer harvest fluctuates according to permit levels and hunter success rates. From 1994-2002, the antlerless harvest averaged 917 per year. A total of 2,481 general anterless permits along with 493 special hunt permits (late hunts, senior, youth) were issued in 2003 resulting in a harvest of 1,186 antlerless deer. The permit controlled harvest, and general season antlerless harvests totaled 1,497 antlerless deer, which is 63% above the 1994-2002 average. Antlerless deer were harvested at a rate of 66 antlerless per 100 bucks. Hunting pressure has been increased on white-tailed deer, with 77 antlerless white-tailed deer harvested per 100 bucks. The overall success rate for antlerless permits was 63%, with general permits (mule deer/wt deer) averaging 70%, and "whitetail only" permit success averaging 47%. Approximately 24% of the antlerless permit holders did not hunt.

Surveys

Deer surveys are conducted to determine pre-hunt and post-hunt herd composition. Both aerial and ground surveys are used for herd composition counts. Pre-hunt surveys were conducted from the ground, and resulted in 664 mule deer classified. Productivity was good with 61 fawns/100 does.

Post-hunt surveys were conducted from the ground and air, with 1,550 mule deer classified (Table 3). December fawn ratios declined to 48 fawns/100

does. Buck ratios declined to the lowest level since 1990 at 11 bucks/ 100 does, which is below the Game Management Plan objective.

Three years of late summer/fall drought has had a negative impact on fawn production and survival. The winter of 2003-2004 was especially tough on mule deer populations in the lowland areas. The lowlands received approximately 18" of snow in December and snow remained on the ground for over one month due to a temperature inversion. In southeast Washington, snow rarely remains on the ground in the lowlands for more than a few days. Snow conditions combined with poor forage conditions contributed to increased fawn mortality.

Population Status and Trend Analysis

Mule deer populations along the Snake River are on a downward trend.

The white-tailed deer population is doing well in the foothills, but an EHD outbreak in 2004 may have reduced the population in localized areas along the major rivers

Increased hunting opportunity, and the increase in both modern firearm and muzzleloader hunters, combined with lower fawn survival along the breaks of the Snake River is putting significant pressure on the mule deer buck population. Lower fawn production/survival in 2001, 2002, and 2003 will result in fewer antlered bucks available for harvest over the next few years. Lower productivity will also exacerbate the problem of low post-season buck ratios. Post-hunt mule deer buck ratios in 2003 declined to 11 bucks per 100 does, which falls below the minimum objective listed in the Game Management Plan. The average post-hunt ratio for mule deer in 2000 and 2001 was 25 bucks/100 does. The 10 year (1992-2001) post-hunt buck ratio for mule deer ranged between 14 – 29 bucks/100 does, and averaged 20.7 bucks/100 does.

Although data on post-hunt herd composition for white-tailed deer is limited, buck ratios have averaged 21 bucks/100 does since 1992 and appear to be stable.

Habitat Condition And Trend

Summer-fall drought has occurred during the past 3 years (2001, 2002, 2003), and is having a negative impact on the mule deer population. Weather patterns in 2004 appear to be changing and fall green-up had already occurred by early September, which may help boost body condition in deer and improve productivity for 2005. Mule deer populations along the breaks of the Snake River and in the farmland areas need fall (Sept.-Oct.) green-up to increase the fat reserves needed for winter survival and good productivity. Forage quality declines during the summer, but the fall green-up gives deer the nutritional boost needed to enter the winter in good physical condition. A drought during the fall can have a negative impact on both the physical condition of deer and productivity the following spring.

The Conservation Reserve Program (CRP) dramatically improved habitat conditions for deer in the major agricultural areas, providing approximately 250,000 acres of additional habitat. These large areas of continuous habitat provide good forage and fawning areas where little existed prior to this program.

Yellow star-thistle is a major problem in the foothills and along the breaks of the Snake River south of Asotin. Yellow star-thistle has inundated thousands of acres of habitat in GMU-181 along the Snake River breaks, and this problem surely contributes to a lack of improvement in the mule deer population in this unit.

Habitat conditions on National Forest land have declined due to road densities, logging, and fire suppression. The new Access Management and Fire Management Plans will improve habitat conditions over time, and prescribed burns are being implemented throughout the forest to improve stand conditions. Roads are being closed to increase habitat effectiveness.

Augmentation/Habitat Enhancement

The Conservation Reserve Program has significantly increased habitat for deer populations in southeast Washington. Continuing the CRP program and acreage enrolled will be very important to the future of deer populations in the farmland areas of southeast Washington.

Wildlife Damage

Damage complaints attributed to deer have been minimal in southeast Washington, compared to deer densities. Development of vineyard acreage continues in southeast Washington, and will eventually contribute to an increase in deer damage complaints.

Management Conclusions

Mule deer populations along the breaks of the Snake River are starting to decline. Mule deer populations in the mountains are considerably below management objective, but are improving slowly.

Fall drought over the last three years has resulted in lower fawn production and survival for mule deer in the arid farmland areas and the breaks of the Snake River.

The quality of bucks harvested under the three-point program has improved, compared to the era when hunters could harvest "any buck". Since 1992, 43-55% of the mule deer bucks harvested possessed four or more antler points. The white-tailed buck harvest ranges from 17-24% five point or better. Public support of the three-point regulation is excellent, due to the quality of the bucks harvested, and good hunter success rates.

Table 1. Deer harvest summary, 1990-2003, Blue Mountains.

Year	Antlered	Antlerless	Total	Mule deer % ≥ 4 point	Antlerless:100 Antlered
1990	1,209	771	1,980	34%	64
1991	1,317	1,088	2,405	38%	64
1992	1,588	875	2,463	47%	55
1993	2,012	766	2,778	50%	38
1994	2,231	1,252	3,483	46%	56
1995	1,451	930	2,381	43%	64
1996	2,332	816	3,148	52%	35
1997	2,418	768	3,186	51%	32
1998	2,366	591	2,957	54%	25
1999	2,484	791	3,275	53%	32
2000	2,750	827	3,577	50%	30
2001	2,399	1,127	3,526	50%	47
2002	2,599	1,150	3,749	47%	44
2003	2,254	1,497	3,751	50%	66

Note: % ≥ 4 point calculated from harvest under three point regulation.

Table 2. Late Whitetail Permit Hunt Summary, Modern Weapon and Muzzleloader, Blue Mtns., WA.

Year	No. Permits	Bucks	Does	Total	Hunter Succ.	Whitetail Bucks %Harvest ≥ 5 pt.	Obs./Htr
1991	120	48	22	70	68%	24%	4.7
1992	140	62	24	86	58%	18%	6.5
1993	140	66	22	88	69%	22%	6.2
1994	200	68	49	117	69%	18%	5.8
1995	200	74	18	92	56%	16%	6.5
1996	200	74	14	88	56%	21%	7.3
1997	220	79	17	96	66%	24%	10.9
1998	175	57	14	71	63%	20%	9.8
1999	175	62	10	72	59%	20%	10.8
2000	260	82	26	108	68%	17%	na
2001	210	76	10	86	56%	18%	na
2002	210	82	11	93	59%	17%	na
2003	210	93	13	106	57%	17%	na

Note: the percentage of 5 pt. + calculated from harvest under 3 pt. regulation.

Table 3. Post-hunt mule deer surveys 1989-03, Blue Mtns., Washington.

Year	Bucks Ad.	Yearl.	Doe	Fawn	Total	Per 100 Does F:100:B
1989	6	23	790	234	1,053	30:100:4
1990	15	111	1,358	544	2,028	40:100:9
1991	17	133	943	455	1,548	48:100:16
1992	40	153	1,231	431	1,868	35:100:17
1993	45	119	995	559	1,718	56:100:17
1994	20	163	879	381	1,443	43:100:21
1995	43	69	693	264	1,069	38:100:16
1996	51	85	993	697	1,826	70:100:14
1997	47	157	822	489	1,515	60:100:25
1998	81	117	705	460	1,363	65:100:28
1999	72	180	1,316	796	2,364	61:100:19
2000	8	20	98	52	178	53:100:29
2001	71	109	876	471	1,529	53:100:21
2002	77	158	1,651	581	2,465	35:100:14
2003	34	70	979	467	1,550	48:100:11

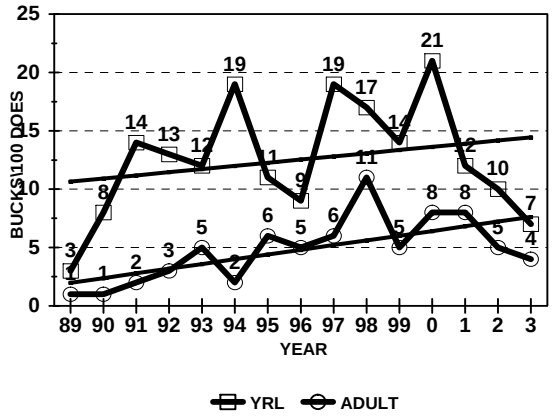

Figure 1. Post-hunt Mule Deer Buck Ratio.

Between 1991 and 2001, the three-point regulation combined with a short 9 day season accomplished the goal of increasing post-season buck survival for mule deer. Lower fawn survival and expanded hunting opportunity have resulted in a progressive decline in the post-season buck ratio for mule deer since 2001. The 2003 post-season buck/doe ratio for mule deer declined to 11 bucks/100 does, which is the second year in a row it has fallen below the *minimum* goal of 15 bucks/100 does.

A combination of conditions, such as lower fawn production/survival caused by drought, expanded hunting opportunity, and an increase in modern firearm and muzzleloader hunters has created a double-edged sword resulting reduced buck survival and lower post-season buck ratios for mule deer.

Some states that have tried the "three point" regulation failed to improve post-season buck survival because they expanded hunting opportunity, or maintained long hunting seasons. Hunting season guidelines over the last few years have required hunting opportunity to be expanded in southeast Washington. Expanded hunting opportunity, increased hunter pressure, and lower fawn production/survival is having a negative impact on mule deer buck survival. If the post-season mule deer buck ratio remains below the minimum management objective in 2004, adjustments to the 2005 hunting season may be necessary to increase buck survival and bring the post-season buck ratio into compliance with the Game Management Plan.

DEER STATUS AND TREND REPORT: REGION 2
PMU 21 – GMUs 203, 209, 215, 218, 224, 231, 233, 239, 242, 243,
PMU 22 – GMU 204

SCOTT FITKIN, District Wildlife Biologist

Population objectives and guidelines

In general, the Okanogan District is managed for maximum productivity and sustainable harvest of mule deer (*Odocoileus hemionus*) and white-tailed deer (O. virginianus). The post-season sex ratio target is a minimum of 15 bucks per 100 does. In addition to harvest information, data on buck:doe ratios, fawn production, and fawn recruitment are collected during field surveys to assess success in achieving management objectives.

Hunting seasons and harvest trends

The 2003 hunting regulations expanded the general modern firearm season to 14 days in response to excellent herd productivity and high buck:doe ratios. Antlerless opportunity continued for archery hunters during the early season. The youth and disabled any deer opportunity changed from a general season to a permit hunt, and also incorporated new senior permits. This change helped to significantly reduce illegal harvest and safety concerns associated with the youth hunt. It also helped fine-tune antlerless harvest. Hunter numbers declined in the Okanogan District in 2003 likely as a result of a landslide closing a major highway, but generally they appear to be leveling off at about half of what they were ten years ago (Figure 1).

Hunters enjoyed generally favorable weather conditions and good access. The later season and early high country snow improved hunting conditions as compared to recent years. Migration behavior was evident towards the end of the general season, improving hunter prospects.

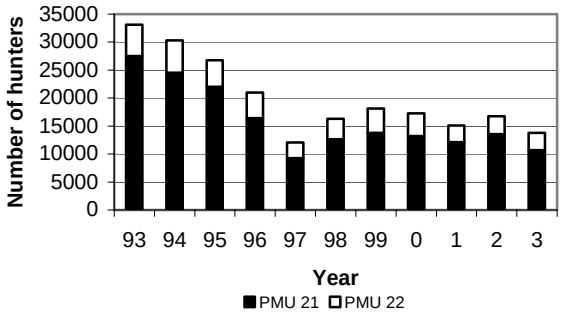

Figure 1. Trend in number of hunters, PMUs 21 22, 1993-2003.

As a result, hunter success improved in 2003 (Figure 2), despite reductions in youth/disabled harvest and a reduction in overall harvest (Figure 3) attributable to decreased hunter pressure. Antlerless harvest fell to 371 animals, yielding a two-year average of 688, which falls within the recent annual target of 500-700 animals. The restructuring of the youth/disabled season to permits is largely responsible for the antlerless harvest reduction.

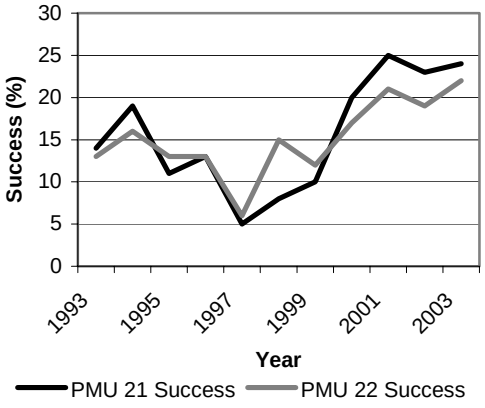

Figure 2. Success in PMUs 21 & 22, 1993-2003.

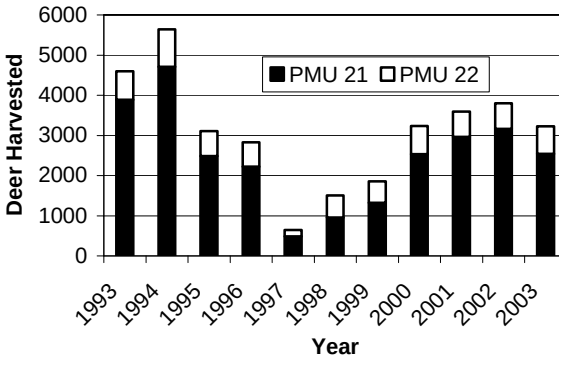

Figure 3. Harvest in PMUs 21 & 22, 1993-2003.

Table 1. Chewuch Check Station Results.

Year	Deer Type Bucks	Antlerless	Total	Hunters	Success
1993	48	--	147	2,410	0.06
1994	--	--	160	1,994	0.08
1995	--	--	36	1,388	0.03
1996	24	0	75	1,247	0.06
1997	3	0	5	729	0.01
1998	30	0	33	980	0.03
1999	48	0	53	1,414	0.04
2000	69	0	72	1,250	0.06
2001	106	39	133	1,314	0.10
2002	54	45	99	1,265	0.08
2003	71	6	77	840	0.09

WDFW check station personnel surveyed 840 hunters and examined 77 deer in 2003 (Table 1). Staff collected chronic wasting disease and DNA samples from carcasses when possible.

Tribal input

Data from the Colville Confederated Tribes (CCT) for the last two seasons had not been received at the time of this report. Tribal harvest is no longer being monitored at the GMU level, so it will likely not be possible to document the tribal contribution to harvest in PMU 22 (GMU 204).

Surveys

Post-hunt surveys are conducted to collect mule deer herd composition data and monitor progress toward population objectives. Surveys are conducted by helicopter in late November / early December when most hunting seasons have ended, when most bucks are still with does and have not dropped antlers, and when deer are concentrated on winter ranges. Deer are counted, identified to species, and classified as ≥ 3-pt buck, < 3-pt buck, doe, or fawn.

Hiking surveys are conducted in early spring just as winter ranges begin to green-up, and before mule deer begin to migrate to summer range. As with the post-season surveys, this effort is restricted largely to mule deer in PMU 21, due to limited resources and sample size shortcomings in PMU 22.

Biologists classified a total of 5,314 mule deer during helicopter surveys in PMU 21 in early December 2003 (Table 2). The counts yielded overall buck:doe and fawn:doe ratios of 18:100 and 68:100 respectively. Ratios show a decline in productivity (Table 3), likely attributable to recent extreme drought conditions.

During hiking surveys in late March and early April 2004, biologists classified 1,260 mule deer in PMU 21 (Table 4) and observed a fawn:adult ratio of 36:100. Continued weak recruitment is also probably a result of drought conditions that reduced forage quality and quantity (Table 5). Falling recruitment will be addressed with changes in doe harvest strategies in 2004.

Table 2. Post-season population composition counts from 2003, by area. F:100:B is fawns and bucks per 100 does.

Area	Bucks ≥3 pt	Bucks <3 pt	Doe	Fawn	Total	F:100:B
Methow	159	270	2314	1606	4349	69:100:19
Okanogan	34	59	540	332	965	61:100:17
Total	193	329	2854	1938	5314	68:100:18

Population status and trend analysis

Helicopter quadrant censuses conducted during a research project in PMU 21 in the mid 1980's produced a mule deer population estimate of approximately 25,000 animals. The resources needed to duplicate this intensive survey effort are no longer available, and no recent reliable population estimates have been calculated.

Our long-term intention is to generate estimates using population reconstruction models, and efforts are underway to refine survey collection methodology to obtain the data necessary for reliable model outcomes. This effort is hampered by unreliable pre-season data and biased buck harvest age data gathered under the three-point harvest restriction. Current herd management does not rely on population estimates, and is based on demographic parameters generated from spring and post-season surveys. Even so, crude estimates and harvest data suggest the current herd size is comparable to that of the mid 1980's.

Throughout much of this century, the mule deer population in Okanogan County has fluctuated widely, largely in response to long-term shifts in habitat quality and quantity, and short-term changes in winter weather patterns. Even so, an overall gradual decline in mule deer numbers is evident. For roughly the last 20 years,

Table 3. Post-season mule deer population composition counts for PMU 21 from 1992 - 2003. F:100:B is fawns and bucks per 100 does.

Year	Buck Antler Class ≥3 pt	<3 pt	Total	Doe	Fawn	Total	F:100:B
1992	--	--	72	1191	864	2127	73:100:6
1993	--	--	103	1209	984	2296	81:100:9
1994	--	--	67	1012	719	1798	71:100:7
1995	--	--	69	608	456	1133	75:100:11
1996	55	72	127	1956	1284	3367	66:100:6
1997	64	113	177	1464	1061	2712	72:100:12
1998	103	185	288	1735	1520	3544	87:100:17
1999	102	225	327	1301	1150	2778	88:100:25
2000	123	264	387	1425	1321	3133	93:100:27
2001	168	318	486	2067	1841	4394	89:100:24
2002	214	319	533	2059	1607	4199	78:100:26
2003	193	329	522	2854	1938	5314	68:100:18

Table 4. Spring population composition counts from 2004, by area for PMU 21. F:100A is fawns per 100 adults.

Area	Adult	Fawn	Total	F:100A
Methow	685	228	913	33:100
Okanogan	240	107	347	45:100
Total	925	335	1260	36:100

harvest data indicates that even during periods of mild winter weather, the population is not rebounding to the historic highs of the 1950s and 60s, suggesting a reduction in landscape carrying capacity for deer .

Historically, heavy doe harvest in response to damage complaints caused significant short-term declines in deer numbers. Also, traditional season setting based on the assumption that hunting mortality is compensatory, also contributed to population swings. Current research in other states, suggests that hunting mortality may be more additive for mule deer. Ongoing research in Washington will address the effects of hunting mortality. In the interim, more conservative hunting regulations have been adopted, and guidelines for antlerless harvest have been developed using an additive mortality model.

In recent years, qualitative observations from land managers, biologists, and long time residents, as well as harvest figures, suggest that by 1997 the population may have fallen to half or less of what it was in the mid 1980s and early 1990s. Severe winter weather contributed most to this short-term decline.

Fortunately, the last seven winters have been mild, and deer populations have rebounded strongly. Production has generally been high, and has been aided by greater buck:doe ratios and conservative antlerless harvest. A more recent decline in production and recruitment are likely attributable to drought conditions; however, the population may also be approaching landscape carrying capacity. If drought is the primary factor limiting herd growth, above average precipitation this summer should translate into increased productivity in 2005.

Unlike mule deer, whitetail deer have increased in the district over the long-term. Development patterns and agricultural practices, may have promoted the expansion of whitetail. Whitetail are widespread in the eastern part of the district, and now inhabit most of the major drainages and valley bottoms in the western half of the county, including many places where they were never seen historically. Relatively flat harvest figures suggest the whitetail population may be stabilizing. Whitetail also sustained significant winter losses in the 90's, but in general, they have been more resilient than mule deer.

Table 5. Spring mule deer population composition counts from PMU 21. F:100A is fawns per 100 adults.

Year	Adults	Fawns	Total	F:100A
1994	507	257	764	51:100
1995	965	243	1208	25:100
1996	948	384	1332	41:100
1997	1167	198	1365	17:100
1998	1279	462	1741	36:100
1999	1393	833	2226	60:100
2000	1496	838	2334	56:100
2001	1593	707	2300	44:100
2002	1661	626	2287	38:100
2003	1516	506	2022	33:100
2004	925	335	1260	36:100

In contrast to population size, herd composition is tied to harvest rather than habitat. Heavy hunting pressure on antlered mule deer in the past caused the buck:doe ratio to hover at or below the historical minimum threshold of 10:100. Implementation of more restrictive seasons and a minimum management objective of 15 bucks per 100 does, have improved post-season sex ratios for the last several years.

Habitat condition and trend

Habitat quality and quantity have likely suffered from decades of fire suppression. The resulting tree encroachment and loss of early to mid-successional forage conditions diminish forage quality and quantity in the long-term.

Historically, heavy and widespread livestock grazing pressure also negatively affected habitat, particularly during drought years when forage is limited and stock even consume important deer browse in the late summer and fall when forbs and grass are dried and exhausted. Intensive grazing also fosters the establishment and spread of noxious weeds. Grazing impacts are partially offset by the availability of irrigated pasture and crops, depending on landowner tolerance of deer herbivory.

In addition, loss of winter range, due to increased human population and associated development is likely also a significant contributor to reduced herd size. This has been true district-wide, but is most pronounced in PMU 21.

In recent years, wild fires burned well over 100,000 acres of deer habitat within the district, primarily at mid to higher elevations. This should improve summer forage quality and availability. Similarly, public agencies are pursuing a more aggressive prescribed burning policy near the forest/development interface. This could potentially revitalize winter forage over a significant area.

Currently, grazing pressure is much reduced from a few decades ago, and better herd management has improved habitat conditions. On the other hand, a declining farm economy and associated loss of irrigated acreage, could in turn reduce available deer forage at lower elevations, and negatively affect deer production. Even more importantly, noxious weeds are an epidemic problem in Okanogan County. As fast as one pest species is brought under control, a new one appears to take its place. Landscape-wide habitat degradation is likely without a coordinated and aggressive weed control program. Local, State and Federal agencies are doing all they can to address this issue. Success will hinge on the availability of financial resources.

Like weeds, the threat from development pressure remains high and is accelerating rapidly, constantly consuming and fragmenting existing tracts of winter range. This problem is countywide but is most acute in the Methow Valley, where the largest concentrations of wintering mule deer occur. This is being mitigated somewhat by WDFW land acquisition efforts and conservation purchases by local land trusts, but this is not a complete solution. More aggressive growth management planning is needed if critical private lands are going to continue to play an important role in deer conservation.

Road management is also receiving increased attention from public land managers. Many non-essential roads are being evaluated for seasonal or permanent closure, in an effort to provide greater wildlife security and reduce illegal harvest. This will benefit deer herds in both the short and long term.

The drought in 2003 hampered forage production and the lingering effects were evident in reduced productivity and recruitment in 2004. Fortunately, deer enjoyed easy access to available natural forage during the last year's mild winter and this year started well with an excellent growing season fueled by a wet spring and summer. Tremendous shrub leader growth should mean excellent winter forage prospects. Combined with the favorable summer season this should lead to improved recruitment and production in 2005, barring a severe winter.

It is hoped the combination of habitat protection, fire reintroduction, improved grazing management, weed control, and conservative harvest will slow, and perhaps even halt, population decline over the long-term.

Management conclusions

Mule deer populations had bottomed out after a series of severe winters, but have now rebounded nicely, fueled by high productivity and recruitment, and aided by conservative hunting seasons. Most recently, herd growth has reached a plateau, likely a result of prolonged drought, but may accelerate again with adequate moisture. Even so, a gradual long-term population decline will likely continue, if long-term reductions in habitat quantity and quality are not curbed. The recent extension of the general hunting season coupled with reduced productivity may push buck:doe ratios below the management minimum in 2004. Further reductions in buck permits, if not general seasons may be necessary, pending winter survey winter results. Also, the percentage of mature animals in the post-season buck cohort may decline as well with the later season. Goals for post-hunt buck age ratios need to be identified and defined.

Whitetail deer numbers have also dipped during harsh winters, but also rebounded strongly in recent years. In the face of increasing human development, the long-term prognosis for expanding whitetail distribution and abundance is more favorable than for mule deer expansion. This is a function of the whitetail's ability to better handle habitat changes associated with human development, and the barriers to over harvest on private lands, where white-tail tend to concentrate.

DEER STATUS AND TREND REPORT: REGION 2
PMU 24 – GMUs 272, 278, 290, and PLWMA 201
PMU 25 – GMU 284

JIM TABOR, District Wildlife Biologist

Population objectives and guidelines

In GMUs 272 and 284, deer herds are managed to maintain herd size at a maximum level that can be tolerated in relation to deer damage claims/complaints and to maintain a post-hunt buck:doe ratio of at least 15:100. Part of GMU 272 contains PLWMA 201, which has special population objectives formulated by PLWMA management in conjunction with WDFW.

In GMU 278, the goal is to maintain a herd size below carrying capacity to minimize deer damage claims/complaints occurring on irrigated agricultural lands that make up a large percentage of this unit. Most deer in this unit occur in non-agricultural areas with a high percentage of public ownership. Herd management is intended to restrict most deer use to these public lands.

In GMU 290, the management goal is to increase herd size to the long-term carrying capacity of habitat available on the Desert and Potholes Wildlife Areas without increasing damage claims/complaints from agricultural land adjacent to the wildlife areas. Additional objectives for this area are to maintain a buck:doe ratio of at least 30:100 post-hunt and maintain a high percentage of adult bucks ($\geq$ 50 % of the total buck population). This GMU is managed primarily to provide a "quality" mule deer (*Odocoileus hemionus*) buck hunting opportunity through "permit only" deer hunting.

Hunting seasons and harvest trends

GMUs 272, 278, and 284 had a 30-day early archery season in 2003 (Sept. 1-15, 3-point buck minimum and Sept. 16-30, 3-point buck minimum or antlerless for mule deer and any white-tailed deer [*O. virginianus*]). In addition to the Sept. season, GMU 272 had a late archery season (Nov. 20-Dec. 8) for 3-point buck minimum or anterless mule deer or any white-tailed deer. GMU 290 had an any deer, permit archery season with 21 permits (Nov. 16-30).

All units except 290 had a nine-day general modern firearm buck season in 2003 (Oct. 11-19). In GMU 290, 15 permits were issued for a 15-day modern firearm any deer hunt (Nov. 1-15).

In 2003, a legal mule deer buck in all GMUs except 290 had to have a minimum of three antler points on one side.

Muzzleloader deer seasons in the Columbia Basin GMUs included an early (Oct. 4-11) general season in GMUs 278 and 284 for bucks and 6 permit seasons that included anterless deer.

Antlerless permits were issued for all four GMUs in 2003. A total of 372 permits for anterless only and buck or anterless were available in 2003.

Special seasons and regulations were in effect in PLWMA 201 (contained in GMU 272). The deer hunting season for PLWMA 201 in 2003 was Sept. 1-Dec. 7. Hunting was by permit only. There were 140 permits available.

In the 2003 season, 2289 deer hunters hunted in the four Columbia Basin GMUs (Table 1). This represented 9% of Region 2 deer hunters. Hunting pressure, as measured by number of hunters in the four GMUs combined, decreased by 25% in 2003 compared to 2002.

Hunting conditions during the 2003 general modern firearm season were not optimum. Weather was very warm (80's) and dry. It was also very windy in most areas during opening weekend.

Overall hunter success (all weapons) in the four GMUs combined was 29% and was slightly lower than that of 2002 but higher than the 10-year mean of 1993-2002 (Table 1). Highest hunter success (71 %) was in GMU 290, a limited-entry, permit-only area.

Buck harvest in the four units combined was 593 in 2003 and decreased 18% from that of 2002 (721 bucks) and was very slightly less than the 1993-2002 mean of 595 bucks (Table 1). Forty-six percent of the buck harvest in the four units was from GMU 272, 44 % from GMU 284, 7 % from GMU 278, and 3 % from GMU 290.

In GMU 290, 14 of the 15 modern firearm any deer permittees hunted and harvested 13 bucks and 1 anterless deer. The six muzzleloader hunters harvested two bucks. Twelve of the 21 archery permittees hunted in the GMU and reported harvesting 2 bucks. Twenty-one of 50 anterless permittees hunted to harvest 10 deer.

Antlerless harvest in the four units has fluctuated annually, primarily as a result of the number of permits issued. The mean 10-year (1994-2003) harvest of antlerless deer in the four units combined was 167 (range, 42 to 256).

Harvest of deer by archers in the four GMUs increased dramatically in 2003 to 10% of the total harvest. In 2003, muzzleloader hunters accounted for 7 % of the deer harvest in the four GMUs.

The four Columbia Basin GMUs produced 12 % of the buck harvest in Region 2 in 2003. Hunter success in the four Columbia Basin GMUs was 29 % compared to 24 % in the remainder of Region 2.

Surveys

Surveys to obtain data to estimate herd composition and size in the Columbia Basin GMUs have been limited in recent years to GMU 272, PLWMA 201 (contained in GMU 272), GMU 290, and GMU 284. No surveys have been conducted in GMU 278.

Post-hunt herd composition surveys have been done annually (except no survey in 1994) in GMU 272 including areas outside PLWMA 201. Surveys have been made from a helicopter, airplane, or from the ground during November and December. In PLWMA 201 (an intensively managed cooperative of approximately 44,000 acres), pre-and post-hunt "total" counts were made annually from 1992 through 1999. Counts were made from a helicopter in late August or early September (pre-season) and late November or early December (post-hunt). In 2000, only the post-hunt count was made. In 2001-2003, no counts were made.

Post-hunt herd composition surveys were made in GMU 290 from a helicopter in December 1995 through 1997. In 1995, intensive counts from the ground supplemented data obtained from the helicopter and allowed an estimate of herd size to be made. In 1997, the helicopter survey (approx. 2 hours of survey time) failed to produce an adequate sample size to estimate the composition of the herd. From 1998 through 2003, the post-hunt survey for herd composition was made from the ground by volunteers and WDFW personnel. In 2003, the post-hunt survey was made by 25 volunteers and 2 WDFW personnel. The 2003 post-hunt herd composition survey of GMU 284 was made from an airplane.

The 2003 post-hunt herd composition survey in GMU 284 was made on Jan. 5, 2004. A total of 927 mule deer were classified. The buck:doe:fawn ratio was 18:100:61 and 27% of the bucks observed were adults.

In Nov. and Dec. 2003, 900 mule deer were classified in that part of GMU 272 outside PLWMA 201 (Table 2). Post-hunt ratios were15 bucks and 59 fawns/100 does. Approximately 25 % of the bucks were judged to be adults. The buck:doe ratio decreased slightly from that of 2002. The percent of adult bucks and the fawn:doe ratio also decreased from that of 2002.

During the Dec. 13, 2003 post-hunt herd composition survey, 589 deer were classified in GMU 290 with 44 bucks and 51 fawns per 100 does (Table 4). The 1995 estimate of herd size within the 250 square mile GMU 290, based on a helicopter survey and intensive ground count, was 264 (170 deer seen during the survey) deer with a composition of 54 bucks, 95 does, and 115 fawns. Based on incidental observations in the past 20 years, herd size has increased substantially and distribution within the area has expanded.

Population status and trend analysis

Little data other than estimates of harvest are available for use to evaluate long term trends of deer herd size in the Columbia Basin GMUs. Based on annual buck harvest since 1980, it appears that deer numbers in GMU 272 increased substantially through 2000, but decreased slightly 2001-2003. The 1980 harvest was 112 bucks compared to the 2000 harvest of 416 bucks. In 2003, 276 bucks were harvested. In GMU 284, a trend similar to that of GMU 272 shows an increase in herd size since 1980. The 1980 harvest was 76 bucks compared to 259 in 2003. Buck harvest since 1980 in GMU 278 has been erratic and rather small but indicates that herd size has increased well above that of the early 1980's. The 1980 harvest was 10 bucks compared to 40 bucks in 2003.

Post-hunt buck ratio in GMU 272 in 2003 was 15 bucks per 100 does and met the objective of 15:100. The post-season buck ratio in GMU 284 was 18 bucks per 100 does in 2003 and was above the objective of 15:100. Post-hunt buck ratio in GMU 290 in 2003 was 44 bucks per 100 does and was above the management goal of 30 bucks per 100 does.

Habitat condition and trend

The winter of 2003-04 was moderate in terms of temperature and the amount and duration of snow cover in all GMUs except GMU 284. Winter conditions in all GMUs should have provided no major disadvantage for deer.

Winter food for most deer in GMUs 272 and 284 is green winter wheat and fall/winter, "new" growth of non-cultivated plants. During the winter of 2003-04, these short-stature foods were available to deer most of the winter. In some parts of GMU 284, heavy snow cover reduced the availability of green winter wheat. Wintering herds were distributed differently from that of most years in GMU 284. Winter mortality appeared to be very light in all GMUs.

Three major changes in habitat have occurred in the Columbia Basin in recent years that appear to have

affected deer significantly. Several thousand acres of primarily dryland wheat fields have been enrolled in the Conservation Reserve Program. Conversion of wheat to grass added permanent cover and some useful forage in the form of forbs primarily, but in some areas has removed a vital winter food resource (i.e., winter wheat).

The spread of Russian olive trees in GMUs 278 and 290 has been rapid and dramatic in recent years. Distribution of deer in these units appears to be positively correlated to the occurrence of Russian olive.

Wildlife damage

Deer related damage claims/complaints in the Columbia Basin GMUs involve primarily orchards, alfalfa haystacks, alfalfa fields, various row crops, and ornamental trees and shrubs. In recent years, some landowners in GMU 284 have contended that deer introduce weeds to their cropland.

Orchard tree damage and damage to alfalfa haystacks are the most serious types of damage to private property, and elicit the majority of claims/complaints. Orchard damage and the potential for it, is most prevalent in GMUs 272 and 278. Damage can occur at all times of the year, but is most serious in winter. Deer damage to alfalfa haystacks is confined to winter and is usually not a serious problem unless the winter is severe.

Many deer feed in alfalfa fields and various row crops during the growing season in most GMUs but claims/complaints due to this use are minimal. During the winter of 2002-03, major claims/complaints were made for deer damage to orchards in the western part of GMU 272. A small number of damage complaints were received from landowners in GMU 284.

Management conclusions

Acceptable buck:doe ratios, relatively high percent adult bucks, and near maximum sustainable buck harvests have been achieved in the Columbia Basin units in recent years.

Population data for deer herds in the Columbia Basin GMUs are minimal at present. Post-hunt herd composition estimates have been made from sample sizes that are very likely too small to provide reliable estimates.

Table 1. Mule deer harvest in GMUs 272[a], 278, 284, and 290 from 1992 - 2003.

	Harvest				Hunter		Days/
Year	Buck	Doe	Total	Success	Number	Days	Kill
1992	460	194	654	0.25	2,581	8,344	13
1993	373	169	542	0.23	2,389	5,443	10
1994	455	134	589	0.21	2,774	8,213	14
1995	296	114	410	0.19	2,173	5,816	14
1996	745	172	917	0.27	3,403	8,102	9
1997	629	189	818	0.24	3,477	9,884	12
1998	594	42	636	0.24	3,477	7,941	12
1999	616	219	835	0.24	3,965	16,715	20
2000	831	241	1,072	0.25	4,329	13,676	13
2001	686	256	942	0.30	3,160	10,771	11
2002	721	223	944	0.31	3,053	--	--
2003	593	77	670	0.29	2,289	--	--

[a] Does not include PLWMA 201

Table 2. Post-hunt mule deer herd composition in GMU 272 from 1992-2003.

Year	Bucks	Does	Fawns	Total deer	Adult Bucks (%)	Per 100 Does Bucks	Per 100 Does Fawns
1992	9	127	76	212	44	7	60
1993	8	45	38	91	75	18	84
1994	--	--	--	--	--	--	--
1995	3	27	46	76	33	11	170
1996	47	223	187	457	23	21	84
1997	29	213	133	370	31	14	68
1998	64	181	157	402	44	35	72
1999	50	213	176	439	48	24	83
2000	38	201	166	405	29	19	83
2001	85	435	282	802	36	20	65
2002	84	510	331	925	40	17	71
2003	77	517	306	900	25	15	59

Table 3. Post-hunt mule deer surveys in PLWMA 201, 1988 and 1990-2000.

Year	Bucks	Does	Fawns	Unid.	Total deer	Adult Bucks (%)	Per 100 Does Bucks	Per 100 Does Fawns
1988	45	185	141	23	394	--	24	76
1990	90	390	362		842	--	23	93
1991	134	342	264	209	949	--	39	77
1992	145	550	446		1,141	48	26	81
1993	159	565	474		1,198	59	28	84
1994	166	480	453		1,099	52	35	94
1995	185	517	534		1,236	49	36	103
1996	255	593	580		1,428	50	43	98
1997	182	520	411		1,177	57	35	79
1998	229	613	514	7	1,363	54	37	84
1999	217	615	522	17	1,371	46	35	85
2000	219	594	492		1,305	48	37	83

Table 4. Post-hunt mule deer surveys in GMU 290, 1995- 2003.

Year	Bucks	Does	Fawns	Total deer	Adult bucks (%)	per 100 Does Bucks	per 100 Does Fawns
1995	35	61	74	170	57	57	121
1996	22	72	76	170	46	31	106
1997	2	55	28	85	50	3	51
1998	76	151	110	337	61	50	73
1999	77	180	124	407	51	43	69
2000	70	165	111	376	46	42	67
2001	84	192	67	380	67	44	35
2002	95	266	107	504	61	36	40
2003	126	288	147	589	62	44	51

DEER STATUS AND TREND REPORT: REGION 3
PMU – 32 GMUs 328, 329, 334, 335
PMU – 33 GMUs 336, 340, 342, 346
PMU – 34 GMUs 371, 372
PMU – 35 GMUs 352, 356, 360
PMU – 36 GMUs 364, 368

JEFFERY A. BERNATOWICZ, District Wildlife Biologist

Population objectives and guidelines

The management goals for deer in the majority of Region 3 are to increase mule deer (*Odocoileus hemionus*) populations while maintaining recreational opportunity while minimizing damage complaints. Escapement and recruitment objectives are ≥15 bucks and 45 fawns per 100 does post-hunting season.

Hunting seasons and harvest trends

Game Management Units (GMUs) 329, and 371 are restricted to permit only. All other units are open during the general modern firearm season for 3-point minimum bucks. The late archery season is open in GMUs 346, 352, 364, and 368. Archers were allowed to take antlerless deer in 2003. GMUs 328, 330-342, 352-360, and 368 are open for muzzleloader. The number of units open to muzzleloader increased from 3 to 10 units in 2003. Antlerless harvest for modern and muzzleloader hunters is by permit only.

Deer hunter numbers increased in Region 3 in 2003 for the first time in 4 years, but was 25% below the previous 10-year average. The winter of 1996-97 reduced deer numbers. The 3-point restriction and subsequent low success rate further deflated hunter interest. Deer populations rebounded, but hunters did not returned to the region. The increase in 2003 was due to increased opportunity for all user groups.

Harvest has increased since 1997 and was above the 10 year average, but below the harvest from 1970-1996 (Table 2). Buck harvest was 48% below the 1991-96 (pre-3 point minimum) average in 2003. Hunter success has been above average the last 3 years. Antlerless harvest increased with more opportunity for all user groups.

Surveys

In December of 2003, portions of PMU 33 were surveyed via ground and helicopter (Table 3). The purpose of the December surveys was to estimate fawn and buck ratios. Population surveys of PMU's 32 and 33 were conducted in April 2004 (Table 4). The survey results should be viewed with caution. The survey area may not be representative of the population, especially the buck portion that is somewhat segregated from does and fawns during December. Positively identifying all the fawns and small spike bucks in a large group of deer from the helicopter is difficult. The reported buck and possibly fawn ratios are probably minimal estimates.

The April 2004 population surveys were only the second attempt to index population. Stratification of units was preliminary and may not be accurate.

Population status and trend analysis

The deer population in PMU 32 was estimated at 5462±505 deer, which was down about 900 deer from the 2003 estimate (Table 4). However, the index count (same units flown both years) was almost identical. In PMU 33, both the population (5067±1065) and index count (2630) were similar to 2003. The winter of 2003-04 started off cold and snowy, then moderated. Some fawns obviously died, but large-scale die offs were not expected or observed. The population estimates are for known concentrations and does not include scattered, low-

Table 1. Number of deer hunters and success rate in Region 3, 1986-2002.

Year	Modern Firearm	Muzzle-loader	Archery	Total	Success rate (%)
1986	22,448	0	4,607	27,055	6
1987	23,164	204	4,761	28,130	7
1988	23,256	170	5,114	28,542	10
1989	23,623	254	4,693	28,575	12
1990	--	--	--	--	--
1991	28,873	1,104	6,736	36,713	15
1992	30,159	1,546	7,602	39,310	12
1993	24,190	1,038	7,070	32,390	6
1994	23,022	756	6,343	30,122	8
1995	19,641	631	5,025	25,297	8
1996	19,982	673	4,705	25,360	10
1997	14,555	155	3,086	17,796	3
1998	10,586	227	2,455	13,268	6
1999	11,174	242	3,445	14,861	6
2000	11,688	147	3,599	15,434	9
2001	9,946	132	2,648	12,726	11
2002	9,659	106	2,577	12,342	12
2003	10,314	869	3,772	14,955	15
'93-02 avg	15,444	411	4,095	19,950	8

density pockets of deer. Harvest does indicate the estimates are somewhat logical.

Harvest is not the best indicator of population, but is the only long-term index available. The mean buck harvest for 1991-1996 was 28% higher than the mean buck harvest for the 1970s and 18% higher than the mean buck harvest for the 1980s. The average doe harvest in all 3 decades has been below 500 animals annually.

The current deer populations are probably below the long-term average. Harvest peaked in the early 1990s after 7 relatively mild winters. Severe winters in 1992-93 and 1996-97 caused the population to fall dramatically. The lack of harvest and mild winters since 1996-97 should have resulted in a rebound in deer numbers. The 3-point minimum regulation clouds comparison of recent harvest to historic.

The buck ratios have increased since the 3-point minimum regulation in 1997. In PMU's 32 and 33, buck ratios and number of mature bucks have been kept near goals by late-season permits. The majority of deer migrate out of the permit only unit (GMU's 329), are subjected to general season mortality, and are then hunted during the rut after they've migrated back to winter range during permits seasons. PMU's 35 and 36, which did not have late season permits until 2003, have far exceeded the goal of 15 bucks per 100 does. GMU 371 (PMU 34 Survey data) is a non-migratory herd that is managed for quality hunting.

Table 3. Deer survey data by PMU in Region 3.

Year	PMU	Total Sample	Fawns: 100 does	Bucks: 100 does
1996	32	704	49	2
1997	32	326	46	10
1998	32	325	78	16
1999	32	255	58	21
2001	32	559	47	14
2002	32	372	48	13
1996	33	863	58	2
1997	33	427	37	8
1998	33	645	75	11
1999	33	609	44	17
2001	33	481	37	15
2002	33	1017	44	17
2003	33	666	53	11
1996	34	67	56	17
1999	34	120	54	20
2000	34	372	54	28
1996	35	85	40	NA
1997	35	193	56	NA
1998	35	57	62	16
2002	35	191	38	30
1996	36	659	55	3
1997	36	6	25	25
1998	36	21	52	11
2002	36	352	48	22

Habitat condition and trend

There is little data on the historic or current condition of the deer range. Woody browse was probably negatively impacted by fires during the 1980s. Cheat

Table 2. Deer harvest by PMU in Region 3, 1970-2002.

	PMU 32		PMU 33		PMU 34		PMU 35		PMU 36		Region	Total
Year	Buck	Doe	Buck	Doe	Buck	Doe	Buck	Doe	Buck	Doe	Buck	Doe
1970-79	990	183	529	152	95	0	316	67	324	86	2,254	488
1980-89	996	54	721	82	112	8	370	72	250	21	2,449	237
1991	1,545	364	1,588	294	178	29	990	130	611	164	4,912	981
1992	1,736	224	1,293	140	218	10	703	158	480	188	4,430	720
1993	509	124	678	133	98	10	82	53	43	59	1,410	379
1994	1,100	134	754	49	182	7	183	83	155	16	2,374	289
1995	746	85	781	45	95	5	200	31	154	17	1,976	183
1996	474	40	895	53	201	0	402	53	281	28	2,253	174
1997	230	0	56	0	137	0	27	0	14	0	464	0
1998	209	0	115	0	141	0	64	0	120	0	649	0
1999	303	2	314	1	142	17	71	0	86	0	916	20
2000	482	0	461	0	179	17	140	0	121	0	1,383	17
2001	459	28	371	62	179	35	121	0	103	0	1,233	125
2002	531	62	446	75	194	32	100	3	168	1	1,439	173
2003	517	242	518	261	146	32	173	144	145	92	1,499	769
10 yr avg avgean	504	47	487	42	155	12	139	22	124	21	1,409	144

grass has increased the frequency of fire and reduced woody browse on low elevation winter range. Over much of the range, grasses and dried forbs are the only available forage. A drought the last few years has likely impacted forage production. Houses are also being built in prime winter range.

Management conclusions

It is difficult to measure the goal of increasing deer populations without a better index to the population. The current hunting season structure has helped increase buck ratios to the objective, but decreased harvest and probably the number of deer hunters participating. There has been no increase and possibly a decreased in recruitment with the increasing buck ratios. The lack of hunters is potentially costing the local economy millions of dollars annually. The increased opportunity in fall 2003 increased participation. The population estimates indicate antlerless opportunity can probably be increased. In PMU 33, the estimated antlerless harvest was about 5% of the population and 16% of recruitment.

Table 4. April Population Surveys.

PMU	2003 Estimate	2004 Estimate	2003 Index	2004 Index
32	6,315 ± 669	5,462 ± 505	2,727	2,726
33	5,049 ± 666	5,067 ± 065	2,564	2,630
35	1,221 ± 133	NA	726	NA
36	1,662 ± 94	NA	1,358	NA

DEER STATUS AND TREND REPORT: REGION 4
PMUs 41-46, GMUs 407, 410, 418, 426, 437, 450

JENNIFER BROOKSHIER, Wildlife Biologist

Population objectives and guidelines

Our population goals for black-tailed deer (Odocoileus hemionus columbianus) in these Population Management Units (PMUs) are to maintain maximum population levels compatible with available habitat base, provide recreational opportunity, and minimize damage complaints. The population objective is to maintain a post-hunt buck:doe ratio of 15 bucks:100 does when possible.

Hunting seasons and harvest trends

Hunting season formats differ between individual Game Management Units (GMUs) based upon geographic variation. GMUs 407 and 410 are island and coastal areas with a high human population distributed throughout the habitat base. Hunting season strategies in these units generally emphasize more conservative seasons and hunting methods (permit hunts, archery, muzzleloader, or shotgun). Either-sex hunts are more common in island and coastal units because deer populations are generally higher with less public access to private lands. GMUs 418 and 437 are characterized as mainland areas of mid elevation with lower human population densities than the more urbanized island and coastal regions. Historical harvest data indicates that deer harvest success increases substantially as GMUs move south from the Canadian border. It has been speculated that lower temperatures resulting from cold air intrusion from the Frazier River basin lower carrying capacity for deer in affected units. GMUs 426 and 450 are high elevation areas situated well into the Cascade Mountain range. These units are characterized by extremely low human populations, limited road access, and severe geography. These eastern-most units differ from other areas in that the deer populations in high elevation habitats support predominately mule deer or mule/black-tail hybrid populations, as opposed to black-tailed deer only in lower elevation units.

Harvest and recreational opportunity profiles for GMUs 407-450.

The statewide total for deer hunters during the 2003 season was 133,832. This is comparable to the 137,921 hunters documented for the 2002 season in Washington State. The number of deer hunters in Region Four continued to decline from a total of 15,962 hunters in 1999 to 6,985 hunters in 2003 (a 56.2 percent decrease). The total number of Region Four deer hunters in 2002 was 7,292.

Region Four deer harvest for the 2003 season was 1,658 animals, essentially unchanged from the 2002 total of 1,654 deer harvested.

Black-tailed deer harvest in GMUs 407 – 450 during the 2003 season totaled 1,155 animals. Antlerless harvest for the 2003 season totaled 202 animals (17 percent) with antlered harvest totaling 953 animals (83 percent). Harvest distribution in Region Four by hunting method is as follows for the 2003 season:

Table 1. 2003 deer harvest in Region 4.

Harvest	Modern Firearm	Archery	MZL	Total
Antlerless	89 (30.6%)	179 (61.5%)	23 (7.9%)	291
Antlered	1,116 (81.6%)	208 (15.2%)	43 (3.2%)	1367
Total	1205	387	66	1658

The proportion of deer harvested in 2003 within GMUs 407-450 (1,155 animals) as compared to the statewide harvest for the 2003 season (34,859 animals) indicates that these northern Region Four GMUs represent 3.3% of the statewide total harvest. This number is consistent with the 3.3% of the statewide total harvest that came from GMUs 407-450 in 2002.

Reported tribal harvest in GMUs 407-450 for the 2003 season totaled 91 animals (52 antlered and 39 antlerless). GMU 418 (Nooksack) accounted for approximately 47% of the total tribal deer harvest reported in GMUs 407-450 during the 2003 season.

Surveys

Herd composition surveys are not conducted in GMUs 405-450 due to low deer population densities and equally low hunter distribution and numbers.

Hair loss syndrome continues to be prevalent throughout the mainland GMUs in north Region Four but has not yet been observed in the island habitats of GMUs 407 and 410.

Chronic Wasting Disease (CWD) sampling efforts in 2003 were limited due to the absence of meat lockers and limited access to road kills. Based upon small sample numbers, CWD remains undocumented in GMUs 405-450.

Population status and trend analysis

The only evidence of population status and/or trends is the subjective observations of WDFW field employees (enforcement officers, fish and wildlife biologists) and the field observations of other natural resource agencies (DNR, State Parks, National Parks, and U.S. Forest Service) that consistently report fewer animals observed in traditional work areas over the last five to ten years.

Wildlife damage

Deer related damage to private property has remained a chronic problem throughout all of the mainland portions of north Region Four. No damage payments were made in this general area in 2003.

San Juan County (GMU 410) continues to experience high deer damage problems associated with agricultural lands and residential properties. Deer/vehicle collisions remained high during 2003 and are anticipated to increase as the human population in San Juan County continues to increase. Widespread posting of land and a county ordinance restricting hunting access to private property limit WDFW options for managing the deer populations in these areas of Region Four.

Habitat condition and trend

No recent habitat analysis or formulated population surveys have been conducted to quantitatively define current habitat condition or population trends. Road closures continue to increase and may buffer the influences of increased human disturbance throughout deer ranges in Whatcom and Skagit counties.

Increased use of herbicides on private timber lands has been observed over the last three to five years. This practice had declined on state and federally owned lands over the last ten years and was considered to be of minimal concern when compared to historical herbicide use levels. It will be necessary to monitor this activity in order to evaluate actual impacts on local deer habitats.

Management conclusions

Recommendations for effective management of north Region Four deer populations include:

1. Implement a comprehensive habitat analysis of all deer range in Whatcom, Skagit, and San Juan counties.
2. Conduct herd composition surveys (age and sex class) in all GMUs in Whatcom, Skagit, and San Juan counties. Define population status in individual game management units using current population modeling techniques.
3. Develop survey methodology for assessing deer density trends in San Juan County.
4. Increase hunter access to private land in San Juan County to alleviate deer damage. Provide incentive to landowners to create land pool available for hunting.
5. Confirm the absence of Chronic Wasting Disease in Whatcom, Skagit, and San Juan counties' deer populations. Collect tissue samples for laboratory analysis from a minimum of 20 deer per district.
6. Continue monitoring local deer populations for presence /absence, distribution and severity of hair loss syndrome.
7. Increase biological sampling for diseases and parasites in the San Juan Island Portion of GMU 410.

DEER STATUS AND TREND REPORT: REGION 4
PMU 44 – GMU 454
PMU 48 – GMU 466, 485

LEE KANTAR, District Wildlife Biologist

Population objectives and guidelines

Population goals for PMU's 44 and 48 are to maintain healthy population levels of black-tailed deer (*Odocoileus hemionus columbianus*) within habitat limitations to provide recreational opportunity and ensure long-term population persistence.

Precise population estimates for GMUs 454 and 466 are unavailable. Mandatory hunter reports since 2001 are used to monitor deer population trends and hunting regulations.

Hunting seasons and harvest trends

Management strategies are similar for the GMU 454 and 466 deer herds. Both have a general modern firearm season from mid-October to the end of October with annual calendar date adjustments. Each has a four-day late buck season in mid-November also with annual calendar date adjustments. Both have an archery season from September 1-30, and GMU 466, has an any-deer late archery season from November though December. GMU 454 also has a muzzleloader season for any deer from Oct 4-10. GMU 454's more liberal seasons are designed to maintain the population at a level that keeps damage complaints at an acceptable level. However, habituated, small deer groups do occur in suburban and rural areas of GMU 454 and because of private property and safety concerns they do not receive comparable hunting pressure.

Deer in GMU 454 have shown little fluctuation based on harvest estimates despite human population growth and development (Figure 1). Fluctuations in deer numbers in GMU 466 may be because of a reduction in habitat quality and/or predation. Limited empirical data beyond harvest trend assessment belies our ability to estimate population changes. GMU 485 retains a special permit hunt with limited access. Deer that winter in the low elevations of GMU 485 may range into GMU 466 during other times of the year and be legally harvested (Raedeke 1995). Population guidelines for GMUs 466 and 485 should be considered together.

It is largely unknown how hair-slip syndrome, which appeared in black-tailed deer populations throughout western Washington in 1996 may be influencing these deer populations.

In general, male and female harvest in GMU 454 has been stable, with yearly fluctuations since 1991. However, the data indicate a general and surprising increase in harvest from 1997-2000 remaining consistent from 1999-2003. GMU 454 exhibited a substantial increase in total harvest beginning in 1999 (Figure 1). Modern Firearm buck harvest contributed the most to this annual harvest increase. Total buck harvest post 1998 showed an approximate 75% increase in harvest compared to previous harvests. While number of modern firearm hunters reached their peak in 1999 and 2000 at 758 and 750 hunters respectively, the following years show a decrease in modern firearm hunters by roughly 300 hunters, yet buck harvest remained high. It is unclear why modern firearm hunters have had such an increased success over the last 5 years. While increased habitat modification continues with widespread new home and lot development, modern firearm hunters remain able to find accessible lands with ample opportunity to harvest a buck. In 1999 and 2000 buck harvest increased by about 82% compared to 1998 (Figure 1) and has also remained steady.

Buck harvest in GMU 466 has moved back and forth indicating possible extrinsic factors in harvest rather than population changes. GMU 466 antlerless harvest has shown some variation with yearly fluctuations most likely affected by dry early fall weather and early winter snowfall, both influencing hunter success.

GMU 485 has had a limited entry special permit hunt since 1984. Concerns over population declines and hunter pressure have reduced permit numbers over time with accompanying reduced harvest (Figure 3). In 2000 the special permit hunt was designated as buck only. In 2003 a limited number of permits for persons with disabilities allowed the take of any deer.

Surveys

Currently, there are no surveys conducted in GMU 454. The Muckleshoot Tribe (MIT) has conducted population estimate surveys in GMU 485 since 2000 based on mark-resight/Lincoln Peterson using radio-collared deer.

Population trend and analysis

Based on limited, primarily anecdotal information,

deer in GMU 454 have exhibited little change. GMU485/466 deer based on MIT surveys appear to be on the slight increase, however confidence intervals are wide and therefore true changes in population may be dubious.

The Northwest Inland Fisheries Commission Big Game Harvest Reports over the last 6 years show harvest levels that add an average 10.7 deer per year to the total harvest in GMU 466 (not included in figures below). This is an additional mortality source to the total deer harvest for this GMU. Tribal harvest numbers should be considered in evaluating future permit levels and population trends.

Habitat condition and trend

In general, the long-term trend in GMU 454 deer habitat is for a continued decline. This is consistent with development of habitat currently used by deer. However deer are taking advantage of 2-10 acre tracts that are cleared for homes. These tracts still provide and may even improve deer forage availability, particularly during winter months, thereby improving overall body condition. This alone can lead to higher productivity and increased survival. Further, because many of these private lands are not open to general public, hunting mortality may be reduced. This can lead to increasing deer densities and may prompt some deer dispersal to surrounding habitats that are available to hunting in GMU 454.

Deer habitat trends in GMU 466 and 485 are most dependent on timber management and subsequent seral stage development that determines forage availability. There are several thousand acres of timberlands managed primarily for wood fiber production, with considerations for recreation, fish, and wildlife.

Wildlife damage and nuisance problems

In GMU 454 deer damage to ornamental shrubs and gardens can be a problem and numerous complaints are received every year. These deer are supported by many citizens and equally condemned by others because of associated property damages. There are no damage complaints for deer in GMU 466 and 485.

Management conclusions

Deer in GMU 454 should continue to be managed with liberal seasons designed to keep damage issues at acceptable levels in developing areas. Isolated sub-herds, generally on the eastern boundary of the GMU, should continue to offer hunting and recreational viewing opportunity.

In cooperation with the Muckleshoot Tribe and Tacoma Water additional surveys should be implemented in GMUs 485/466 to increase sample size for population estimation and gain a better assessment of herd composition.

Literature Cited

Raedeke, K.J. and D.A. Milligan Raedeke. 1995. Big game management plan for the Green River Watershed, Tacoma, Washington. Raedeke Associates, Inc., Report to Tacoma Public Utilities, Water Division. 86pp.

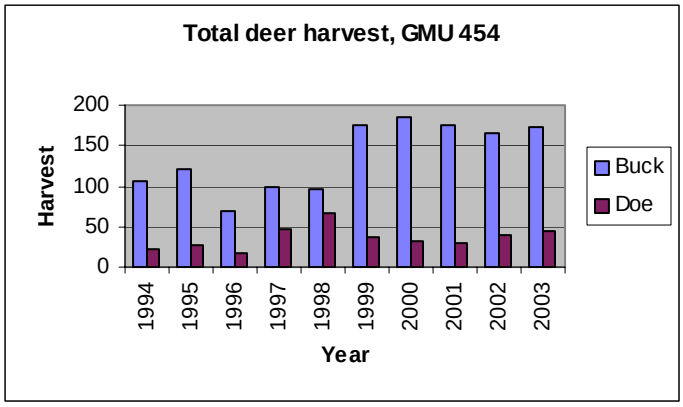

Figure 1. Annual deer harvest in GMU 454, 1994-2003.

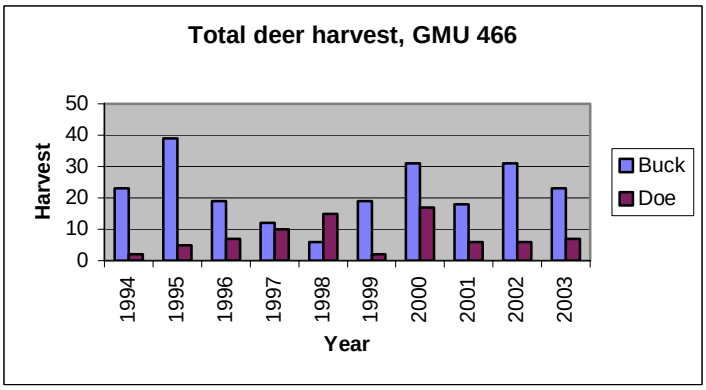

Figure 2. Annual deer harvest in GMU 466, 1994-2003.

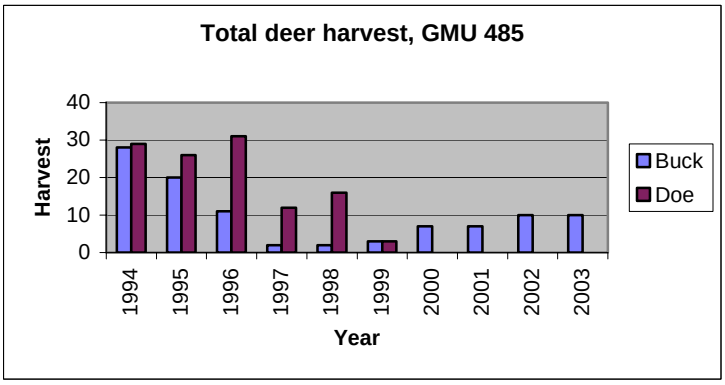

Figure 3. Annual deer harvest in GMU 485, 1994-2003.

DEER STATUS AND TREND REPORT: REGION 4 PMU 46, GMU 448 and 450.

RUTH L. MILNER, District Wildlife Biologist

Population objectives and guidelines

Objectives for black-tailed deer (*Odocoileus hemionous columbianus*) in Game Management Unit (GMU) 448 are twofold: 1) to provide healthy and stable deer populations for the long term and 2) to maximize harvest opportunity and hunt quality despite an increasing human population and related habitat loss due to human development.

Hunting seasons and harvest trends

The 2003 hunting season in GMU 448 was similar to previous years, with the general modern firearm season open for any buck from Oct 11-31, the general archery season open for any deer from Sept. 1-30, and the general muzzleloader season open for any buck from Oct 4-10. Late buck seasons were closed for all weapons.

About the same number of hunters (749) hunted in GMU 448 in 2003 compared to 2002 (770 hunters), continuing a trend first seen in 2001 when hunter numbers declined by over 50%, compared to previous years (Figure 1). In 2003, 120 deer were harvested from the unit, with a 16% hunter success rate. These numbers are consistent with harvest numbers and success rates seen in 2001 and 2002.

Modern firearm hunters made up 87% of hunters and this group harvested 78% of the deer taken from GMU 448. Archery hunters comprised 12% of hunters in GMU 448 and took 21% of the deer. Muzzleloader hunters accounted for 1% of hunters and 1% of the harvest.

The Swinomish, Sauk-Suiattle, Tulalip and Stillaguamish Tribes hunt GMU 448. The Northwest Indian Fisheries Commission reported 5 bucks, 4 does, and 2 unknown gender deer taken by tribal hunters in 2003.

In GMU 450, 10 deer were harvested. 96 hunters hunted in GMU 450, with a 15% success rate. 93 hunters chose modern firearms, and 3 chose archery as their weapon choice. All 10 deer were harvested by modern firearm hunters.

Surveys

Surveys were not conducted in GMU 448 in 2003.

Population status and trend analysis

Insufficient data exist to model the deer population in PMU 46. However, the relatively stable number of deer harvested in the last 6 years, even though hunter numbers have declined significantly, indicates that the population is stable.

Habitat condition and trend

Much of the forest habitat available on USDA Forest Service lands is in a 10 to 30 year age class. These conditions provide minimal forage for deer due to the presence of large tracts of dense young trees with minimal browse available to deer. The nutritional quality of the forage available is not known. Clear-cutting continues on private and State owned timber lands in GMU 448. However, herbicidal sprays applied in many clear cuts to control brush appear to limit forage available to deer in parts of the area.

Over 20 inches of rain fell in parts of Snohomish County between October 15 and October 23, 2003. Bridges and trails were rendered inaccessible in many areas on US Forest Service Lands. Weather may have negatively affected access for many hunters

Management conclusions

Hunter numbers, total deer harvested and hunter success were similar in 2003 compared to 2002. Hunter success remains higher than hunter success reported for a decade prior to 2001. For those hunters willing to hike or bicycle into areas where access is gated and for those who look for less crowded Game Management Units, GMU 448 continues to offer opportunity to all user groups.

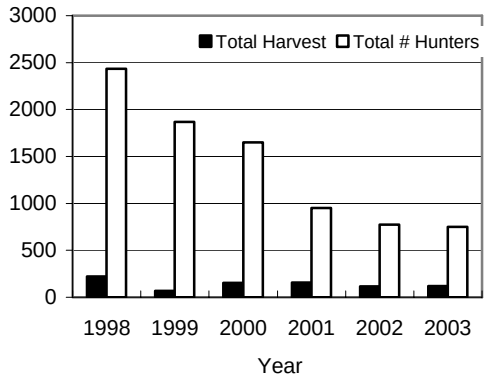

Figure 1. Deer harvest and number of hunters, GMU 448, 1998-2003.

DEER STATUS AND TREND REPORT: REGION 5
PMU 51 - GMUs 578, 588
PMU 52 – GMUs 564, 568, 574
PMU 53 – GMUs 524, 554, 556, 558
PMU 54 – GMU 516, 560, 572
PMU 55 – GMU 510, 513
PMU 56 – GMU 505, 520, 550
PMU 57 – GMUs 501, 504, 506, 530

ERIC W. HOLMAN, Wildlife Biologist

Population objectives and guidelines

Black-tailed deer (*Odocoileus hemionus columbianus*) populations in southwest Washington are managed under the Washington Department of Fish and Wildlife's (WDFW) mandate to maximize recreational opportunities within the framework of preserving the biological integrity of the species. Specific objectives are to maintain current population levels and a minimum buck escapement of 15 bucks per 100 does.

Hunting seasons and harvest trends

Information on black-tailed deer harvest and hunter effort during the 2003 hunting season was obtained from WDFW's mandatory reporting system. Estimates of total harvest, hunter pressure, and hunter success are based upon reports submitted by the hunters. All hunters were required to submit such reports. The mandatory reporting system is thought to provide accurate estimations of hunter activity.

Black-tailed deer are hunted under WDFW′s resource allocation strategy. Hunters must select a weapon type (modern firearm, muzzleloader, or archery) with which to hunt. Each weapon type has distinct seasons of varying lengths designed to provide equal opportunity. The fundamental structure of each hunting season is grouped into 3-year packages. The current 3-year package encompasses 2003-05. During the 2003 deer hunting season, modern firearm hunters made up 77% of the hunters, archery accounted for 14%, while those choosing to hunt with a muzzleloader made up 9%.

Several harvest strategies are employed in Region 5. During the general modern firearm season, the majority of Game Management Units (GMUs) are managed under an any-buck strategy, where any buck with visible antlers is legal for harvest. Selected GMUs (558, 574, 578, and 588) are managed under a 2-pt. or greater harvest regime. Finally, GMU 382 is managed as a mule deer unit, with a 3-pt. minimum. Muzzleloader harvest is primarily restricted to any buck, except for those seasons which occur in the branched antler GMUs above. Similarly, archery hunters are subject to the same branch-antlered buck restrictions as modern firearm and muzzleloader hunters. Harvest of antlerless deer during archery season is legal in the majority of GMUs. However, those archery hunters electing to hunt in GMUs 506, 530, 550 and 568 are restricted to bucks only. Apart from the archery harvest, antlerless permits are allocated based on the damage history and the total estimated population of deer in selected GMUs.

In 2003, an estimated 27,540 hunters spent a total of 179,850 days deer hunting in Region 5 (Table 1). Total general-season deer harvest in 2003 was 5,522 with a hunter success rate of 20% (Table 1). The percentage of hunters that harvested a deer in 2003 was very similar to the 11-year mean of 17%. However, the total deer harvest was just 75% of the mean harvest from 1992-2002.

Hunter success rates were not evenly distributed throughout the Region (Figure 1). Similarly, deer harvest was not uniformly distributed throughout the Region (Figure 2). Those PMUs located in the Cascade Mountains contributed relatively less to the overall deer harvest than their lower elevation counterparts. In turn, those hunters electing to hunt in Cascade Mountain GMUs enjoyed a lower level of success relative to other areas of Region 5.

In addition to the deer hunting effort and harvest discussed above, 887 hunters participated in special hunts open only to permit holders in 2003. These hunters enjoyed a combined success rate of nearly 50%. Table 2 details the hunter effort, harvest and success rate of special deer permit holders in Region 5 during 2003

Surveys

Region 5 black-tailed deer demographics have historically been collected from three types of annual surveys. These surveys include; (1) annual biological sampling stations, (2) annual summer productivity surveys, and (3) annual spring counts of the Klickitat deer

herd. Data from the sampling stations and productivity surveys are used as inputs into the Sex-Age-Kill (SAK) population reconstruction model.

Sampling stations designed to collect deer biological data were established in 1993. Six voluntary deer sampling stations were staffed by a combination of Regional Staff and volunteers during the opening weekend of the general firearm deer season, 11-12 October 2003. Biological sampling stations were located in Toutle, Chehalis, Longview, Peterman Ridge, near Yacolt and on Headquarters Road near Kelso. Stations were strategically placed near routes of travel from popular hunting areas to maximize the number of deer checked. The spatial arrangement of sampling stations is intended to offer coverage of the west side of the Region.

Deer brought to sampling stations were examined by WDFW personnel and/or qualified volunteers. Age, sex, number of antler points, and GMU of harvest were taken from each deer. Age was determined by tooth irruption and deer were grouped into one of three discrete categories (fawn, yearling, adult) at the discretion of the examiner. Brain-stem samples were also collected from each deer and submitted to WDFW's veterinary Staff for Chronic Wasting Disease testing. Finally, genetic material was collected from each deer and submitted to Olympia Staff as a part of an ongoing effort to investigate the genetic makeup of Washington's deer herds.

Data retained at the Regional level are used to determine the percentage of yearling bucks in the total buck harvest (=1.5 years old). In an age stable population, this percentage is assumed to be equal to the overall buck mortality rate i.e. yearlings are replacement animals filling voids left by the previous year's mortalities. Central to this relationship is the assumption that yearlings are as vulnerable to harvest as are adults.

A total of 52 male deer were properly aged at the biological sampling stations during October 2003. The annual yearling buck percentage (AYBP) from any-buck GMUs was 0.65. The trend in the annual buck mortality rate has been upward (R^2=.30) since initiation of this data collection effort in 1993. Annual buck mortality rates in the range of 40%-50% are indicative of a lightly exploited population. The increase in estimated buck mortality rates from 1993-2003 may be indicative of increases in non-hunting related mortality. See Figure 3 for a graphic display of the AYBP and number of deer sampled from 1993-2003.

The long-term estimate of annual doe mortality rates in the Region is 0.22. An effort to characterize doe mortality rates was undertaken in 2001. Tooth envelopes and an explanatory letter were sent to all hunters possessing an antlerless permit in Region 5. Additionally, incisors were taken from any female deer checked at the check stations or recovered from meat lockers. In 2001 a sample of 96 harvested female deer from the western portions of Region 5 resulted in an annual doe mortality rate of 0.219. A sample of 68 females from PMU 51 (GMUs 578 and 588) resulted in an annual doe mortality rate of 0.132.

Summer deer productivity surveys were first established in 1995. In 2003, deer observations were conducted throughout the Region from August 15th to September 30th. Personnel from WDFW's Wildlife Management Program along with a variety of volunteers from within WDFW, the U.S. Forest Service, private timber companies, tribal nations and interested individuals recorded observation data for all deer encountered during field activities or recreational outings. In addition to these incidental deer observations, two deer productivity aerial survey were conducted. Finally, multiple night deer surveys (spotlighting) were conducted by a combination of Wildlife Management Staff and volunteers. Deer group sizes and composition were determined. All deer were classified as bucks, does, fawns, or unknowns. However, only those groups of deer in which all individuals were classified were included in statistical analysis to help eliminate observer bias.

During the 2003 productivity surveys, a total of 757 deer were classified. The mean value of .51 fawns/doe is an improvement over 2002's ratio of .44 but still well below historical productivity data (~.75) for the Region (Figure 4). We do, however, sample after the peak of neo-natal mortality, so these values are closer representatives of ultimate recruitment than fecundity.

For spring counts, four permanent survey routes centered on the Klickitat Wildlife Area, near Goldendale, WA, were censused on 17-18 March 2004. Transects were driven on the evening of the 17th and morning of the 18th. Deer group sizes and composition were determined. All deer were classified as fawn, adult, or unknown. The fawn:adult ratio was determined. A total of 619 deer were classified during the March 2004 Klickitat deer survey (Table 3). The resulting fawn:adult ratio of 0.52 is indicative of good over-winter survival. The long-term mean (1980-2004) ratio for this area is 0.45.

Long-term correlations (1992-2003) between the spring fawn:adult ratio and the overall buck harvest in GMU 588 the following fall are significant (r = 0.61). These analyses indicate that spring surveys are a good predictor of hunting success in GMU 588. The biological significance of this relationship is straightforward. First, since fawns are generally more vulnerable to resource shortages and other environmental stress, low fawn:adult ratios indicate tougher over-wintering conditions and likely lower overall survival of deer. High winter mortality across all age classes will result in lower fall harvests. Secondly, biological sampling station data

indicate that many yearling bucks (approximately 56% in GMU in 588) develop two points on at least one antler and are therefore legal for harvest at age 1.5. Depressed fawn:adult ratios in the spring mean fewer yearling bucks will be available in the fall; hence, a lower total buck harvest.

The long-term mean fawn:adult ratio is 0.45, and is an indicator of average conditions. Using the long-term mean ratio as a benchmark, ratios above 0.50 are indicative of better-than-average hunting conditions, whereas ratios below 0.40 predict poor fall hunting in Klickitat County.

Post-season deer herd composition surveys were initiated in Region 5 during 2003. The surveys were conducted to evaluate the effectiveness of current management strategies in meeting the goal of 15 bucks per 100 does following hunting season. The relatively less vegetated habitats of Klickitat County offer suitable survey conditions during daylight hours in winter.

The surveys were conducted by Regional Wildlife Program Staff during December. The timing of post-season surveys was selected to fall after the conclusion of the year's final hunting season (late archery) and prior to the initiation of antler casting (approximately January 1). Ground surveys were conducted in GMU 588 and 382. Additionally, one helicopter survey was conducted over the western portion of GMU 588. The results of these post-season deer surveys are listed in Table 4.

The results from these initial survey efforts indicate that current management regimes are meeting management objectives. A continuation of these survey efforts will be required to adequately assess ongoing management efforts.

Population status and trend

Information compiled from hunting activity offers a contradictory view of deer population status in the Region. Hunter success rates over the past twelve years have remained very consistent (R^2=.03). Similarly, hunter days per kill has not changed significantly (R^2=.05). In contrast, total deer harvest has slowly declined (R^2=.60). In order to more accurately assess the population status of deer in Region 5, biological data must be evaluated. Assuming the age structure of Region 5 deer is stable, biological data indicate that we are seeing a slow decline in the Regional deer population. See Figure 5 for a graphic illustration of the estimated deer population in Region 5. The AYBP has increased steadily since 1993 (R^2=.30). These data suggest a slow increase in overall buck mortality during a time period when harvest-related mortalities have decreased. Additionally, recruitment rates seem to be declining in Region 5. Summer productivity surveys in 2003 resulted in a ratio of .51 fawns per 100 does, down from 60 or greater fawns per 100 does in the late 1990's and far lower than the historical figure of 75 fawns per 100 does.

Habitat condition and trend

Increasing urbanization in several GMUs (504, western portion of 550, 554, and 564) is resulting in a loss of quality deer habitat, an increase in deer/human conflicts and loss of hunting opportunity. Additionally, the increase in residential development along the Lewis River drainage may be negatively impacting the quality of black-tailed deer winter range. This winter range loss is being addressed in both the WDFW′s Integrated Land Management (ILM) program for the Lewis River watershed, and in mitigation agreements concerning the three major hydroelectric projects (Merwin, Yale, and Swift reservoirs) on the Lewis River.

Additional negative impacts to deer habitat are the result of forest management activities. While forest canopy removal (natural or otherwise) generally increases forage production, certain aspects of forestry are detrimental to black-tailed deer. For example, timber harvest (especially on private lands) tends to effect large areas of habitat at one time, leaving many square miles in very similar habitat condition, all of which is maturing at an identical rate. Such large-scale habitat alteration leads to boom and bust cycles of forage availability, thermal cover and security, which are likely detrimental to deer populations. Secondly, herbicides are used extensively by both private and public timber managers to kill and preclude the establishment of "competing" vegetation. The broadleaf shrubs, trees and forbs eliminated by these efforts are the very plants that comprise the black-tailed deer diet. Also, the stocking rates for seedlings in forest plantations are high, further reducing the competitive advantage that many forage species would normally have in early-successional forests. Once the densely-stocked conifer seedlings reach approximately age 12, very little light is able to reach the ground, further reducing forage production. This removal of deciduous tree species along with shrubs and forbs comes at the detriment of deer and other early successional species in the forested environment. Lastly, timber harvest requires the construction and maintenance of a vast system of forest roads to facilitate the removal of forest products. Studies have demonstrated the negative effects of roads on deer. These impacts include the loss of security associated with increased human access to remote areas, weed dispersal, direct loss of habitat due to hardened surfaces, soil erosion and loss of thermal cover. In aggregate, these forest management activities cause reductions in forage production, community complexity and early successional vigor. These impacts are detrimental to deer and atypical of young forests following natural disturbances.

In the Cascades (GMUs 513, 516, 558, 560, 572 and 574), the downward trend we are seeing in the deer population is a long-term trend and likely the result of habitat condition. Large amounts of forested habitat were clearcut in the 1980s prior to (or in anticipation of) the listing of the northern spotted owl. Those forest stands harvested in the 1980s are now largely at an age (14-24 years), where forage production is minimal. In the Cascades, largely held in Federal ownership, subsequent timber harvest has been tremendously reduced. Additionally, the level of timber harvest anticipated under the Northwest Forest Plan has not been realized. Furthermore, stocking rates for domestic livestock (cattle), have not been appropriately changed to reflect reduced forage availability. A review of the literature lends strong evidence to suggest that cattle may cause elk to shift their diet away from grasses and towards the browse plants favored by deer. Thus, the lack of forage offered by current forest management practices comes at the further detriment of deer.

Outside of the above-listed areas, reduced deer populations may not be simply attributed to reduced timber harvest. Ownership outside of the Cascade Mountains is largely private or Washington State Department of Natural Resources (DNR) managed. Timber harvest in these areas has remained relatively constant.

No specific habitat enhancements for black-tailed deer are planned in Region 5. Both the Klickitat (Klickitat County) and Cowlitz (Lewis County) Wildlife Areas have on-going, long-term management practices designed to benefit black-tailed deer habitat.

Management conclusions

The habitat conditions discussed in the previous section have caused an apparent decline in the Region 5 deer population. One potential additional cause of the decline in deer numbers is hair loss syndrome. Reports of the problem began in PMUs 56 and 57 during 1996. Since that time, numerous reports of affected deer have been received from throughout the Region. Hair loss syndrome was observed in Klickitat County for the first time in 2000. Approximately 3% of the deer observed during the March 2003 Klickitat deer survey had noticeable signs of the syndrome. The declines in harvest, increases in buck mortality rates and reduced productivity in the western portions of Region 5 all roughly coincide with the onset of the hair loss syndrome. Anecdotal reports from hunters, homeowners and citizens indicate that deer are now absent from areas where they were present in high numbers during the mid 1990s.

In summary, the cumulative effects of increased development, certain forest management activities, reduced federal timber harvests and the hair loss syndrome, have reduced the Region's deer population. At this time, WDFW does not have the authority to implement landscape level programs or regulations that would reverse these trends. Very large scale changes that would benefit deer at the population level would include such things as a moratorium on the sub-division of private property, significant changes to the Forest Practices laws relating to the use of herbicide and the establishment (through cutting or burning) of tens of thousands of acres of early-successional forest on the federally-managed lands. Changes of these magnitudes are not realistic in the foreseeable future of western Washington State.

Table 1. Deer Hunter Numbers and Harvest Statistics for Region 5, 1992-2003.

Year	Hunters	Days	Harvest	Success (%)
1992	44,148	265,889	9,325	0.21
1993	46,616	271,233	7,154	0.15
1994	45,122	297,383	9,678	0.21
1995	43,244	293,616	7,333	0.17
1996	42,122	257,288	6,725	0.16
1997	41,776	281,458	7,501	0.18
1998	62,908	253,517	7,208	0.11
1999	41,551	388,082	6,948	0.16
2000	34,672	226,550	6,454	0.18
2001	39,686	270,908	7,363	0.19
2002	29,231	201,360	5,219	0.18
2003	27,540	179,850	5,522	0.20

Table 2. Region 5, 2003 Special Deer Permit Hunter Activity and Harvest Summary.

Permit Type	Hunters	Antlered Kill	Antlerless Kill	Total Kill	Percent Success
Modern	545	109	171	280	51.4
Muzzldr	45	5	10	15	33.3
Archery	3	0	1	1	33.3
Senior	86	5	44	49	60.0
Disabled	37	3	13	16	43.2
Youth	171	25	56	81	47.4
SUM	887	147	295	442	49.8

Table 3. Historic fawn:adult ratios for the Klickitat spring deer survey, 1992-2004.

Year	Total	Fawn:Adult
2004	619	0.52
2003	647	0.52
2002	448	0.52
2001	764	0.54
2000	843	0.46
1999	481	0.58
1998	328	0.47
1997	702	0.18
1996	637	0.42
1995	607	0.56
1994	460	0.34
1993	522	0.13
1992	420	0.42

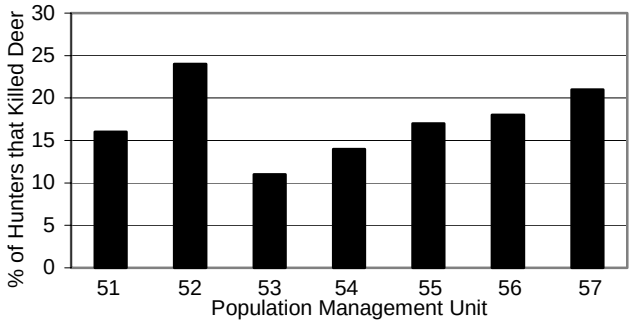

Figure 1. Hunter success by PMU, Region 5, 2003.

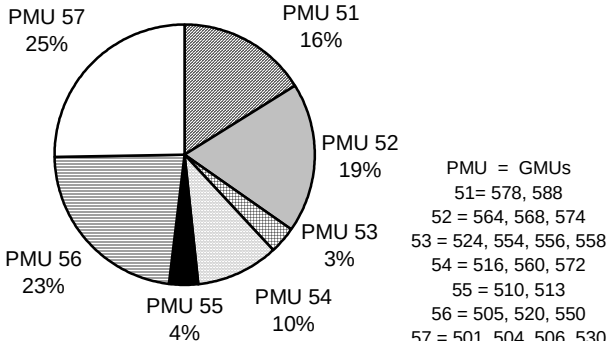

Figure 2. Deer harvest by PMU, Region 5, 2003.

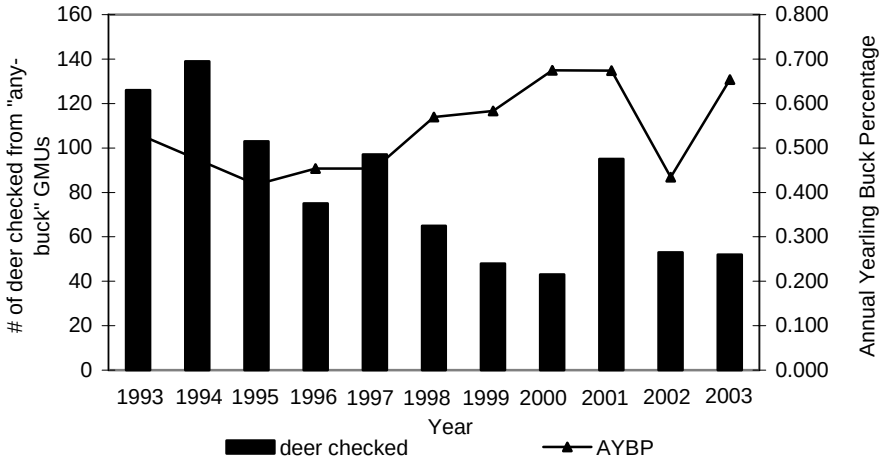

Figure 3. Annual yearling buck percentage, Region 5, 1993-2993.

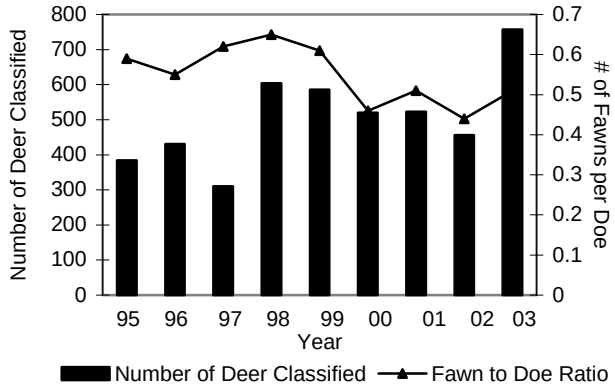

Figure 4. Deer productivity survey, Region 5, 1995-2003.

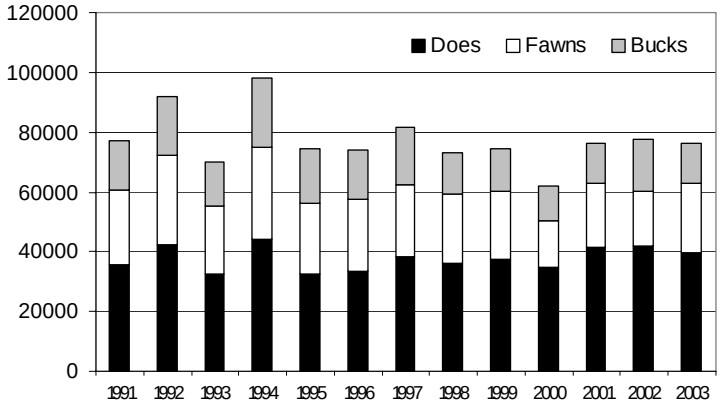

Figure 5. Estimated pre-season deer population, Region 5, 1991-2003.

Table 4. 2003 Post-Season Deer Composition Survey Summary, GMUs 588 and 382.

GMU	Total Deer	Bucks	Does	Fawns	Bucks:Does:Fawns
588	376	32	200	144	16:100:72
382	270	22	152	96	14:100:63

Black-tailed Deer Hair loss SYNDROME: Affliction Rates and Sources of Mortality

ROBIN S. WOODIN, Wildlife Biologist

General Background

Deer hair loss syndrome (HLS) has been observed in Western Washington black-tailed deer since 1996. Initially seen in Southwest Washington, observations of HLS-afflicted deer occurred throughout Western Washington by 2000 (Bender and Hall 2004). HLS occurs primarily at elevations below 610 meters (2,000 feet) in forest, agricultural, rural and suburban habitats.

Deer with patches of discolored fur or bare spots are seen in winter and early spring. Constant licking and emaciated conditions are seen among deer with severe HLS. By summer, deer have replaced their winter coats, and are not seen with HLS.

Originally, it seemed that fawns and yearling were most affected, but now all age groups exhibit hair loss. As this is a very visual symptom, it has significant public attention and concern. Management concerns revolve around impacts to fawn survival rates, doe productivity (pregnancy rates), and population-level impacts.

Pathology.–Through studies of captive deer at Washington State University (Foreyt et. al. 2004), this syndrome has been theorized to follow a complicated sequence. Deer with HLS have heavy loads of internal parasites. The parasite of main concern is *Parelaphostrongylus odocoilei*, which is a muscle worm. This parasite lays eggs in the bloodstream, which are filtered out in the lung capillaries and grow into larvae, creating localized inflammations. The adult phase lives in the muscle tissue of the back and legs (Foreyt et. al. 2004).

Parelaphostrongylus odocoilei is introduced to deer through a slug, which is an intermediate host. The deer ingest these slugs along with their forage and then the inflamed lung conditions evolve into a depressed immune state. Heavy external parasite loads (lice) follow, which causes skin irritation. Constant licking and chewing results in loss of hair in patches. A low-grade pneumonia can occur, exacerbating the depressed immune condition.

More recently, a type of louse has been identified on deer with HLS that originates in Europe or Africa. It is possible that the accidental introduction of this exotic louse has caused hypersensitivity in deer infested with it. Without immune system adaptation to this exotic louse, infested deer react by chewing their fur off. Again, results are a depressed immune system and higher energy demand at a time of year when environmental conditions are at their most severe.

Observed Symptoms.–Deer are seen between November and May with patches of discolored hair or bare skin. Often those deer frequently lick and chew themselves. All age groups of deer, but less often with bucks, are seen with the hair loss. Sometimes these deer demonstrate emaciation, lethargy, diarrhea, and death. By June, deer that do survive have re-growth of hair and weight gain.

Management Impacts.–There is an expectation that under these conditions there would be:

- Higher winter loss of fawns.
- Productivity would be impacted, both from lower doe recruitment as well as decreased pregnancy rates due to compromised health.
- There exists the possibility of population-level impacts.

Previous inquiry by Bender and Hall (2004), have not shown direct population-level effects from HLS. However, the tangle that is hair loss syndrome continues to be difficult to unravel.

Public Concerns.–Observation of HLS began in 1996-1997. Landowners and hunters have raised concerns regarding impacts to livestock and safety of the meat. The public has expectations for WDFW to take the lead on understanding HLS.

Study Proposal

A proposal was developed in 2001 to conduct a 3-year intensive study. That study was designed to:

- Evaluate hair-loss affliction rates.
- Compare survival rates between deer with and without hair-loss.
- Determine doe mortality rates.
- Relate affliction and survival rates to nutritional condition of deer.
- Test assumption of fall productivity reflecting recruitment rates.
- Relate survival and productivity rates to population estimates.

Unfortunately, that study did not receive funding. Therefore, an abbreviated study was conducted to look at affliction rates and sources of mortality in black-tailed deer fawns. Funding was provided by WDFW's Game Program for flight time and 15 – 20 radio telemetry collars.

In addition to permission for access onto their land, Campbell Group funded the purchase of drugs for use during fawn capture.

The objectives of this abbreviated study were to:

- Find out how many deer are impacted by hair-loss.
- Determine the survival rates of radio-collared fawns.
- Identify the sources of fawn mortality.

In addition, the agency had the goal of responding to concerns of abnormal deer raised by the public.

Location

The study location is in the Eastern Willapa Hills in Lewis County, Washington, and is a part of the Ryderwood Game Management Unit #530. Elevations range from 92 meters (302 feet) to 946 meters (3,110 feet). The area is in the Coast Range physiographic province and the *Tsuga heterophylla* (Western Hemlock) vegetational zone (Franklin and Dyrness, 1973).

This mostly private industrial forest land is managed for conifer tree production. Habitat types are typical younger conifer forest age classes from clear cut to early mature Douglas Fir, and mixed deciduous/conifer riparian forest which occur along drainages.

Methods

Fawns were captured and installed with radio collars using immobilization darts, net guns, and physical restraint. Nine black-tailed deer fawns were installed with radio collars in September and October 2001. Seventeen more fawns were radio-collared in August 2003.

Fawn radio signals were monitored on a weekly basis for the duration of the study. The radio collars were designed to operate on a slow pulse rate, unless the collar did not move for 12 hours, at which time the pulse rate doubled. This allowed for identification of mortalities.

The ability for this project to succeed was contingent upon the efforts of volunteers. A core group of two individuals, assisted by three other volunteers carried out weekly monitoring of the deer for two years. Upon finding a mortality, volunteers refined their radio-tracking skills to allow them to:

- Locate the deer carcass.
- Take GPS coordinates.
- Photograph and provide a general description of the site.
- If merited, transport the carcass back to Longview for necropsy.

Visual surveys were conducted in 2002 and 2003 by helicopter to assess HLS affliction rates. All radio-collared fawns were located in 2003. Flights were conducted by flying low and slow over clearcut habitats in order to see deer. Once spotted, deer were evaluated for HLS in three categories; high, medium, and low affliction

Results

Rates and Sources of Mortality.–Of the nine fawns captured in Fall 2001, four (44%) died. Deaths were attributed to predation, poaching, malnutrition (mal), and capture myopathy.

In the second year of the study, seven of seventeen fawns (42%) died. Two deaths were attributed to capture myopathy, two to predation, and three to malnutrition (maln.) losses.

The total mortality rates for both years was 43%. Total mortality rates for each loss type were 4% for poaching, 12% each for predation and capture myopathy, and 15% for malnutrition (mal).

Aside from capture myopathy, these sources of mortality are not unusual. Fawn mortality associated with HLS is commonly seen as hypothermia or malnutrition (Bender and Hall 2004). While HLS could have influenced susceptibility to predation and malnutrition, it would be very difficult (and costly) to separate out from general risk.

Bender and Hall (2004) found their black-tailed deer fawn mortality rates between 17% and 44% were comparable to previous studies (Gilbert 1992; Bender et. al. 2002a). Studies on mule deer fawns found their lowest mortality rates between 46% and 52% (Bartmann et al 1992), a mean mortality rate of 71% (White and Bartmann 1983), and overwinter mortality of 56% (Unsworth et al 1999).

Capture loss rates around 10% is not unusual in ungulate capture operations. The slightly higher rate of 12% reflects the small number of animals handled in total. Distinguishing if and how much a contribution HLS might have added to these "normal" sources of mortality is beyond the capability of this study.

Affliction Rates.–The Winter and Spring 2002 and Spring 2003 helicopter flights gave us some information on timing. Higher incidence of HLS was observed later in spring. Also, a higher affliction rate was observed in fawns than in adult does.

Bender and Hall (2004) found affliction rates in May 2000 to be 9% for fawns and 4% for does in the same geographic area. However, they found fawn affliction rates ranged from 6% to 48% in May 2001 in four different areas in Western Washington. This study also demonstrated lower affliction rates in does in all but one case, where affliction for fawns was 6% and 11% for does .

Conclusions

Sources of mortality for black-tailed deer fawns were identified. These deaths could not be directly

attributed to HLS, and mixed effects, if present, could not be identified. The rates of mortality were within the range of previous findings.

In Southwest Washington, late April through May appears to be the best time to observe maximum hair loss syndrome.

This investigation did attempt to address public concerns regarding suspected high mortality rates. Also, through the assistance of dedicated and skilled volunteers, state resources were able to be put to maximum use.

Recommendations

It is suggested to continue pre-season flights to monitor fawn:doe ratio's where funds are available, and establish a limit for fawn productivity which would trigger a spring survey for HLS affliction rates.

Continue to monitor the research progress on identifying the role of suspected old world louse recently found on black-tailed deer.

Acknowledgements

We thank the Campbell Group for permission to conduct this study on their lands and for the purchase of the immobilization drugs used during capture. We thank Jess Hagerman, of Aerocopters for his finesse in helicopter piloting during capture. Our indebtedness to Dr Briggs Hall, DVM and Rocky Spencer for their skills in fawn immobilization and physical restraint. Our deep appreciation goes to our volunteers, Dan Howell and Jim Brinkerhoff for two years of dedicated telemetry monitoring of the deer.

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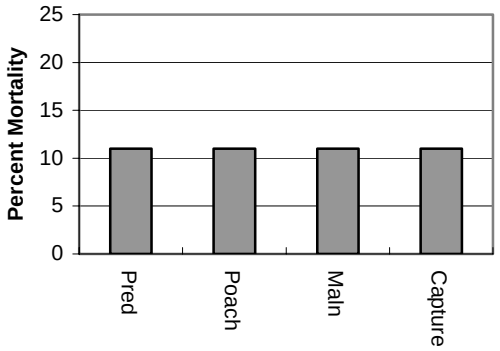

Figure 1. Percent mortality of black-tailed deer fawns in 2001 to 2002.

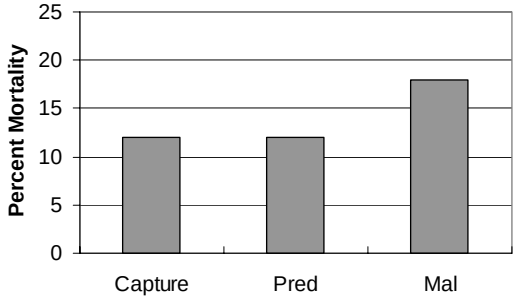

Figure 2. Percent mortality of black-tailed deer fawns in 2002 to 2003.

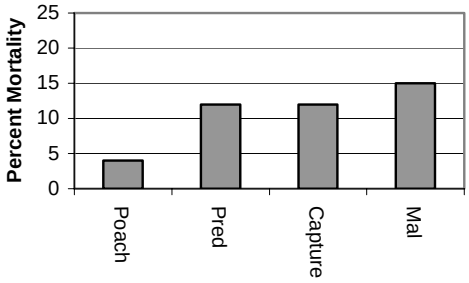

Figure 3. Percent mortality by source 2001 through 2003.

Table 1. Percent HLS affliction rates observed.

	Feb 2002, %	May 2002, %	May 2003, %
Does	0	8	0
Fawns	4	39	30

DEER STATUS AND TREND REPORT: REGION 6
PMU 61 – GMUs 658, 660, 663, 672, 673, 681, 684
PMU 62 – GMUs 652, 666, 667
PMU 63 – GMUs 642, 648, 651
PMU 64 – GMUs 621, 624, 627, 633
PMU 65 – GMUs 607, 615, 618, 636, 638
PMU 66 – GMUs 601, 602, 603, 612
PMU 67 – GMUs 653, 654

GREG SCHIRATO, District Wildlife Biologist

Population objectives and guidelines

Objectives are to maintain deer numbers at their current numbers. Buck harvest is generally any antlered buck although Game Management Units (GMUs) 636, 654 and 681 are managed as 2 point or better units.

There has been considerable public concern about Chronic Wasting Disease throughout the West. Brainstems samples have been submitted from throughout the Region to screen for the presence of this disease. It has not been identified to date in Washington.

Hunting seasons and harvest trends

Based on the analysis of the Mandatory Reporting System, hunter success remained high (26 %) in the general deer season. Actual success is even higher when permit hunting is incorporated. The permit hunter success overall exceeds 60 %.

Estimates of total annual mortality rates (i.e. from all sources) vary depending on the data source. However, recent findings from the completed buck mortality study have shown that the percent yearlings in the harvest as measured by tooth eruption at check stations accurately estimates annual mortality rates. For GMUs without check stations, the analysis of harvest report card data looking at antler size (spike vs. branch antlered) adjusted for older spikes and yearling 2 points determined a regional buck mortality rate from 0.24 to 0.37 for various Population Management Units (PMUs). Work in 1998 showed that there is a small under estimation of buck mortality rate from report cards due to bias in under reporting harvest of spikes. Mandatory Reporting should reduce this bias. An analysis of 385 antlered deer at the Vail check station showed that 48 % were yearlings. A sampling of adult (yearling and older) antlerless harvest in GMU 667 resulted in an estimate of an average annual mortality rate of 32% (n = 41). In general, the hunting regulations continue to be conservative with doe harvest targeted at 20 % of buck harvest.

Table 1. Summary of four harvest parameters for Region 6, 1993-2003.

Year	Hunters	Hunter days	Success	Days/kill
1994	31,632	193,324	0.22	27
1995	31,449	192,221	0.19	31
1996	27,733	192,717	0.20	30
1997	29,402	130,400	0.17	26
1998	35,333	145,523	0.12	34
1999	36,762	229,611	0.13	47
2000	38,259	172,331	0.14	33
2001	22,367	135,997	0.25	24
2002	23,666	159,414	0.23	30
2003	23,437	153,840	0.26	29

Four GMUs, Satsop, Capitol Peak, Skookumchuck, and Wynochee, have had a special limited special November deer hunting season. This season overlapped with elk rifle season, but gave an opportunity to hunt deer through the rut. These hunts are extremely popular. They provide a new opportunity for deer enthusiasts. These hunts provide a higher quality buck hunt. These hunts have some of the highest success rates for the permits approaching 80%. Because of the nature of the hunt and the individuals seeking this opportunity success for these buck only permits often exceeds or doubles the success of the antlerless permit hunters.

Little tribal input on deer management has been received. Tribal harvest and interest is focused more on elk.

Surveys

A pre-hunt helicopter survey was conducted in GMU 667 (Skookumchuck). In GMU 667, a total of 109 deer were classified. The ratios of fawns and bucks per 100 does were 77 and 28, respectively. Deer check stations were run at Vail on 4 weekends in 2003 with the help of the Eyes in the Woods volunteers making over 5,000 hunter contacts.

Population status and trend analysis

A Sex-Age-Kill Ratio (SAK) model was used to generate deer population estimates by PMU. Population parameters were estimated from Vail check station data, antler harvest reports, well as the aerial pre-season surveys. (Table 3). The recovery rate was reduced to .75 to more closely reflect the data from the mortality study. The model is most sensitive to the female survival estimate.

Table 3. SAK population estimate by PMU.

PMU	Estimated Population
67	4,611
66	2,854
65	3,128
64	9,943
63	13,526
62	13,809
61	13,216

Management conclusions

There are some general declines in deer numbers in some GMUs while others are expanding. This follows the patterns that would be expected from timber rotations, where large magnitude changes in population occur with stand age. Long-term declines are expected and are occurring on USFS lands where there is little timber harvest and a push for older stand age classes. In addition, declines are occurring were canopy closure is occurring over large expanses of even aged timber management, (GMU 627). Some of these past declines appear to be generally stabilizing at lower harvest levels. The current year had high harvests and success rates. The early November buck hunt provides a popular special opportunity. Due to the success of this hunt it has the ability to quickly shift the overall mortality rate in the buck portion of the population. If resistant is not met with the elk season overlap this opportunity could be expanded to other units. It is recommended that the permits not exceed 2-3 % of the total buck harvest to prevent substantial shifts in buck mortality and recruitment of bucks to the older age classes desired in these hunts.

Elk

ELK STATUS AND TREND REPORT: STATEWIDE

JERRY NELSON, Deer and Elk Section Manager

Population Objectives and Guidelines

The goal set by Washington Department of Fish and Wildlife (WDFW) for the management of elk (*Cervus elaphus*) populations in Washington is to maintain numbers within habitat limitations. Landowner tolerance, a sustained harvest, and non-consumptive elk opportunities are considered within the land base framework.

Specific management objectives call for post-hunt bull:cow ratios of 12 to 20 bulls:100 cows with a bull mortality rate from all sources of 50 % or less (Wash. Dept. of Fish and Wildlife 2003). Some limited-entry Game Management Units (GMUs) are being managed for 15 to 25 bulls per 100 cows in the post-hunt composition counts.

There are 10 recognized elk herds in Washington: Blue Mountains, Selkirk, Colockum, Yakima, North Cascades, North Rainier, South Rainier, Mount St. Helens, Olympic, and the Willapa Hills. Population objectives for Washington elk herds allow for substantial population increases in the Blue Mountains, North Cascades, North Rainier, South Rainier, Willapa Hills, Mount St. Helens, and the Olympic Peninsula. Although some herds may be below management objective, a re-distribution of current elk populations may still be required to alleviate elk damage complaints for the Blue Mountains, Willapa Hills, Colockum, Yakima, and potentially other herds.

Some herds can support an increase but only in specific areas of the herd's range. Additional range expansion by the Selkirk elk herd will be tolerated in some areas of northeastern Washington within the limits of landowner tolerance. The Yakima herd is at the targeted population objective, but site-specific damage complaints still need to be addressed. The Colockum herd is below current population objective but damage complaints are still received for that herd.

In western Washington areas of eastern King, eastern Pierce, northern Skagit, and Whatcom Counties could likely support additional elk.

Hunting Seasons and Harvest Trends

Washington elk were historically managed under fairly aggressive hunting regulations with any bull being legal, over-the-counter license sales, and no quotas. Post-hunt bull ratios of 5 bulls per 100 cows or lower were not uncommon in eastern Washington herds.

Currently, WDFW manages the level of harvest and hunter distribution through a number of hunting season structures. These include, regulating the number of days hunted, requiring hunters to select an elk license for the eastern or western portion of the state, spike-only or 3 point minimum antler point restrictions, and requiring hunters to select a weapon type and hunt only during those seasons. Washington currently has no quota on elk licenses sold for the general season. Current harvest management objectives target between 12 to 20 bulls per 100 cows in post-hunt surveys and maintain total bull mortality from all sources at or below 50 %. Either one or both of these metrics may be used to assess bull subpopulation status for a given herd. Bull subpopulations in eastside elk herds are more likely to be assessed using the bull:cow ratios and bull subpopulations in westside elk herds are more likely to be assessed using the total bull mortality rate.

Due to low productivity in the Blue Mountains elk herd, the Fish and Wildlife Commission adopted a spike-only elk regulation for the general season beginning in 1989. Branch-antlered bulls were legal only through limited entry special permits. The regulations for the Colockum and Yakima herds were switched from any bull to a spike-only general season with branch-antlered bulls legal by special permit only in 1994. As a result of reduced recruitment and conservative seasons, the eastern Washington general season bull elk harvest declined in the early 1990s and has remained relatively stable for the past decade. The estimated bull harvest for the 2003 general season in eastern Washington was slightly over 1,400. Western bull harvest has shown some increase since the mid to late 1990s. The estimate for the westside bull elk harvest for the 2003 general season was over 3,000. This increase is possibly a function of improved habitat condition resulting from timber harvest on private timberlands and increased road management on both private and public lands. These estimates do not incorporate male calves killed under antlerless, special permit regulations. In 2003, the general season total elk harvest was divided between western Washington at 4,105 elk (66 %) and eastern Washington at 2,159 elk (34 %).

The estimated statewide elk harvest for both the general season and special permits combined in 2003 was 8,705 elk (Table 2).

Both antlered and antlerless harvest increased in 2003 over 2002. The general season elk hunter success rate for all weapon types in 2003 was 8.9 %. General season success rates by weapon type were 8.0 % for

modern firearm, 11.7 % for archery, and 9.5 % for muzzleloader.

Success rates for special permit hunts are quite varied and substantially higher than general season. In 2003, the special permit success rate for elk hunters across all weapon types was 37.4 %. For modern firearm the success rate was 45.0 %, for archery the success rate was 14.8 %, and for muzzleloader the success rate was 30.1 %.

Surveys

WDFW conducts surveys on all 10 elk herds. On the westside the Department surveys 10-20 % of the elk units. In the Colockum and Yakima areas we survey about 75 % of the elk winter range. In the Blue Mountains we survey about 80 % of the elk winter range. In northeast Washington, elk surveys include composition counts made from the ground in the spring, and composition counts made while conducting aerial surveys for moose. WDFW uses the visibility bias model developed in Idaho for elk (Samuel et al. 1987) to estimate elk populations or sub-herds for the Blue Mountains, Yakima, and Colockum herds. These surveys are conducted in sampling units stratified as high-, medium-, and low-density zones. Paint ball mark-resight estimators have been used to cross check the efficacy of the visibility bias model. Preliminary estimates suggest that survey methodology provides relatively precise and accurate estimates. Paint ball mark-resight estimators have also been used with success on sub-herds on the Olympic Peninsula, North Rainier and North Cascades. Composition counts are conducted by WDFW and by Tribal biologists in the North Cascades and North Rainier.

Most elk surveys conducted in western Washington are completed prior to the modern firearm hunting seasons. The rationale for mid-September surveys is there is a reduced level of segregation between age and sex classes during the rut. The hope is that observations at this time tend to be less biased in terms of accurate bull:cow:calf ratios.

Aerial and ground surveys, harvest data, and productivity data are used to model populations and provide estimates of herd components. Pre-hunt surveys typically range anywhere from 15 bulls:100 cows to 50+ bulls:100 cows in some southwest Washington GMUs. Calf:cow ratios also vary markedly in pre-hunt surveys from the mid 20s to the high 50s depending on the unit surveyed.

Population Status and Trend Analysis

Statewide elk populations are virtually impossible to estimate but likely number somewhere between 52,000 and 58,000.

Elk populations in the Blue Mountains continue to show lower than average calf survival. Summer calf ratios seem to have improved over rates in the 1980s, but calf survival is still not up to desired levels. Late winter elk populations were estimated at approximately 4,700, about 900 below population objective. Bull harvest declined markedly in the Blue Mountains in the 1980s. The spike bull general season was initiated in the Blue Mountains in 1989. The post-hunt Blue Mountain bull ratio combining all GMUs surveyed was within management guidelines at 14 bulls per 100 cows.

Elk populations continue to grow slightly in numbers and expand their distribution in northeastern Washington. The Department's goal is to increase elk abundance in Pend Oreille County and eastern Stevens County. North of Kettle Falls there is some room for elk expansion east of the Columbia River. South of Kettle Falls there is room for elk expansion east of Highway 395. Range expansion of elk in northeast Washington will be allowed to continue in some locations within the limits of landowner tolerance.

The Yakima elk population is at population objective after three years of relatively aggressive antlerless harvest initiated to reduce the total population by 10 %. The spike-only general season with branch-antlered bulls available by limited permit has been in place for the Yakima herd for 7 years. Post-hunt bull ratios have met objective since 2000. Winter calf ratios were near or above the level required for population maintenance. Site-specific damage problems exist for the Yakima herd and require special permit hunts as well as damage hunts to address those cases.

The Colockum population still appears to be below objective. Post-hunt bull escapement objectives are not being met. The post-hunt bull ratio for the Colockum herd for all GMUs surveyed was just below objective at 11 bulls per 100 cows in February of 2004. Calf recruitment was up for the first time in several years. The Colockum herd also creates localized damage problems. Most of these are being dealt with through extensive special permit hunts that apply hunting pressure through the fall and into the winter.

The North and South Rainier elk herds are both likely below objective. Limited data available indicate that population declines may have slowed. These two herds may have stabilized at some lower than preferred level. Both populations are very difficult to survey. Rigorous inferences about population size or rates of growth or decline cannot be made based on the limited information at our disposal.

Elk hunting regulations on the Olympic Peninsula were changed to a 3-point minimum antler restriction for legal bulls beginning in 1997. WDFW and Olympic Peninsula Tribes have been meeting regularly to evaluate elk population status and develop conservative hunting seasons. The Olympic elk herd is near management

objective but the Olympic Peninsula can support more elk.

The North Cascades population is below objective. An unexplained reduction in recruitment is one cause for the decline from historical higher levels. Increased vulnerability due to road access as well as undocumented harvest are also thought to be contributing factors in this population decline. The herd has grown slightly to approximately 400 animals but is still well below objective of 1,200. The core population was augmented with 41 cows and calves from the Mount St. Helens Wildlife area in October of 2003. Post-release survival for these elk was only 61 %. A second augmentation effort targeting an additional 50 elk is planned.

The Willapa Hills herd is below population objective and in addition some refinement is necessary in terms of redistribution of elk to address damage complaints. The Mount St. Helens herd is below objective. These herds have declined somewhat in recent years, probably as a result of increased hunting mortality, habitat loss, and declining habitat quality due to advancing successional age and changes in forest management. Both of these populations are also difficult to monitor due to the nature of the landscape. Although seemingly on the decline these two herds contribute significantly to the Westside bull harvest each year.

Habitat Condition and Trend

In general elk do well on habitat in early to mid-successional stages. Elk herds in western Washington benefited from new growth after timber harvest in the 1960s, 70s, and early 80s. Much of the U. S. Forest Service land in western Washington is now shifting toward late successional reserves (LSR) and mature growth forest. This change will greatly diminish the carrying capacity of these habitats. The long-term trend in elk carrying capacity is down on public lands managed by other agencies.

Timber management on industry-owned forest is generally shifting toward smaller clear cuts or selective cuts. While this may be beneficial to elk, understory management and other silvicultural practices may be having a negative impact on elk forage and it's availability.

Excessive road density limits habitat suitability for elk on most managed forest. New road management programs are being implemented, however, resulting in less disturbance and more security for elk.

WDFW is cooperating with other researchers investigating the influence of habitat quality as it relates to elk body condition, calf production, and recruitment. Preliminary information suggests many western Washington habitats are less productive than first believed in terms of elk production.

Most of the habitat improvement projects statewide depend on partial funding from Rocky Mountain Elk Foundation (RMEF). Many habitat improvement projects sponsored by the Colville National Forest and the RMEF have improved habitat for elk. These projects have involved burning, fertilization and road management. Other cooperative projects involved RMEF and Olympic, Gifford Pinchot, Wenatchee, and Mount Baker-Snoqualmie National Forests. Elk forage enhancement projects are ongoing or planned for areas inhabited by the Willapa Hills, Olympic, Blue Mountains, Yakima, Colockum, North Cascades, North Rainier, Selkirk, and Mount St. Helens elk herds.

Wildlife Damage

WDFW is mandated by law to address agricultural damage caused by elk. In response to landowner complaints, WDFW tries to alleviate damage problems without reducing the elk population if possible.

The Blue Mountains and Colockum elk herds are below management objective but agricultural damage complaints occur in these areas each year. Elk damage complaints also come from areas inhabited by the Willapa Hills, Mount St. Helens, Yakima, North Rainier, and South Rainier herds.

Hunting seasons have been adopted to discourage elk from increasing in Benton, Ferry, and Stevens County (north of Kettle Falls discourage elk west of the Columbia River; south of Kettle Falls discourage elk west of Highway 395) and from dispersing into northern Chelan and Okanogan counties.

WDFW is attempting to reduce elk in Snohomish and southern Skagit counties and is preventing dispersal of elk east of the Columbia River in Douglas and Grant counties. In all of these areas elk are in conflict with agricultural production. In many other areas, increasing urban sprawl and development are restricting elk range. Maintaining elk populations that are viable, provide a sustained harvest, and are still tolerated by landowners is a constant, often contentious challenge.

Management Conclusions

After many years of any legal bull hunting seasons, antler restrictions and reduced season lengths have been adopted to achieve post-hunt bull ratio and overall survival objectives. In eastern Washington most units have spike-only bull general seasons with limited permit branch-antlered bull and antlerless seasons. In western Washington, most GMUs have 3-point minimum restrictions for the general season and offer antlerless elk hunting opportunities by limited permit. Both spike-only and 3-point minimum hunt structures are attempts at maintaining adequate bull sub-populations through the hunting season to breed the following fall. Bull escapement goals are set at a range of 12 to 20 bulls per 100 cows in post-hunt surveys, and an annual bull mortality from all sources of 50 % or less.

Elk in Washington are under intensive hunting pressure. Elk in Washington are hunted from early September until the middle of December. Washington is the smallest of the eleven western states and has the highest number of hunters per elk. It also has the highest human population density of all the "elk states". Threats to elk population persistence include loss of habitat, declining quality of habitat, conflicts with agriculture, and high hunting demands by both non-tribal and tribal hunters.

Federal courts have ruled that members of federally recognized treaty tribes can hunt unrestricted by the state except for conservation closures. In 1998, the State Supreme Court ruled that members of federally recognized treaty tribes can legally hunt only within their ancestral hunting areas. State and tribal managers are working toward agreements that ensure conservation of wildlife resources including cooperative harvest management. Obtaining accurate, complete tribal harvest data is a constant point of negotiation with some tribes.

Management plans for five of the ten elk herds have been completed. Elk herd management plans for Blue Mountains, North Rainier, South Rainier, North Cascades and Yakima. Draft plans that are in development include Selkirks, Colockum, Willapa Hills, Mount St. Helens, and Olympic.

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Table 1. General season bull elk harvest in Regions 1, 2, and 3 (eastern) and Regions 4, 5, and 6 (western).

Year	Eastern Bull Harvest	Western Bull Harvest
1991	2,342	2,750
1992	2,788	2,795
1993	1,711	2,093
1994	1,937	2,669
1995	1,477	2,045
1996	1,688	2,113
1997	1,471	1,993
1998	1,659	1,693
1999	1,956	2,362
2000	2,033	2,486
2001	1,581	2,339
2002	1,603	2,735
2003	1,431	3,075

Table 2. Statewide elk harvest 1991-2003 for general season and special permit combined by antlered and antlerless class.

Year	Antlered	Antlerless	Total
1991	5,092	3,554	8,646
1992	5,583	3,292	8,875
1993	3,804	2,563	6,367
1994	4,606	5,360	9,966
1995	3,522	2,907	6,429
1996	3,801	3,152	6,953
1997	2,992	1,929	4,921
1998	3,352	2,506	5,858
1999	4,416	2,693	7,109
2000	4,960	3,318	8,278
2001	4,422	3,283	7,705
2002	4,767	3,349	8,116
2003	5,141	3,564	8,705

ELK STATUS AND TREND REPORT: REGION 1
Selkirk Herd
GMUs 101, 105, 108, 111, 113, 117, 121, 124

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DANA L. BASE, Associate Wildlife Biologist

Population objectives and guidelines

Elk (*Cervus elaphus*) are managed in two zones within the Colville District as divided by Game Management Units (GMUs). Within GMUs 111, 113, and 117, increasing the numbers of elk along with their distribution is the goal. Here the elk hunter harvest objective is to maintain the annual overall bull mortality rate at less than 50% and a post hunting season bull-to-cow ratio of 12 to 20 bulls:100 cows (WDFW 2003). Antlerless hunting opportunity within these GMUs is by permit only, except that bow hunters may hunt any elk. Elk population growth is discouraged within the other elk management zone, which includes GMUs 101, 105, 108, 121, and 124. Consequently "any elk" seasons are generally offered within these GMUs.

Hunting seasons and harvest trends

Elk are widely scattered in small groups throughout the densely forested region of northeastern Washington. As a consequence, elk in northeastern Washington are exceptionally difficult for hunters to harvest. While we have limited population data, there is currently no indication that bull:cow ratios are a problem. Therefore, there are no antler point restrictions and any antlered bull is legal.

A significant change was made in the 3-year (2003-2005) season package shifting the archery season later to a standard opening of September 8 and thus running to September 21. New for muzzleloaders was the opportunity to hunt GMU 113, Selkirk. Muzzleloader opportunity in the "any elk" (GMUs 101, 105, 108, 121, and 124) units was also shifted from running concurrent with the modern firearm hunt to the muzzleloader early October hunt. The only significant change in the modern firearm general hunt was the extension of the "any elk" hunt to all of GMU 124. Elk west of Highway 2 in GMU 124 have continued to encroach on farms and suburbs associated with Spokane and have become an intolerable damage problem. The change to "any elk" was implemented to put pressure on these elk and maintain the local population within landowner tolerance. Antlerless permits were issued for muzzleloaders and modern firearm hunts in GMUs 111 and 113, and for modern firearm hunters in 117.

While there was little change in total hunter numbers in the 2003 season compared with 2002 we did see an apparent shift of modern firearm hunters to the muzzleloader hunt (Figure 1). The Colville District was encouraged to provide increased muzzleloader elk opportunity for 2003 and it appears this was achieved as muzzleloader numbers increased 111% from 2002.

The estimated bull elk harvest for 2003 was up 26%, while cow harvest was up 71% from 2002 (Table 1). All three user groups - archery, muzzleloader, and modern firearm - appreciably increased their harvest of elk in 2003 (Figure 2). In addition, harvest rates seemed to be well spread amongst the eight GMUs comprising northeastern Washington.

With the change to "any elk" in GMU 124, total elk harvested increased by 20 animals in 2003 compared to 2002. Antlerless harvest increased from 9 in 2002 to 29 in 2003. It is obvious that modern firearm hunters accounted for this increase when looking at the percent of the antlerless harvest to total harvest. For modern firearm hunters, this percentage increased from just 5% in 2002 to 60% in 2003.

A survey of all permit holders (WDFW 2004) revealed that harvest by "any elk" permit holders continues to be exceptionally low. (Table 2). Of the 54 total permits issued, 41 (76%) of the permittees reported hunting. The harvest included only 1 bull and 6 cows taken from the following Game Management Units: GMU 111 (2 elk), GMU 113 (2 elk), and GMU 117 (3 elk). Permits for any elk appear to be providing enhanced recreational opportunity for hunters in these units, but the harvest continues to be almost negligible.

Surveys

Harvest rates have generally been relatively low for the northern Selkirk Herd compared with other regions of Washington State. Consequently, devoting substantial time to surveying bull-to-cow ratios has not been a high priority. For management decisions we currently rely primarily on trends in bull mortality rates based upon age estimates from antler point data obtained by hunter reports and field checks (Table 3). Hunter reporting rates have improved with the

mandatory reporting system begun in 2001.

In early winter we conduct moose composition flights over some elk range and classify elk wherever encountered. While the sample size is low, these are the only post-hunting season data we currently have. During our December 2003 moose survey flights we observed only 6 elk, all of which were antlerless. We had an observation rate of only 1.1 elk versus 30.0 moose per helicopter flight hour. Elk are exceptionally difficult and expensive to survey in the Selkirk Mountains of northeastern Washington. In each of the three years previous to 2003 we observed and classified more elk during our moose flight surveys. For the years 2000-2002 we had a combined sample of 69 classified elk observed within several GMUs and yielding a bull:cow:calf ratio of 23:100:37. This bull:cow ratio is within the range of 12-20 bulls per 100 cows and the calf ratio is near the average calf ratio for other state herds .

Our best opportunity to observe elk from ground-based surveys is in the early spring from mid-March to mid-April. We have continued our program of involving volunteers to survey elk. Observations during early mornings or early evenings before dark are made of elk that concentrate on "green-up" fields or within forest openings.

The calf:cow ratio is the most reliable information gathered on early spring surveys. The spring 2004 survey efforts yielded a ratio of 36 calves per 100 cows, which is lower than the previous five years (Table 4).

Population status and trend analysis

General observations and anecdotal information indicate that elk populations may be increasing primarily by expansion of their range. The high calf ratio in recent years along with high hunter harvest in 2003 support these observations. We do not consider the bull:cow ratios observed during early spring surveys as being accurate because generally bulls have shed their antlers by that time. In addition, mature bulls tend to not come out into farm fields and other openings in daylight hours as do antlerless elk and young bulls. Nevertheless the ratios observed can be considered as minimums and in the last 3 years bull: cow ratios have been within the 12-20 bulls:100 cows that management guidelines call for in the post-hunt population (Table 4). The antler point data from harvested bulls in 2003 provides a good sample and suggests an increasing trend and relatively high percentage of mature bulls available in the population (Table 3).

Habitat condition and trend

Habitat conditions for elk in the Pend Oreille sub-herd appear to be favorable for the foreseeable future. Road closures by federal and private land managers have been aggressive in recent years. Logging continues on national forest lands and continues intensively on private lands especially. The high rate of logging during the 1980s in central Pend Oreille County has produced forest successional forage vegetation that elk prefer. Residual blocks of mature timber cover are getting smaller, however, and thus the quality of cover may be more of a problem than we are aware of at this time.

After several years of unusually dry summers with poor forage growth the 2004 spring and late summer saw above normal precipitation that resulted in excellent plant growth. This should make a significant difference in the quantity and quality of forage available to elk.

Wildlife damage

We continue to experience only a few formal elk damage complaints in northeastern Washington each year. Within GMU 124, however, groups of elk have been regularly observed near the suburbs of northeast Spokane and conflicts with agriculture are a problem. As of the 2003 hunting season, all of GMU 124 was included in the "any elk" hunting opportunity for all hunting methods to address this increasing threat. The resulting harvest was 20 bulls, which is near average, and 29 antlerless, which is a substantial increase.

Habitat enhancement

Cooperative projects to enhance habitat, primarily through seeding grass forage, browse burns, and road closures are an ongoing endeavor. Most projects have involved the Rocky Mountain Elk Foundation (RMEF) and the Colville National Forest. State agencies, private timberland corporations, and the Kalispel Tribe have been involved in several projects as well.

Management conclusions

All hunt methods had greater success in 2003 but a later opening day likely improved archery success the most. The number of archery hunters has not changed in the past 3 years while the harvest has increased from 9 to 44 in GMUs 101-124. The increased muzzleloader opportunity, primarily with opening GMU 113, has increased muzzleloader participation and success. Modern firearm numbers have declined slightly, suggesting some shift to muzzleloader. At this point it appears the new season structure has successfully provided all hunt choice options with good opportunity and success.

This elk population is difficult to survey and good bull:cow classification data would be relatively expensive to gather. The antler point data from harvested bulls in 2003 provides a good sample and suggests an

increasing trend and relatively high percentage of mature bulls available in the population. Given 35% of the bulls taken were reported at 6 points and greater the hunting season structure should be appropriate. We will continue to monitor antler point data to evaluate any changes in this trend.

Many management decisions depend upon having adequate knowledge of elk distribution and preferred habitats. Managers consistently emphasize coordinating habitat enhancement efforts. Such habitat enhancements should be accomplished within key portions of elk range. Our knowledge, however, is limited as to where these key places are. The helicopter surveys that we do for moose in the early winter provide an opportunity to acquire GPS locations on elk groups as well. Thus over time we can document preferred elk range. The same is true for the surveys done in the early spring as observed elk tend to use fields adjacent to the forested hills and drainages where they winter.

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Table 3. Special permit allocations and hunter take within the Colville District, GMUs 101-124.

Year	Number of Permits	Antlered Bull Harvest	Antlerless Harvest	Percent Hunter Success
2001	80	2	12	18 %
2002	120	1	9	8 %
2003	54	1	6	13 %

Table 2. Three-year bull and antlerless elk harvest within the Colville District, GMUs 101-124.

Year	Antlered Bull Harvest	Antlerless Harvest	Total Harvest
2001	65	23	88
2002	87	38	125
2003	110	65	175

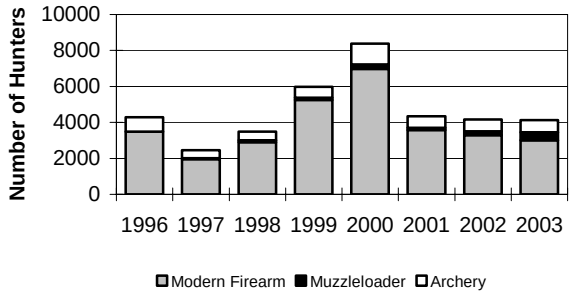

Figure 1. Trend in elk hunters by hunt method, GMU's 101-124.

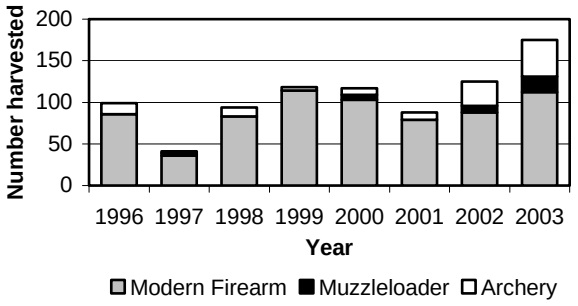

Figure 1. Trend in elk harvested by hunt method, GMU's 101-124.

Table 1. Antler point distribution from hunter harvested elk within GMUs 101-124.

Year	1-2 points	3-5 points	6+ points	Total
1997	11 (52%)	4 (19%)	6 (29%)	21
1998	7 (44%)	5 (31%)	4 (25%)	16
1999	17 (61%)	6 (21%)	5 (18%)	28
2000	23 (56%)	11 (27%)	7 (17%)	41
2000	23 (56%)	11 (27%)	7 (17%)	41
2001	27 (46%)	25 (42%)	7 (12%)	59
2002	32 (37%)	37 (42%)	18 (21%)	87
2003	47 (43%)	25 (23%)	38 (35%)	110

Table 4. Early spring elk composition surveys within the Colville District.

	Ratios		Sample
Year	Bull:Cow	Calf:Cow	Size
1999	5:100	42:100	141
2000	2:100	43:100	118
2001	13:100	47:100	183
2002	14:100	48:100	220
2003	15:100	57:100	139
2004	29:100	36:100	221

ELK STATUS AND TREND REPORT: REGION 1
PMU 11 – GMUs 127, 130, 133, 136, 139
PMU 13 – GMU 142

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Population objectives and guidelines

The population goal for this elk (*Cervus elaphus*) herd is to manage the elk population for a sustained yield; a variety of recreational, educational and aesthetic purposes including hunting, wildlife viewing and photography; and to preserve, protect, manage and enhance elk and their habitats (Zender et al. 2004). It is also important to intensively manage this elk population at levels compatible with agriculture production and within tolerance levels of landowners occupying the rural-urban interface.

Hunting seasons and harvest trends

The 2003 general elk hunting seasons for GMU 127-142 were as follows:

- Modern Firearm - Oct. 25-Nov. 2, Any elk
- Archery - Sept. 8-21, Any elk
- Late Archery (GMU 127) - Nov.20-Dec. 8, Any elk
- Muzzleloader - Oct. 4-10, Any elk
- Late Muzzleloader - Nov. 20-Dec. 8, Any elk
- AHE only - Dec. 9-31, Any elk

Harvest strategies in place are directed to control populations where agricultural damage and nuisance problems have persisted or increased. However, more recently local landowners have recognized the economic benefits of providing fee access for elk hunting, thus increasing hunter access. This has resulted in increased harvest, and subsequently fewer damage complaints.

The current hunting season structure, which allows the harvest of any elk combined with a late season opportunity, appears to have increased the harvest of elk in 1999 and 2000 (Table 1). However, the last 3 years of total elk harvest, although considerably lower than 1999 and 2000, has been very consistent. In 2001, 117 taken, in 2002, 112 and in 2003, 127 animals taken. The harvest now appears to be less variable and appears to have increased slightly in 2004. When looking at these numbers, it is important to consider the switch in 2001 from voluntary hunter harvest cards to mandatory reporting which may significantly affect reported harvest numbers.

The number of hunters in the field was the lowest since 1998, however, overall hunter success increased in 2003 compared to the previous 5 years with a 9.45% success rate (Table 2). Not since 1996 and 1997 have success rates been above 9%.

Table 1 GMU 127-142 elk harvest, hunters and hunter days.

Year	Antlered	Antlerless	Total	Hunters	Hunter days
1991	76	82	158	1,330	4,795
1992	24	40	64	461	2,542
1993	6	19	25	582	2,944
1994	40	67	107	1,016	3,960
1995	32	28	60	1,107	3,758
1996	29	106	135	1,305	5,210
1997	25	45	70	735	3,563
1998	2	19	21	254	661
1999	101	103	204	2,473	17,210
2000	75	169	244	2,966	10,634
2001	61	56	117	2,674	11,380
2002	59	53	112	1,555	7,150
2003	61	66	127	1,344	6,082

Table 2. Hunter success by weapon.

Year	Archery	Modern	Muzzle	All
2001	4.08%	7.17%	8.40%	7.14%
2002	4.15%	6.55%	9.31%	7.20%
2003	7.14%	10.24%	9.13%	9.45%

Modern firearm hunters became the most successful in 2003, whereas muzzleloader hunters had been the most successful the previous 2 years (Table 2). Modern firearm hunters managed a success rate of 10.24% taking 32 bulls and 36 antlerless – 15 more antlerless than in 2002. Muzzleloader hunters had a success rate of 9.13% taking 23 bulls and 25 antlerless elk. Archery success was lowest at 7.14%, almost twice the success of the previous year, taking 6 bulls and 5 antlerless.

Surveys

Ground and aerial surveys have been very limited due to budget restrictions. In 1998 a mark-resight study was conducted in GMUs 127 and 130 resulting in a minimum estimate of 179 elk. Composition counts have been conducted in GMUs 123 and 130. Table 3 shows the limited number of elk composition counts conducted

Table 3. Elk Composition Counts in GMUs 124 & 130.

					per 100 Cows	
Year	GMU	Cow	Calves	Bulls	Calves	Bulls
1999	130	63	19	19	30	30
2000	130	80	33	24	41	30
2001	130	105	38	9	36	9
2003	124	248	90	52	36	21
2004	124	76	30	7	39	9

since 1999. The bull:cow ratio is below the guidelines (12 to 20 bulls:100 cows) presented in the Game Management Plan (WDFW 2003); however composition counts were so few that confidence is low in these numbers. Hopes are that funding will allow helicopter surveys in 2005 in order to get better composition counts for the entire area.

Population status and trend analysis

Harvest data from 1991 to 2000 indicates either a highly variable harvest, or else highly variable harvest reporting. As previously mentioned, few population estimates and actual surveys exist for this district to reference. However, data since mandatory reporting began in 2001 indicate a fairly consistent harvest report. Antler point distribution also indicates a fairly consistent composition of bulls harvested from the population (Table 4.). The data in Table 4 reveals consistent bull mortality in each age class. In addition, averaging the data from Table 3, albeit a small and quite variable sample, yields a bull:cow ratio of just below 20, a ratio consistent with WDFW management guidelines (WDFW 2003). Calf:cow ratios from Table 3 indicate an average cow:calf ratio of 36:100, a value that is on the low range of historical data for the Pend Oreille sub-herd (Zender et al. 2004).

Habitat condition and trend

The greatest concern for habitat in past years had been related to agriculture crop damage in the area. With increasing elk numbers there had been a parallel increase in damage complaints as well as nuisance problems. However, with the current popularity and economic benefits of leasing land, farmers have been complaining less and less. Now, elk habitat degradation due to urban expansion, increased roads and human disturbance is of the highest concern.

Elk Damage

During the last few years, elk damage complaints have decreased. Hotspot and landowner antlerless permits have been effective tools for targeting offending elk. It is important that the number of permits issued, and the conditions and procedures under which these permits are issued must be carefully coordinated.

Table 4. Elk antler point distribution within GMUs 127-142.

Year	1-2 Pt.	3-4 Pt.	6+ Pt.	Totals
2001	32 (59%)	12 (22%)	10 (19%)	54
2002	24 (48%)	16 (32%)	10 (20%)	50
2003	27 (50%)	13 (25%)	13 (25%)	53

While the core herd area is in GMUs 127 and 130 there are indications of increasing elk numbers in GMUs 133, 139, and 142, and as a result more complaints have been received from these more southern GMUs. The elk in these areas are in scattered groups, occupying habitats wherever they can find relative seclusion and safety, frequently CRP lands.

Management conclusions

Data from the last three years indicates a fairly constant, or slightly increasing population level in the district. More surveys are required for better herd composition and population estimates, and if funding permits, helicopter surveys are planned in early 2005.

Literature Cited

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Washington Department of Fish and Wildlife. 2003. Game Management Plan. Washington Dept. of Fish and Wildlife, Olympia, WA, USA

ELK STATUS AND TREND REPORT: REGION 1
PMU 13 – GMUs 145, 149, 154, 162, 163, 166, 169, 172, 175, 178, 181, 186
PMU 14 – GMU 157

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Population objectives and guidelines

Elk (*Cervus elaphus*) populations in most management units are at or near management objective, with the exception of GMU-169 (Wenaha). Agricultural damage complaints may hinder our ability to reach management objective in GMU-172 (Mt. View). The elk population in the Blue Mountains is still below management objective by approximately 900 elk, mostly because of the population decline in GMU 169. The aerial survey in March, 2004 produced a count of 3,579 elk, and a population estimate of 4,723 elk based on the sightability model.

Hunting seasons and harvest trends

The general season bull harvest was restricted to spike-only in 1989 in order to increase bull survival, post-season bull to cow ratios, and improve breeding efficiency. This strategy has resulted in a dramatic improvement in post-season bull ratios in most units. Post-season bull to cow ratios were very low prior to the regulation change; 2-5 bulls/100 cows. A high percentage of the bulls observed post-season were yearlings, with very few bulls older than 2.5 years of age. Bull to cow ratios in March 2004 ranged from a low 6 bulls/100 cows in GMU-175 (Lick Creek) to 38 bulls/100 cows in GMU-157 (Watershed), and averaged 16 bulls/100 cows for the Blue Mountains. In GMU-175, where tribal hunting is unregulated, the post-season bull ratio was 6 bulls/100 cows, 60% below management objective.

The bull harvest in the Blue Mountains has declined due to the spike-only regulation, a dramatic decline in calf survival and the overall elk population. Hunters harvested an average of 752 bulls per year between 1984 and 1988. Between 1995 and 2002, the bull harvest averaged 238 bulls/year. Hunters harvested 235 bulls in 2003 (Table 1), which is comparable to the 1995-2002 average.

Adult bulls are harvested under permit control. In 2003, only 17 permits were issued in two units for rifle, muzzleloader, and archery hunters. Permit holders harvested 3 bulls, for an overall success rate of 20% (Table 2). Since permits were issued in only two units, and GMU-172 Mt. View is mostly private land, this may have been the reason the success rate was so low. Eight hunters in GMU-172 did not harvest a bull, while seven hunters in GMU-169 harvested 3 bulls. Six point or larger bulls comprised 100% of the 2003 permit harvest.

Special permit hunters (Auction, Raffle, Incentive tags) again focused their hunting efforts in the Blue Mountains. The Auction Tag hunter spent considerable time in GMU-169 Wenaha searching for a specific bull, but was unsuccessful. One Incentive Tag holder and the Raffle Tag holder also hunted in GMU-169 and harvested six point bulls. Three out of four special tag holders hunted in the Blue Mountains.

Poaching of adult bulls appears to have returned to normal levels. Only a few were reported in 2003, compared to 50+ bulls between 2000-2002. As a result, bulls were allocated for harvest in GMU-162 Dayton and GMU-154 Blue Creek for the 2004 season. The Umatilla Tribe honored a request from the WDFW to control the tribal harvest of adult bulls by allocating six bulls for tribal harvest in GMU-162 Dayton. Tribal hunters will be required to call the Tribal Office before hunting in GMU-162 Dayton, and report any kill within 72 hours. Once the quota of six bulls is harvested, hunting for adult bulls will be terminated.

Forty permits were issued for GMU-157 Watershed in 2003. Hunting conditions were good throughout most of the season. Hunters harvested 13 bulls, for a success rate of 38%. Six point or larger bulls comprised 85% of the bull harvest.

Surveys

Pre-season surveys are conducted to determine calf production when elk re-group after calving (July-Sept.). Surveys are conducted from the ground, or air when possible.

Post-season surveys are conducted to determine population trend and herd composition in late winter. The annual post-season survey was conducted during mid March 2004. The survey followed the protocol for the Idaho Elk Sightability Model, using the Hiller 12-E helicopter. A total of 30 of the 38 survey zones were covered in eight GMU's. Unit 169 Wenaha was not surveyed due to budget limitations.

Population status and trend analysis

Winter surveys in March 2004 produced a count of 3,579 elk, compared to 3,332 elk in 2003. The sightability model produced a population estimate of 4,723 elk.

Elk population status varies between sub-herds. Even though antlerless permits have been increased on private land in GMU-162 and elk numbers have declined, the overall elk population is stable. The number of elk in GMU-154/157 remains near management objective, with 707 counted in 2004. The Wenaha herd is still far below management objective (1500) at approximately 500-600 elk. Sub-herds in GMU 166, and 172 are slightly under management objective.

Summer calf ratios have improved to historical levels (Fig. 1). Winter calf ratios continue to fall below historic levels, but have improved slightly over the last three years. Winter calf ratios from 1995 to 2002 ranged from 15-24 calves/100 cows, and averaged 21 calves/100 cows. The winter calf ratio in 2004 averaged 24 calves/100 cows, down 17% from 2003 (29 ca/100 cows).

The number of yearling bulls counted post-hunt varies from year to year, and is influenced by several factors: calf production and survival the previous year, and yearling bull mortality. The number of yearling bulls counted between 1993-2003 ranged from 82 to 153, and averaged 105. The March 2004 survey produced a count of 127 yearling bulls, an increase of 30% over March 2003.

Post-hunt bull ratios in 2003 ranged from a low of 6 bulls/100 cows in GMU-175, to a high of 38 bulls/100 cows in GMU-157 Watershed. Spike-only units averaged 14 bulls/100 cows.

Shed antler hunting activity continues to be a problem for elk on the winter range. Shed antler hunting activity in GMU-166 Tucannon and GMU-169 Wenaha is extremely heavy during March and April. Elk use patterns in several units have changed over the last few years due to human disturbance caused by shed antler hunting activity. Bull groups are broken and scattered into the upper elevation timber and snow, while cow/calf groups are pushed onto agricultural lands. The department will need to take a serious look at regulating human activity on public land winter range, because shed antler hunting and other activities are increasing.

Research

The Washington Department of Fish and Wildlife is currently in the second year of a 3-year study examining elk survival in the Blue Mountains. The objectives of the study are: evaluate vulnerability of bull and cow elk based on habitat conditions and land ownership, determine what percentage of yearling bulls are being harvested under the "spike-only" management strategy, evaluate the level of tribal harvest, determine the level of poaching occurring (outside of the Wenaha, Mountain View, and Mill Creek GMU's), and ascertain the level of bull movement between habitats and ownerships. Ninety-one elk were radio-marked in September 2004; 19 yearling bulls, 50 bulls greater than 1 year old, and 22 cows. Monitoring is conducted weekly by fixed-wing aircraft. Capture efforts will be conducted in February and May of 2005 to supplement animals lost through hunting or depredation. Results from this study will be analyzed in 2006.

Habitat condition and trend

The Forest Service is attempting to improve habitat conditions through prescribed burning, and has accomplished projects in GMU-166 and GMU-175. More projects are planned for the near future.

The Pomeroy Ranger District has made progress in closing old roads and reducing road densities in GMU-175, however more roads need to be closed in order reduce harassment and improve habitat conditions for elk.

The Pomeroy District has plans to expand ORV trails in GMU-175 and this could cause more problems for elk unless the plan is developed in a manner that will not increase disturbance to wildlife.

The road closure program on the Walla Walla Ranger District is complete. However, the woodcutting program has resulted in some closed areas being opened for woodcutting. This occurred in the Griffin Peak area closure during 2003 and a well-known trophy bull was poached. Discussions with the District should prevent this from happening in the future.

Augmentation and habitat enhancement

One project was submitted to the Blue Mtns. Elk Initiative in 2004 and approved at the annual meeting. The project is a prescribed burn on National Forest and WDFW lands on the Asotin Wildlife Area The forage enhancement project on Cook Ridge has been a success, and elk use is heavy on the project. Another forage enhancement project was started on Sourdough and seeding was completed in the spring of 2004.

Elk damage

Elk damage continues to be a problem in GMUs 154 and 162. Antlerless elk permits have been issued on private land in both units, and elk numbers on private land in GMU-162 have been reduced. Complaints in GMU-154 have not been as intense as previous years. Antlerless elk permits have also been issued in GMU's 181 (Couse) and 172 (Mt. View) to

deal with damage problems in those units.

Management conclusions

The spike-only management program has been in effect for 14 years and has resulted in an increase in the number of adult bulls in the post-season population. The bull population has improved in age structure, with bulls of all ages in the population. The number of adult bulls in the population has also improved breeding ecology and efficiency. Rutting activity is much more intense, and harem sizes are smaller.

The increase in adult bulls in the population has resulted in the WDFW being able to offer very high quality permit controlled hunting opportunity (Table 2). The intense rutting activity and presence of large, adult bulls has also resulted in a tremendous increase in elk viewing activity during the month of September.

Summer calf ratios have improved and remain near historic levels; 50 calves/100 cows. Winter calf ratios have increased slightly, but still remain considerably below management objective. Low calf survival has had a negative impact on several sub-herds, and overall hunting opportunity.

The elk population on private land in GMU-162 has been reduced, due to agricultural damage problems, but the overall population remains stable. Elk populations in most units are at or near management objective. The Wenaha herd (GMU-169) has declined by 1,400-1,500 elk from historic levels. The population decline in the Wenaha combined with low calf survival has negatively impacted hunting opportunity in the Blue Mountains.

Several factors are limiting the ability of the Blue Mtns. elk herd to reach population management objectives. Agricultural damage complaints result in the WDFW being forced to implement control measures, which often results in a reduction in targeted elk populations. Damage hunts often impact local sub-herds and herds adjacent to the damage area resulting in a decline in the overall population. Low calf recruitment continues to plague the Blue Mountains elk herd, which hinders the ability of elk populations to increase. Habitat values have declined due to roads, logging, noxious weeds, and fire suppression. Unregulated tribal hunting on the east side of the Blue Mtns. needs to be controlled and monitored in order for sub-herds in this area to reach bull management objectives.

Overall, elk populations in most sub-herds have improved and are at or near management objective.

Table 1. Blue Mountains Elk Harvest (PMUs 13 &14), 1992-03.

	Bulls					Antlerless Harvest
Year	Spikes	Adult	Total	Antlerless	Total	Cows:100 Bulls
1992	278	78	356	281	637	79
1993	190	82	272	243	515	89
1994	241	64	305	167	472	55
1995	177	64	241	15	256	6
1996	138	69	207	109	316	53
1997	309	71	380	57	437	15
1998	107	41	148	61	209	41
1999	169	40	209	28	237	13
2000	231	41	272	25	297	9
2001	184	36	220	127	347	56
2002	202	24	226	181	407	80
2003	209	16	225	149	374	66

Table 2. Permit Controlled Bull Elk Harvest - All Weapons, 1992-03, Blue Mtns. WA. (excludes GMU-157 Watershed).

	Bull		Hunter	Percent	Bulls Obs.
Year	Permits	Harvest	Success	6 Point+	Per Hunter
1992	131	53	44%	64%	4.7
1993	132	53	41%	66%	3.1
1994	122	42	37%	66%	3.4
1995	122	45	41%	72%	4.9
1996	139	49	42%	68%	5.5
1997	110	54	51%	79%	6.7
1998	62	31	55%	73%	6.8
1999	67	29	51%	85%	9.1
2000	63	30	55%	83%	na
2001	49	26	59%	90%	na
2002	28	15	68%	87%	na
2003	17	3	20%	100%	na

Note: data does not incl. Auction/raffle/ tag harvest

Table 3. Annual Winter Elk Survey summary, Blue Mtns. Wa.

	Bulls						Per 100 Cows	
Year	Adult	Yearling	Total	Cow	Calves	Total	Bu.	Ca
1991	195	137	332	2922	818	4072	11	28
1992	276	155	431	2660	469	3560	16	18
1993	261	139	400	3103	589	4092	13	19
1994	240	91	331	2395	435	3167	14	18
1995	354	111	465	2690	534	3689	17	20
1996	307	82	362	2836	431	3656	13	15
1997	233	87	320	2487	598	3405	13	24
1998[a]	177	89	266	2325	527	3118	11	23
1999	232	122	354	2724	599	3677	13	23
2000	246	92	338	2806	484	3628	12	17
2001	208	92	300	2951	623	3874	10	21
2002	212	153	365	2835	595	3795	13	21
2003	193	98	291	2362	678	3332	12	29
2004	271	127	398	2561	620	3579	16	24

Surveys conducted in mid March

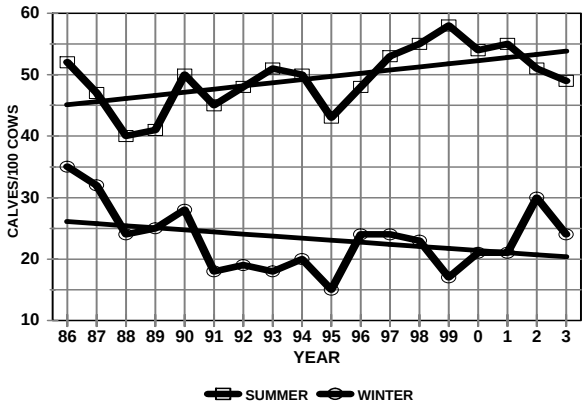

Figure 1. Summer and Winter Calf Ratio Trend, Blue Mountains 1986 - 2003.

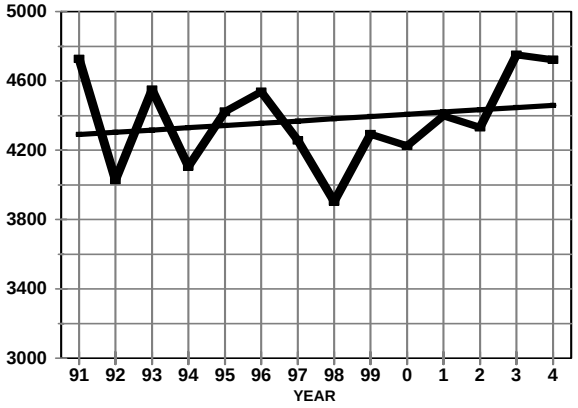

Figure 2. Trend in total elk population size, Blue Mountains, Washington.

ELK STATUS AND TREND REPORT: REGION 3
PMU 32 – GMUs 328, 329, 335
PMU 33 – GMUs 336, 340, 342, 346,
PMU 34 – GMUs 372, 382
PMU 35 – GMUs 352, 356, 360
PMU 36 – GMUs 364, 368

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Population objectives and guidelines

The post-season population objectives for the Yakima and Colockum elk (*Cervus elaphus*) herds are 9,025-9,975 and 4,275-4,725 respectively. A tentative goal of 300-400 animals has been set for the Rattlesnake Hills sub-herd. The postseason bull ratio goal is 12 to 20 bulls per 100 cows.

Hunting seasons and harvest trends

Historically, the Colockum units opened earlier than Yakima units and any bull was legal. In 1994, all branched antler bull hunting became permit only. Archers and muzzleloaders may take antlerless animals in some areas. Hunting seasons were changed to a standard opening date in 1997. In 2000, hunters were able to hunt any area in eastern Washington under one tag. The PMU 34 portion of the Yakima herd has been managed as a damage area with a wide array of liberal seasons allowing the harvest of antlerless and any bull.

Early archery seasons, which were historically September 1-15, are now September 8-21. The late Archery season is set at November 20-December 8th. Muzzleloader season is 7 days and usually starts the first Saturday in October. General modern firearm season starts in late October and runs 9 days. There are also various damage control seasons for muzzleloader that start as early as August 1st and end as late as February 28th.

In 2003, the reported number of elk hunters in Region 3 declined slightly and was near the 10-year average (Table 1). The number of modern firearm and muzzleloader hunters decreased while archers increased in the region.

Overall hunter success was unchanged and near the 10-year average (Table 1). Modern success increased while muzzleloader remained stable, and archery hunters declined slightly.

Bull and antlerless harvest in the Colockum declined in 2003 and was slightly below the 10-year average (Table 1). Bull and cow harvest increased in the Yakima herd, and was above average (Table 1).

Surveys

Post-hunt aerial surveys were conducted in February 2003. Survey units were stratified and randomly selected. Approximately 70% of the Colockum and Yakima units were surveyed. Feedlots for the Yakima herd were ground surveyed. PMU 34 is not included in the flights or data summaries.

Observed calf recruitment in both the Yakima and the Colockum increased (Table 2). However, historical harvest data has not always followed trends seen on surveys. When dramatic shifts in calf ratio were observed in the 1990's, harvest often showed the opposite trend. Since surveys have become more standardized, there is a closer correlation between calf seen on surveys in February and spike harvest in the following fall. However, discrepancies in the data remain. For example, spike bull harvest is suggesting there are more calves than the surveys in the Colockum. Observers may be recording large healthy calves as older animals. In the Yakima and Colockum, the number of adult cows observed increased proportionally to the decrease in calves observed, despite relatively heavy antlerless harvest.

Observed bull ratios throughout the Region decreased (Tables 2 and 3). Adult bulls typically occupy small portions of the winter range and are in a clumped distribution, making year-to-year comparisons weak. The number of bulls and ratio should be viewed as a gross scale estimate over a number of years. Surveys are being re-designed as more is learned about the distribution of bulls. Future surveys will hopefully more accurately estimate the bull population.

Population status and trend analysis

In February 2004, the Colockum and Yakima herds were estimated at 3,443±168 and 9,834±983 (Tables 2 and 3). Estimated populations have decreased over the last 3 years. The Yakima herd is now within the objective range and the Colockum herd is below. Cow populations are at their lowest point since the populations were first estimated in 1999. The high antlerless harvest in both herds was expected to decrease the cow population, but may have been excessive.

Table 1. Elk harvest, hunter numbers, and success in Region 3.

	Colockum harvest		Yakima harvest		Regional hunter numbers				Regional hunter success			
Year	Bull	Cow	Bull	Cow	Modern	Muzz	Archery	Total	Modern	Muzz	Archery	Mean
1986	715	437	754	516	24,265	1,346	3,440	29,501	9	13	5	8
1987	564	579	824	482	21,505	2,163	4,173	27,841	8	22	6	9
1988	797	735	1,492	1,152	23,054	2,530	4,473	30,057	15	17	9	14
1989	977	537	1,294	901	25,785	3,323	3,992	33,100	11	14	9	11
1990	621	761	1,595	1,016	NO	DATA			NO	DATA		
1991	611	652	1,348	1,246	26,928	4,086	5,865	36,879	11	10	7	10
1992	801	613	1,513	1,020	26,513	4,618	5,989	37,120	11	12	6	11
1993	550	433	782	770	26,328	5,503	6,114	37,945	6	9	7	7
1994	542	731	970	2,418	21,341	5,517	5,622	32,480	17	11	9	15
1995	469	660	631	892	20,288	6,190	4,819	31,297	9	6	8	8
1996	449	593	911	1,069	21,237	5,490	5,558	32,285	10	7	8	9
1997	335	255	717	426	18,253	3,918	3,701	25,872	6	9	9	7
1998	492	239	975	889	20,128	4,705	4,362	29,195	8	11	9	9
1999	392	214	1,140	1,058	25,383	4,554	5,549	35,486	7	8	10	8
2000	385	245	1,450	1,549	23,278	4,305	5,363	32,946	9	18	12	11
2001	379	358	1,184	1,442	22,204	4,791	6,177	33,172	11	10	8	10
2002	513	591	1,017	1,157	21,926	6,119	5,914	33,291	8	13	10	10
2003	424	393	1,083	1,373	20,888	3,342	6,521	30,751	11	13	9	11
Mean[a]	451	432	978	1,161	22,037	5,109	5,318	32,397	9.1	9.8	9.0	9.3

[a] 10 Year Mean Ending 2002

If bull harvest is used as an index of population, the Colockum herd has decreased the last 15 years while the Yakima herd is above the historic average but decreasing. Harvest comparisons must be viewed with caution as regulations have changed dramatically the last 15 years. Recruitment of calves will also have a major influence on bull harvest, which is weighted heavily toward yearlings. However, to maintain the high bull harvest seen in the Colockum from 1986-92, there were either more adult cows, a higher number of young per cow, or a combination of the 2 factors.

The Yakima herd survey matches the harvest data fairly closely and the observed decrease in overall population. A high antlerless harvest since 1999 has probably reduced the population. Historic harvest indicates the Yakima population has gone through cycles. Relatively low cow harvest in the mid-1980's resulted in an increasing population that was reduced in the early 1990's. The population likely peaked 1999-2000 and decreased in recent years.

The PMU 34 population grew from less than 100 elk in the early 1980's to approximately 1,000 (~840 in Rattlesnake Hills) in 1999. An aggressive hunting program and a trapping effort has reduced the herd to about 600 (~520 in Rattlesnake Hills). A fire in 2000 displaced elk from a refuge (ALE), which increased harvest. A low antlerless harvest 2001-2003 will probably result in an increasing population.

Habitat condition and trend

The overall summer range forage for the Colockum herd is improving due to timber harvest. However, large areas may lack hiding cover. When human activity increases, a large portion of the herd concentrates around the Coffin Reserve. The area in and around the reserve is heavily impacted by both elk and domestic cattle and appears to be in poor condition. Cattle were not present in 2003, and forage seemed to increase.

Colockum winter range forage quality is likely decreasing in some areas. Nearly all the winter wheat fields have been converted to CRP**.** The older CRP is in crested wheat grass, which is undesirable elk forage in this area.

The U.S. Forest Service (USFS), Washington Department of Natural Resources (DNR), and industrial timber companies manage the majority of summer range for the Yakima herd. Habitat suitability for elk varies across these ownerships depending on management emphasis. The USFS is shifting toward a late seral emphasis. This change in forest management is likely to reduce forage production on a portion of summer range. The reduction in forage production along with an

increased awareness of watershed impacts is beginning to generate concern about cumulative ungulate grazing.

In the range of both Colockum and Yakima elk, human use is becoming a concern. Activity on winter and spring range has increased drastically with increased bull numbers and dropped antlers. Stories and observation of individuals chasing elk across the range have become common.

In PMU 34, the major change to habitat was a fire that consumed 95% of the winter range for elk in June 2000. The short-term effect of the fire was to reduce herd productivity and push elk onto private ranches. The long-term effect is unknown.

Wildlife damage

Elk damage to agricultural crops is a concern throughout Region 3. Most of the serious problem areas within the Yakima elk area have been fenced. However, in some areas the fence is deteriorating and needs to be rebuilt. Extended hunting seasons below the fence were enacted in 2003 in an attempt to reduce damage.

Most of the Colockum herd is not fenced. Damage is being managed by hunting. The boundaries of the hunts are drawn depending on where damage is occurring. In 2003, the damage season was extended to August 1 – February 28th. The program has been successful in some areas. Additional problem elk are being managed through hot spot and landowner preference hunts. The goal is to eliminate/displace the elk that have developed a preference for agricultural crops.

Cattle ranchers in the Yakima area are complaining of competition between elk and cattle. In 2001, a bill was passed allowing ranchers to claim wildlife damage on rangeland. Claims have been filed, but measuring the impact of elk on rangeland is difficult and controversial. Initial data collected suggests elk are not having a significant impact of forage.

The PMU 34 herd has the potential to cause the most significant annual damage. In 2001, damage payments to wheat farmers exceeded $200,000. The total for the entire region from 1991-2000 was $37,777. The proximity of PMU 34 elk to valuable tree crops further increases the risk. Controlling the herd size is problematic as the core use area is on ALE, where hunting is prohibited. Aerial flights have recently been used to haze elk from wheat fields. This approach appears to be successful in the short term. Long term, the herd needs to be reduced. Reducing the herd is difficult as a large reserve borders the agricultural land. When elk do leave the security of the reserve, hunters have targeted adult bulls.

Management conclusions

Based on the available information, the Yakima herd appears to be near the management goals. The Colockum herd is below population and bull ratio objectives, although the accuracy of the survey it is unknown. The high antlerless harvest is a concern in both herds. Observed calf ratios in both herds increased in 2003-4, but there are indications that the data might be biased. Cow nutrition is likely driving calf recruitment and not bull ratios. Harvest data also brings into question the accuracy of the survey data. The overall summer range may be improving on the Colockum, but animals are concentrated in a small area for an extended period in late summer and fall. Winter range quality has probably deteriorated. Ideally, the condition of the animals would be measured on various ranges and seasons in hopes of identifying nutritional bottlenecks. If funding is not available for radio collaring, then efforts should be made

Table 2. Colockum elk winter composition 1990-2003.

	Antlerless		Bulls		Total	Ratios (per 100 cows)	
Year	Cow	Calves	Spike	Branched	Elk	Calves	Bulls
1990	918	336		21	1,275	37	2
1991	559	213		23	795	38	4
1992	1,314	309	16	9	2,099	23	2
1993	1,439	607	22	6	2,074	42	2
1994	NO	DATA					
1995	1,197	409	14	36	1,656	34	4
1996	1,597	486	88	66	2,237	30	10
1997	1,581	467	16	75	2,139	30	6
1998	2,807	854	88	60	3,809	30	5
1999[a]	3,871	1,061	84	242	5,258 ± 2,048[b]	27	8
2000[a]	2,697	570	60	130	3,159 ± 940[b]	21	7
2001[a]	3,464	719	100	170	4,453 ± 543[b]	21	8
2002[a]	2,800	829	119	391	4,173 ± 566[b]	30	18
2003[a]	3,060	526	96	238	3,920 ± 445[b]	17	11
2004[a]	2,388	782	63	209	3,443 ± 168[b]	33	11

[a] 1999-2004 data based on visibilty model
[b] 90% Population Estimate + 90% Confidence Interval

to measure condition of animals harvested by hunters.

The Yakima herd appears healthy. Hunter opportunity and harvest has been high the past 4 years as the herd has been reduced. The herd can probably not maintain the level of antlerless harvest much longer. There is a perception by some of the constituency that the Yakima elk herd is too large and should be reduced to prevent range damage. Information needs to be collected on elk movement, range condition and forage utilization to better respond to those concerns. The PMU 34 herd is above the goal of 300-400 elk, and is expected to continue to grow. Damage payments in 2000-01 emphasize the need to reduce the PMU 34 elk population. Hunting is not expected to control herd growth under the current harvest strategies available to WDFW. Direct management access to elk on the Arid Land Ecological Reserve (ALE) is required to effectively manage the number of elk in this sub-herd.

Table 3. Yakima elk winter composition 1990-2003.

	Antlerless		Bulls		Total	Ratios (per 100 cows)	
Year	Cow	Calves	Spike	Branched	Elk	Calves	Bulls
1990	929	371		28	1,328	40	3
1991	432	195		28	655	45	7
1992	940	266	8		1,214	28	1
1993	943	457	51	13	1,464	48	7
1994	NO	DATA					
1995	748	396	5	35	1,184	53	5
1996	1,719	604	126	33	2,482	35	9
1997	610	254	44	38	946	42	13
1998	4,085	1,333	274	281	5,973	33	14
1999 [a]	10,399	3,479	442	716	16,786 ± 4,334 [b]	33	11
2000 [a]	8,125	2,528	421	703	11,848 ± 1,242 [b]	31	14
2001 [a]	6,896	2,652	464	698	10,460 ± 830 [b]	38	17
2002 [a]	6,611	2,337	356	970	10,274 ± 609 [b]	35	20
2003 [a]	6,815	2,007	413	599	9,834 ± 983 [b]	29	15
2004 [a]	6,217	2,806	357	688	10,068 ± 457 [b]	45	17

[a] 1999-2004 data based on visibilty model

[b] Population estimate + 90% C.I.

ELK STATUS AND TREND REPORT: REGION 4
PMU 44 – GMU 454
PMU 47 – GMU 460

LEE KANTAR, District Wildlife Biologist

Population objectives and guidelines

Precise population estimates for elk (*Cervus elaphus*) in Game Management Units (GMUs) 454 and 460 are unavailable. Estimates for elk numbers in these areas are based on limited surveys and knowledge of herd and sub-herd sizes. Past numbers have been reported for elk in GMU 454 at approximately 200-250 head and 175-225 elk in GMU 460 (WDFW 2001). Elk occurring in GMU 454 are generally restricted to the eastern portions, adjacent to core elk herds and away from the suburban growth and sprawl. However, habituated, small satellite herds do occur in suburban and rural areas.

Elk in GMU 460 are scattered throughout the potential range in small, somewhat isolated groups that normally range in size from 8-12, but occasionally approach 40 elk. The North Bend-Snoqualmie herd has grown to an estimated 85-100 animals. Occurrence varies on the extremes, with elk found from isolated wilderness areas and managed timberlands to suburban/urban populations. Population objectives for GMU 460 are to increase the herd to 500 elk (WDFW 2002).

Hunting seasons and harvest trends

Management strategies vary for these two elk herds. GMU 454 has liberal seasons, including extended antlerless seasons designed to maintain the population at a level that keeps damage complaints at an acceptable level. In GMU 460, there has been limited antlerless harvest and a 3-point or better restriction on bull harvest designed to allow the population to grow at a slow rate and expand their range. Antlerless harvest was eliminated since the 2000 season to enhance herd growth. This GMU has good elk habitat, primarily on managed forestlands and the potential to support about 450-550 elk without damage concerns. Harvest for years 1994-2003 in GMU 460 and 454 is presented in Figures 1 and 2, respectively.

Surveys

Currently no surveys conducted in GMU 454 or 460 because of limited funds and difficulty in surveying elk in the suburban/rural interface.

Population status and trend analysis

Based on limited, primarily anecdotal information, the elk population in GMU 454 is stable or declining slightly, elk from adjacent GMUs, 490 and 485, may use portions of this GMU as well as portions of GMU 460. The elk population in GMU 460 is increasing slowly. More recent concerns regarding movement of elk across I-90 and vehicle-elk collisions plus the continued development of the Snoqualmie-North Bend area has brought additional attention to this herd and input from multiple stakeholder groups.

Habitat condition and trend

In general, quality and quantity of elk habitat in GMU 454 is declining, primarily as a result of habitat conversion. Habitat trends in GMU 460 are more favorable to elk, where several thousand acres of timberlands managed for wood fiber, fish, recreation, and wildlife can support an increasing elk population. There is strong community support for elk sub-herds occupying farmland, open space, parks, and conservation areas in the rural and suburban fringes of GMU 460.

Wildlife damage and nuisance problems

In GMU 454, elk damage to ornamental shrubs, gardens, and pastures is a problem and numerous complaints are received every year. In GMU 460, elk damage and nuisance are limited in scope, yet can be a notable problem. Elk damage has been a problem primarily to some golf courses and Christmas tree farms.

Management conclusions

Elk in GMU 454 should continue to be managed with liberal seasons designed to keep damage issues at acceptable levels in developing areas. Isolated sub-herds, generally on the eastern boundary of the GMU should continue to offer hunting and recreational viewing opportunity.

Currently the most important concern in GMU 460 is to get an accurate assessment of the population size and distribution of elk. Survey information would facilitate management, habitat protection and population enhancement.

Several small sub-herds occur within and immediately adjacent to the urban boundaries of the

cities of North Bend and Snoqualmie. Strong community interest suggests these elk represent a "quality of life" indicator consistent with a rural lifestyle and characterized by open space consisting of greenbelts, local parks, and conservation areas. Efforts should be initiated to identify the scope of habitats used by these elk sub-herds and incorporate new data into city planning efforts to direct development, protect open space, establish parks, and other conservation efforts. Encounters of elk and humans along the urban interface present an opportunity for building and expanding public interest in wildlife conservation.

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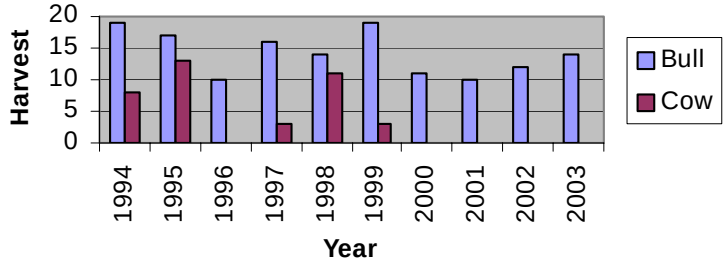

Figure 1. Total elk harvest, GMU 460, 1994-2003.

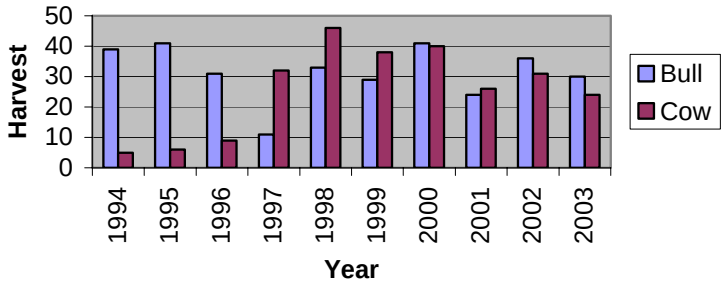

Figure 2. Total elk harvest, GMU 454, 1994-2003.

ELK STATUS AND TREND REPORT: REGION 4
PMU 45 – GMUs 418, 437
PMU 46 – GMU 450

MIKE DAVISON, District Wildlife Biologist

Population objectives and guidelines

1) Manage the North Cascade elk herd using the best available science.
2) Increase elk population numbers in the North Cascade elk herd to or above the late 1980's estimated level of 1700 animals.
3) Promote expanding the North Cascade elk herd into potential ranges south of the Skagit River in the Sauk unit.
4) Re-establish tribal/state authorized hunting seasons.
5) Manage hunted elk units for spring bull ratios consistent with the statewide Game Management Plan (12 to 20 bulls per 100 cows) combined with overall bull mortality rates less than or equal to 50 percent.
6) Minimize elk damage to private lands.
7) Work cooperatively with Indian tribes to implement the North Cascade Elk Herd Plan.
8) Increase public awareness of elk and promote recreational uses of elk, including viewing and photographic opportunities.
9) Increase public awareness of elk and promote recreational uses of elk, including viewing and photographic opportunities.
10) Maintain elk habitat capability on U.S. Forest Service, Department of Natural Resources, and private lands.

Hunting season and harvest trends

Conservation closures were established in both GMUs 418 and 437 in 1997 as outlined in the management strategies for the Nooksack elk herd (WDFW 2002). Tribal hunting has continued in areas outside the primary range of the Nooksack elk herd (damage areas in both the Skagit and Nooksack river drainages, and other portions of GMU's 407 & 437). Reported tribal harvest during 2003 was 2 bulls in GMU 437 and 3 animals (1 bull and 2 cows) in GMU 407. Non-tribal harvest during the 2003 season was 1 bull in GMU 437 (Sauk).

Surveys

Aerial herd composition surveys in GMU 418 were conducted on Sept. 22, 23, and 26 2003. No animals were classified on either of the first two flights. A total of 100 elk were classified on the third flight (Sept. 26, 2003). The ratio of calves and bulls per 100 cows was 41 calves/100cows/38 bulls. The number of branch-antlered bulls (3pt +) was once again very high at 52.4 percent of the total bulls observed.

Population status and trends

The Nooksack Elk Herd Plan (WDFW 2002) identifies the development of a statistically valid population model as the highest research priority for this herd. Current population estimates for the Nooksack Herd based upon field observations, is between 350 and 400 animals. Projected population responses to augmentation of the North Cascade Elk Herd based upon multiple variables indicate that the transplanting of up to 100 animals is the most practical management option for accelerated recovery of the herd (Bender, 2000).

A cooperative research project between WDFW and the N. W. Indian Fisheries Commission focusing upon the establishment of a sightability model for estimating population numbers in the Nooksack elk herd is currently planned to begin in the spring of 2005 (pending funding approval).

Habitat condition and trends

Habitat analysis has not been updated from earlier Landsat/GIS work completed in 1991. Upgrade of this earlier habitat work is considered a high research priority and will require relatively little effort beyond purchase of current (Year 2000) Landsat flight data. Problems limiting the current effectiveness of the Nooksack elk range continue to include, high road densities on both summer and winter range areas, cumulative disturbance impacts from multiple recreational and management uses on the land, and increased development of trails (hiking, horse, and ORV). Housing development and conversion of forest lands to agricultural and/or industrial use is accelerating and poses the greatest threat to elk habitat in the future.

WDFW implemented phase 1 of a Rocky Mountain Elk Foundation (RMEF) habitat enhancement proposal designed to expand forage enhancement acreages on both summer and winter ranges. This project varied from previously established food plot projects that applied mass quantities of nitrate fertilizers to clear cut areas in an effort to raise nutrient

levels in forage plant species, in favor of a "soil-balancing concept". This soil-balancing concept prescribes soil analysis as a means to identifying what's missing in resident soils that would prevent normal nutritional uptake by preferred vegetation on enhancement sites. The potential advantages of this approach include decreased cost associated with expensive commercial fertilizer, decreased noxious weed invasion on plots, and extended nutritional values over time. Soil analysis of samples collected on seven sites throughout the Nooksack elk range indicated that residual soils present after timber harvest are so extremely out of balance that impractically large amounts of calcium, potassium, and/or magnesium would be required to reach the desired goals of the project.

Wildlife damage

Estimates of elk numbers occupying agricultural damage areas has increased moderately and is estimated to be between 75 –150 animals in 2003. The majority of damage occurs in the Acme area (Whatcom County) and along the Highway 20 corridor between Sedro Woolley, and Concrete, in Skagit County, Washington. Continued land acquisitions throughout the Skagit River valley corridor by Skagit Land Trust and the U.S. Forest Service has significantly reduced the overall problem associated with elk use of private lands. Two key land purchases announced for next year could secure farms currently recognized as the most impacted by elk in the valley. Generally speaking, the magnitude and dispersal of elk related damage complaints associated with commercial crops or grazing has increased considerably along the SR-20 corridor between the towns of Sedro Woolley and Concrete in Skagit County. Damage to a commercial apple orchard during the winter of 2003-04 is estimated to exceed $12,000.00. Elk damage complaints in the traditional problem areas of Acme, Washington persist but remain at constant levels.

Augmentation and habitat enhancement

On October 4 and 5, 2003 a total of 41 elk were captured in the Mt. St. Helens area of Region 5 and transported to the upper S.F. Nooksack River drainage (GMU 418) in Region 4. This was a cooperative effort between WDFW, Point Elliot Treaty Tribes, RMEF volunteers, and Crown Pacific Timber Company. All animals were fitted with radio collars and subsequently monitored throughout the following winter, spring and summer months. Preliminary monitoring results indicate that, with the exception of one unconfirmed report of a collared elk in the Acme area, all of the augmentation elk have remained within the primary range in GMU 418.

Mortality rates for elk moved to the Nooksack have been very high. To date, 16 of the original 41 elk (39%) have died. Body fat measurements taken by John and Rachel Cook (Forestry and Range Sciences Lab – La Grande, Oregon) indicated that twenty-two percent of the animals captured had estimated body fat levels equal to or less than 2%. According to John and Rachel Cook, " such a level is characteristic of animals in poor health and would be indicative of animals with a substantially heightened probability of dying". Twenty-eight percent of the animals relocated had body fat levels ranging from 2-5%. Only about 40% of the Mt. Saint Helens elk fell within the 8% - 16% autumn body fat range that is more typical for western Washington and Oregon Herds (lactating and non-lactating cows combined). It is probable that poor physical condition in combination with capture and transport related stress was the cause (either directly or indirectly) of the high mortality rate. Four of the mortalities were attributed to cougar kill following carcass inspection with an additional 3 mortalities listed as potential cougar kills.

Management conclusions

Management recommendations for the Nooksack Elk Herd and associated habitat include the following:

- Continue efforts to establish a statistically valid population estimate via population modeling.
- Continue road closure agreement with DNR and Crown Pacific, Inc. in primary winter and summer range areas.
- Evaluate the potential for a mark/resight population estimation project.
- Maintain and/or upgrade existing habitat enhancement projects.
- Establish new habitat (forage enhancement and road closure) projects in key summer range areas.
- Maintain elk population numbers in agricultural damage areas at or below current estimated levels (75-100 animals).
- Continue to evaluate the potential for a transplant project in GMU 418 (Nooksack) and 437 (Sauk).
- Continue to collect genetic samples from the North Cascade elk herd.
- Continue work on a Nutritional Ecology Study designed to evaluate elk nutritional levels on a seasonal basis.
- Complete a Habitat Landscape Evaluation for GMU 437 (Sauk).
- Continue recaptures and monitoring of radio collared elk to evaluate migration patterns, habitat use, mortality and habitat description of elk range in GMU 418 (Nooksack).

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ELK STATUS AND TREND REPORT: REGION 4
PMU 48 – GMU 485, 466

LEE KANTAR, District Wildlife Biologist

Population objectives and guidelines

The Green River elk (*Cervus elaphus*) herd is a relatively small and compact population that has exhibited a decline since the early 1990's. Elk historically occurred in the Green River, but numbers were limited. In the early 1960s with increased timber harvest, elk populations expanded. There are no historical population estimates, but late winter, early spring numbers likely peaked at about 800-900 elk between 1988 and 1991. The current elk population estimate of 200 animals (95% C.I. ±34) may signify an increase over recent years. (Vales unpubl. data 2004).

In 1984 the Green River Unit (GMU 485) became a unique management unit where access is strictly limited by the City of Tacoma to protect water quality and eliminate unauthorized access. The Stampede Unit (GMU 466), also part of the Green River Watershed consists of multiple ownerships including US Forest Service lands. In 1984 GMU 485 became established as a quality bull area with additional high success antlerless hunts. By the early 90's field observations and aerial surveys including mark-resight work demonstrated a decline in the population prompting a closed season since 1997. The adjacent Stampede Unit retains public access and hunting opportunities for bull elk with a 3-point minimum.

In 2002 the North Rainier Elk Herd Plan was written. This plan presents information on distribution, herd and habitat management, associated social and economic values and research on elk that range north of Mt. Rainier on the western slope of the Cascades. The Green River and Stampede elk together are considered a sub-herd within the greater North Rainier Herd. Objectives for this herd include increasing population numbers to 500 elk, maintaining minimum post-season bull to cow ratio of 12:100, and increasing and improving forage on winter/spring and summer range (WDFW 2002).

Hunting seasons and harvest trends

In GMU 485, beginning in 1984, 50 either-sex elk permits were allocated each year for the five-day all citizen season. Hunters focused on the branched bulls and subsequent composition surveys revealed a decline in this herd component. Subsequently permit allocation was changed beginning in 1986 to reduce bull harvest and increase antlerless harvest. In 1996, 35 antlerless, and 15 branch-antlered bull permits were issued.

Beginning in 1992 the Muckleshoot Tribe began exercising treaty hunting rights in the Green River Watershed. Subsequently, permit allocation changed to include the Tribe as follows: 1992 and 1993 - 15 elk (6 spike, 9 antlerless); 1994 - 31 elk (6 spike, 19 antlerless, 6 branch-antlered bulls); 1995 and 1996 - 43 elk (6 spike, 35 antlerless, 2 branch-antlered bulls). Permit numbers totaled 93 for both hunts combined. No permits were issued from 1997-2002.

Total elk harvest remained fairly consistent for the years 1984-1991, averaging 46 elk. Between 1992 and 1994 average harvest increased to 57 elk, dropping notably to 44 and 25 elk respectively in 1995 and 1996 despite the same permit level allocation.

Prior to 1992 these regulations met our management objectives. The increase in harvest from 1992-1996 may have adversely affected the population.

The hunter success rate was initially high, averaging 91 % (range 78-100 %) between 1984 and 1991. Between 1992 and 1995 the success rate declined, averaging 67 % (range 44- 83 %). The 1996 success rate of 27% was a notable exception to the past and the lowest recorded since 1984.

Currently, the Muckleshoot Tribe collects age and reproductive data as part of continuing research efforts. The tribe also contributes flight dollars for composition flights. Management decisions, including in the past, permit levels and allocation, result from yearly meetings between the Tribe, State, and Tacoma Water. Since 2000 herd composition surveys have shown an average bull:cow ratio of 23:100. In consultation with the Muckleshoot Tribe a 1 permit any bull hunt for all citizens and 1 any bull tag for the tribe was instituted for the 2004 season by special permit.

GMU 466 continues to be included in the general season with 1998 being the last year an antlerless elk could be taken. Elk intermix with GMU 485 elk, and instrumented elk have been shown to move to winter range down the east side of the Cascades on Manastash Ridge to the L.T. Murray Wildlife Area (D. Vales, pers. comm. 2003). Harvest regulations for adjacent GMUs should be assessed to determine associated impacts to this sub-herd.

In part due to the bull only hunt, total elk harvest in GMU 466 dropped substantially from a high of 30 (8

bull, 22 cow) to 5 (3 pt. minimum bulls) in 2002 with an average of 5.3 elk killed (range 3-8/season) between 1999 and 2003 (Figure 1).

Tribal harvest as reported by the Northwest Indian Fisheries Commission in GMU 466 has also added to the total elk harvest for this PMU (Figure 2). Tribal harvest continues to include cows in this unit and cooperative efforts between the tribes and state are vital to increasing the future productivity of this sub-herd. State late seasons have harvested relatively few elk possibly due to restricted access in this unit during the late season because of snow combined with elk moving to lower elevations.

Surveys

Prior to 1986 elk composition surveys for GMU 485 was primarily from the ground by foot or vehicle; standardized helicopter surveys are now the primary method.

Pre-hunt (September) bull:cow:calf ratios from 1984-1997 are presented in Table 1. The pre-hunt composition shows a general decline in calf:cow ratios since 1984. The low calf survival rates are below the average for other western Washington herds. Beginning in 1996, flights in June, July, and August were conducted to better assess calf production and to document and compare recruitment with traditional September composition surveys. Calf:cow ratios averaged 40:100 for June-August and declined to 26:100 by September.

The pre-hunt, branch-antlered bull ratios have generally increased since 1984 and stabilized at about 29:100 cows. Pre-hunt, branch-antlered bull survey data remained stable for the 1994-1997 period. Inadequate funding caused this survey to be scaled back in 1997. In 1998-2003 no pre-hunt flights were conducted because of population declines. Post-hunt (March) composition counts from 1985-2003 have shown a general increase in calf recruitment over the last four years (Table 2).

Population status and trend analysis

There are no historic population estimates for comparison, but the long history and experience with this elk herd from field observations and sub-herd location suggests this herd has declined from about 1992 to the present. Also, the total number of elk counted during post-hunt helicopter composition flights in March has shown a decline from 1992 thru 2003. This suggests a decline in the population and generally supports field observations.

Our 1994 population estimate indicated only 50 elk calves were recruited to the population. This coupled with the decline and low recruitment indicated from post-hunt composition counts since 1985 suggested a declining population. Increased harvest in declining populations can compound the problem by increasing the rate of decline. Other factors that may be affecting this herd are 1) a density dependent decline associated with changes in seral forest stages which reduces winter range carrying capacity and elk numbers exceeding carrying capacity; this can have a negative effect on recruitment and there are some data to support this hypothesis; 2) predation may be affecting recruitment; predation mortality may be additive and not compensatory. GMU 485 was closed to bear and mountain lion harvest until 2000**;** these predators are likely at maximum densities relative to prey availability. Analysis of mountain lion elk kills (n=28) found that selection for elk < 1 year old was statistically significant. Certainly a combination of these variables should be considered.

In March and April 1997, another paintball mark-recapture estimate was conducted. This was the first opportunity to assess population changes since 1994. It was suspected the 1997 population estimate would show a decline from the 1994 estimate of 612 elk. The 1997 estimate was 227 elk (range 177-277). The paintball mark-recapture estimate was repeated in March and April of 2001 with an estimate of 170 elk (range 145-192) (Spencer unpubl. data 2001). The last post-hunt flight in 2004 gave an estimate of 193 elk (D.Vales unpublished data).

Calf mortality study

The WDFW initiated a calf mortality study in May of 1997 and in June 1998 to determine the sources of elk calf mortality. In 1999 the Muckleshoot Tribe continued with this in cooperation with WDFW. This cooperative study included the Muckleshoot Indian Tribe, Tacoma Water, Weyerhaeuser and Plum Creek Timber Companies, and the Army Corp of Engineers. Results have suggested that predation, predominantly mountain lion, is the primary source of death to radio equipped calves. However, based on preliminary data, the nutritional status of radio equipped adult cows, many associated with these calves is poor which may be also affecting calf survival and their vulnerability to predation. In addition it has been noted that the nutritional condition of other Westside Cascade elk herds tends to be poor, further research to distill differences in calf survival and both proximate and ultimate causes is necessary to understand these relationships (WDFW 2002, D.Vales, pers. comm. 2003).

Habitat condition and trend

The Green River Watershed has interspersed ownership of private, state, and federal timberlands. Most of the timberlands are intensively managed and

create a mosaic of seral stages. Average rotation between successive harvests is about 60 years on private and state lands. These managed lands also contain remnant old growth forest, primarily in federal ownership, at higher elevations (> 2500 feet).

There is preliminary information to indicate that overall elk winter range carrying capacity in GMU 485 has declined from about 1955 to 1995. This was determined from a forage based model called HABSIM (Raedeke and Lehmkuhl 1984, Raedeke 1995) that tracks forest seral stages and quantifies the change in the amount determined as forage and change in elk numbers for each seral stage over time.

Wildlife damage to private property and nuisance problems

Elk in these GMUs are not a problem to private property and there are no nuisance problems.

Habitat enhancement activities

Past and present work has included cooperative projects with the U.S. Army Corp of Engineers, Tacoma Water, and the Muckleshoot Tribe to create open meadow grass habitat plots for elk. These mitigation measures were enacted to compensate for the anticipated loss of habitat from raising the Howard Hansen Dam and subsequent loss of habitat due to additional water storage.

In August 2000 a 250 acre forage enhancement project with the RMEF, Tacoma Water, and the Bonneville Power Administration was completed. The project was highly successful and involved spraying and mowing of scotch broom along powerline corridors to stimulate elk forage. The work and collaboration has continued with consecutive projects occurring through 2004. At this point over 550 acres have been treated mechanically and/or chemically to improve forage conditions on the range.

Management conclusions

Low calf recruitment rates are a concern for this elk herd. Continued low recruitment and the antlerless harvest rate up to 1996 were incompatible. The low post-hunt spike ratios from 1993 through 2000 (1.8:100 cows) remain a concern. Management goals for the Green River sub-herd include increasing the population to a minimum 500 elk, maintaining high bull to cow ratios and ensuring a majority of bulls reach the prime age class (5-10 years).

This past permit hunt was one of Washington's most popular because of the opportunity to harvest and view quality bulls coupled with the high success rates. Elk permits were not issued for the 1997 to 2003 hunting seasons because of the continued population decline. In 2004 a limited entry 1 bull permit each for the state and the Muckleshoots will occur. The Muckleshoot Tribe and WDFW cooperatively agreed to institute this hunt after 3 consecutive years of high bull:cow ratios. It was further agreed that the limited hunt would be biologically acceptable and not affect the future growth of the herd, while at the same time allowing hunter opportunity, the first since 1997. Cooperative efforts between Tacoma Water, the Muckleshoot Tribe, and WDFW will continue to assess herd composition and population numbers while enhancing habitat in order to achieve population objectives and improve forage conditions.

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Table 1. GMU 485 Pre-hunt elk herd composition 1984-1997 (all ratios per 100 cows) no flights in 1998,1999, and 2000.

Year	Spikes	Br. Bulls	Total Bulls	Calf
1984	7	21	28	41
1985	8	12	20	36
1986	8	19	27	30
1987	13	14.5	27.5	22
1988	7.5	36	43.5	35
1989	5.3	28	33.3	28
1990	5.4	31	36.4	26
1991	7.5	26	34	15
1992	5	30	35	33
1993	3	26	29	20
1994	8	30	38	22
1995	11	29	40	26
1996	7	29.5	36.6	25
1997[a]	8.3	27.7	36	30

[a] Includes data from July 97 flight- elk not mixing at this time. No surveys were conducted in 1998, 1999, or 2000 because of low population levels.

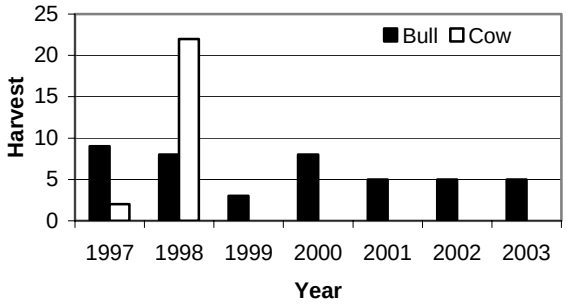

Figure 1. Annual elk harvest, GMU 466, 1997-2003.

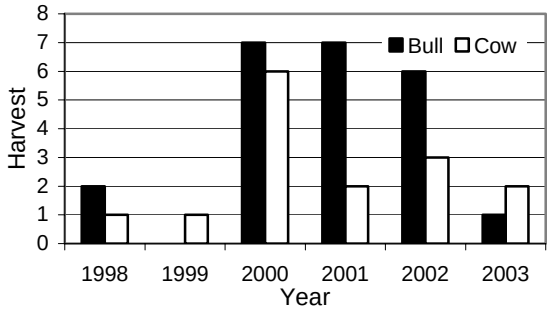

Figure 2. Annual elk harvest, GMU 466, 1998-2003.
*Northwest Inland Fisheries Commission Data

Table 2. GMU 485 Post-hunt elk herd composition, 1984-2004 (ratios per 100 cows).

Year	Total Bull	Calves
1984	9	21
1985	10	30
1986	13	23
1987	10	15
1988	19	22
1989	18	21
1990	27	15
1991	30	14
1992	20	21
1993	22	12
1994	20	13
1995	13.5	10
1996	8.4	11.5
1997	6.3	14.8
1998 [a]	27	7
1999	14.7	6.4
2000 [a]	19.2	8.1
2000 [a]	22.8	9.9
2001	7.9	23.7
2002 [a]	16.1	32.3
2003 [a]	30.3 [b]	15.2
2004	23	27

[a] Flight and data provided by D. Vales, Muckleshoot Indian Tribe Biologist.
[b] Ratios include bulls not classified.

ELK STATUS AND TREND REPORT: REGION 5
PMUs All, GMUs All

PATRICK J. MILLER, District Wildlife Biologist
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Population Objectives/Guidelines

The Washington Department of Fish and Wildlife s (WDFW) population management goals for elk (*Cervus elaphus*) in all Game Management Units (GMUs) of Region 5 are to "manage for viable and productive elk populations with desirable population characteristics" and "to provide recreational opportunity and sustainable annual harvests" (WDFW 2003). Specific Region 5 objectives include, (1) manage general hunting GMUs to achieve post season bull elk escapement objectives of 12 to 20 bulls per 100 cows, (2) manage limited entry GMUs for 15-25 bulls per 100 cows, and, (3) discourage the proliferation of elk in several units by using liberal regulations to reduce damage. In general, herd productivity is managed to maintain the population objective within 5% and is re-evaluated every six years (WDFW 2003).

Hunting Seasons and Harvest Trends

Historically, data on elk harvest, hunter success, and hunter effort were obtained annually through the WDFW hunter questionnaire and mandatory hunter report cards issued with each elk permit. Beginning in 2001, all hunters were required to report their hunting activity via the phone or Internet. This new mandatory harvest reporting structure does increase the precision of harvest data, although true accuracy is still difficult verify.

Elk are hunted under WDFW s resource allocation strategy. Hunters must choose a weapon type (modern firearm, muzzleloader, or archery), each of which has distinct seasons of varying length designed to minimize the chance of over-exploitation and to provide equal opportunity. Season length and timing are determined by 3-year hunting packages. The current hunting package operates from 2003 to 2005.

As previously mentioned, in 2003 elk were managed under three principal harvest strategies in Region 5. During the modern firearm season these were:

- Any-elk (where any elk is legal) GMUs 564, 568, 574, 578, and 588.
- 3-pt minimum (any bull with 3 or more antler points is legal) GMUs 503, 504, 505, 506, 510, 513, 516, 520, 530, 550, 558, 560, and 572.
- 3-pt or antlerless GMU 501.
- Permit only (limited entry, hunting by permit draw only) GMUs 524 and 556.

Concern over the level of antlerless harvest in GMUs 506, 520, and 530 led to a reduction in modern firearm antlerless permits and a restriction of late archery season cow harvest. Antlerless harvest was curtailed for all user groups entirely in GMUs 510, 513, and 516. In all other units, apart from the any-elk GMUs and GMU 501, antlerless harvest was allowed during archery seasons, late muzzleloader in GMUs 503 and 505, and by permit during general firearms and muzzleloader seasons.

Elk populations in some of the Region s 3-pt GMUs are not meeting WDFW post-season escapement objectives of 12 to 20 bulls per 100 cows. Modeling indicates that post-season bull:cow ratios range from 9-17:100 throughout the Region.

Hunting conditions were warmer and drier than average at the beginning of the 2003 elk season and returned to a more normal cool and wet late season. Typical warm, dry weather during September and early October made early archery and muzzleloading hunting challenging. Fire danger during the early archery season resulted in the closure of all private timberlands during the first weeks of September. Typical fall and early winter precipitation and cooler temperatures returned during the general firearm and late seasons.

In Region 5, a total of 27,769 elk hunters spent 150,375 days afield in 2003. Region 5 harvest was 3,006 elk. Overall hunter success during the general season was 11%. The estimated 2003 elk harvest of 3,006 was 5% higher than the 2000 harvest of 2865, the highest of the past decade. Modeling, estimated harvest, and harvest/effort all indicate slowing of the general decline in elk populations in Region 5

Increased cow mortality in the Packwood area has also been a concern. The South Rainier elk herd (GMUs 510, 513, and 516) has been declining for several years, although the number of resident elk in the Cowlitz River valley has been increasing over the same time period. Also, there are elk that seasonally migrate between Mount Rainier National Park, and the National Forest and other private lands to the south

Due to the decline in the South Rainier herd, no antlerless elk hunting has been allowed in the three GMUs that encompass this area since 1999. Earlier work had suggested that the timing of tribal harvest in this area took both migratory and resident elk. Surveys in Mount

Rainier National Park in 1999, however, indicated an increase in the Mount Rainier South elk herd. These survey results suggest that resident elk herds may be receiving the majority of the harvest pressure, rather than the migratory elk. The population modeling indicates that the population slightly increased in the 1999 to 2000 timeframe and then slightly decreased in the 2000-2002 period. Useful population model inputs were unavailable in 2003 (see next section). Harvest restriction should remain in place.

Surveys

Until 1995, spring and fall elk composition counts were used to determine the sex and age structure of the Region 5 elk population. Since 1996, only fall composition counts have been conducted. Data from these counts are used to evaluate; (1) whether elk herds are meeting productivity and escapement goals, (2) the effect of alternative harvest strategies on bull elk population structure, and (3) as input into the elk reconstruction model (Bender and Spencer 1999).

Fall composition counts are used to generate cow:calf, bull:cow, and bull age structure ratios. Fall cow:calf ratios are an index of population productivity. Since bulls, cows, and calves freely intermix during and immediately after the rut, fall composition counts may provide the most un-biased bull:cow ratios. Bull:cow ratios are used to assess bull escapement, which provides information on the number of bulls available for breeding and harvest. Bull age structure is used to estimate annual bull elk mortality rates.

Counts were conducted from a helicopter. All elk encountered were recorded. All sample units (SUs) were sampled only once and SUs were widely spaced (>5 miles between SUs). Since sampling was accomplished within a short time period, the possibility of double count bias was minimized. In 2003, fall surveys were conducted on 2-5 September, and 22 - 26 September. Observed elk were classified as calf, cow, or bull. Bull elk were further classified by number of antler points to determine the percentage of prime (heavily beamed, five or more antler points per side) bulls present in the herds. Data were used to generate calf:cow and bull:cow ratios, expressed as the number of bulls or calves per 100 cows. Ninety percent confidence intervals were constructed about the ratios following Czaplewski et al. (1983).

A total of 1,416 elk were classified during the 2003 surveys (Table 1). Survey coverage in 2003 was better than in the recent past. Daytime highs were in the 70's for most survey flights, which was reflected in lower actual numbers of elk seen. Due to hot weather, Washougal (GMU 568) and Siouxon (GMU 572) were sparsely covered. Sample sizes were also lower than expected for Yale (GMU 554) and Ryderwood (GMU 530). Strong wind was not much of a factor during most flights.

Demographic parameters are presented in Tables 1 and 2. Despite reasonable sample sizes in most units, confidence intervals continue to be 20-30% of the given parameter. It will likely require more effort than is practical to reduce these confidence intervals to desirable levels. This shortcoming, however, can be mitigated by increasing the number of units surveyed on an annual basis.

Permit Units

Demographics in both Margaret and Toutle were closer to what they had been prior to 1997. Bull mortality rates in both units were 20 - 25%, which is right where they were prior to the onset of tribal harvest in 1997 (Table 3). The return to lower observed mortality rates was a result of decreased harvest. Bull ratios in both units were also good. Productivity ratios also fall within an acceptable range.

The age distribution of bulls in both these units continue to show a decrease in the 2003 surveys (Table 3). The mature bull component of the population in Margaret has decreased from 27 % in 2001 to 20% in 2003. In Toutle, mature bulls have gone from 17% to 5% over the same time period. Prior to the 2 years of tribal harvest, over-harvest of bulls, particularly in the Margaret, likely occurred. Thus, permit allocation was reduced from 50 bull tags to 29. It is hoped that this harvest rate is sustainable, and will likely still result in an older standing bull population. Given the fairly constant rag horn bull percentages in these two units, and with better control over harvest now, the mature bull component should increase over the next couple of years.

Both the Margaret and Toutle seem to be recovering from several years of higher than average mortality, that affected all age and sex classes, albeit some harder than others (i.e. calves). We are meeting our escapement objectives in these 2 units. The continued decline in the mature bull component of the populations is of concern, and will continue to be monitored.

Open Entry Units

Productivity was mostly up throughout the Region (Tables 2, 4, and 5). Bull ratios were mostly good. Raghorns made up the majority of bulls at 40% on average. The presence of mature bulls improved over 2002 throughout the open-entry units. Mature bulls comprised 8% of the sampled bull population, which was the average in these units prior to 3-pt minimum regulations.

Surveys indicate that the 3-pt minimum regulation has mostly resulted in achievement of bull mortality rate objectives. In the Marble (GMU 558) and Lewis River (GMU 560) units, data indicate mortality rates of 44 - 48%. Models predicted ~60-65% in 1998, so 5 years of

3-pt regulations in these units have resulted in lower overall bull mortality rates. This is lower than the historic 70% when these units were any bull, and meets our goal of #50% annual mortality. That mortality rate showed a decline in 2002. Branched bull survival rates have improved in these units. If productivity continues to be high (> 40 calves:100 cows), we will likely reach post-season escapement goals, but will have bull populations highly skewed towards animals < 2.5 years-old.

Observed bull mortality rates were even higher in PMU 57 than in PMU 56 (Table 2). Harvest estimates for 2003 in both Ryderwood and Willapa Hills were slightly higher for antlerless elk. The paucity of older bulls in the surveys suggested that, indeed, bull harvest was heavy. Since the initiation of the early muzzleloader bull hunt in Ryderwood, we have seen an increase in observed bull mortality rates from 50% to 67%. This year that rate was 60%, and is not too surprising, since we had a similar season in Willapa Hills during 1995 and had bull mortality rates ~63%. With continued high bull mortality rates we are not going to meet escapement ratio goals in this PMU. Continued high productivity, however, will help us achieve higher bull numbers, although we will continue to have few older bulls.

The 2003 survey results from PMU s 56 and 57 underscore the importance of comprehensive annual surveys. Lack of current information or inadequate sample sizes in many of the Cascade elk units (GMUs 510, 513, 516, and 572) make evaluation of the 3-pt minimum regulation incomplete (see Table 6.). Due to the lack of timber harvest on National Forest lands, pre-season composition surveys have not obtained adequate sample sizes.

Differences exist in habitat, climate, and access between the Cascades and the lowland areas. We need to determine whether the 3-pt minimum regulation will achieve our bull mortality and escapement objectives in the Cascades, where elk have greater cover and access is tougher.

Presently, survey data and modeling suggests that the 3-pt minimum regulation, at least in the lowland areas does not result in significantly lowered bull mortality rates. There was some difference in demographic parameters among the lowland units, with the bull component lower in the western lowlands compared to east. Coweeman and Willapa Hills exhibited similar demographics with bull mortality rates between 58% and 67%.

Population Status and Trend

Population modeling, in conjunction with other indices, show a slowing of the general decline in elk populations in some areas of Region 5. While harvest rates are similar to the past three years, limited hunter access and reduced permit levels in some cases is maintaining population levels in 2003.

Habitat Condition and Trend

In most years, climate tends to have a negligible effect on Regional elk populations west of the Cascade Crest. Localized effects, however, can be drastic. Although snowfall at higher elevations may be heavy, subsequent freezing conditions seldom occur. Elk summering at higher elevations tend to be migratory in response to snow, whereas elk at lower elevations exhibit year-round fidelity to those areas. The primary effect of climate on elk west of the Cascade Crest is the influence it exerts on hunting pressure. The severe winter kill of 1998-99 in the Toutle River valley was more likely due to poor quality wintering ground and high elk numbers, than to a catastrophic winter event. There were approximately 14 elk mortalities documented on the St Helens Wildlife Area during the winter of 2002/2003 although climatic data indicated an average winter. We are currently determining if elk are entering the winter in poor condition and are therefore more susceptible to mortality during even moderate winter conditions.

Degradation of wintering habitat is occurring along the North Fork of the Toutle River, specifically along the mudflow within the St. Helens Wildlife Area. The inadequacy of the habitat was evident in the winter of 1998-99. Declines in habitat quality are a result of (1) shifts in plant composition away from nutritious forages, (2) invasion of exotic plants such as Scotch broom, (3) continued erosion of stream side vegetation, and (4) erosion of land acreage. The forage quality of the surrounding slopes continues to decline, as the canopy closes.

East of the Cascade crest climate will periodically result in significant winterkill of elk. The last significant winter kill occurred during the winter of 1991-1992. The winter of 2002-03 was mild at the lower elevations, with very little snowfall. A small fraction of Region 5 elk occurs east of the Cascade Crest. On a Regional basis, only during extreme winters will weather significantly influence elk population numbers.

Region 5 continues to face loss of elk habitat through: (1) establishment of extensive Late Successional Reserve (LSR) on US Forest Service (USFS) lands that reduce forage habitat, (2) increased residential development along the three hydroelectric reservoirs (Merwin, Swift, and Yale Reservoirs) that had inundated historical winter range, decreases winter range acreage along the Lewis River watershed, and (3) general increases in development and human encroachment throughout the lowlands of Region 5 results in a lower tolerance by landowners to the presence of elk.

Mitigation for the loss of winter range along the Lewis River watershed has been addressed in the Merwin Wildlife Management Plan. The Plan is a cooperative management agreement for Merwin Reservoir between Pacificorp (Portland OR), the utility company managing Merwin, Swift, and Yale Reservoirs, and the WDFW. Similar negotiations are ongoing over Yale Reservoir; negotiations over Swift Reservoir began prior to the expiration of Pacificorp s license in 2000.

Augmentation/habitat Enhancement

Steps continue to be taken to enhance forage quality on the Toutle mudflow through plantings and fertilization. With the cooperation of the Rocky Mountain Elk Foundation (RMEF), other volunteers, one hundred twenty eight acres were fertilized and a portion of that was also seeded in 2003. Trees and forage seed was applied to 17 acres to serve as erosion control. A cooperatively funded weed control project with RMEF applied herbicide on one hundred forty six acres.

In October 2003, 41 elk were relocated from the St. Helens herd to the North Cascades. This was the first year of a two-year augmentation project to move up to 50 elk per year from the Mount Saint Helen's Wildlife Area to the Nooksack Region in Northwest Washington. A total of 41 cows and calves were transported in October 2003. While transferring elk from the Mount Saint Helen's Wildlife Area to the Nooksack herd may alleviate some pressure on the Toutle River valley wintering grounds, it is not viewed as a long-term strategy for herd management. It was rather an effort to take advantage of an opportunity to use surplus animals to supplement an elk population in another area that was struggling.

Management Conclusions

Declines in elk populations in the Region seem to be slowing. Steps to address these declines were initiated during formulation of the 2000-2002 hunting package and carried over to the 2003–2005 package. Allocation of antlerless permits has been reduced in several of the areas of concern. Following these regulation changes, a 45% decrease in antlerless harvest occurred in those areas. Conservative cow harvest will continue in these areas until populations are back at management goal levels. Increases in the amount of elk damage occurring within localized areas of the Region and political pressure complicate the reduction of antlerless opportunity.

Bull escapement has improved, but will be monitored. Analysis indicates that objectives are being met in the open-entry units and most of the 3-pt units. We will continue to monitor the efficacy of this strategy.

Prior to 2000, the level of population survey in Region 5 was inadequate to determine the effects of both winter severity on calf survival and various harvest regimes on our elk. The utility of spring surveys to determine over-winter calf survival was illustrated in the early 1999 survey. Although not suitable for adult sex ratios due to biased samples, spring surveys do provide good indications of calf survival and ultimate recruitment to the population.

The current intensity and coverage of Region 5 fall surveys needs to be continued. Recent survey coverage has been just adequate to provide representative sampling of most parts of the Region. We anticipate greater effort in the Cascade units where survey sample sizes have been low.

Population modeling is dependent on good data input. Due to the variability in our elk units, representative survey data must be collected annually. Pre-season survey intensity needs to remain high, in order to increase sample sizes, reduce confidence intervals, and provide the best model inputs.

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Table 1. Raw Helicopter Survey Data, Sept 2003.

PMU	GMU	Spike	Rag	Mature	Bull	Cow	Calf	Unk	Total	BU:CO	CA:CO	Bull mort
P52	568	0	2	2	4	11	1	0	16	36±8	9±4	N/A
P53	554	7	7	0	14	33	20	9	76	42±8	61±10	50%
P53	558	14	11	4	29	100	48	0	177	29±8	48±12	48%
P54	560	4	5	0	9	76	36	7	128	12±5	47±12	44%
P54	572	2	4	1	7	28	12	0	47	25±7	43±9	29%
P56	520	14	14	3	31	52	24	0	107	60±11	46±9	45%
P56	550	24	11	1	36	61	26	0	123	59±12	43±9	67%
P57	506	11	6	1	18	78	36	1	133	23±7	46±11	61%
P57	530	7	4	1	12	43	23	0	78	28±7	54±11	58%
	524	19	43	16	78	124	53	0	255	63±*	43±*	24%
	556	11	42	3	56	133	70	17	276	42±10	53±12	20%

* Anomaly in population model estimate prohibited confidence interval calculation.

Table 2. Demographic Parameters Combined by PMU, Sept 2003.

PMU	BULL:COW	CALF:COW	BULL MORTALITY	SAMPLE SIZE
P52	36±8	9±4	N/A	16
P53	32±9	51±14	49%	253
P54	15±6	46±13	38%	173
P56	59±14	44±11	57%	230
P57	25±8	49±14	60%	211

Table 3. Historic Survey and Demographic Data from GMUs 524 and 556, 1995-2003.

GMU	YEAR	SPIKE	RAG	MATURE	BULL	COW	CALF	TOTAL	B:CO	CA:CO	BULL MORT
524	2003	19	43	16	78	124	53	255	63±*	43±*	24%
	2002	22	42	19	83	132	77	292	63±5	58±9	26%
	2001	37	38	15	90	153	95	338	59±8	62±8	41%
	2000	39	55	13	107	189	85	381	57±5	45±4	36%
	1999	13	39	11	63	145	44	252	43±8	31±6	21%
	1998	38	37	20	95	193	70	358	49±6	36±5	40%
	1997	35	39	26	100	210	100	410	48±5	48±5	35%
	1996	34	29	27	90	167	75	332	54±6	45±5	38%
	1995	25	28	20	73	128	70	271	57±9	55±9	34%
556	2003	11	42	3	56	133	70	259	42±10	53±12	20%
	2002	24	60	11	85	199	74	369	48±4	37±3	25%
	2001	10	21	12	43	144	65	252	30±7	45±9	23%
	2000	17	27	4	48	140	73	261	34±7	52±10	35%
	1999	5	20	3	28	84	29	141	33±10	35±11	18%
	1998	29	20	7	56	158	52	266	35±7	33±7	52%
	1997	18	17	11	46	131	64	241	35±7	49±10	39%
	1996	25	27	16	68	109	53	230	44±9	49±9	37%
	1995	18	13	9	40	92	47	179	43±11	51±13	45%

* Anomaly in population model estimate prohibited confidence interval calculation.

Table 4. Historic Pooled Demographic Parameters from GMU's 520 and 550, 1995-2003**.**

YEAR	BULL:COW	CALF:COW	BULL MORTALITY	SAMPLE SIZE
2003	59±14	44±11	57%	230
2002	61±4	50±4	52%	415
2001	40±7	48±8	61%	390
2000	46±9	49±10	62%	291
1999	30±10	51±15	38%	143
1998	37±8	33±7	68%	267
1997	26±5	42±7	74%	296
1996	26±9	42±12	70%	151
1995	24±6	54±11	82%	293

Table 5. Historic Demographic Parameters for GMU 530, 1995-2003.

YEAR	BULL:COW	CALF:COW	BULL MORTALITY	SAMPLE SIZE
2003	28±7	54±11	58%	78
2002	53±6	60±6	62%	196
2001	42±18	46±21	64%	261
2000	63±11	54±15	71%	145
1999	36±12	56±17	67%	128
1998	26±10	47±16	50%	107
1997	31±11	39±13	64%	122
1996	21±8	39±12	56%	135
1995	39±12	47±14	50%	134

Table 6. Pooled Survey Data by Geographic Area, 2003.

LOCALE	PMU	SPIKE	RAG	MATURE	BULL	COW	CALF	TOTAL
CASCADES	54	6	9	1	16	104	48	168
LOWLANDS	56+57	56	35	6	97	234	109	440

Table 7. Southwest Washington (Region Five) Elk Harvest for the 2003 General Hunting Season.

WEAPON TYPE	BULL HARVEST	COW HARVEST	TOTAL HARVEST	# HUNTERS	HUNTER SUCCESS	HUNTER DAYS	DAYS/ KILL
M. FIREARM	1,596	140	1736	16,908	0.10	81,264	45.8
ARCHERY	358	394	752	5,689	0.13	39,434	52.4
MUZZLELOADER	264	254	518	5,172	0.10	29,677	57.3
TOTAL	2,218	788	3006	27,769	0.11	150,375	50.0

Table 8. Southwest Washington (Region Five) Elk Harvest for the 2003 General Hunting Season by Population Management Unit (PMU) and Game Management Unit (GMU).

PMU	GMU	BULL HARVEST	COW HARVEST	TOTAL HARVEST	# HUNTERS	HUNTER SUCCESS	HUNTER DAYS	DAYS/ KILL
P51	578	85	134	219	1,710	0.13	9,112	41.6
	588	20	22	42	456	0.09	2,120	50.5
	SUM	105	156	261	2,166	0.12	11,232	43.0
P52	564	46	61	107	693	0.15	3,795	35.5
	568	19	22	41	526	0.08	2,307	56.3
	574	55	52	107	1,190	0.09	5,702	53.3
	SUM	120	135	255	2,409	0.11	11,804	46.3
P53	554	5	0	5	211	0.02	1,098	219.6
	558	168	28	196	1,654	0.12	9,063	46.2
	SUM	173	28	201	1,865	0.11	10,161	50.6
P54	516	97	0	97	1,477	0.07	7,681	79.2
	560	248	38	286	2,891	0.10	16,700	58.4
	572	172	21	193	1,894	0.10	10,089	52.3
	SUM	517	59	576	6,262	0.09	34,470	59.8
P55	510	4	0	4	151	0.03	681	170.3
	513	44	0	44	602	0.07	2,839	64.5
	SUM	48	0	48	753	0.06	3,520	73.3
P56	503	19	30	49	560	0.09	2,837	57.9
	505	34	48	82	1,014	0.08	5,423	66.1
	520	335	101	436	3,046	0.14	17,604	40.4
	550	328	28	356	3,115	0.11	17,123	48.1
	SUM	716	207	923	7,735	0.12	42,987	46.6
P57	501	30	50	80	1,225	0.07	6,296	78.7
	504	41	2	43	430	0.10	2,728	63.4
	506	257	70	327	2,276	0.14	12,618	38.6
	530	211	81	292	2,648	0.11	14,559	49.9
	SUM	539	203	742	6,579	0.11	36,201	48.8

ELK STATUS AND TREND REPORT: REGION 6
PMUs 61-66, GMUs 601-684

H. M. ZAHN, District Wildlife Biologist

Population objectives and guidelines

The year 2003 hunting season was the first of the 2003-2005 three-year season package. Specifically, goals are to increase elk (*Cervus elaphus*) populations in suitable habitat while addressing elk damage complaints. On the Olympic Peninsula long-term management strategies will need to be cooperatively developed and implemented with Olympic Peninsula Treaty Tribes.

Hunting seasons and harvest trends

For the year 2003 hunting season the three-point minimum requirement for antlered elk was retained region-wide. A total of 574 either sex or antlerless-only permits were issued to all user groups including Advanced Hunter Education graduates and Persons of Disability. Only 110 of these permits were issued on the Olympia Peninsula mostly to address elk damage issues in the Dungeness Area and in portions of the Satsop Unit. Harvest estimates, based on mandatory reporting adjusted for non-response bias, project a total region-wide elk harvest of 1,025 elk, down 3 percent over the previous year. The estimate of the number of elk hunters in Region 6 also declined by about 3 percent for the same period.

Harvest estimates of antlered elk by Population Management Units (PMU) are listed in Table 1. Hunting conditions were typical for the area and season with no unusual dry or inclement weather recorded. All harvest estimates are for state hunting seasons only and do not include harvest by treaty tribes.

During the 2003 – 2004 reporting period, meetings between regional personnel and representatives of Olympic Peninsula Tribes continued for the purpose of managing the elk resource of the Olympic Peninsula cooperatively. Periodic technical and policy meetings have taken place with representatives of the Point No Point Treaty Council (Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, Lower Elwha Klallam), Quinault, Hoh, Quileute and Makah Tribes.

Surveys

During the period of September 22 through October 8, 2003 pre-season helicopter elk composition counts were conducted in a number of Game Management Units (GMU).

During these surveys elk are classified as cows, calves, yearling bulls (spikes) and branch-antlered bulls (2.5 years old and older). Table 2 summarizes the results of these surveys by GMU.

During the period of March 31 through April 7, 2004, post-season helicopter elk composition counts were conducted (see Table 3). Post-season surveys have value in estimating over-winter calf survival and hence recruitment into the yearling class. Post-season surveys are not, however, good indicators of adult bull (older than yearling) escapement since adult males do not mix freely with other elk at this time of year. This pertains particularly to the forested areas of coastal Washington. One method of estimating annual bull mortality from all sources is to look at the proportion of yearling males among antlered elk seen during pre-season (fall) surveys. Because of bull elk behavior during the rut it is felt that this results in a conservative estimator of overall annual bull elk mortality rates from all sources. In Region 6 this estimator varies yearly but tends to fall between 40-50 percent total annual mortality rate for antlered elk.

Region-wide the harvest of antlered elk increased to 807 bulls in 2003. This represents an increase of 4 percent over the previous year. Very encouraging is the continued strong showing of GMUs in Pacific County (most of PMU 61). The GMUs comprising PMU 65 include some of the historically best elk areas in Region 6. Antlered elk harvest in this PMU was estimated as 127 bulls, an increase of 41 percent over the previous year.

Population status and trend analysis

Harvest figures of legal bulls taken during the 2003 state elk seasons confirm trends observed in recent years. Thus the bull harvest on the Olympic Peninsula is now above the very low levels observed during the early to mid – 1990's although still below the 1980's levels. This issue continues to be the focus of much of the technical discussions of the cooperative elk management group (WDFW and the Olympic Peninsula Tribes). The Department has continued the moratorium on antlerless harvest on the Olympic Peninsula for the 2003 season except in damage areas. The cooperative elk management group continues to support the antlerless harvest recommendations presented in Table 5.

Harvest information also suggests that elk populations in PMU 61 (mostly Pacific County) continue to be robust and may in fact be increasing.

Habitat condition and trend

Habitat conditions on managed forest lands continue to be generally favorable for elk, although high road densities are detrimental if open to vehicular traffic. Units that sustained large-scale timber harvest during the 1970s (portions of Pacific County) now have large stands of second growth, but we have not documented nutritional stress (due to lack of forage) in those populations. Indeed, there are no indications of unusual winter mortality. Current forest management practices, which favor smaller clear-cuts, will benefit elk.

Management conclusions

The guiding principles of the previous 3-year season package were carried over into the year 2003 elk season. These include a 3-point minimum antler restriction for legal bulls, conservative cow harvest, where possible, and no cow harvest on the Olympic Peninsula during state seasons. We continue to try to address elk damage problems through special permit seasons. Elk calf survival and hence recruitment rates are in line with long-term averages. Unusual winter mortality has not been documented.

Table 1. Antlered elk harvest for the 2003 general elk seasons by PMU.

PMU	Antlered harvest	% change from 1999
61	383	-4
62	89	+31
63	80	-7
64	7	+40
65	127	+41
66	67	-9
67	54	+4

Table 4. Maximum cow harvest levels recommended to tribal policy planners in 2003.

GMU	Max cow harvest
601	6
602	22
603	2
607	15
612	7
615	26
618	11
621	12
Total	101

Table 2. Results of pre-season elk surveys by GMU (Fall 2003)

		Antlerless		Antlered		Ratios per 100 cows		
GMU	*n*	Cows	Calves	Spikes	Branch	Calves	Spikes	Branch
615	120	72	30	10	8	42	14	11
648	71	48	17	3	3	35	6	6
673	139	88	29	8	14	33	9	16

Table 3. Results of post-season elk surveys by GMU (Spring 2004)

		Antlerless		Antlered		Ratios per 100 cows		
GMU	*n*	Cows	Calves	Spikes	Branch	Calves	Spikes	Branch
615	115	79	19	16	1	24	20	1
648	399	285	76	34	4	27	12	1
673	220	149	50	19	2	34	13	1
681	106	70	27	8	1	39	11	1

Mountain Goat

MOUNTAIN GOAT STATUS AND TREND REPORT
Statewide

DONALD A. MARTORELLO, Carnivore, Furbearer, and Special Species Section Manager

Population objectives and guidelines

The population monitoring objective for mountain goat is to monitor population demographics of mountain goats at a level where a 20% decline in population size can be detected within 3-years or less. The corresponding harvest objective is to provide recreational hunting opportunities in individual mountain goat herds where harvest success averages >50% over a 3-year period, while at the same time goat population size remains stable or increasing. Specific guidelines for managing harvest within sustainable limits are discussed in WDFWs Game Management Plan (2003). Key guidelines are to maintain a herd productivity goal of 25 kids:100 adults, only allow harvest in goat population meeting or exceeding 50 total animals, and limit harvest opportunity to 4% of the total population.

Hunting seasons and harvest trends

Mountain goat hunting opportunity in Washington is limited by permit. Permit availability (and therefore hunter opportunity) has decreased dramatically over the last 10 years (Figure 1). Twenty-one permits were available in 10 goat management units in 2003 and a total of 5,484 applicants entered the drawing. The 2003 mountain goat season provided 47 days of mountain goat hunting (September 15 to October 31).

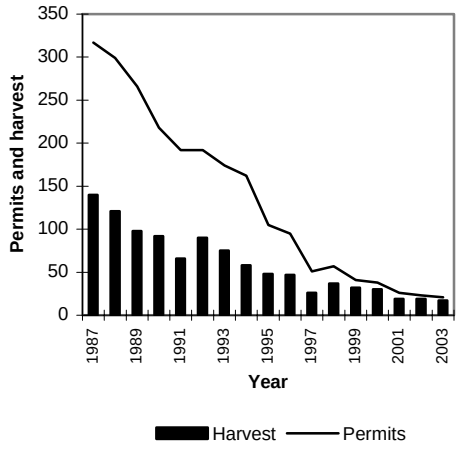

Figure 1. Mountain goat recreational hunting opportunity in Washington.

Hunters were able to use any legal weapon and may harvest any adult goat with horns greater than 4 inches.

Of the 21 permits available in 2003, 20 individuals actually reported that they hunted goats. A total of 17 goats were killed for a hunter success rate of 85%.

Given the marginal status of mountain goats (see **Population status** section), only goat populations that are surveyed annually, and meet or exceed population guidelines described in the Game Management Plan are considered for recreational hunting.

Surveys

For many years, funding limitations greatly reduced the Departments ability to conduct thorough and consistent surveys. However, during the last five years, funding from cooperative grant sources allowed volunteers and Department staff to survey nearly all goat units during 2003 that were open to hunting. All surveys were conducted using a helicopter and generally occurred between July and September. Because the funding level wasn't enough to survey all goat units, (regardless if they're hunted or not) priority was given to hunted units. As such, no consistent survey effort has been accomplished during the last 5 years for most of the goat units closed to hunting. Survey that have been done in closed units were funded and conducted via a research project headed by WDFW.

Population status and trend analysis

Mountain goat populations have been on the decline in Washington for many years. Historically, goat populations may have been as high as 10,000 animals. Today goats likely number fewer than 4,000. Hunting opportunity has decreased accordingly, and current permit levels are extremely conservative and represent 4% on the known population in herds that are stable to increasing. Despite continued reductions in hunting opportunity many local goat populations continue to decline. However, despite the overall declining trend in goat numbers and range, a few populations are doing well. Goat populations alone the lower Cascade crest and the north shore of Lake Chelan appear to be stable to slightly increasing.

Habitat condition and trend

Fire suppression policies and natural forest succession continues to degrade critical mountain goat foraging habitat. Fire suppression allows conifers to

invade these natural openings and decreases their foraging value for goats. The degradation and loss of alpine meadows, coupled with increasing recreational human use and disturbance of alpine habitat are likely the two greatest negative impacts to mountain goats.

Management conclusions

In terms of goat management, the two biggest obstacles are the lack of biological information on individual goat herds and a consistent funding base to assess the status of goats. To address the biological data need, a new goat research project was initiated during the summer of 2002. The objectives of the project are to identify the cause of the goat decline in Washington, provide recommendations for reversing that decline, and develop a robust survey method for assessing goat populations in the future.

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 1
Linton Mountain

DANA L. BASE, Associate Wildlife Biologist
STEVE ZENDER, District Wildlife Biologist

Population Objectives/Guidelines

The current population objective for the Linton Mountain Goat Herd is to maintain a viable population for public viewing. The Linton Mountain area received national recognition when the U.S. Forest Service recognized the Sullivan Lake District of the Colville National Forest with an award for developing a public mountain goat viewing area. The area was developed in partnership with the Washington Department of Fish and Wildlife, local industry, and the Inland Northwest Wildlife Council.

Hunting Seasons And Harvest Trends

Mountain goats at Linton Mountain were hunted from 1972–1976. The number of permits authorized annually ranged from 5 to 15 and animals harvested ranged from 4 to 11. Hunters took a total of 34 mountain goats over the 5-year period, with mostly nannies harvested. Hunting has not resumed at Linton Mountain since 1976, as the goat population has not consistently met Department guidelines for recreational hunting.

Surveys

Surveys of the Linton Mountain Goat Herd are generally accomplished by ground-based counts. Excellent views of nearly the entire goat range are afforded by vantage points along Boundary Road near the town of Metaline Falls. Additional vantage points are on a primitive road that services a high voltage power line with a wide right-of-way clearing parallel to the goat cliffs. Surveys seem to be most productive when conducted either early or late in the day. In recent years the counts have been so low that multiple visits have become necessary to improve the likelihood of seeing any goats.

Mountain goats have been observed only intermittently at Linton Mountain since the year 2000. The most recent observation of mountain goats by agency personnel at Linton Mountain was of 1 unclassified adult mountain goat on September 25, 2003. In addition D. MacArthur (pers. comm. 2003), a USFS seasonal employee and WDFW volunteer who lives near the goat cliffs, reported observing 3 mountain goats on May 3, 2003, 1 on July 22, 2003, and 2 in early October of 2002.

Population Status And Trend Analysis

So far as we know, mountain goats did not occupy Linton Mountain since Euro-American settlement until 7 animals were released there by the Washington Department of Game in 1965. The original herd came from Nason Ridge in Chelan County and consisted of 2 billies, 4 nannies, and 1 female kid. Other transplants of mountain goats into Pend Oreille County were also made by the Department of Game in the early 1960s. These included 5 nannies along with 2 billies to Dry Canyon in 1962 and 4 nannies along with 2 billies to Monumental and Molybdinite Mountains in 1964. Only the Linton Mountain introduction, however, resulted in a significant goat population.

In the 40 + years since the original transplants, a few observations of individual goats have been documented in small, rocky cliff areas in a few places outside of Linton Mountain. The most recent of these was 1 goat observed at Dry Canyon on August 12, 2004. There is no evidence, however, of any reproducing mountain goat population anywhere in northeastern Washington outside of Linton Mountain.

In 1981, 11 mountain goats from the Olympic Mountains were trans-located to Hooknose Mountain, which is roughly 5 miles north of Linton Mountain. At least 3 of these 11 including 2 billies and 1 nanny, were subsequently found at Linton Mountain.

Since the mid 1990s the mountain goat population at Linton Mountain has become perilously low and unproductive (Table 1). Reasons may include poor habitat conditions, the severe winters of 1992-93 as well as 1996-97, and predation.

Habitat Condition And Trend

No recent comprehensive surveys of mountain goat habitat have been made at Linton Mountain. Both quantity and quality of forage along with predator escape terrain may be limiting factors to goat population growth. Controlled burns may be a strategy to enhance goat habitats in the area. The Sullivan Lake Ranger District has developed a controlled burn plan for the area but has thus far not implemented it. The long-term goal continues to be to improve foraging habitat on Linton Mountain, but the few goats remaining there now are likely not limited by forage quantity.

Table 1. Status of Linton Mtn. mountain goat herd, 1965-2003.

Year	Kids	Adults	Population Estimate	Kids per 100 adults
1965 [a]	1	6	7	17
1966	B	b	7	b
1967	B	b	9	b
1968	B	b	11	b
1969	B	b	14	b
1970	B	b	18	b
1971	8	b	23	b
1972 [c]	8	b	32	b
1973 [c]	B	b	32	b
1974 [c]	B	b	35	b
1975 [c]	B	b	33	b
1976 [c]	4	b	34	b
1977	B	b	b	b
1978	B	b	b	b
1979	B	b	b	b
1980	B	b	b	b
1981	B	b	b	b
1982 [d]	5	8	20	62
1983	3	12	25	25
1884	1	10	25	10
1985	6	12	25	50
1986	7	25	35	28
1987	6	21	35	29
1988	7	24	40	29
1989	6	20	40	30
1990	1	9	40	11
1991	1	13	25	8
1992	7	26	33+	27
1993	4	16	20+	25
1994	3	13	16+	23
1995	0	18	18+	0
1996	0	9	10-20	0
1997	1	9	10	11
1998	0	5	5+	0
1999	0	6	6	0
2000	1	3	4+	33
2001	1	4	5+	25
2002	0	2	2+	0
2003	0	3	3+	0

[a] Year that 7 Mountain Goats were translocated from Chelan County to Linton Mountain.
[b] No survey data available.
[c] Years that herd was hunted by special permit.
[d] Year that 3 marked Mountain Goats were identified at Linton Mountain that came from failed release of 11 animals at Hooknose Mountain in 1981.

Augmentation

There is currently no source of mountain goats available for augmenting the Linton Mountain population. As the pool of breeding animals is apparently dying out since the population peak around 1989, a new introduction is likely necessary to keep the herd viable.

Management Conclusions

At present, there are too few goats remaining in the Linton Mountain Goat Herd to provide a reliable viewing opportunity. The population appears to be perilously near extirpation. While opportunities for augmentation are not on the immediate horizon, augmentation will likely be needed to re-establish this goat-viewing site.

Personnel will continue occasional ground-based surveys to document any animals that are present. Since surveys are labor intensive, qualified survey volunteers who possess necessary optical equipment will be enlisted whenever possible.

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 2
Methow Unit 2-2

SCOTT FITKIN, District Wildlife Biologist
JEFF HEINLEN, Field Biologist

Population Objectives/guidelines

Currently, the Methow unit is being managed for conservative, sustainable yield, with the goal of increasing herd size and distribution where possible. In addition to hunting recreation, watchable wildlife opportunities, such as the salt lick along the Hart's Pass Road, are encouraged.

Hunting Seasons And Harvest Trends

Hunters enjoyed fair conditions; the high country remained accessible throughout much of the season in 2003, but the landscape was very dry and the weather quite mild. Two permits were issued for the Methow Unit (Table 1). Permit holder's harvested two goats in 2003 season. On average hunters saw 31 goats apiece, including several kids. For 2004, WDFW again issued two permits in the Methow Unit.

Table 1. Summary of harvest information for mountain goats in the Methow Unit.

Year	Permits	Hunters	Harvest	Success	Goats Seen/Hunter
1991	5	5	4	80%	--
1992	5	5	5	100%	21
1993	8	8	7	88%	31
1994	8	7	6	86%	26
1995	8	8	8	100%	31
1996	8	8	5	63%	8
1997	5	5	4	80%	20
1998	5	5	3	60%	22
1999	5	5	4	80%	32
2000	5	5	5	100%	23
2001	2	2	0	0%	11
2002	2	2	1	50%	26
2003	2	2	2	100%	31

Surveys

Annual surveys are conducted to determine minimum population size and herd productivity. This data is used to generate hunting permit allocations in accordance with statewide management guidelines. Surveys during the summer of 2004 yielded a count of 82 animals, the highest annual count in the last 11 years. The luxury of two survey replicates, including a mid-July flight probably enhanced sightability. Unfortunately, productivity has been down in recent years, likely the result of drought conditions (Table 2).

In 2002, WDFW extended an ongoing goat research project to the Methow Unit. Two mountain goats are now radio-marked in Goat Unit 2-2 and valuable information on seasonal movements and habitat use is being collected. These animals are part of a larger effort to assess population parameters and mortality factors. Another objective is to identify sightability biases and improve survey protocols.

Population Status And Trend Analysis

Stable funding has allowed for a consistent survey effort in the Methow Unit for several years. The population appears to be relatively stable. Marginal productivity in recent years may be the result of sustained drought conditions and advancing successional change since the last major fire in the Mt Gardner portion of the unit. It is hoped that this year's abundant summer moisture and new growth following last year's Needles fire will boost productivity in 2005.

Incidental observations outside of traditional hunting units suggest small numbers of goats are persisting in pockets scattered throughout suitable habitat in the Okanogan District. Little survey work has been done in these areas due to lack of resources. Population size or trend is unknown for these animals; however, anecdotal information from outfitters and others suggests no major changes in abundance or distribution.

Habitat Condition And Trend

All goats in the Okanogan District enjoyed mild conditions last winter. Winter mortality should not have been a significant factor.

Goat habitat is almost entirely within secured areas and habitat availability remains stable. Habitat quality varies noticeably throughout goat range in the Okanogan District. For instance, in areas of recent fire activity, goats benefit from favorable foraging conditions. On the other hand, range quality in heavily forested areas suffers from fire suppression, and could benefit from some pro-active fire management.

Much of the district's goat habitat is in wilderness areas. Thus, changes in habitat quality will occur primarily through natural stochastic events such as wildfires and avalanches, rather than human intervention. Wildfires burned over 20,000 acres of goat habitat in the Methow Unit in 2003. This should stimulate early successional forage, which may in turn improve goat productivity.

Management Conclusions

The management objective of harvesting no more than four percent of a herd hinges on reliable survey data. As a result, emphasis should remain on providing the resources necessary for a consistent survey effort. Sightability of the animals can be quite variable in portions of the unit. Current research to develop a sightability index will produce more accurate and dependable survey results.

Goat populations in the Methow Unit are the most robust in the district, but require diligent scrutiny, due to continued low productivity. Suitable goat habitat adjacent to this unit is sparsely populated and could likely support many more animals than exist currently. In light of these conditions, a conservative harvest strategy in the Methow Unit should continue. Hopefully, the recent fires will reverse these trends. If in practice, the Methow herd grows but exhibits little dispersal, animals could be actively relocated to other suitable areas in the county.

Table 2. Population composition counts from the Methow Unit. K:100 A is kids per 100 adults.

Year	Kids	Yearling	Adults	Minimum Population	K:100 A
1994	6	--	25	31	24:100
1995	--	--	--	--	--
1996	16	--	41	57	39:100
1997	20	--	49	69	41:100
1998	--	--	--	--	44:100
1999	--	--	--	--	--
2000	11	--	36	47	31:100
2001	10	--	50	60	20:100
2002	19	--	61	80	31:100
2003	8	--	45	53	18:100
2004	13	17	52	82	*25:100

*Starting in 2004 adults and yearlings were classified separately. Prior to 2004 yearlings were classified as adults. Therefore, the ratio K:100 has changed to exclude yearlings starting in 2004.

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 2
Chelan County

TOM MCCALL, Wildlife Biologist
BEAU PATTERSON, District Wildlife Biologist

Population objectives and guidelines

The management objective for Chelan County mountain goats is to maintain self-sustaining goat populations in historic ranges and recreational hunting opportunities. The herd productivity goal is 25 kids: 100 adults, and harvest opportunity is only considered for stable or increasing populations exceeding 50 adults and meeting the productivity goal. For goat populations meeting or exceeding these guidelines, harvest is limited to 4% of the observed adult population.

Hunting Seasons and Harvest Trends

Until 2001, no goat harvest had occurred in Chelan County in over 20 years. In 2001, 2 permits were authorized for the north shore of Lake Chelan, and 2 male goats were harvested (Table 1). One permit was authorized for each of the 2002 and 2003 seasons but no goats were harvested. One permit was authorized for 2004.

Surveys

Two survey methods have been used to monitor mountain goat populations in Chelan County, in addition to incidental observations. As part of a hydropower relicense agreement, the Chelan Public Utility District (PUD) annually completes 12 winter wildlife surveys by boat on Lake Chelan (Chelan County's largest contiguous mountain goat habitat). For Lake Chelan, the total number of known goats is the result of comparing all surveys completed during each winter. This is the only consistently collected, long-term data for Chelan County goats.

In other areas of Chelan County, helicopter surveys have been used in recent years in selected mountain goat areas. Because of difficult terrain and low population densities, mountain goats are expensive to monitor. Population objectives have been established for each geographic mountain goat area within the Wenatchee District, but are rarely attained (Table 2).

Population Status And Trend Analysis

Mountain goat populations in Chelan County appear to be below historic levels of the 1960s to 1980s. Except for the Lake Chelan population, mountain goats are not monitored closely enough in Chelan County to document population trends. Based on limited surveys since 1996, the Chelan County goat population appears stable to declining (Table 2). Goat numbers and distribution may have been profoundly affected by the 2001 Rex Creek fire. In 1998, the Cascade Mountains received more snow than any year since 1956. Some areas set all-time records for snow pack. These heavy snows probably increased mortality of goats. The winters of 1999-2002 were milder.

In July 2004, two adult nannies were collared in the District, as part of a statewide goat research project. One nanny was collared on Nason Ridge and one in the headwaters of Graham Harbor Creek on the south shore of Lake Chelan. Between July-September, the Nason Ridge goat has spent all of her time on the Ridge. Location information is not currently available for the Graham Harbor nanny. Two other nannies that were collared on Gamma Ridge on Glacier Peak have since traveled 10-12 miles east to the south shore of Lake Chelan. In September, one was near Pinnacle Peak and the other near Bonanza Peak.

The current Lake Chelan goat population is considerably less than the estimated 500 goats in the area in the 1960s. The Lake Chelan populations have been closely monitored for the past 20 years. There is no apparent trend in this population since 1994 (Table 3). Kid:adult ratios are below productivity goals, averaging 20:100 since 1994. The kid:adult ratio in 2003 was 24:100, compared to the average of 20 kids observed per year between 1994-2003.

In fall 2001, the Chiwawa and East Stevens areas were surveyed by helicopter. Twelve adult goats were observed in the Chiwawa area and 1 adult goat in the East Stevens area. The lack of kids in these areas in 2001 is of concern. The drought conditions in summer 2001 may have reduced kid survival. In fall-2003, incidental observations of goats by WDFW personnel yielded 19 goats in the Chiwawa unit (8-9 kids, 8-10 adults including 2 large males). Eighteen goats (7 kids, 11 adults including 1 male) were also counted in the East Stevens area on Nason Ridge during winter-2003.

In fall 2000, the North Wenatchee River area was surveyed intensively by helicopter and from the ground. During the survey 35 goats (25 adults, 10 kids) were counted. During summer 2001, the Rex Creek fire on the north shore of Lake Chelan burned over 40,000 acres, including approximately 50% of the goat winter range. This fire profoundly changed nearly all goat winter range on the north shore, and may

Table 1. Summary of harvest information for mountain goats for north Lake Chelan.

Year	Permits	Hunters	Harvest	Success	Goats seen/hunter	Days hunted	Average days/kill
2001	2	2	2	100	24	6	3
2002	1	1	0	0	0	20	--
2003	1	1	0	0	12	8	--
2004	1	1	NA	NA	NA	NA	NA

Table 2. Mountain goat surveys in Chelan County, 1996-2002.

Area[a]	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	Population objective
N. Lake Chelan	42	80	64	58	68	44	71	100
S. Lake Chelan	13	44	41	40	31	28	39	50
Stehiekin	4		5		6	2		25
Chiwawa	14	15				12	19	30
N. Wenatchee River	42	6	27		35			30
E. Stevens	33	14	13			1	18	30
Total	123	163	150	98	140	87	147	265

[a] Chiwawa = Chelan County north of Little Wenatchee River, east of Cascade Crest; East Stevens = North of highway 2, south of Little Wenatchee River (Nason Ridge); North Wenatchee River = West of highway 97, north Chelan/Kittitas county line, east of Cascade Crest, south of highway 2.

impact this population; whether positively or negatively remains to be seen.

Habitat Condition And Trend

Fire suppression during the last 50 years has probably decreased habitat for mountain goats in Chelan County. Most mountain goat habitat is within wilderness areas and is managed by Wenatchee National Forest. Wilderness designation precludes most forms of habitat management. A let-burn policy is currently in place for wilderness areas on the Wenatchee National Forest, except where it threatens homes, so habitat changes will probably occur slowly. Goat habitat conditions are expected to gradually improve as a result of this policy.

Management Conclusions

Mountain goat populations in Chelan County are below historic and objective levels. Population trends in areas besides Lake Chelan, which are surveyed by Chelan PUD, cannot be effectively monitored without additional survey resources. Based on the PUD data set, kid production is below objectives.

Table 3. Mountain goat population composition for Lake Chelan, Chelan County, 1994-2003.

Year	No. kids	No. adults	Unk.	Total Count	Kids:100 adults
1994	25	98		123	26
1995	12	109		121	11
1996	7	47		54	15
1997	18	105		123	17
1998	17	93		110	18
1999	19	79		98	24
2000	24	76	5	100	32
2001	14	60		74	23
2002	21	89		110	24
2003	25	103		128	24
Average	18	96		104	20

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 2
Goat Units: 3-6/4-38, 3-7, 3-10, 3-11

JEFFREY A. BERNATOWICZ, District Wildlife Biologist

Population Objectives/guidelines

The statewide goals for Mountain Goats are:

- Preserve, protect, perpetuate, and manage mountain goats and their habitats to ensure healthy, productive populations.
- Manage mountain goats for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing and photography.
- Enhance mountain goat populations and manage for sustained yield.
- For populations to be hunted, a minimum of 50 goats and 25 kids:100 non-kids over a 3-year period.
- Harvest should not exceed 4% of a stable population.

Hunting Seasons And Harvest Trends

Mountain Goat season is open only to hunters drawing a special permit. In 2003, there were 6 permits spread over the 4 units (Table 1). The raffle permit holder also hunted the region. All permit holders were successful.

Surveys

Table 1 show survey results for Goat units that are presently open for hunting. Historically goat surveys were conducted in June and/or September. September surveys tended to yield the higher counts, but conflict with other surveys and hunting seasons. Years with the lowest counts were typically June surveys. In 2003, all surveys were flown in July.

Population Status And Trend Analysis

The status of mountain goat populations is difficult to determine. Surveys techniques have not been tested for accuracy or precision. Survey timing, area and technique within the region has not been consistent enough to allow for meaningful trend analysis. The visibility of goats is an unknown. The data suggests individual groups are often missed on some surveys. At present we look at the trends from the available data and interviews with hunters, guides, and others people knowledgeable on goats.

All goat populations in the Region appear to have declined. There is strong indication that most populations have been over-harvested historically. Recent research suggests harvesting no more than 4% of the adult population. Harvest in the Bumping from 1990-96 average over 6 goats. A similar harvest was evident in the 1980's. A population of 150 adult goats would have been needed to support the harvest, yet recent surveys have never documented more than 66 adult goats in the Bumping. Approximately 15-20 goats are commonly found on Timber Wolf Mountain, which is closed to hunting. Since 1997, harvest has been more conservative and the population may be recovering. The total population in the survey area is estimated at approximately 100 goats.

Historically, the Naches and Corral Pass areas were managed as different units even though large numbers of goats were observed near the boundary. Corral Pass was rarely surveyed as a unit and Naches Pass surveys frequently included goats on the Corral Pass side. A sustainable harvest in Naches/Corral Pass during the 1990's would have required an adult population of at least 200; the current estimate is less than 70. Harvest has likely impacted the population and only recently been reduced.

Blazed ridge was historically included with Naches Pass as a unit. In 1996, permits were used for the new Blazed Ridge unit. Over-harvested was likely from 1998-2000. Historic records indicate it was not unusual to issue 40 permits for the area. The high count in 1997 was due to a large group of goats that was possibly passing through the unit, as they have not been seen since. Recent surveys have not documented more than 66 adult animals.

Kachess Ridge was historically surveyed with Davis and Goat peak units. Thirty-two goats were taken from the area from 1975-81, which is more adults than have been seen in the last 10 years. Surveys had continued to count Davis and Goat Peaks in with Kachess goats. Even with the extra survey area, there have not been enough goats to justify a hunt. The current population is probably less than 40 animals.

Habitat Condition And Trend

The majority of goats in the Bumping, Tieton and Naches Pass summer in Wilderness Areas where short-term habitat is mostly influenced by weather cycles. However, the fire suppression has probably reduced open meadow habitat in wilderness areas. Recreational use could also be influencing use of available habitat. There is no comprehensive documentation of where the Wilderness goats winter. Outside the wilderness, timber harvest and road building could impact habitat.

The Blazed Ridge and Kachess Units are mostly

outside of wilderness areas. Timber harvest has/is occurring in both units. The north portion of the Blazed ridge unit has been particularly heavily harvested. The timber cutting has probably improved summer habitat, but may have removed winter cover. Roads densities have also increased. There are often roads at the top and bottom of every ridge. ORV and general recreation is heavy in the Blazed Ridge Unit.

It is unknown how goats react to roads and human activity, which have increased with Washington's population. Major highways like I-90 have probably limited movements between herds over time. Smaller highways and development like ski areas could also limit movement and use of areas. This may limit re-colonization and recovery of some areas.

Management Conclusions

Goat populations in Region 3 have probably declined over historical levels. Over-harvest appears to be a major factor. Harvest has only recently reduced. Recovery may take decades. Determining if the current population level and if it is stable and healthy is difficult. Future harvest should be conservative with no permits unless the unit is surveyed. Ideally, goats should be radioed to determine movements, population size, and critical habitat such as winter range.

Boundaries of existing herds need to be reviewed to determine realistic "populations". Current resources for surveys are limited. Options for collecting better quality data need to be explored.

Table 1. Summary of harvest and survey information for Region 3 goat units.

		Harvest Information				Survey Data			
Unit	Year	Permits	Hunters	Harvest	Goats seen/Hunter	Kids	Adults	Total	K:100
Bumping	1990	15	14	11	14	--	--	--	--
	1991	10	9	7	17	5	12	17	42
	1992	10	10	9	19	12	66	78	18
	1993	6	6	5	17	7	43	50	16
	1994	6	5	4	16	5	35	40	14
	1995	2	2	2	49	3	30	35	17
	1996	6	5	5	28	20	39	59	51
	1997	1	1	1	15	12	49	61	25
	1998	2	2	2	15	--	--	--	--
	1999	2	2	2	60	--	--	--	--
	2000	2	1	1	8	7	22	39	32
	2001	2	2	2	185	14	46	60	30
	2002	2	2	2	78	25	52	77	48
	2003	2	2	2	32	24	59	83	41
	2004	2	--	--	--	16	39	55	41
Nachess Pass	1989	9	7	4	30	24	94	118	26
Corral Pass	1990	12	>7	>7	65	--	--	--	--
	1991	12	8	6	31	10	42	52	24
	1992	12	10	9	53	11	86	97	13
	1993	14	12	11	28	5	18	23	28
	1994	14	11	9	28	13	27	40	48
	1995	5	3	2	35	9	78	87	12
	1996	14	11	9	32	23	58	81	40
	1997	5	5	5	14	10	55	65	18
	1998	7	7	7	22	--	--	--	--
	1999	5	5	5	34	--	--	--	--
	2000	5	5	5	22	21	48	69	44
	2001	5	4	4	20	3	18	21	17
	2002	4	3	4	28	18	41	59	44
	2003	3	3	3	16	12 (18)	22 (62)	36 (80)	55 (29)
	2004	2	--	--	--	21	61	82	34
Blazed Ridge	1991	--	--	--		9	22	31	41
	1996	3	2	1	31	27	57	79	47
	1997	1	1	1	83	40	99	139	40
	1998	6	6	6	20	--	--	--	--
	1999	6	6	6	27	--	--	--	--
	2000	6	6	5	49	18	43	61	42
	2001	2	*3	*2	*55	13	40	53	32
	2002	1	1	1	18	15	40	55	37
	2003	1	*2	*2	*19	27	66	93	29
	2004	1	--	--	--	17	63	80	27
Kaches Ridge	1991	--	--	--	--	21	39	60	54
	1992	--	--	--	--	7	18	25	39
	1993	--	--	--	--	14	44	58	32
	1996	1	1	1	40	11	25	36	44
	1997	1	1	1	20	1	5	6	20
	1998	1	1	1	40	--	--	--	--
	1999	1	1	1	20	--	--	--	--
	2000	1	1	1	8	5	32	37	16
	2001	1	1	1	24	6	22	28	27
	2002	1	1	1	77	6	18	24	33
	2004	0	--	--	--	8	18	26	44

( ) indicates Sept survey; no data for Blased Ridge 1992-95 or Kaches Ridge 1994, 1995, 2003

* Includes raffle permit hunter

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 4 GOAT UNITS 4-1 – 4-13

MIIKE DAVISON, District Wildlife Biologist

Population Objectives/guidelines

The management objectives for mountain goat units in north Region 4 are to maintain stable populations in all units for public viewing and harvest opportunities. Harvest levels are set at 4% of recognized sub-populations throughout individual goat management units (Hebert and Turnbull, 1977).

Hunting Seasons And Harvest Trends

The history of mountain goat hunting seasons and associated harvest trends demonstrates a severe decline in both areas throughout north Region 4 (Whatcom & Skagit counties). Hunting seasons have dramatically declined since the earliest mountain goat season format in 1897 when Washington State hunters were allowed two goats per person in a three month season. The typical season format for mountain goats in north Region 4 during the 1980's was 47 days (late September through October). In Whatcom and Skagit counties, the mountain goat range was divided into six geographic areas (Goat Management Units) with a total of 72 harvest permits issued (70 rifle, 2 archery). In 1986 mountain goat units were re-designated to more adequately reflect the geographical distribution of discrete sub-herds and to allow WDFW better management control over harvest distribution. Goat management units increased from 6 to 14 in north Region 4. Permit numbers in 1986 were 63 for the 14 new units. Harvest in these units totaled 16 goats in 1986. By 1996, all but two of the GMU's were closed to hunting (GMU's 4-8 –East Ross Lake, 4-9 – Jack Mountain). A total of 12 permits resulted in the harvest of 5 mountain goats within the two units during the 1996 season. All of the original 14 goat management units were closed to hunting in 2002.

Surveys

On September 22, 2003 an aerial mountain goat survey was flown in the Mt. Baker/Loomis Mountain areas of Whatcom and Skagit counties. This was a cooperative survey effort involving WDFW, National Parks Service, U.S.F.S., and the N.W. Tribal Comission. A Hughes 500-D helicopter was used to fly the survey area. The survey route(s) were similar to previous years surveys but do vary slightly in response to weather and habitat changes. A total of 126 goats were classified (92 Adults, 34 Kids). This represents a 27.0 percent kid composition and reflects a 52% increase from the 17.7% kids observed on the previous years survey. Elevations and Lat/Long locations of mountain goats observed on this survey were documented utilizing on board GPS and altimeter instruments. The elevation range of goats observed was between 4,800 – 6,800 feet (Mean = 5,685 feet).

The Department of Fish and Wildlife initiated a mountain goat research project in 2002 that included cooperators such as the U.S. Forest Service, the National Parks Service, the Sauk-Suiattle Tribe, the Stilliguamish Tribe and Western Washington University. The long-term objective of this project was "to assess the magnitude, extent, and causes for the reported declines in mountain goat populations in Washington. A total of 32 mountain goats were captured and fitted with GPS radio collars in both the north and south cascade regions. A total of 12 collars were placed on goats in the Mt. Baker/ Mt. Shuksan areas of Whatcom county. Preliminary findings outlined in a December 10, 2003 Progress Report (Mountain Goat Research in the Washington Cascade Mountains, by Cliff Rice) indicate the following:

1) Older male goats (age >4 years) move relatively little during the fall.
2) Younger males (ages 2-4 years) appear to exhibit large movements as compared to older males.
3) Adult females demonstrate a higher degree of movement in higher extensive habitat range areas than those in isolated habitats.

Additional information regarding the overall physiological condition of mountain goats in the cascade range indicates that rump fat levels were found to be low in the small number of animals checked. Blood serum samples collected from 21 goats in 2003 all tested positive for one or more serovars of Leptosporosis. According to Cliff Rice (pers. Comm.), Leptosporosis affects both humans and other animals and varies in the severity of its affects, but can cause abortion in domestic animals and liver damage, kidney failure and internal bleeding in humans.

Population Status And Trend Analysis

The status of mountain goat populations in north Region 4 GMU's is not well documented. The majority of historical information regarding goat numbers and distribution have been derived from harvest report cards and questionnaires returned by

permitted hunters. Goat management units 4-2, 4-3, 4-4 and 4-5 collectively encompass the Mt. Baker range in Whatcom and Skagit Counties. Harvest in these units during the period 1969-85 totaled 121 animals with an average harvest of 13 goats per season. For the period 1986-95, harvest totaled 26 animals with a 6 goat per season average. By 1996, all of the Mt. Baker GMU's were closed to hunting due to declines in harvest and goats reported by permit hunters.

An aerial survey of the Mt. Baker GMU's was conducted in 1996. That survey documented 61 animals (an average of 8.7 goats per unit). A similar survey completed in 2000 covering 80% of the range documented 88 animals (an average of 17.6 goats per unit). The most recent survey in this area was completed in October, 2001. This survey covered 100% of the Mt. Baker range and documented a total of 121 (an average of 24.2 goats per unit). These survey data indicate a 178% increase in the average goats seen per unit in 2001 as compared to the 1996 survey.

It is likely that the 133 goats observed in the Mt. Shuksan area (2002) and the 121 goats observed in the Mt. Baker goat management units (2001) reflect population densities that are among the highest in the state of Washington. However, it should be noted that the remaining goat management units in north Region 4 indicate the presence of only remnant populations of mountain goats or have no current survey data available for population assessment.

Habitat Condition and Trend

No recent habitat analysis or formulated population surveys have been conducted to quantitatively define current habitat condition or population trends. Road and hiking trail development continues to encroach upon existing habitat and is projected to further expand the influences of increased human disturbance throughout mountain goat ranges in Whatcom and Skagit counties.

Management Conclusions/Recommendations

It is anticipated that considerable new information regarding the habitat utilization patterns of north Cascades mountain goats will emerge from the ongoing research initiated in 2002. An enhanced understanding of habitat use will enable managers to better regulate the perceived conflicts between recreational activities and mountain goats on critical winter and summer ranges.

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MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 5
Goat Rocks, Smith Creek, Tatoosh

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Population Objectives/guidelines

Mountain goats (*Oreamnos americanus*) are prized in Washington as both a game animal and for viewing purposes. Region 5 of the Washington Department of Fish and Wildlife (WDFW) has three mountain goat population management units; Tatoosh (Goat Unit 5-2), Smith Creek (Goat Unit 5-3), and Goat Rocks (Goat Unit 5-4). In 2003 the management of the Goat Unit Tieton River 3-9 was combined with the Goat Rocks unit. Hunting in all three units is allowed by permit only. Current population goals for these three areas are to maintain or expand current population levels. A productivity goal of 20-25 kids per 100 adults is applied to these populations. Legal harvest levels are designed to limit harvest to 4% or less of the population.

Hunting Seasons And Harvest Trends

Since 1997, all three units in Region 5 have been open to any legal weapon. Prior to 1997, Smith Creek Unit was an archery-only unit. Harvest quotas were more conservative in 2002: Smith Creek, 1; Tatoosh, 3; and Goat Rocks-Tieton River, 6.

Hunting seasons in all three units have traditionally been the last two weeks of September and the entire month of October. Since 2002 the season has opened on 1 September for archery-only hunting. Firearm hunting was allowed from 15 September-31 October. The bag limit was one goat per permit, of either sex, with horns longer than 4 inches. Hunting pressure in each unit is limited by the conservative nature of the permit allocations.

Harvest trends, hunter success rates, and hunter survey returns indicate variable mountain goat population levels in the three units. Aerial surveys conducted by WDFW/USFS indicate that mountain goat populations in the Goat Rocks Unit and Tatoosh unit may be declining (See Surveys below). Prior concern over low recruitment or increasing adult mortality in the Goat Rocks Unit led to a reduction in permits from 10 to 7 in 1998 and from 7 to 3 in 2001. The permit levels for Goat Rocks were combined with Tieton River for 2003. Concerns over lower hunter success combined with habitat loss in the Smith Creek Unit supported the decision to reduce the permits in this unit from 3 to 1 in 2001.

Weather conditions in 2003 were moderate for goat hunting. Periods of warm dry weather during the early weeks of September made hunting difficult, particularly for those hunters in the Tatoosh Unit. The majority of animals in Tatoosh available for harvest migrate out of Rainier National Park with the onset of snow at the higher elevations. Warm weather tends to delay this movement. Weather conditions moderated as September progressed, and cooler weather prevailed during most of October

Overall, hunter success in 2003 was slightly up from the previous two years (Table 1). Historically, success rates in the Goat Rocks Unit approach 100%. This was the case in 2003. This unit contains extensive, high quality habitat, has the highest goat numbers, and is comprised of resident animals. Success rates in Goat Rocks since 1993 appear stable.

Since 1993 success rates in Tatoosh have also been increasing. Goat sightings per hunter are mixed though many sightings are from areas north of the hunt unit boundary, in Mount Rainier National Park.

Goat hunting was initiated in the Smith Creek Unit in 1993, following augmentation and recovery of the population. The endemic goat population was nearly extirpated due to over-exploitation facilitated by easy hunter access and the patchy distribution and lower quality of goat habitat in the unit. In 1993 hunting was archery-only. Permit allocation was conservative (n=3) for the first couple of years of hunting. Overall harvest was acceptably low and population response was favorable. Subsequently, permits were increased to 5 in 1995. The change in 1997 to any weapon resulted in a return to 3 permits. The number of goats seen, however, has been declining. As a result, in 2001 the permit number was decreased to one.

Surveys

From 1993-97 surveys were concentrated in the Smith Creek Unit. A cooperative project between the Gifford Pinchot National Forest-Cowlitz River District and WDFW allowed for the use of helicopter surveys in Smith Creek. The results of those surveys indicated that the conservative permit allocations in the unit were sustainable. Currently, survey results may indicate that the population is stabilizing at a low level, and may be in decline (See Table 2).

A question arises from these aerial count results. What is the level of sightability bias associated with the surveys? Sightabilty is the estimate of the proportion of the total population that is observed during a survey. Previous studies have attributed estimates of sightabilty ranging from 59% (Brent 1960) to 75% (Adams and Bailey 1982) of the total population. Houston et al. (1986) determined sightabilty bias estimates of 0.66 for helicopter surveys in the Olympic National Park. In open habitats, such as Goat Rocks, aerial surveys are likely observing upwards of 60% of the total population. In more timbered areas, such as Smith Creek, the percentage is likely lower than that reported by Brent (1960).

Another confounding factor, at least in the Goat Rocks, is the amount of mixing that occurs across the administrative boundary of the Goat Rocks and Tieton hunt units. The boundary is the Cascade Crest Trail. Most goats observed in the Goat Rocks, at least, are found within 5 miles of the Crest.

Recently, concern has been voiced about the possibility of double-counting animals in the surveys which take place in each unit. Previously, flights for the two units were not coordinated, and goats observed on the Goat Rocks side in one survey could have been on the other side of the administrative boundary when the Tieton survey was conducted. Thus, population estimates for each unit may have been exaggerated. A joint survey of the Tieton and Goat Rocks took place in 2001. Results indicate that the goats do move east and west of the Cascade crest. Therefore, the permit level of 6 for both units combined reflects the concerns of population decline and survey over-estimation.

Population Status And Trend Analysis

Goat populations in Tatoosh seem to be low. In the surveys during 2002 and 2003 all the goats observed were in the National Park. Permit reductions may be adopted to encourage goats to expand their range to areas outside the park.

The number of goats seen by hunters,have been declining in Smith Creek. There were no survey data for the Smith Creek Unit in 2001 due to poor weather conditions and concerns over safety.

The 2003 survey numbers were much higher than the past few years Goat Rocks/Tieton. Movement between the Goat Rocks unit and Tieton still must be factored in. Based upon studies conducted in other mountain goat habitats, we are observing between 59% and 75% of the total population in the August aerial surveys.

Results of the cooperative Cispus AMA study with the USFS indicate that goat populations are expanding in several areas of the Region. Sightings of goats are becoming common around the Mt. St. Helens area, and the north-south ridge systems south of the Cispus river contain good numbers of goats (see Management Conclusions below). Sightings of ear-tagged Smith Creek transplants in the Mt. Adams Wilderness indicate that goats are likely expanding their range. Informal surveys are also observing goats in areas to the south and west of Smith Creek. Long-term changes in habitat (see Habitat Condition below), particularly in the Smith Creek Unit, may limit certain goat populations in the future.

Habitat Condition And Trend

High elevation openings characteristic of goat habitat are being lost in the Smith Creek Unit due to conifer encroachment. Alpine meadows are critical mountain goat foraging areas. Given the limited extent of suitable goat habitat in the Smith Creek Unit, alpine meadow loss represents a serious threat to the sustained viability of this goat population. Results of the cooperative Cispus AMA project indicate that in the four study areas (Stonewall ridge, South Point ridge, Smith ridge, and Castle Butte), a total of 404 acres of alpine meadow have been lost in the period 1959_ 1990 (Kogut 1996).

The documented loss of alpine meadow in the study area equals a 20.8% decrease. Of the 1540 acres of alpine meadow present now in the study area, only 311 acres (20.2%)have low conifer intrusion. The remaining alpine meadows have-moderate (53.8%) and high (26.0%) levels of conifer intrusion. Meadows with high to moderate conifer intrusion can be expected to become unsuitable for goats within 35 years. Avalanche chutes comprise an additional 1047 acres of marginal goat habitat (Kogut 1996).

High alpine meadows are thought to be primarily created through disturbance such as avalanche, disease, wind-throw, and fire (Hemstrom 1979). Periodic fire is considered to be one of the most important factors in the creation and maintenance of alpine meadows (Olmsted 1979). United States Forest Service policy currently dictates the suppression of both man-made and naturally occurring fires. This policy has probably resulted in the losses of alpine meadow documented in the above study. In the 10 years since the completion of this study, the loss of meadow has likely increased.

Increasing use of high elevation meadows by elk is another concern. Elk are typically observed using high elevation meadows adjacent to goats. Elk use will further degrade these habitats for goats, and may even preclude goat use. Any inter-specific competition that occurs in the alpine meadows will favor elk. Thus, the need for restoration and preservation of these areas is paramount to continued healthy goat populations.

Habitat Enhancement

Continued budget cuts and other constraints in both the USFS and WDFW make the possibility of a prescribed burn program in the foreseeable future unlikely. Presently, it does not appear that habitat is limiting goats, however, enhancement will have to be pursued in the next decade, as more and more habitat in the Smith Creek Unit is lost to conifer encroachment.

Another possible avenue to address conifer encroachment is through the use of girdling and snag creation. Informal discussions concerning snag creation have occurred, and hopefully more formal discussions will transpire in the near future.

Management Conclusions

All three mountain goat units in Region 5 are valued for both viewing and hunting opportunities. Consequently, harvest quotas are kept conservative. Population objectives for viewing are probably being met in the Goat Rocks unit but may not be met in the other goat units in Region V. WDFW can not say if population objectives are being met without an estimate of population size.

Research is needed to develop population estimates and models for the goat populations in Region 5. A study initiated in 2002 is beginning to address these needs in Smith Creek and Goat Rocks/Tieton River.

The continuation of annual aerial surveys is needed to document trends in population and productivity.

Without a population estimate, attainment of a harvest rate of <4% of the population is difficult to measure. Due to low inherent productivity and high mortality rates among 1 and 2 year olds, mountain goats (Festa-Bianchet and Urquhart 1994), are highly susceptible to over-harvest. Presently, our information about goat population dynamics is limited. Although hunter report cards provide information on demographic parameters, these data are highly variable. This is likely due to hunters observing and counting the same groups of goats repeatedly, variability of days spent hunting, some mis-classification, and lack of sampling independence. Aerial surveys provide the least biased data and the most efficient method of census, particularly considering the large expanse of area involved.

Additionally, resource managers should identify important habitat linkages between Smith Creek and Goat Rocks and suitable isolated habitats such as Mt. Adams and Mt. St. Helens National Volcanic Monument. Geographic Information Systems (GIS) coverages could be used to identify suitable goat habitat within unsuitable matrix lands. Potential corridors between such areas could then be managed for goats.

Based upon the results of the cooperative Cispus AMA study, alpine meadow restoration in the Smith Creek Unit is recommended. This will require USFS funding and environmental approvals.

Augmentation/translocation

Recommendations

None are needed nor recommended.

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Table 1. Hunter survey summary statistics for Region 5 mountain goat harvests, 1993-2003.

Year	Permits	Harvest	Success (%)	Avg. goats seen	Kid:Ad seen	Avg. days to harvest
Smith Creek						
2003	1	1	100	19	6	12
2002	1	1	100	30	23	5.0
2001	1	1	100	17	70	12
2000	3	2	67	16	60	14.5
1999	3	2(2)	100	4	25	1.0
1998	3	2	67	21	36	7.7
1997	3	1(2)	50	25	67	9.5
1996	5	2	40	42	26	12.5
1995	5	2(4)	50	24	14	22.5
1994	3	2	67	17	28	6.0
1993	3	2	67	53	59	11.0
Goat Rocks						
2003	6**	6**	100	334	119	3.2
2002	3	2	66.7	144	28	5.0
2001	3	3	100	44	26	4.3
2000	7	6(6)	100	55	28	3.2
1999	7	7	100	52	20	2.7
1998	7	7	100	32	43	3.2
1997	10	9(9)	100	19	30	2.8
1996	10	6(9)	67	55	36	5.8
1995	10	10	100	40	42	2.2
1994	10	10	100	46	39	2.3
1993	10	10	100	37	39	1.9
Tatoosh						
2003	3	3	100	27	11	21
2002	3	2	66.7	21	23	12.5
2001	3	1(2)	50	4	29	4.0
2000	5	2	40	14	40	10.0
1999	5	2(3)	67	22	35	18.0
1998	5	2(4)	50	15	54	7.5
1997	5	1	20	9	16	8.0
1996	5	1(3)	33	9	37	35.0
1995	5	3(4)	75	7	28	6.0
1994	5	2	40	3	33	15.0
1993	5	2	40	3	15	12.5

*Numbers in ( )=s indicate number of hunters, if less than permits issued

**Permits for both Goat Rocks and Tieton River were combined

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Table 2. Survey results of Mountain Goat flights, 1998 - 2002.

Goat Unit	Adult	Yearling	Kid	Unknown	Total	Kid:Adult
Smith Creek						
2003	9		6		15	67:100
2002	8	3	6		17	54:100
2000	23	0	10		33	43:100
1999	6	2	2	1	11	33:100
1998	3		1		4	33:100
Goat Rocks						
2003**	130(130)		36(36)		166	28:100
2002**	168(160)		36(35)		203	21:100
2001	79		13		92	16:100
2000	50		12		62	24:100
1999	20	2	9	8	39	45:100
1998	6		2	6	14	33:100
Tatoosh						
2003	2	3	1		8	14:100
2002	5	3	1	1	10	11:100
2001	6	1	2		9	33:100
2000	9		2		14	22:100

*No survey in 2001 due to poor weather conditions

**Survey combined Goat Rocks and Tieton River units, data in ( ) represents Goat Rocks counts

Bighorn Sheep

BIGHORN SHEEP STATUS AND TREND REPORT
Statewide

DONALD A. MARTORELLO, Carnivore, Furbearer, and Special Species Section Manager

Population objectives and guidelines

The population objectives for bighorn sheep herds are to maintain each herd at levels indicated in Table 1 and to monitor herds at a level where a 20% change in population size can be detected in 3-years or less (Game Management Plan 2003). The harvest objective for bighorn sheep is to maintain a harvest success that averages >85% over a 3-year period, while at the same time bighorn population size remains stable or increasing. Strategies and harvest thresholds to obtain these objectives are described in the WDFW's Game Management Plan (2003).

Table 1. Population size objectives for specific bighorn sheep herds.

Herd	Desired Population [b]
Hall Mountain[a]	40-70
Asotin Creek[a]	50-60
Black Butte[a]	300
Wenaha[a]	140
Cottonwood Creek[a]	50-60
Tucannon	60-70
Vulcan	80-110
Mt. Hull	55-80
Sinlahekin	50
Swakane	50-60
Quilomene	250-300
Umtanum(+Selah Butte)	250-300
Cleman Mountain	140-160
Lincoln Cliffs	60-70
Lake Chelan	100-150
Tieton River	75-150
Total	1,750-2,130

[a] Rocky Mountain bighorn sheep
[b] Based on biologists estimates of habitat capacity, including forage, escape cover, and water sources

Hunting seasons and harvest trends

Bighorn sheep hunting opportunity in Washington was limited by permit-only hunting. Permit availability, and therefore hunter opportunity, has been high over the last 3 years as bighorn numbers increase (Figure 1). Twenty-three general season permits, one auction permit, and one raffle permit were available in seven different sheep management units for 2003 and a total of 7,461 applicants entered the drawing. The 2003 bighorn sheep season was September 15 to October 10, except 3 areas had split seasons; September 15 to October 3 and November 8-30. Hunters had the choice of any legal weapon to harvest any bighorn ram (no curl restrictions). Of the 25 permits available in 2003, all individuals reported that they hunted bighorn sheep. A total of 23 sheep were killed for a hunter success rate of 92%.

Surveys

All bighorn sheep units open to hunting in 2003 were surveyed. Surveys also were conducted in all non-hunted populations, including the 4 herds of the Blue Mountains. Survey efforts in this area continue to be a priority as we attempt to document population recovery from the 1996 *pasteurella* outbreak. Both ground counts and aerial surveys were used to survey and classify sheep as lambs, ewes, or rams. Rams were further classified as yearling, less than 3/4 curl, or greater than 3/4 curl. Surveys were conducted at differing times throughout the year, with a general pattern for most regions to survey lamb production in early summer and total herd composition in winter.

Population status and trend analysis

Rocky Mountain bighorns in the Blue Mountains continue to struggle as they recover from the 1996 *pasteurella* outbreak. Lamb mortality has remained high and ewe survival has declined in several herds;

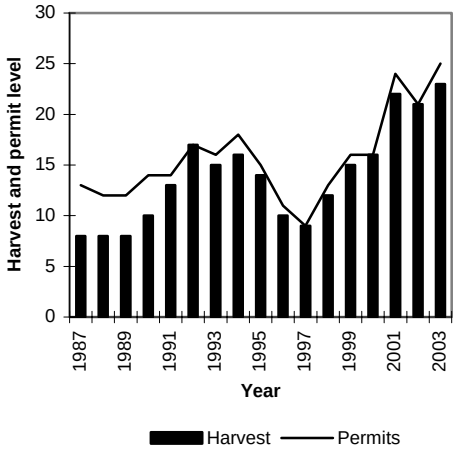

Figure 1. Trend in bighorn sheep recreational hunting opportunity in Washington.

Herd	1994	1995	1996	1997	Year 1998	1999	2000	2001	2002	2003
Rocky Mountain Bighorn Sheep										
Hall Mountain	33	30	32	27	25	29	26	23	--	--
Asotin Creek	15	12	13	13	30	34	38	40	36	51
Black Butte	215	50	45	54	64	60	60	60	55	60
Wenaha	110	90	50	69	55	60	60	60	65	65
Mt. View	60	45	18	23	23	32	27	28	25	--
Subspecies total	*433*	*227*	*158*	*186*	*142*	*215*	*211*	*211*	*181*	*176*
California Bighorn Sheep										
Tucannon	50	45	50	50	42	30	27	18	11	17
Vulcan	69	61	43	52	24	24	19	17	22	36
Mt. Hull	--	55	50	60	--	70	62	65	67	85
Sinlahekin	--	--	37	32	32	32	25	32	37	--
Swakane	30	30	38	25	30	36	35	51	54	58
Quilomene	50	70	90	135	143	164	165	165	165	---
Umtanum	200	150	150	150	150	150	100	130	160	190
Selah Butte	17	32	43	58	43	47	73	60	10	--
Cleman	55	60	65	100	117	135	156	141	171	203
Lincoln Cliffs	35	45	65	90	102	88	95	--	--	60
Lake Chelan	--	--	--	--	--	15	50	50	67	114
Tieton	--	--	--	--	11	25	46	67	70	80
Subspecies total	*506*	*548*	*631*	*752*	*694*	*816*	*853*	*796*	*804*	*843*
Total	939	775	789	938	836	1,031	1,064	1,007	985	1,019

however, the total sheep population has remained fairly stable (Table 1). California bighorn populations remained stable in most herds. The population of California bighorns now numbers approximately 843 sheep (Table 1).

Washington Department of Fish and Wildlife continued cooperative work with the Foundation for North American Wild Sheep, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, U.S. Forest Service, Bureau of Land Management, and the Nez Perce Tribe on restoration of bighorn sheep within Hells Canyon. Project activities included monitoring lamb production and mortality, sightability surveys, and disease investigations related to domestic-bighorn sheep.

Habitat condition and trend

Range conditions for bighorn sheep were fair to poor in most units, with the exception of Mount Hull where the forage quality increased due to a recent fire. Noxious weed invasion, primarily yellow-star thistle, continued to be a major concern for most bighorn sheep ranges (particularly in the Blue Mountains). Grazing also is a concern is several areas of the Blue Mountains and Yakima River basin.

Management conclusions

Bighorn sheep management in Washington centers on three main issues at this time: minimizing disease outbreaks, increasing forage conditions, and establishing new self-sustaining herds.

Disease outbreaks associated with domestic-bighorn interactions is the primary concern for several herds. Disease threatens at least 6 bighorn sheep herds at present. For those herds, eliminating the risk of disease transmission between domestic and bighorn sheep is the priority.

Noxious weed control is important for maintaining quality forage habitat for sheep and aggressive programs aimed at eliminating invading species and restoring native grasses are essential. Noxious weed control can be accomplished only in conjunction with better overall range grazing practices. Where the potential exists for conflicts between bighorn sheep and domestic sheep, particularly on federal lands, we should seek cooperative agreements that place a priority on the restoration of native species (i.e., bighorn sheep).

Restoration of bighorn sheep should remain a top priority. A new herd was established at Chelan butte in 2004 and a new release site at Moses Coulee is currently being considered. In addition, a few existing herds may need augmentation give there low numbers.

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1
Blue Mountains

PAT FOWLER, District Wildlife Biologist
PAUK WIK, Wildlife Biologist

Population objectives and guidelines

The first bighorn sheep population was established on the W.T. Wooten Wildlife Area in the Tucannon drainage during the early 1960's, and consisted of California bighorns transplanted from the Sinlahekin Wildlife Area. Since that re-introduction, four additional herds of bighorn sheep have been established in the Blue Mountains; Mountain View, Wenaha, Black Butte, and Asotin Creek herds. The first two herds consisted of California bighorn sheep (Tucannon, Mt. View), but subsequent transplants have consisted of Rocky Mtn. bighorn sheep from Hall Mtn. in Washington, herds in Montana and Wyoming, and from the Wallowa Mtns in Oregon. Very few California bighorns still exist in the Blue Mtns., because the spread of scabies (*Psoroptes ovis*) into the Mountain View and Tucannon herds during the late 1980's and 1990's resulted in a massive die-off of California bighorns. Currently, herds in the Blue Mtns. consist primarily of Rocky Mtn. bighorn sheep.

Four herds are included in the Hells Canyon Initiative, which is a cooperative working group that includes Idaho Dept. of Fish and Game, Oregon Dept. of Fish and Wildlife, U.S. Forest Service, BLM, Nez Perce Tribe (NPT), and Foundation for North American Wild Sheep. Population management objectives for each herd are based on habitat conditions within the herd range of each population. The overall population objective for the Blue Mountains is 500-550 bighorn sheep; Tucannon herd-60, Mt. View herd-60-70, Asotin herd-75-100, Black Butte herd-150-200, Wenaha herd-90+.

Hunting seasons and harvest trends

Permit controlled hunting was terminated in the Blue Mountains after the Pasturella die-off in 1996, with the exception of the Tucannon herd. Permits were terminated in the Tucannon in 1999, after this herd suffered a major population decline. General permit hunting will not be implemented until bighorn sheep populations meet criteria established in the Bighorn Sheep Management Plan.

Treaty hunting by the Nez Perce tribe has been unregulated and resulted in the loss of three Class-4 rams from the Asotin herd in 2002, and five rams total over the last three years. Permit controlled hunting has never been authorized in the Asotin herd, because it did not meet the criteria necessary to establish a hunting season. Information gathered while investigating the treaty kills revealed that some tribal members have been harvesting bighorn sheep from the Asotin herd for several years, both ewes and rams.

Since the NPT does not regulate or monitor harvest, these losses should be considered the minimum number taken by tribal members. In 2003, the NPT Wildlife Committee recommended closing the Washington portion of their treaty area to bighorn sheep hunting by tribal members. Following this recommendation by the NPT, no harvests were reported in 2003.

Surveys

Aerial surveys are conducted in March using a sightability model currently being developed through the Hells Canyon Initiative. These surveys are conducted in conjunction with annual post-season elk surveys in order to determine population trend and herd composition at the low point of the annual population cycle. Radio telemetry locations are obtained frequently throughout the year by foot and/or aircraft,

Table 1. Bighorn Sheep Population Trend and Herd Composition, Blue Mountains 1994-2004 (March Surveys) [( ) indicates number of Class-4 rams in > 3\4 segment].

			Rams				Count	Population	Per 100 Ewes
Year	Lambs	Ewes	Y1	< 3\4	> 3\4	Total	Total	Estimate	R:100:L
1994	89	202	3	35	57(14)	95	386	450	47:100:44
1995	20	138	10	11	28(8)	49	208	242	36:100:14
1996	16	115	8	6	13(3)	27	158	176	23:100:14
1997	26	135	11	16	19(7)	46	207	220	34:100:19
1998	31	105	17	15	23(7)	55	191	214	52:100:30
1999	42	104	13	15	15(5)	43	189	216	41:100:40
2000	32	100	15	22	18(5)	55	187	212	55:100:32
2001	33	99	5	17	30(5)	52	184	206	53:100:33
2002	29	83	7	15	35(7)	57	169	192	69:100:35
2003	38	96	9	13	32(6)	54	188	206	56:100:40
2004	50	103	17	10	36(6)	63	216	227	61:100:48

supplementing the March helicopter surveys.

Surveys conducted for the five herds in early 2004 resulted in a count of 216 bighorn sheep, 103 ewes, 50 lambs, 63 rams for a ratio of 61 rams and 48 lambs per 100 ewes (Table 1.).

Population status and trend analysis

Lamb survival has been a major problem since the *Pasturella* die-off in 1996, with lamb survival varying greatly between years. In 2003, lamb productivity improved in the Black Butte, Mountain View, Wenaha, and Asotin herds with lamb ratios of 35, 71, 53, and 55 lambs/100 ewes, respectively. While lamb productivity in the Tucannon herd was poor, with a ratio of 22 lambs/100 ewes. Individual herds should be able to increase in numbers if lamb production and survival stays above 30 lambs/100 ewes for several years.

The ram population suffered very high mortality during the *Pasturell*a die-off, which resulted in few adult rams in the population for several years. Low lamb survival resulted in poor recruitment of rams into the population. The number of Class-4 rams in the population is increasing, but still remains substantially below the number that existed prior to the die-off (Table 1.).

During the summer of 2004, another pasteurellosis epizootic plagued lambs in the Black Butte and Wenaha herds. By late August, lamb ratios in these two herds had declined to 15 and 22 lambs/100 ewes, respectively. This outbreak will reflect in the march counts in 2005.

The Tucannon herd is continues to decline due to poor lamb survival. This population will not rebound in the near future without a supplemental transplant.

Habitat condition and trend

Habitat conditions are moderate to good in most areas. However, the spread of noxious weeds, mostly yellow-star thistle and rush skeleton weed is threatening herds in the Snake River and Grande Ronde river drainages.

Disease and parasites

The pasteurellosis epizootic continues to plague all of the herds except Asotin and Tucannon, resulting in poor lamb survival. Lamb survival usually takes from 3-8 years to return to normal levels. The presence of domestic sheep and goats within and adjacent to bighorn sheep range presents a constant and substantial risk of another *Pasturella* epizootic.

Other government agencies have encouraged landowners to use domestic goats for weed control. The WDFW will work closely with these agencies to discourage this program in areas near bighorn sheep range.

Scabies (*Psoroptes ovis*) continues to be a problem in all five herds. The Tucannon herd has suffered a major die-off due to scabies infecting this population in 1999.

Management conclusions

Bighorn sheep herds in the Blue Mountains are slowly recovering from the *Pasturella* die-off that occurred in 1995-96. Lamb survival is still plagued by periodic pneumonia outbreaks. Although the Tucannon herd escaped the *Pasturella* die-off, it was infected with scabies in 1999, and suffered a massive die-off due to complications from this parasite. The Asotin herd was not impacted by the *Pasturella* outbreak, but has suffered losses due to unregulated tribal hunting. Each herd suffers from various problems that limit lamb recruitment and its ability to increase in numbers.

Domestic sheep and goats continue to be a major problem for bighorn sheep populations in the Blue Mtns. Rural development and the subsequent acquisition of domestic sheep and goats by residents poses a continuous threat to bighorn populations. Distribution of a pamphlet developed by the HCI to educate rural residents about the disease risk posed to bighorns by domestic goats and sheep appears to have little impact on the number of domestics in these areas. The disease risk will undoubtedly result in continued *Pasturella* outbreaks in the future, unless rural residents can be discouraged from acquiring domestic sheep and goats, or provide pens that prevent contact between domestics and bighorn sheep.

Bighorn sheep herds in the Blue Mountains continue the struggle to recover from the Pasteurella die-off that occurred in 1995-96. However, combining herds, the bighorn sheep population in the Blue Mountains appears to be stable. As such, limited hunting of mature rams may be considered if consistent with recovery goals. In the future, as each herd meets the criteria, general permit hunting opportunities may also be offered.

Table 2. Population Trend and Herd Composition, Asotin Creek Herd, Blue Mtns., Washington.

			Rams				Count	Population	Per 100
Year	Lambs	Ewes	Y1	<3\4	>3\4	Total	Total	Estimate	R:100:L
1994	3	6	3	2	1	6	15	15	100:100:50
1995	1	4	1	3	1	5	10	12	125:100:25
1996	1	5	0	1	4 (1)	5	11	13	100:100:11
1997	2	14	1	1	3 (1)	5	21	13	36:100:33
1998	7	13	3	2	2 (1)	7	27	30	54:100:54
1999	8	16	2	2	5 (2)	9	26	34	56:100:50
2000	7	18	4	2	3 (1)	9	34	38	50:100:39
2001	3	23	1	2	5 (2)	8	34	40	24:100:13
2002	7	17	0	4	5 (1)	9	33	36	53:100:41
2003	11	23	1	5	2(1)	8	42	45	35:100:48
2004	12	22	6	1	5(0)	12	46	51	54:100:54

( ) indicates number of Class-4 rams in > 3\4 segment.

Table 3. Black Butte Herd Composition Data 1989-02, Blue Mtns., Washington (Pre1989 rams were broken into legal and sublegal)

			Rams				Count	Population	Per 100
Year	Lambs	Ewes	Y1	< 3\4	> 3\4	Total	Total	Estimate	R:100:L
1977	3	7		2		2	12	N/A	29:100:43
1978	3	9		3		3	15	N/A	33:100:33
1979	6	12		6	2	8	26	N/A	67:100:50
1980	4	13		5	1	6	23	N/A	46:100:31
1981	9	17		10	3	13	39	N/A	76:100:53
1982	7	10		7	2	9	26	N/A	90:100:70
1983	11	17		9	4	13	41	N/A	77:100:65
1984	7	31		6	10	16	54	N/A	52:100:23
1985	18	34		8	10	18	80	N/A	53:100:53
1986	25	33		14	10	24	82	N/A	76:100:76
1987	28	46		13	13	26	100	N/A	56:100:60
1988	19	56		23	13	36	111	N/A	64:100:34
1989	33	64	—	28	16 (8)	44	141	150	69:100:52
1990	16	46	—	14	21 (9)	35	97	120	76:100:35
1991	23	45	—	13	5 (2)	18	86	110	40:100:51
1992	31	55	—	10	12 (7)	22	108	130	40:100:56
1993	39	75	—	7	15 (7)	22	136	150	29:100:52
1994	51	93	—	13	26 (8)	39	183	215	42:100:55
1995	2	34	3	1	2 (1)	6	42	50	0.81951389
1996	2	29	2	1	2	5	36	45	0.7778588
1997	7	30	4	4	4 (2)	12	49	54	40:100:23
1998	11	31	4	5	5 (2)	14	56	64	36:100:35
1999	10	30	4	6	6 (1)	16	56	60	59:100:33
2000	7	25	3	7	6 (2)	16	48	60	60:100:28
2001	7	25	3	9	10 (2)	22	54	60	88:100:28
2002	2	18	3	6	14 (1)	25	51	55	138:100:11
2003	13	24	2	3	10(1)	16	53	60	67:100:54
2004	9	26	6	4	7(1)	17	52	57	27:100:35

( ) indicates number of Class-4 rams in > 3\4.

Table 4. Population Trend and Herd Composition, Mt. View Herd-Unit 8, Blue Mountains [( ) indicates number of Class-4 rams in > 3\4 segment]. Pre1989 rams were broken into legal and sublegal.

			Rams				Count	Population	Per 100
Year	Lambs	Ewes	Y1	< 3\4	> 3\4	Total	Total	Estimate	R:100:L
1974	5	6		3	0	3	14	N/A	50:100:75
1975	3	6		2	1	3	12	N/A	50:100:50
1976	5	7		3	2	5	17	N/A	71:100:71
1977	6	7		4	2	6	19	N/A	86:100:86
1978	6	12		6	2	8	26	N/A	67:100:50
1979	9	16		4	6	10	35	N/A	63:100:56
1980	12	17		7	8	15	44	N/A	88:100:71
1981	11	21		7	7	14	46	N/A	67:100:52
1982	7	17		8	2	10	34	N/A	59:100:41
1983	10	29		11	8	19	58	N/A	66:100:41
1984	13	28		10	5	15	56	N/A	54:100:46
1985	15	35		13	7	20	70	N/A	57:100:43
1986	20	38		10	4	14	72	N/A	37:100:52
1987	6	15		5	2	7	28	N/A	47:100:40
1988	6	16		5	4	9	31	N/A	56:100:38
1989	6	16	—	5	4 (2)	9	31	31	56:100:38
1990	7	18	—	5	2 (1)	7	32	32	39:100:39
1991	8	15	—	8	6 (4)	14	37	37	93:100:53
1992	5	16	—	6	8 (4)	14	35	35	88:100:31
1993	18	23	—	10	8 (4)	18	59	65	78:100:78
1994	10	24	—	10	7 (4)	17	51	60	71:100:42
1995	6	28	1	1	5 (2)	7	41	45	25:100:21
1996	1	14	1	0	0	1	16	18	0.36119213
1997	3	14	1	1	2 (1)	3	21	23	29:100:21
1998	5	12	3	2	2 (1)	7	21	23	58:100:42
1999	10	14	3	1	1	5	29	32	36:100:71
2000	4	14	4	1	1	6	24	27	43:100:29
2001	3	11	1	2	1	4	21	28	35:100:27
2002	8	10	0	1	0	1	19	25	10:100:80
2003	0	11	1	1	5(1)	7	18	.	64:100:0
2004	10	14	2	2	3 (1)	7	31	32	50:100:71

Table 5. Tucannon herd trend (prior to 1989 rams were broken into legal and sublegal).

			Rams				Count	Population	Per 100 Ewes
Year	Lambs	Ewes	Yl	<3/4	>3/4	Total	Total	Estimate	R:100:L
1975	4	7		1	3	4	15	N/A	57:100:57
1976	4	9		2	2	4	17	N/A	44:100:44
1977	2	10		3	2	5	17	N/A	50:100:20
1978							0	N/A	NA
1979	4	10		6	3	9	23	N/A	90:100:40
1980	3	13		7	4	11	27	N/A	85:100:23
1981	9	14		4	7	11	34	N/A	79:100:64
1982	5	17		6	6	12	34	N/A	71:100:29
1983	4	20		6	5	11	35	N/A	55:100:20
1984	4	23		5	7	12	39	N/A	52:100:17
1985	4	20		6	7	13	37	N/A	65:100:20
1986	7	18		6	10	16	41	N/A	89:100:39
1987	8	20		7	11	18	46	N/A	90:100:40
1988	8	21		10	10	20	49	N/A	95:100:38
1989	9	23	---	10	8	18	50	55	78:100:39
1990	11	22	---	11	13 (5)	24	57	65	104:100:50
1991	12	23	---	10	13 (5)	23	58	65	100:100:52
1992	15	28	---	12	12 (4)	24	67	70	86:100:54
1993	12	24	---	13	8 (2)	21	57	60	89:100:50
1994	4	24	---	4	14 (2)	18	46	50	75:100:17
1995	2	24	1	4	7 (1)	12	39	45	50:100:08
1996	10	24	1	4	7 (2)	12	46	50	50:100:42
1997	10	27	1	3	6 (3)	10	47	50	37:100:37
1998	4	22	4	2	6 (2)	12	38	42	50:100:18
1999	2	17	2	2	3 (2)	7	26	30	41:100:12
2000	7	13	1	4	2 (1)	7	27	27	54:100:54
2001	2	12	0	0	4 (1)	4	18	18	33:100:25
2002	0	7	0	0	6 (2)	6	11	11	86:100:0
2003	2	9	1	1	4(1)	6	17	17	67:100:22
2004	2	9	1	1	4(2)	6	17	17	66:100:22

( ) indicates number of Class-4 rams in > 3\4 class

Table 6. Wenaha Herd Population Trend and Composition Counts, Blue Mtns., Washington (Pre 1989 rams were broken into legal and sublegal).

			Rams					Population	Per 100 Ewes
Year	Lambs	Ewes	Y1	<3\4	>3\4	Total	Total count	Estimate	R:100:L
1983	5	10		5	.	5	20	N/A	50:100:50
1984	3	12		.	.	.	15	N/A	.:100:25
1985	10	13		3	.	3	26	N/A	23:100:78
1986	10	14		4	1	5	29	N/A	36:100:71
1987	13	23		15	6	21	57	N/A	91:100:57
1988	17	28		8	7	15	60	N/A	54:100:61
1989	12	36	—	15	12	27	75	100	75:100:31
1990	33	59	—	14	16 (7)	30	122	135	51:100:56
1991	19	45	—	11	13	24	88	100	53:100:42
1992	19	51	—	4	20	24	94	115	47:100:37
1993	25	48	—	14	15	29	102	120	60:100:52
1994	21	55	—	6	9	15	91	110	27:100:38
1995	9	48	4	2	13 (4)	19	76	90	40:100:19
1996	2	43	4	0	0	4	49	50	0.44450231
1997	4	50	1	7	4	12	62	69	24:100:8
1998	4	27	3	4	8 (1)	15	46	55	56:100:15
1999	12	27	2	4	0	6	45	60	0.98662037
2000	7	30	3	8	6(1)	17	54	60	57:100:23
2001	8	28	0	4	10	14	50	60	50:100:29
2002	6	35	4	4	11 (3)	19	60	65	54:100:17
2003	12	29	4	4	10(3)	18	59	65	62:100:41
2004	17	32	2	2	17(2)	21	70	N/A	66:100:53

( ) indicates number of Class-4 rams in > 3\4 class

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1
Hall Mountain

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Population objectives and guidelines

Rocky Mountain Bighorn Sheep were introduced to Hall Mountain from Alberta, Canada in 1972 (Johnson 1983). The objective is to maintain a population of 40–70 Rocky Mountain Bighorn Sheep within the Hall Mountain Herd. Herd composition objectives stipulate a lamb to ewe and ram to ewe ratio each of at least 50:100. The Hall Mountain herd is not currently hunted; however, this population has been used as a primary source for transplants of Rocky Mountain Bighorn Sheep to other parts of the state.

Surveys

From the early 1970s through the year 2002, ground surveys at the Noisy Creek winter feeding station were carried out to estimate the total number of sheep, sex ratio, and lamb production (Table 1). During the summer of 2003 the winter feeding station was dismantled and no feeding occurred over the winter of 2003-04. Reconnaissance of the area was made to assess reaction of the sheep to the loss of the feed source but few sheep were observed. The 2003-04 winter was a transitional year from being able to count sheep at a feeder to developing a new survey protocol to monitor herd numbers in the wild environments of the Sullivan Lake area. No formal surveys were conducted in 2003 but we will likely begin survey flights in the 2004-05 winter.

A population of bighorn sheep pioneered by the Hall Mountain Population has existed in British Columbia since about 1982. In the summer the Canadian sheep still occasionally mix with the Hall Mountain Herd. The Canadian bighorn sheep have also been surveyed and classified each year since at least 1998 at a winter feeding station near Canada Highway 3. Count totals at this feeder in January of 2004 included 7 lambs, 20 ewes, and 10 rams for a lamb/ewe/ram ratio of 35 L : 100 E : 50 R.

The U.S. Forest Service (Sullivan Lake Ranger District, Colville National Forest) regularly monitored survival and movements of a number of Bighorn Sheep from the Hall Mountain Herd by radio telemetry from 1995 through 1999 (Baldwin 1999, Aluzas 1997, and Bertram 1996). Since the year 2000 radio-tracking has been accomplished only intermittently. The latest radio-tracking was accomplished from the Sullivan Lake Road at the south end of Sullivan Lake on January 28, 2004. Radio signals were received from 3 ewes. Of the 21 total bighorn sheep that were fitted with radio transmitters beginning in December of 1995, there have been 13 confirmed mortalities to date. These mortalities included 7 rams and 6 ewes. The most recent was a large ram last collared in 2000 that apparently died of natural causes or predation on the forested slopes of Sullivan Mountain some time in 2003. Locating the collar and carcass of this animal was exceptionally difficult but finally accomplished by volunteers from the Inland Northwest Wildlife Council in August 2003. Three other radio-collared sheep are of unknown status as radio contact has been lost since the year 2000. Three of the remaining 5 radio-collared sheep have been monitored as recently as January of 2004 (Table 2).

Population status and trend analysis

No surveys were accomplished in 2003 so there is no additional information on population trend for the resident herd at Hall Mountain. With only 13 ewes at last count in the winter of 2002-03 the best we can expect is an additional 7 or so lambs, which would result in a herd size of less than 40 sheep a year later.

Habitat condition and trend

This part of the state is heavily forested and bighorn sheep depend upon the steep terrain and open grasslands on Hall Mountain and other scattered sub-alpine openings for forage and predator avoidance. Between Hall Mountain, Sullivan Mountain, Crowell Ridge, and Gypsy Ridge, non-forested escape terrain appears significantly limited and fragmented. Sheep migrating between these and other peaks and ridges have to go through dense forest where they may be highly vulnerable to predators. The dead collared ram recovered from the slopes of Sullivan Mountain in 2003 may be a perfect example of this bottleneck for the sheep herd.

The U.S. Forest Service has ownership of virtually all the bighorn habitat so there are few immediate threats, and quality and quantity in the short term is likely a function of annual weather. The U.S. Forest Service will continue to actively manage winter range habitat with controlled burns as the need and opportunity arise. There are no domestic animals grazing on the portion of the Forest frequented by the bighorns.

Table 1. Population composition counts of Hall Mountain Bighorn Sheep since herd establishment in 1972 through the last year of winter feeding in 2003. (Note that subsequent to the original release of 18 sheep in 1972, there has been only one additional introduction, which was of two adult ewes in 1981. There have been 85 sheep translocated out of this population over 9 separate years. In addition, some sheep from this population broke off from the Hall Mountain Herd and established a new population in the Kootenay Pass area of British Columbia, Canada in about 1982).

				Count	*Number Trans-located*			Ratio
YEAR	Lambs	Ewes	Rams	Total	Lambs	Ewes	Rams	*Lambs:100 Ewes:Rams*
1972	0	13	5	18				0 : 100 : 38
1973	No Data	No Data	No Data	No Data				No Data
1974	7	No Data	No Data	19				No Data
1975	5	No Data	No Data	22				No Data
1976	2	7	5	14	2	5	2	29 : 100 : 71
1977	No Data	No Data	No Data	No Data				No Data
1978	5	10	6	21				50 : 100 : 60
1979	8	No Data	No Data	27				No Data
1980	9	15	4	28				60 : 100 : 27
1981	14	24	10	48				58 : 100 : 42
1982	15	34	21	70	4	8	3	44: 100 : 62
1983	13	22	13	48	7	3	1	59 : 100 : 59
1984	17	27	17	61				63 : 100 : 63
1985	12	29	21	62	8	15	3	41 : 100 : 72
1986	9	11	13	33			1	82 : 100 : 118
1987	6	10	12	28	2		1	60 : 100 : 120
1988	5	12	10	27				42 : 100 : 83
1989	9	15	13	37				60 : 100 : 87
1990	11	20	19	50	3			55 : 100 : 95
1991	6	12	12	30	1	3	2	50 : 100 : 100
1992	5	14	12	31				36 : 100 : 86
1993	9	18	13	40	3	4	4	50 : 100 : 72
1994	6	14	13	33				43 : 100 : 93
1995	5	15	10	30				33 : 100 : 67
1996	5	17	10	32				29 : 100 : 59
1997	3	14	10	27				21 : 100 : 71
1998	6	11	8	25				55 : 100 : 73
1999	6	14	9	29				43 : 100 : 64
2000	4	13	9	26				31 : 100 : 69
2001	4	11	8	23				36 : 100 : 73
2002	7	13	4	24				54 : 100 : 31
2003	No Data	No Data	No Data	No Data				No Data

ND = Insufficient data available

Watchable wildlife area

The Washington Department of Fish and Wildlife and the U.S. Forest Service Sullivan Lake Ranger District made the decision to phase out the bighorn feeding and viewing site over the winter of 2002-03 to lessen the impact of predation on the herd and reduce the risk to public safety. The feeding station and corral trap facility were dismantled in the spring of 2003 and the barn was burned by the USFS in the fall. There was no feeding during the winter of 2003-2004. We believe that the sheep will subsist adequately on natural forage and be less vulnerable to predation when they are spread out over the surrounding rugged terrain with greater predator escape opportunity. A few visits were made to the old feeder site to monitor the reaction of the sheep to the change in feed availability and determine if visitors were attempting to provide feed for the sheep. Sheep explored the old feed site and campground area but did not concentrate or bed in the area. Cougar tracks were also observed on one occasion. While people had walked into the area there was no sign of anyone putting out feed. We visited the nearest landowner to determine if sheep might be coming to their deer feed. They had not had sheep come in and readily agreed to avoid encouraging sheep to feed at their residence by restricting or eliminating deer feed. No other issues with sheep descending on residents for food occurred.

Augmentation and translocation

Trapping was not attempted last winter and no efforts were made to either supplement or trans-locate Hall Mountain bighorn sheep in 2003-2004. This herd of Rocky Mountain bighorn sheep has served as useful transplant stock for other areas in Washington. The last sheep trans-located from Hall Mountain occurred in 1993 (Table 1).

Management conclusions

After several winters of cougar presence and predation on bighorn sheep at the Noisy Creek Feeding Station along with unacceptable risk to the public, the decision was made to cease winter feeding operations entirely after 2003. The shortened viewing opportunity from mid December 2002 to mid January 2003 provided a phase-out for both viewers and the sheep. The 2003-04 winter was the first full season with no feeding or close human interaction. There was concern the sheep may descend on the nearest local residents looking for food. Fortunately this did not happen.

With loss of the ability to survey sheep at the feed site each winter, our time and money must now turn to developing a new survey technique and protocol. We lost one year with no survey data but given the count of 24 sheep in 2002 we know we are dealing with a small herd of about 30 sheep and less than 10 rams. We hope to monitor the herd closely for a couple of years to determine if the population numbers and trend can support a limited hunting opportunity.

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Table 2. Radio-telemetry tracking of Bighorn Sheep from Hall Mountain and their status as of the year 2004.

Ear Tag Number	Month / Year Radio-Tagged	Sex	Capture Age	Status as of 2004
Orange 12	12/1995	M	10+	Mortality in July 1997.
Yellow 28	12/1995	F	2.5	Last observed at Canada Highway 3 Feeder on 01/24/2001.
Yellow 30	12/1995	F	2.5	Mortality in July 1998.
Scarlet 12 (formerly Red 11)	02/1996	M	4+	Mortality in fall of 2000.
Red 14	02/1996	F	4+	Mortality by Cougar in January 2001 at Noisy Creek Feeder.
Red 39	12/1996	F	4+	Mortality in August 1997.
Scarlet 13	12/1996 & 01/2000	M	6+	Mortality discovered in August 2003.
Yellow 29	12/1996	M	8.5	Mortality in August 1997.
Scarlet 4	12/1996	F	2.5	Radio signal received near Sullivan Lake, 1/28/2004.
None	12/1996	F	4+	Mortality in September 1997.
None	12/1996	M	4+	Unknown – last detected at Hall Mountain in early 2000.
Red 16	12/1996	M	2.5	Unknown – last detected at Hall Mtn. on 10/10/1997.
None	12/1996	M	4+	Unknown – last detected at Hall Mountain in early 2000.
Green 8	12/1996	F	2.5	Radio signal received from Salmo Mtn. on 7/1/2003.
Lavender 51	01/1999	F	4+	Mortality in March 2000.
Lavender 52	01/1999	F	4+	Radio signal received near Sullivan Lake, 1/28/2004.
Lavender 54	01/1999	F	6.5	Radio signal received near Sullivan Lake, 1/28/2004.
Lavender 58	01/1999	M	4+	Mortality in June 2000.
Green 18	01/1999	M	4.5	Mortality in September 2000.
Scarlet 10	01/2000	F	Adult	Mortality in September 2002.
Scarlet 11	01/2000	M	Subadult	Mortality in December 2001 and found dead at the Canada Hwy. 3 Feeder on 12/07/2001.

BIGHORN SHEEP STATUS AND TREND REPORT 2004: REGION 1
Lincoln Cliffs

HOWARD L. FERGUSON, District Wildlife Biologist
DAVID P. VOLSEN, Associate Wildlife Biologist

Population objectives and guidelines

The management objective for the Lincoln Cliffs herd is to increase bighorn sheep numbers to a self-sustaining population capable of supporting both consumptive and non-consumptive recreation. The population objective is to reach a self-sustaining population size of 70 or more bighorn sheep, with a maximum of 95-100 (WDFW 2003).

Bighorn distribution was historically centered on the original release site on the Lincoln Cliffs area just south of the town of Lincoln. Observations of bighorn sheep have been reported as far east as Porcupine Bay on the Spokane Arm of Roosevelt Lake and to the east side of Banks Lake in Grant County, and as far west as Neal Canyon. Within the last five years, it appears the sheep now occupy two main areas throughout the year – the original Lincoln Cliff area and the cliffs around Whitestone Rock, about 7 miles downstream from Lincoln. Bighorns have not yet been observed north of the lake on the Colville Indian Reservation.

Hunting seasons and harvest trends

The first hunting permit for this herd was issued for the 1997-hunting season. Since then, one permit has been issued each year and harvest success has remained at 100%. Applications for permits increased steadily to a high of 1,352 in 2002, and then dropped to 1,219 in 2003. This drop likely reflects the overall drop in statewide bighorn sheep applications of about 1,100 from 7,461 in 2002 to 6,364 in 2003 rather than a decrease in Lincoln Cliff specifically. In 2003 the bighorn sheep auction winner selected to harvest a ram from the Lincoln Cliffs area. There were 2 rams harvested in 2003 – one from the standard permit hunt, the other from the WDFW bighorn auction.

From 1997 to 1999, hunters spent an average of 6 days hunting; from 2000 to 2003 hunters have spent an average of 4.6 days hunting before being successful.

Table 1. Bighorn Sheep Harvest Data.

Year	Applications Received	Sheep Seen	Lambs Seen	3/4+ Curl Seen
1997	527	38	15	3
1998	451	60	23	8
1999	732	42	5	7
2000	1,078	55	0	7
2001	1,100	13	0	3
2002	1,352	38	4	17
2003	1,219	32	0	8

Surveys

Aerial surveys have been conducted in conjunction with deer surveys whenever possible. In the past, aerial surveys have been inconsistent over the years due to funding and personnel. Since 2002 an effort is being made to conduct two aerial surveys annually – one in the spring and one in early winter. These surveys have been facilitated by radio-collaring thirteen of the 15 sheep translocated in 2003.

Ground surveys have also been used. However, there are limitations in this methodology due to the terrain of Lincoln Cliffs and access to private property. We will continue to conduct ground counts whenever possible.

Population status and trend analysis

The Lincoln Cliffs population was started with an introduction of eleven California bighorns from Northwest Trek in December 1990. Three additional sheep from Vulcan Mountain were released in March 1991 and 5 from Kamloops, British Columbia in 1996.

Following the release of bighorn sheep into this area the population showed an increase each year and tripled in numbers after 4 years. By 1996 the population objective level of 60 to 70 bighorns was reached with 65 animals observed during the fall ground survey. The population reportedly peaked at around 100 animals in June 1998 (ground survey, pers. comm. G.J.Hickman). This peak in population was further evidenced by the hunter reports on animals seen shown in Table 1. A peak of 62 animals were observed in 1998 and high numbers continued through 2000, when a low of 13 animals were observed by hunters (Table 1.).

As a result of these high numbers, in March 1999, 10 ewes and 1 ram lamb were captured and translocated to the Lake Chelan release site. In February 2000, 6 additional ewes were captured and translocated to the Lake Chelan release site. In February 2001, 11 more ewes were captured and released on the Clemon Mountain area. In total, from 1999 to 2001, 27 ewes and 1 ram were removed from this population. In addition, there were 13 known mortalities since 1996 – 11 rams and 2 ewes.

Table 2. Bighorn Sheep Herd Composition Counts.

Year	Total Sheep	Rams	Ewes	Lambs	Unclassified	R:100E:L ratio
1992	20	-	-	-	20	-
1993	26	6	13	7	0	45:100:57
1994	35	8	17	10	0	47:100:59
1995	45	11	21	11	1	52:100:52
1996	65	15	33	16	1	46:100:48
1997	90	23	42	25	0	55:100:60
1998	102	16	49	37	0	32:100:76
1999	88	25	44	18	1	56:100:41
2000	95	21	46	29	0	47:100:69
2001	No Survey Conducted					
2002	36	19	13	4	0	161:100:32
2003	53	13	27	13	0	57:100:67
2004	64	19	34	11	11	56:100:32

Therefore, from 1996 to 2001, approximately 42 sheep were removed from the population – 13 rams and 29 ewes.

With this high number being removed, and the subsequent low number of sheep observed by the permit hunter in 2001, along with the low numbers recorded from both the aerial survey and the ground surveys in 2002, it became obvious that the population may not have recovered from the removal of ewes for translocation to other areas. The ewe population had declined to an estimated low of around 20-25, with an estimated 19 rams.

As a result, 15 sheep were translocated from Nevada to the Lincoln Cliffs area in January, 2003 – 12 ewes, 1 ram, and 2 lambs. Two of the translocated ewes were found dead in the spring of 2003. The 1 translocated ram was found dead in May 2004. From May 2003 to September 2004, 6 known sheep mortalities occurred. Two from hunting, 2 from vehicle collisions, 1 from a cougar, and 1 unknown -- a total of 4 rams and 2 ewes.

The population in early 2003 was estimated to be around 60 animals. The 2004 population has been estimated to be around 70-75 animals. Another aerial survey will be conducted in November 2004.

Habitat condition and trend

A continuing threat to the sheep at Lincoln Cliffs is the increasing development of recreational and permanent housing in the Lincoln Cliffs area, which in the past few years has accelerated and brought more people and more roads to this sheep site. Habitat within the range of the Lincoln Cliffs herd is in good condition. There is no competition with domestic livestock at the present time. However, it is important to remain vigilant, since three domestic sheep were discovered to have escaped in the area of Sterling Canyon, but follow up observations indicate they did not survive. In the future, we will attempt to distribute bighorn sheep information pamphlets to the many new residents around the Lincoln Cliffs area.

WDFW and the Bureau of Land Management should attempt to secure and protect the habitat base for this herd by acquiring, either by outright purchase or easements, more land in the immediate area.

Augmentation and habitat enhancement

An initial introduction of eleven bighorns to the Lincoln Cliffs area occurred in December of 1990. Three additional sheep were released in March 1991, and five more in 1996. In January of 2003, 15 sheep from Nevada were released at two Lincoln Cliff sites.

Disease and parasites

During capture operations in 2000 and 2001 it was noted that these animals were in excellent physical condition. All of the animals captured were robust with excellent pelage and overall appearance. Disease testing showed low numbers of parasites and no harmful disease. Pregnancy tests conducted were positive for adult ewes

Wildlife damage

We have not received damage complaints related to bighorns in the Lincoln Cliffs area. However, the local human population and associated construction of new housing and splitting of parcels all increase the future potential for sheep-human conflicts.

Management conclusions

The herd is now estimated to number around 70-75 animals. This population level is very near the management objective (70 sheep) for the Lincoln Cliffs herd as stated in the Bighorn Sheep Herd Plan (WDFW 2003). With the augmentation of the herd in January of 2003, we believe the minimum population objective will be reached by the spring of 2004.

With the increase in human population density in

and around Lincoln Cliffs and the augmentation, extra effort will be taken to monitor herd numbers and sex ratios in the next few years.

With the increasing population, permit controlled hunting for rams will be continued in the 2004-2005 season.

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BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1
Vulcan Mountain

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DANA L. BASE, Associate Wildlife Biologist

Population objectives and guidelines

The population goal for the Vulcan Mountain Bighorn Sheep Herd is to maintain 80-110 animals on the available range. These bighorn sheep make considerable use of private rangeland, which has been a contentious issue with ranchers in the past when the population was higher. The population declined dramatically from peak numbers in the early 1990's to as few as about 20 bighorn sheep in 2001. Sport hunting has been a traditional consumptive use for this herd and an activity that is co-managed with the Colville Confederated Tribes (CCT). However, due to the low population no permits have been issued since 1999. Hunting will resume when objectives for managing bighorn sheep harvest, as described in the WDFW Game Management Plan (WDFW, 2003) are reached.

Surveys

Since introduction of the Vulcan Mountain Bighorn Sheep Herd, the population has been surveyed almost every year to determine composition and trend. Since 1990 this survey effort has been standardized and carried out in the fall months usually coinciding with rams in rut. The survey is conducted along an automobile route on the Customs and Kettle River County Roads as well as from private, primitive roads into Moran and Cummings Creek Meadows. Observations are accomplished by binoculars and spotting scope from points along the route. The entire sheep range is surveyed, however, not every sheep is expected to be seen as their range is heavily timbered, mountainous, and rocky which impedes visibility. The most recent survey accomplished in early November of 2003 resulted in observations of 10 rams, 17 ewes, and 9 lambs (Table 1).

The efficacy of surveying the population by helicopter was investigated on November 20, 2003 following the November 12 ground count. Only 3 bighorn sheep were observed on the flight vs. 36 on the ground count. Base reported that the bighorn sheep observed from the helicopter immediately took cover underneath conifers upon the helicopters approach. The results of this effort were consistent with other attempts to count or capture sheep on Vulcan Mountain in the past.

Population status and trend analysis

Originating with a founder herd of only 8 bighorn sheep in 1971, the Vulcan Mountain Herd peaked to 107 observed animals in 1990. Subsequent to 1990 the herd declined dramatically to a low of only 17 animals observed in 2001 (Table 1). In the late 1990's adult mortality was exceptionally high due to poor health (internal parasites, possibly disease, and severe winter stress), several documented road-kills on ewes, and likely cougar predation. Lamb recruitment dropped from 10 in 1995 to 2 in 1996 and to 0 in 1998 and 1999 (Figure 1). By the year 2000 there were encouraging signs that the population was beginning to recover in that observed animals appeared to be healthy again and at least 2 lambs were recruited that year. In June of both 2001 and 2002 eight young lambs were observed of which at least 5 were recruited into the fall population for both years.

On January 13, 2003 five California Bighorn Sheep captured near Winnemucca, Nevada were released at Vulcan including 4 ewes and 1 yearling ram. These sheep were released in an effort to bolster the herd and provide genetic diversity to the small remaining population. All 5 of these sheep were fitted with radio-collars for subsequent tracking. There have been 2 documented mortalities of 2 of the ewes from Nevada. Their carcasses were discovered on May 20 and October 13, 2003 with the cause of death not determined in both cases (Luttich 2003). The population trend appears to continue to improve through 2003 as the total fall count increased from 22 in 2002 to 36 in 2003 (Table 1).

Hunting seasons and harvest trends

Both general public hunters (state) and members of the Colville Confederated Tribes (CCT) have hunted bighorn sheep within the Vulcan Mountain Unit. Biologists annually confer prior to developing their respective permit recommendations. Recreational permit-only hunting began in 1981. From that year through 1999 there were 49 bighorn sheep legally harvested from the Vulcan Unit including 48 rams and 1 ewe (Table 2). Due to low herd population and recruitment levels hunting was suspended by both the State and CCT after 1999.

Herd health and productivity

Table 1. Annual population composite counts of the Vulcan Mountain Bighorn Sheep Herd from 1980 through 2003.

			Rams					Ratio
Year	Lambs	Ewes	Yearling	<3/4 curl	>3/4 curl	Total Rams	Total Sheep	Lambs : 100 Ewes : Rams
1980	14	27	-	-	-	18	59	52 : 100 : 67
1981	14	22	-	-	-	6	42	64 : 100 : 27
1982	15	18	-	-	-	13	46	83 : 100 : 72
1983	9	25	-	-	-	17	51	36 : 100 : 68
1984	22	33	-	-	-	18	73	67 : 100 : 55
1985	-	-	-	-	-	-	-	No survey in 1985
1986	15	40	-	-	-	21	76	38 : 100 : 53
1987	17	35	-	-	-	12	64	49 : 100 : 34
1988	22	47	-	-	-	14	83	47 : 100 : 30
1989	21	35	-	-	-	18	74	60 : 100 : 51
1990*	28	53	-	-	-	26	107	53 : 100 : 49
1991	11	36	-	-	-	24	71	30 : 100 : 67
1992	11	32	-	-	-	13	56	34 : 100 : 41
1993	8	37	-	-	3	9	54	22 : 100 : 24
1994	10	41	-	-	9	18	69	44 : 100 : 24
1995	10	26	3	13	9	25	61	38 : 100 : 104
1996	2	22	1	11	7	19	43	9 : 100 : 86
1997	3	19	2	21	7	30	52	16 : 100 : 158
1998	0	8	0	9	7	16	24	0 : 100 : 200
1999	0	16	0	6	2	8	24	0 : 100 : 50
2000	2	9	0	4	4	8	19	22 : 100 : 89
2001	5	8	0	2	2	4	17	63 : 100 : 50
2002	5	8	3	2	4	9	22	63 : 100 : 113
2003	9	17	3	4	3	10	36	53 : 100 : 59

* Annual "censuses" have been conducted regularly in the fall from 1990 on.

We believe that this bighorn sheep population declined subsequent to about 1995 mainly as a result of complications from exceptionally high internal parasite loads. Mortalities appear to have been highest from 1996 through 1998. Surviving animals observed in 1998 and 1999 were generally in poor physical condition (thin, gaunt body mass, signs of chronic scours, and unusually poor horn growth). No lambs were observed at any time in 1998 or 1999 and only 2 lambs appear to have been produced in 2000.

Efforts to determine the primary cause of the herd decline began in 1999. Numerous samples of fecal pellets were collected in all seasons and sent for analysis of parasites to both the Washington State University Veterinary Sciences Laboratory as well as the Canadian Food Inspection Agency Laboratory in Saskatoon, Saskatchewan. In November of 2000 an adult ram was euthanized and necropsied by the Washington State University Diagnostic Laboratory. (Foreyt 1999 and 2000). While this ram was in good health, it also carried a high density of nematode larvae judged to be, or similar in appearance to *Parelaphostrongylus,* a muscle worm (Murphy, 2000). Additional fecal samples were collected. Further analyses accomplished by Dr. Alvin Gajadhar identified *Muellarius capillaris*, the lungworm of domestic goats rather than *Parelaphostrongylus* (Gajadhar 2002). Domestic goats were known to share part of the Vulcan Bighorn Sheep range. The parasite *Muellarius capillaris* using slugs and snails as intermediate hosts, was able to "jump" from domestic goats to the bighorn sheep. Native bighorn sheep having less natural resistance than domestic goats to *Muellaris capillaris,* likely succumbed to pneumonia that this parasite causes (Hall 2002).

Since the fall of 2002 the owners of the domestic goats have substantially reduced the number of goats in their herd and no longer allow them to free-range. Bighorn sheep still visit the private rangeland, however, where commingling with goats has occurred. In June of 2003, the bighorn sheep were photographed within the fenced domestic goat pasture. Alarming and undesirable as this is, the bighorn sheep population likely has *Muellerius* already established in the population. Brief contact with the domestic goats therefore may not change the level of this parasite within the sheep, depending upon if and when goats are shedding larvae. The greater concern is if there is nose-to-nose contact between the wild sheep and domestic goats in which *Pasteurella* could be transmitted to the bighorn sheep (Mansfield DVM, MPVM 2004). The last bighorn sheep fecal samples

tested were collected in November of 2003 and the results indicated relatively low parasite levels. The fact that the bighorns appear healthy and are producing lambs annually since the year 2000 suggests that the overall health of the herd is acceptable.

Range use and habitat enhancement

Between April of 2002 and March of 2004, six of the Vulcan Bighorn Sheep including 3 rams and 3 ewes were captured by helicopter net-gun and fitted with radio collars. Five bighorn sheep from Nevada were radio-collared and released at Vulcan in January of 2003. The purpose of this radio telemetry study was to document the range use, especially the use of timbered vs. open habitats for the U. S. Bureau of Land Management (BLM) and U. S. Forest Service (USFS) habitat managers. Monitoring since that time has shown little movement from the traditionally known range amongst these sheep.

In the past six years several projects to enhance habitat for the Vulcan Mountain Bighorn Sheep have been accomplished. These include broad range weed control, forage plant seeding, water source development, and temporary fencing at Moran Meadow to better control cattle grazing. Partners accomplishing these projects include several local private landowners, the Foundation for North American Wild Sheep (FNAWS), the Safari Club International (SCI), the Inland Northwest Wildlife Council (INWC), the USFS, the BLM, and the WDFW. The BLM has also implemented a timber sale within the core sheep range in 2003 to improve escape habitat for bighorn sheep through greater sight distances in the most heavily forested portions of their range. This forest management will also provide opportunity to increase forage production for bighorn sheep.

Management conclusions

The Vulcan Mountain Herd of bighorn sheep appears to have recovered in health and is now recovering in population. Nevertheless a population bottleneck of probably fewer than 25 animals occurred between 1998 and 2001. The Vulcan herd was augmented with 5 new sheep from Nevada in early 2003. This transplant coupled with continuing herd recovery probably contributed to the June 2003 observation of at least 10 new lambs which is the highest number observed since the early 1990s. With good lamb recruitment, the Vulcan herd should return to the population goal of 80 – 110 animals. Limited entry hunting will need to be implemented to keep the herd from over-populating. In addition habitat protection and improvement involving a collaborative effort of the private landowners, the federal (BLM and USFS) land managers, and wildlife supporting organizations (FNAWS, SCI, INWC) should continue to be a high priority for the long-term success of this herd. Herd health will continue to be monitored and potential conflicts with domestic sheep and goats will be addressed to the extent private owners are interested and willing to cooperate.

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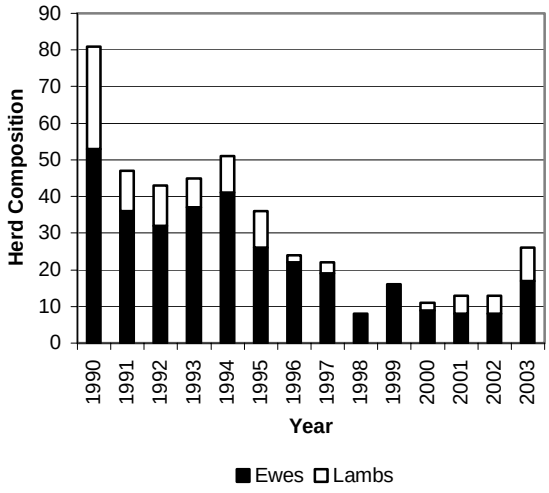

Figure 1. Vulcan Mtn. Bighorn sheep ewe and lamb composition, 1990-2003.

Table 2. Summary of State and Colville Confederated Tribes (CCT) hunter harvest of bighorn sheep from the Vulcan Mountain Unit from 1981 through 1999.

Year	Org.	# Tags	Harvest	Avg. Age	Horn Length*
1981	State	3	3 rams	6.3 years	38, 37, 36
1982	State	3	3 rams	7.7	32, 37, 38
1983	State	3	3 rams	6.3	38, 36, 37
1984	State	2	2 rams	5.5	35, 33
1985	State	2	1 ram	4	29
1986	State	3	3 rams	7.7	37, 36, 39
1987	State	3	3 rams	7.3	35, 32, 36
1988	State	3	3 rams	No data	30, 31, 33
1989	State	2	2 rams	6.5	35, 36
1990	State	3	3 rams	6.7	36, 33, 33
1991	State	2	2 rams	6.5	33, 25
1992	State	3	3 rams	6.3	32,33,29
1993	State	4	4 rams	5.8	36,27,35,33
1994	State	4	4 rams	6.3	32,33,33,31
1995	State	2	2 rams	5.5	36,31
1995	CCT	2	1 ram	1.5	No data
1996	State	2	2 rams	6.6	33,33
1996	CCT	2	ram, ewe	Ram = 1.5	No data
1997	State	1	1 ram	6.0	30
1997	CCT	1	None	---	---
1998	State	1	1 ram	5	27
1998	CCT	1	None	---	---
1999	State	1	1 ram	10.5	30
1999	CCT	1	None	---	---

** Total horn length in inches*

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 2
MT. Hull Unit 10

SCOTT FITKIN, District Wildlife Biologist
JEFF HEINLEN, Field Biologist

Population objectives and guidelines

The Mt. Hull herd is being managed for steady population growth for as long as available resources will support increased numbers. A conservative, any ram permit harvest also is allowed to the extent it is compatible with population growth objectives.

Hunting seasons and harvest trends

Improving herd demographics, particularly in the ram cohort, allowed for the issuance of one ram permit in 2003 after three years of no harvest following the fire of 2000. The permit holder harvested a nice mature ram; no harvest occurred under the tribal any sheep permit (Table 1).

Table 1. Summary of harvest information for bighorn sheep in the Mt. Hull Unit.

Year	Permits	Harvest	CCT[a] Permits	CCT Harvest
1992	2 ram	2 rams	0	--
1993	1 ram	1 ram	0	--
1994	1 ra	1 ram	0	--
1995	1 ram	0	1 ewe	0
1996	1 ram	1 ram	1 ewe	0
1997	1 ram	1 ram	1 ewe	0
1998	1 ram	1 ram	1 ewe	1 ewe
1999	1 ram	1 ram	1 any	1 ram
2000	0	--	1 any	0
2001	0	--	?	?
2002	0	--	1 any	0
2003	1 ram	1 ram	1 any	0

[a] CCT=Colville Confederated Tribes

Surveys

Biologists conducted a helicopter survey of the Mt Hull Unit in early December 2003 and classified 80 sheep, including twelve rams $\geq$ ¾ curl (Table 2). This is the highest count in at least twelve years and represents most of the herd. It is likely that the ram cohort reflects immigration from Canada following the large-scale fires to the north in British Columbia during the summer of 2003. Also noteworthy is the excellent lamb productivity as evidenced by the high lambs:100 adults ratio. This may reflect improved forage conditions following the 2000 fire, and perhaps indicates overall increased herd vigor due to genetic mixing since recent augmentation efforts.

Population status and trend analysis

Observational data suggests that the Mt. Hull herd grew fairly steadily following reintroduction in 1970. Numbers were highest in the late 1980s and early 90s during a spell of mild winter weather, peaking in 1991 at 80-90 animals. The population declined somewhat in the early 1990s, particularly following the severe winter of 1992-93. Herd numbers climbed gradually for the last ten year and are now approaching the all time high. The ram cohort suffered a setback during the fire of 2000, when most of the mature males disappeared, some apparently dispersing to Canada. Lately; however, with help from a reversal of forune, this cohort has now recovered as well, in part due to emigrating Canadian animals.

In 2001 WDFW augmented the herd with 8 ewes and 3 rams from the Cleman Mountain area. This herd was again augmented in 2003 with 5 animals from

Table 3. Population composition counts from the Mt Hull area. <3/4 = less than 3/4 curl rams, >3/4 = greater than 3/4 curl rams, and L: 100:R is lambs (L) and rams (R) per 100 ewes (100).

			Rams			Count	Population	
Year	Lambs	Ewes	<3/4	≥3/4	Total	Total	Estimate	L: 100:R
1992	0	26	1	7	8	34	80	0:100:31
1993	0	17	2	7	9	26	--	0:100:53
1994	5	28	2	8	10	53	--	18:100:36
1995	11	16	6	11	17	44	55	69:100:106
1996	0	5	10	6	16	21	40-60	0:100:320
1997	8	25	--	--	8	41	55-65	32:100:32
1998	--	--	--	--	--	--	--	--
1999	19	24	15	8	23	66	70	80:100:96
2000	21	30	9	0	9	60	60-65	70:100:30
2001	10	30	15	4	19	59	60-70	33:100:63
2002	11	40	6	4	10	61	65-70	28:100:25
2003	20	39	9	12	21	80	80-90	51:100:54

Oregon. Augmentation efforts are primarily designed to maintain genetic diversity. Population growth is achieved largely through natural production. Given the limited range and insular characteristic of the sheep range on Mt Hull, herd size may be nearing carrying capacity.

Habitat condition and trend

The Mt. Hull range has generally remained in good shape and recent fires appear to have reinvigorated natural forage production. Sheep use has become more concentrated in the portion of the range within the perimeter of the 2000 fire.

Even so, noxious weed invasion is a concern. Cheat grass has flourished in portions of the burn and other new invasives may be gaining a foothold in the area, including white-top and dalmation toadflax. In the past programs such as the Forest Service's aggressive weed control effort, funded by FNAWS have been helpful, and similar efforts will likely be needed into the future.

Most recently, animals enjoyed a mild winter in 2003-04 with good access to forage. As a result high over-winter survivorship is expected.

Management conclusions

The Mt. Hull herd appears to be thriving aided by improved post-fire forage conditions, genetic mixing through augmentation, and probable immigration from British Columbia. Robust productivity and improving male demographics should easily support the anticipated harvest of two rams annually in the long-term, with additional ram harvest possible. In fact, the herd may soon reach the carrying capacity of the habitat. If so, then more aggressive management such as ewe harvest and/or translocation of animals to other areas will be necessary. Range condition and herd productivity should be monitored for indications of overpopulation.

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 2
Swakane Canyon, Chelan Butte and Lake Chelan

BEAU PATTERSON, District Wildlife Biologist
TOM McCALL, Wildlife Biologist

Population objectives and guidelines

Within the Wenatchee District, California bighorn sheep are found west of the Columbia River. They have been reintroduced to Swakane Canyon, the north shore of Lake Chelan and Chelan Butte. There are also bighorns from the Quilomene herd that use the south part of the District in the Colockum Creek and Squilchuck Creek watersheds.

Management objectives for the Wenatchee District are: (1) increase the size and range of existing populations; (2) ensure genetic strength by augmenting existing populations with bighorn from other areas; (3) minimize risk of disease by eliminating overlap with domestic sheep grazing allotments on public land, and provide information to the public about the importance of keeping these species apart; (4) reintroduce bighorn to historic but unoccupied habitat within the District; and (5) provide public viewing opportunities.

There were an estimated 55 bighorns in the Swakane herd in June 2004, based on subtracting known mortalities from the June-July 2003 minimum population. The population objective for Swakane is 50-60 adult sheep.

Between March 1999 and March 2001, 53 California bighorns from Washington and British Columbia were released on the north shore of Lake Chelan (Table 1). The population was estimated at 98-129 animals in June 2004, and the current population objective for the herd is 200 adult sheep.

On January 23, 2004, 35 bighorn sheep from the Clemans Mountain herd were released on Chelan Butte, south of Lake Chelan. Composition of the release was 20 ewes, 12 lambs (7 female, 5 male) and 3 rams (2.5, 2.5 and 3.5 years old). All released bighorns were marked with a white eartag in the right ear, and 8 adult and 4 yearling ewes were radio-collared. A population objective has not been established, however habitat analysis (Musser and Dauer 2003) suggests sufficient habitat exists for a population of 195-390 sheep.

Hunting seasons and harvest trends

In 1999, the first ram permit was offered for the Swakane herd, followed by one permit per year for 2000-2001. The hunting season runs September 15-October 10. All of the hunters have been successful at killing a trophy ram ($\geq$3/4 curl). For 2002, one permit was offered for the Swakane and the auction hunter also hunted the area. Both hunters took large $\geq$3/4 curl rams. Only one permit was offered for Swakane in 2003 and 2004, to ensure a sufficient number of older rams for public viewing. At least 2 non-hunting adult ram mortalities occurred in 2003-2004, an injured 3 year old ram euthanized by WDFW, and a 12 year old ram discovered dead of unknown causes. No hunting will occur in the Lake Chelan and Chelan Butte herd until at least 5 years post-introduction, per management guidelines.

Surveys

The Swakane area has considerable tree and shrub cover limiting aerial survey effectiveness. In June 2002, one hour was spent searching for sheep by helicopter, but no sheep were located. For the Swakane, we rely primarily on incidental reports from Washington Department of Fish and Wildlife personnel, permit hunters, and the public, and from ground surveys during the rut and winter period (Table 2). Radio transmitters would help locate groups of sheep and improve survey data. From July 2002 through September 2003, two reports were used to develop the minimum population estimate for 2003:

1) First half of July 2003, 26 ewes and 13 lambs using oat field in Swakane Canyon.
2) June 3, 2003, AHE volunteers counted 20 rams in three groups during coordinated volunteer survey.

On June 2, 2004, the Lake Chelan and Chelan Butte herds was surveyed by helicopter, using radio-telemetry to locate collared sheep. Telemetry proved invaluable for finding sheep that were hiding in timber or rocky habitat. Ninety-four sheep were found on the north shore of Lake Chelan. Composition consisted of 16 rams (5 > 3/4 curl, 10 < 3/4 curl, 1 indeterminate), 62 ewes, and 16 lambs (Table 3). Eleven of the 12 radioed bighorns released on Chelan Butte were located, resulting in observations of 23 ewes and 10 lambs. In addition, subsequent photographic evidence from a member of the public indicates all 3 rams are alive, for a minimum June 2004 population of 36 bighorns. No mortalities of released sheep have been

reported or detected. Assuming all released adult ewes survived, had identical reproduction to the observed ewes, and released lambs survived and were recruited as yearlings (classified as adults on the survey), the maximum June 2004 population was 47. The actual June 2004 population is therefore in the range of 36-47.

Population status and trend analysis

From 1992 to 2000, the Swakane bighorn population increased slowly (Table 2). In 2001 the population was estimated at 51 sheep, representing a 46 percent increase compared to the 1992-2000 average. The increased numbers in 2001 resulted from a new alfalfa field in the Swakane, which attracted ewes and lambs, facilitating detection. This trend has continued in 2002 and 2003. It is likely increased sightability, rather than population growth, accounts for some of the increase. Additionally, each succeeding permit hunter has used the knowledge of the previous hunters to help locate rams, which has enhanced our counts of rams; and a valuable AHE survey in June 2003 boosted the ram count. A minimum of 13 lambs was produced in 2003, and 10 in 1994, compared to the observed average of 4.4 lambs for 1992-2001.

Proliferation of residential developments and associated ornamental plantings along the west shore of the Rocky Reach pool may be enticing bighorns to cross Highway 97-A with increasing frequency and annual duration. Other possibilities include attraction to chemical deicers, feeding by the viewing public, and displacement by public activity or predators (evidence that a female cougar with kittens occupied a traditional lambing area in Swakane Canyon was observed in September 2003). For over 20 years, no bighorn mortalities attributable to vehicle collisions were documented. Since 2002, at least 7 Swakane bighorns have been killed by vehicles on Highway 97-A (5 male, 2 female), and the Washington Department of Transportation, State Patrol and Burlington-Northern Railroad have contacted the Wenatchee field office due to concerns with increased frequency of bighorns on this highway. In Spring 2004, the Wenatchee Sportsmen Association convened a multi-agency working group to address deer and bighorn sheep vehicle collisions on Highway 97-A, and are seeking means to reduce both deer and sheep collisions on this highway.

The Chelan herd has exhibited rapid population growth typical of a founder population in excellent quality, unoccupied habitat. Disease and wildfire concerns have not to date resulted in observed impacts to the population. Lamb survival has been high. Ninety-four sheep were observed during the June 2003 survey. In late June 2003, the National Park Service at Stehekin reported 3 ewes at Rainbow Falls, 3 miles above the mouth of the Stehekin River; this is over 20 air miles from the next highest uplake observation. Based on high lamb and ewe survival, it is likely that ram survival is also high; however, few rams have been observed on aerial surveys. In 2004, June survey data were used to calculate 2002-2004 population trends, based on a 2001 population of 50; trends in ewe counts, which are likely the most reliable trend due to the banding behavior of ewes and presence of 10-14 radioed ewes annually, indicate a 3 year average annual population growth rate of 38%. Total count trends indicate a 3 year average annual population growth rate of 25%. Based on these trend estimates, the population was 70-75 in 2002, 83-113 in 2003, and 98-129 in 2004.

There are probably less than 20 bighorns that use the Colockum and Squilchuck watersheds within the Wenatchee District. These sheep are part of the Quilomene herd.

Habitat condition and trend

Habitat conditions for both Swakane and Chelan bighorns are excellent, in part due to the high frequency of fires. Fires reduce tree and shrub cover and increase the abundance of grasses and forbs, which in turn benefit bighorns. During summer 2001, the Rex Creek fire on the north shore of Lake Chelan burned over 53,000 acres. However, only a small portion of this burn was known occupied bighorn habitat. During summer 2002, the Deer Point fire on the north shore of Lake Chelan, and down-lake from the Rex Creek fire, burned over 43,000 acres, including most of the occupied bighorn habitat of grass, bitterbrush, mixed shrubs, and ponderosa and lodgepole pine. In October 2002, at least 25 bighorns moved up-lake to the Point-No-Point area of the Rex Creek burn to take advantage of the new forage. Supplemental feeding of airlifted alfalfa hay was done in November 2002, to ensure survival of the transplanted herd of bighorns. Winter conditions were extremely mild, and the alfalfa was not utilized to a large degree. Weed surveys were conducted in July and August 2003, to ensure this effort did not introduce new weed species to the Lake Chelan basin. Forage quantity and quality appear to have improved greatly for sheep in spring 2003, following the release of nutrients from both the fires.

The Dinkelman fire in the Swakane area, which burned in 1988, proved beneficial to the bighorns in this area. In Swakane Canyon, several fields have been planted in alfalfa and oats, which enhanced bighorn habitat, and were used by ewe/lamb bands. There are

further opportunities to enhance bighorn, mule deer and other wildlife habitats in Swakane and on Chelan Butte, but these have been limited due to funding constraints.

Due to the dependence of California bighorns on low elevation habitats that are also desirable for human developments, there is long-term habitat loss occurring due to conversion and development of native habitat. Maintenance of habitat connectivity at low elevations in Chelan County is vital to the long-term health of all 4 herds.

Wildlife damage

Two reports of agricultural damage attributed to bighorns were received in 2003. Ohme Gardens, an irrigated horticultural development in cliff habitat at the edge of the Swakane bighorn range, has complained of bighorn use of these ornamental plantings. An orchardist in southern Chelan County complained about Quilomene herd bighorns use of his cherry orchard. No complaints have resulted in a claim for compensation.

Augmentation and habitat enhancement

The Chelan herd is growing rapidly, and presumably has good genetic diversity due to the variety of founder sources (Table 1). For Swakane, augmentation is necessary to achieve the population objective for the herd, given the historic stagnant nature of the population and small founder population. However, because Swakane bighorns have a documented history of intermixing with domestic sheep from nearby grazing allotments, the risk of *Pasteurella* pneumonia for bighorns would likely increase as the herd expands in size. WDFW and the Wenatchee National Forest are working on a memorandum of agreement for management of conflicts related to bighorns and domestic sheep.

The Moses Coulee area in Douglas County offers potential habitat for bighorn reintroduction. Much of the area is privately owned, but the proportion in public ownership has increased in recent years. A long-term agreement with landowners to eliminate potential for contact with domestic sheep would be required before reintroducing bighorns in Douglas County.

Management conclusions

The threat of disease from domestic sheep is significant for Swakane bighorns. Domestic sheep were documented 3 times within the core habitat of Swakane bighorns in 2000. Domestics were twice reported and once confirmed in the core area in 2003, and one domestic sheep in the core area was euthanized by WDFW with prior permission from the presumptive owner. Bighorn rams were documented in domestic sheep allotments twice during 2000. Wenatchee National Forest is currently evaluating sheep allotments in the area. The WDFW and Wenatchee National Forest are currently developing a Memorandum of Understanding concerning bighorn management. These efforts are expected to reduce overlap and conflicts between domestic sheep and bighorn. The Swakane herd would benefit from augmentation, but such efforts will be postponed until domestic sheep conflict issues are resolved.

The Swakane bighorn population is somewhat unique in being highly accessible to the viewing public along Highway 97-A during the winter months. Viewing opportunities, in particular large adult rams, are highly valued by a largely nonconsumptive viewing public. Harvest management should be conservative to maintain this viewing opportunity. Further investigations of strategies to reduce highway mortalities are warranted.

The population objective of 200 for the Lake Chelan herd is extremely conservative, based on the low potential for conflicts, US Forest Service management emphasis for bighorn sheep habitat, and the increase in habitat resulting from wildfires. Conservative estimates of available habitat, based solely on the extent of the 2001 and 2002 fires, suggests there may be habitat to support 800-1600 bighorns. Consideration should be given to significantly increasing this population objective. Harvest management criteria indicate 1-2 permits should be authorized for the 2005 hunting season.

Aerial surveys of bands located with radio-telemetry presents the best opportunity to monitor the status of Swakane, Chelan Butte and Lake Chelan herds. There are no active transmitters in the Swakane, and many of the collars in Chelan have died or are reaching the end of battery life. At least 6-10 radio transmitter collars should be attached to primarily adult ewes in each herd to facilitate accurate monitoring of herd size, productivity and composition. Optimum monitoring would involve 2 helicopter surveys per year, during June following lambing to monitor production, and during the November rut to monitor rams. Chelan Butte bighorns should be adequately radioed at least through 2006.

Literature Cited

Musser, J., and P. Dauer. 2003. Bighorn reintroduction site evaluation. USDI-BLM Wenatchee Resource Area. 14p.

Table 1. California bighorn sheep released on the north shore of Lake Chelan, Chelan County, 1999-2001.

Release Date	Composition	Source
March 17, 1999	10 ewes, 1 male lamb	Lincoln Cliffs, WA
March 17, 1999	2 3-year old rams	Quilomene, WA
February 11, 2000	4 ewes, 2 lambs (1 male, 1 female)	Umtanum, WA
	4 ewes, 1 female lamb	Quilomene, WA
February 16, 2000	2 rams (1 2-year-old, 1 3-year-old)	Clemons Mtn., WA
March 18, 2000	15 ewes, 3 rams (2 2-year-olds, 1 3-year-old), 3 male lambs	Kamloops, B.C.
January 31, 2001	3 ewes (2 ad., 1-1 1/2 years old), 3 male lambs	Clemons Mtn., WA
Total	53 sheep	

Table 2. Population composition of the Swakane bighorn sheep herd, Chelan County, 1992-2003.

			Rams							
Year	Lambs	Ewes	Yrl	<3/4curl	≥3/4 curl	Total rams	Total sheep	Population estimate	Lambs: 100 ewes	Rams: 100 ewes
1992	4						4	20		
1993	2	9			1	6	17	25	22	188
1994	6	8		1	7	8	31	30	75	100
1995	6	6		3		12	27	30	100	200
1996	3	19	2	8	6	16	38	38	16	84
1997	2	4			2	2	8	25	50	50
1998	3	9		7	4	11	23	30	33	122
1999	4	20		5	7	12	36	36	20	60
2000	5	14	1	1	8	10	29	35	36	71
2001	9	23	3	6	10	19	51	51	39	83
2002	10	25	2	9	8	19	54	54	40	76
2003	13	26	3*	5*	8*	20*	59	58**	50	77

*20 rams observed on coordinated volunteer survey June 3, 2003, but only 12 classified; **post-season 2003 estimate (1 ram harvested 2003)

Table 3. Observed population composition and minimum estimated population of the Lake Chelan bighorn sheep herd, Chelan County, 1999-2004.

			Rams							
Year	Lambs	Ewes	Yrl	<3/4 curl*	≥3/4 curl	Total rams	Total sheep	Lambs: 100 ewes	Rams: 100 ewes	Population estimate
1999	2	10	1	2		3	15	20	30	15
2000	6	33	5	6		11	50	18	33	50
2001	12	24	8	4		12	48	50	50	50
2002	17	36	8	6		14	67	47	39	70-75
2003	20	54	0	4	1	5	79	37	9	83-113
2004	16	62	0	11	5	16	94	26	26	98-129

*Note: 1 ram observed in 2004 was indeterminate < or > 3/4 curl, it was included in <3/4 count

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 3
Quilomene, Cleman Mountain, Umtanum/Selah Butte, and Tieton

JEFFREY BERNATOWICZ, District Wildlife Biologist

Population Objectives/guidelines

The statewide goals for bighorn sheep are:

1. Preserve, protect, perpetuate, and manage bighorn sheep and their habitats to ensure healthy, productive populations.
2. Manage bighorn sheep for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing and photography.
3. Manage for sustained yield.
4. Numerical goals for each herd are provided in tables 2,3,4 and 5.

Hunting Seasons And Harvest Trends

Region 3 supports four populations of California Bighorn: Tieton, Cleman Mountain, Umtanum/Selah Butte, and Quilomene. Hunting is permit, ram only and occurs in all units but Tieton. The number of permits and harvest are given in table 1.

Surveys

Quilomene, Umtanum/ Selah Butte, and Tieton are typically surveyed via helicopter. In 2004, funding was only available to survey Quilomene. Individuals from Foundation for North American Wild Sheep (FNAWS) ground counted sheep in Tieton and Umtanum/Selah Butte. Clemans Mountain is ground surveyed in June and at the feeding station in January. Additional observations of sheep in other units are obtained during surveys for other species. The Tieton herd is also monitored via tracking radioed sheep. All available information is used to estimate the total population. Survey results are given in tables 2, 3, 4 and 5.

Population Status And Trend Analysis

Bighorn sheep were native to areas within Region 3, but had been eliminated by over hunting and disease transmitted from domestic animals by the early 1900s. Bighorn sheep re- introductions began in Region 3 during the 1960s on the Colockum Wildlife Area and Cleman Mt.

The Colockum reintroduction was the first in the region and the population was estimated at over 100 animals by the late 1960's. The population crashed in the early 1970's. The cause of the decline was not totally documented, but was either a result of *Pasteurella H*. pneumonia or winter mortality. Colockum bighorns were at very low numbers in the 1980s and reportedly died out by 1990. Reintroduction was initiated in 1993. By 1996, 41 bighorns had been released in the area. The Quilomene population quickly grew to over 160 sheep (Table 2). In recent years, animals have either dispersed or hid when the helicopter approached, as there is no obvious trend in the survey data. In 2004, 99 ewes were seen, but no young rams documented.

The Cleman Mountain population was established in 1967 with eight animals. The herd grew rapidly to over 100 animals (Ellis Bowhay, Pers. Comm. 1998) and then crashed and stagnated in the late 1980s. The decline and stagnation was probably a result of disease. A portion of the population was captured, tested, and treated with antibiotics in 1990. Augmentation included 27 animals from 1989-96. Production and herd growth have increased and exceeded to population goal of 150 animals in 2000(Table 2). In January 2001, 11 ewes and 7 young rams were captured and moved to herds in Region 2. Another 20 ewes, 12 lambs and 3 rams were captured and moved to Region 2 in January 2004. Ground counts documented 185 animals in 2004, but the number of rams seen is questionable.

The Umtanum herd was established in 1970 with the release of eight animals. Within 15 years the population grew to an estimated 200 animals and sheep crossed the Yakima River. Originally, sheep on the east side of the river were considered a separate herd (Selah Butte). Surveys have shown large numbers of animals crossing the river in both directions annually and it is now considered one herd.

Population estimates for Umtanum/Selah Butte have varied between 170 and 200 animals since 1989 (Table 4). Dispersal, winter mortality, and the removal of 52 sheep for augmenting other populations are suspected for causing the fluctuation. The past 3 years the count has been approximately 170 animals with lamb production similar to Clemans. It is unknown why more animals aren't being documented.

The Tieton River herd has been established with the release of 54 sheep from 1998-2002. Documented losses have included 8 ewes and 3 rams emigrating, 1 ram poached, 1 ewe predated (probable bear), and 4 road kills (3 ewes, 1 lamb). A total of at least 70 lambs have been produced in 7 years. In 2004, ground surveys documented 1 large lamb/ewe group with 19 lambs. Other groups were suspected based on radio telemetry,

but not documented. Assuming minimal emigration and mortality, the population should now be ~90 animals.

Habitat Condition And Trend

Forage resources vary annually with moisture. The past 3 summers have been drought conditions. Noxious weeds are present on all sheep ranges especially along roadways. It is important to continue management of these areas to prevent further invasion of noxious weeds. Small fires in the Yakima Canyon have reduced shade and escape cover in the primary lambing area, but the regenerated grasses are providing abundant food. Re-growth from a fire in the Tieton has attracted 50 of the known sheep in the herd.

Augmentation/habitat Enhancement

In the past 5 years, reintroduction/augmentation efforts have focused on the Tieton. Fifty-four animals have been released in the area. The source of the sheep has been Quilomene, Umtanum, Selah Butte, Lincoln Cliffs and John Day, Oregon. In 2001, 11 sheep from Lincoln Cliffs were released at the south end of the Yakima Canyon. Mineral blocks have been put out within the range of all 5 herds. Three guzzlers were installed in the Tieton in fall 2002 in cooperation with the USFS. Sheep at Clemans Mt. are feed during the winter.

The bighorn sheep population in Region 3 is healthy and growing. However, the history of bighorn sheep in Region 3 has been one of boom and bust. Historical declines have likely been associated with disease, particularly *Pasteurella H.*, which is transmitted by domestic sheep. The probability of another disease outbreak is high. Domestic sheep have been documented either with, or within a few of wild sheep in every herd in the Region. In addition, bighorns, particularly young rams, have been documented in or near domestic sheep grazing allotments. Private rangelands within/bordering areas frequented by bighorn sheep in the Quilomene, Umtanum/Selah Butte, and Tieton, which are idle, or grazed by cattle, could be converted to domestic sheep.

Domestic goats have increased dramatically in the area in the past 5 years. It is unknown if the goats harbor diseases or parasites harmful to bighorn sheep, but herd declines have coincidentally occurred after contact with domestic goats in other parts of Washington. In 2003, bighorn sheep from both Umtanum/Selah Butte and Clemans were documented with or near domestic goats. The 2 bighorn rams known to have contacted domestic goats were captured and send to WSU for testing. The Selah Butte animals returned to the main herd.

The best long term insurance is to re-establish bighorn sheep in as many separate ranges as possible. If one population declines, other separate populations should be available as a source of clean stock for augmentation. The bighorn sheep population level .vs risk of disease must be assessed. History has shown that bighorns can't be stockpiled. As the wild sheep population grows, the probability of a contacting disease increases. Removal for transplant has been used frequently in the past 7 years and should be continued.

Table 2. Quilomene June Population Compostion.

Year	Lambs	Ewes	Total Rams	Adult Rams	Total Count	Estimated Population	Desired Population
1995	12	26	7		45		
1996	14	43	13		70		
1997	19	44	23		86		
1998	21	46	19	4	86	143	
1999	30	57	41		128	164	
2000	31	59	43	33	133	165	
2001	29	68	34	22	131	165	
2002	11	33	24	16	68	165	
2003	23	63	28	18	114	Unknown	
2004	13	99	32	32	144	Unknown	250-300

Table 3. Clemans Mt. June Population Compostion.

Year	Lambs	Ewes	Total Rams	Adult Rams	Total Count	Estimated Population	Desired Population
1989			12		31	35	
1990	7		16			40	
1991	7	13	23	2	47	47	
1992	8	19	20	1	47	47	
1993	8	20	23		51	51	
1994	4	18	27		49	55	
1995	6	17	20	4	43	60	
1996	9	30	19		58	65	
1997	17	40	24	2	81	100	
1998	20	42	36		98	117	
1999	32	66	37		135	135	
2000	40	77	39	33	156	156	
2001	18	63	53	39	134	141	
2002	25	91	55	36	171	171	
2003	32	104	66	35	203	203	
2004	17	83	85		185	185	150-160

Table 4. Umtanum/Selah Butte June Population Compostion.

Year	Lambs	Ewes	Total Rams	Adult Rams	Total Count	Estimated Population	Desired Population
1989						170	
1990						180	
1991						190	
1992						190	
1993	32	66	31		129	200	
1994	20	102	29		151	200	
1995	41	83	53		147	175	
1996	34	72	52	0	158	175	
1997	13	61	36	11	110	175	
1998	30	41	37	4	108	175	
1999	26	68	44	0	138	175	
2000	30	60	56	46	146	180	
2001	42	82	40	31	174	190	
2002	27	97	43	23	167	190	
2003	26	94	52	38	172	190	
*2004	33	87	28		148	190	250-300

* FNAWS ground count

Table 5. Tieton Maximum June Population.

Year	Lambs	Ewes	Total Rams	Adult Rams	Total Count	Estimated Population	Desired Population
1998	4	6	1	1	11	11	
1999	4	14	7		25	25	
2000	11	24	11		46	46	
2001	13	35	19		67	67	
2002	10	30	8	8	48	70	
2003	10	40	20	11	70	80	
2004	19	33	5		57	90	75-150

Moose

MOOSE STATUS AND TREND REPORT: REGION 1
GMUs 101, 105, 108, 111, 113, 117, 121

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STEVE ZENDER, District Wildlife Biologist

Population objectives and guidelines

Moose population management objectives in Washington are to maintain a healthy population and to provide quality hunting opportunity through limited entry permits.

Hunting seasons and harvest trends

Moose hunting opportunity in Washington is limited by permit. If drawn, it is a once in a lifetime opportunity. There is a mandatory hunter report to be returned to WDFW.

Permit availability and therefore moose hunter opportunity in Washington has increased over the last 15+ years (Figure 1.) Fifty-six permits were available in five moose management units within the Colville District for 2003 including the Kettle Range, Threeforks, Selkirk Mountains, 49 Degrees North, and Huckleberry Range Permit Hunts (Game Management Units # 101 / 105, # 108 / 111, # 113, # 117, and # 121 / 124 West respectively). One additional moose permit was available by raffle and one permit was available by auction, each offering hunters choice for any open moose unit. New for 2003 was the addition of "antlerless only" permits specifically for persons with disabilities. General permit season dates remained October 1st through November 30th. All moose units were open for the use of any legal weapon to provide eligibility to all hunters for all units and to maintain hunter weapon choice. Except for 3 antlerless moose tags under the 49 Degrees North B Permit Hunt, moose hunters in the Colville District units were allowed to take one moose of either sex.

A total of 51 moose were killed including 46 bulls and 5 cows within the Colville District units in the 2003 season (Table 1). The hunter success rate was 91% and hunters averaged 7.6 days hunting per moose harvested. The new hunt for persons with disabilities in the 49 Degrees North unit worked out well with 100% success on the 3 permits. Hunters averaged 4 days hunted per antlerless moose harvested.

Surveys

The primary moose survey effort is an annual helicopter survey in early winter. The initiation of a moose raffle hunt has greatly enhanced our aerial survey abilities by providing dedicated moose management funds.

Table 1. Colville District (GMUs # 101/105, 108/111, 113, 117, and 121/124 West) Moose Harvest and Hunter Effort, 1992 – 2003.

Year	Permits	Success	Bull	Cow	Total	Total Days	Days / kill
1992	9	78%	7	0	7	65	9.3
1993	9	78%	6	1	7	113	16.1
1994	15	100%	14	1	15	98	6.5
1995	20	85%	10	5	17	152	8.9
1996	23	96%	19	3	22	115	5.2
1997	21	86%	17	1	18	248	13.8
1998	28	89%	24	1	25	211	8.4
1999	32	84%	25	2	27	231	8.6
2000	41	93%	37	1	38	285	7.0
2001	47	83%	36	3	39	318	7.6
2002	49	84 %	37	4	41	443	10.8
2003	56	91 %	46	5	51	390	7.6

The 2003 winter helicopter survey was accomplished in the 49 Degrees North, Threeforks, and Huckleberry Range Game Management Units (Table 2). The sighting rate was 29.6 moose per flight hour which is the highest observation rate ever accomplished. We believe that this high observation rate is a reflection of how efficient we have become in finding and classifying moose as opposed to any substantially higher moose density and abundance. The bull to cow ratio was nearly even at 98 bulls per 100 cows. The calf to cow ratio was better than half to one at 56 calves per 100 cows.

Moose hunters provide their observations with the mandatory report. Hunters reported observing 473 moose within the Colville District during the 2003 season which yielded a bull : cow ratio of 126 bulls per 100 cows and a calf : cow ratio of 40 calves per 100 cows (Table 3). This ratio is higher for bulls and lower for calves than our observed ratio from the post-season (early winter) helicopter flights (Table 4 and Figure 2). The impressively high bull ratio is nonetheless consistent with our flight survey data.

Population status and trend analysis

Early winter composition survey flights have been accomplished each year for the last 10 years (Table 4 and Figure 2). The ten-year trend in the bull to cow ratio appears to be fairly stable with a ratio that almost

consistently exceeds 2 bulls for every 3 cow moose. The ten-year trend in the calf to cow ratio shows a marked increase in the calf ratio, but with substantial variation in the last five years (Figure 2). We believe that limited hunter harvest has not had an appreciable impact on the overall population composition of moose in northeastern Washington.

We monitor age and antler spread of harvested bull moose to detect trends in the age structure of the bull population, which in turn indicate the mortality rate on the bull population (Figure 3 and Table 5). For the Colville District in 2003, the mean antler spread of harvested bull moose was 39 inches. The average age of bull moose taken in 2003 was 5.3 years. Mostly bulls over 5 years of age were harvested in 2003 which has also been the case in 5 of the last 10 years.

Habitat condition and trend

Moose prefer 15-25 year old clear-cuts or thinnings on mesic sites. Forest regeneration in these areas tends to produce dense thickets of willows and other hardwood shrubs that moose browse. Logging was intense in northeast Washington in the 1980s on public and private lands. More recently the rate of logging on national forest lands has decreased. Heavy logging has continued on private and Washington Department of Natural Resources lands. Generally, forest successional conditions appear to be excellent for moose production over the next few decades.

Our observations during winters with relatively deep snow leads us to believe that mature forest stands that provide snow intercept cover and which are adjacent to forage areas may be essential to sustaining moose populations over the long term. As with every winter since 1997, the 2003-2004 winter was generally mild. Consequently, moose losses due to winter severity should have been minimal.

Human safety and nuisance problems

Moose occasionally create a nuisance and potential safety problem within small towns or communities within the Colville District. These "conflicts" are usually handled by either gently herding the moose out of the city limits or stopping traffic long enough for the animals to find their own way out. Possibly more serious in the rural areas of this district are the increasing motor vehicle collisions with moose. Moose have also been known to attack snowmobilers and hikers on foot.

Management conclusions

Moose permit levels for 2004 are the same as 2003 with 56 tags allocated within the Colville District. Moose survey and harvest data continue to indicate a robust moose population, with excellent quality hunting opportunity, and ample numbers of mature bulls.

The availability of moose management funds generated by the moose raffle and auction hunts has provided substantial support to annual moose survey efforts, habitat mapping, and hunting opportunity. This program has been an outstanding example of hunters getting a direct return from funds that they have contributed.

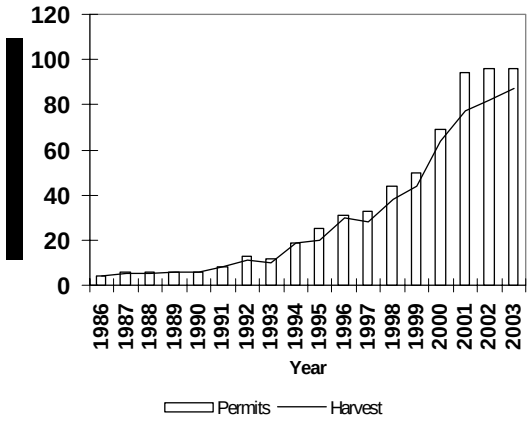

Figure 1. Statewide moose permit levels and harvest, 1986-2003.

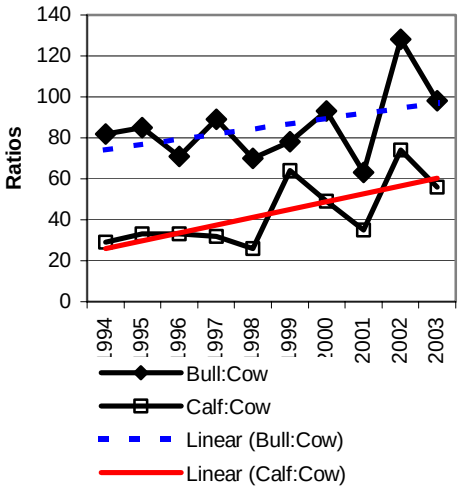

Figure 2. Composition and trends of moose herds as determined by early winter helicopter surveys 1994 - 2003. Areas surveyed vary annually.

Table 2. Composition counts of Moose for helicopter-surveyed areas in the 2003 winter.

Area	GMU	Date	Bull	Cow	Calf	Total	B:100C:Ca	Hours	Moose/hour
49 Degrees North	117	12/18,19/2003	33	42	21	96	79 : 100 : 50	3.3	29.1
Huckleberry Range	121/124	12/18/2003	18	16	9	43	113 : 100 : 56	1.1	39.1
Threeforks	111	12/19/2003	11	5	5	21	220 : 100 : 100	1.0	21.0
Overall :			62	63	35	160	98 : 100 : 56	5.4	29.6

Table 3. Moose hunter observations and days per kill in the Colville District for the 2003 season.

Area	Average Number of Days per Kill	Average Number of Moose Seen per Hunter	Bulls/Cows/Calves	Total Moose	Ratio Bulls : 100 Cows : Calves
Kettle Range	6.0	1.0	1 / 0 / 0	1	100 : 0 : 0
Threeforks	5.3	5.2	21 / 5 / 5	31	420 : 100 : 100
Selkirk Mtns.	13.9	5.4	53 / 40 / 15	108	132 : 100 : 38
49 Degrees N	4.5	10.3	114 / 112 / 33	259	102 : 100 : 29
Huckleberry Mtns.	8.0	18.5	35 / 21 / 18	74	167 : 100 : 86
Overall :	mean = 7.6	mean = 8.4	224 / 178 / 71	473	126 : 100 : 40

Table 4. Summary of early winter survey effort by helicopter on Moose within the Colville District from 1994 through 2003.

Year	GMUs Surveyed	Hours Flown	Total Moose Classified	Moose Observed per Hour	Bulls/Cow/Calf Ratio Bulls : 100 Cows : Calves
1994	113	n/a	36	4.2	82 : 100 : 29
1995	113	11.0	43	3.9	85 : 100 : 33
1996	117	5.0	49	9.8	71 : 100 : 33
1997	109, 117	8.2	146	17.8	89 : 100 : 32
1998	113, 117, 121, 124	10.5	92	8.8	70 : 100 : 26
1999	113, 117	7.0	92	13.1	78 : 100 : 64
2000	117, 109, 101, 105	9.2	143	15.5	93 : 100 : 49
2001	113, 117, 109, 121	11.0	97	8.8	63 : 100 : 35
2002	117, 121/124 W.	7.3	139	19.0	128 : 100 : 74
2003	117, 111, 121	5.4	160	29.6	98 : 100 : 56

Table 5. Tooth age and antler spread in inches for harvested bull moose in the Colville District from 1992 through 2003.

Year	Sample Size	Mean Age (years)	Mean Spread (inches)	Yearling	2-5 years old	> 5 years old
1992	5	4.5	39	0%	80%	20%
1993	6	5.0	35	0%	67%	33%
1994	8	3.9	36	0%	75%	25%
1995	8	5.9	37	0%	50%	50%
1996	17	5.7	37	6%	29%	65%
1997	16	4.1	34	13%	56%	31%
1998	22	4.8	41	0%	55%	45%
1999	22	5.4	36	10%	45%	45%
2000	34	6.7	41	0%	37%	63%
2001	32	6.9	39	0%	31%	69%
2002	37	5.1	36	3%	61%	36%
2003	46	5.3	39	0%	46%	54%

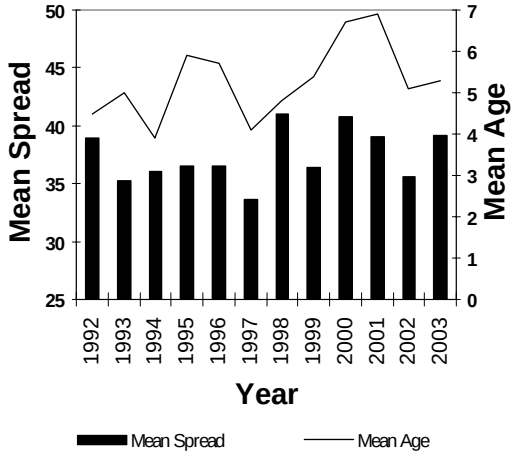

Figure 3. Average age (years) and antler spread (inches) of bull moose harvested within the Colville District, 1992 - 2003.

MOOSE STATUS AND TREND REPORT: REGION 1
GMUs 124, 127, and 130

HOWARD FERGUSON, District Wildlife Biologist
DAVID P. VOLSEN, Wildlife Biologist

Population objectives and guidelines

Statewide moose management goals are to: 1. Preserve, protect, perpetuate and manage moose and their habitats to ensure healthy productive populations 2. Manage for a variety of recreational, educational and aesthetic purposes and 3. Manage statewide moose populations for a sustained yield. Harvest management emphasizes quality-hunting opportunities through a limited entry permit process. The proximity of expanding moose populations near the Spokane metropolitan area adds the challenge of balancing population objectives with society's tolerance of moose encounters.

Hunting seasons and harvest trends

Moose hunting opportunity in Washington is limited by permit, and is generally a once in a lifetime opportunity if drawn (this stipulation is waived in 2002 for the Mt. Spokane youth-only permit hunt, raffle and auction hunts). Permit season dates remained October 1 - November 30, 2003. Moose hunts were open for the use of any legal weapon in order to provide eligibility to all hunters for all units and maintain hunter weapon choice.

Thirty-eight permits were available in the Mt. Spokane and Hangman units, 30 in Mt. Spokane and 8 in Hangman, and a total of 11,320 hunters applied for the general permit drawing in 2003. The Hangman and Mt. Spokane units each had an either-sex moose hunt and an antlerless only hunt. The Mt. Spokane unit also had a youth-only antlerless hunt consisting of 8 permits.

Thirty-eight permittees hunted moose in 2003, with participation rates in each hunt at 100%. Thirty-seven moose were killed (13 bulls, 24 cows) for an overall hunter success rate of 97%. The mean number of days hunted per hunter was 4.1 days (Table 1). The success rate for the youth hunt in GMU 124, Mount Spokane, was again 100% in 2003. Youth hunters (15 years or younger) were 100% successful in 2002 and 60% successful in 2001.

Surveys

During the winter of 1999-2000, standardized aerial surveys of moose in the Mt. Spokane Unit and adjacent units of Idaho were conducted by WDFW ungulate biologist W. Myers, in cooperation with Idaho Fish and Game. Survey data were used to develop a sightability model and population estimate. The total population estimate for the Mount Spokane unit on both sides of the Washington-Idaho border was 180 moose (Myers, pers. comm.).

Table 1. Moose harvest and hunter effort for GMUs 124, 127 and 130.

Year	Permits	Success	Bull	Cow	Total	Days/Kill
2003	38	97%	13	24	37	4.1
2002	45	96%	15	25	40	8.2
2001	45	82%	18	19	37	8.7
2000	27	96%	6	18	24	3.8
1999	17	100%	9	8	17	2.6
1998	15	87%	8	5	13	3.4
1997	11	91%	10	0	10	4.4
1996	8	100%	6	2	8	5.3
1995	5	100%	5	0	5	3.8
1994	4	100%	3	1	4	11
1993	3	100%	3	0	3	5.3

The estimate for the Mt. Spokane Unit in Washington was 84 moose.

Aerial surveys were flown again during the winter (December/January) of 2002-03 and 2003-04 in some of the same surveys quadrats as 1999. Those units straddling the Washington-Idaho border were not flown in 2002-03 or 2003-04, but two additional survey quadrats were established in the Hangman unit in 2002-03 and resurveyed in 2003-04. A comparison of moose observed and moose density by survey quadrat is presented in table 2.

Population status and trend analysis

Several pieces of information support the observation that the moose population in District 2 has increased over time. Moose numbers observed during four aerial surveys (1990, 1992, 1999 and 2002) has increased over time (Table 3). Hunting success has averaged over 93% since 1993 with many hunts returning 100% success. Moose observations continue to increase in outlying areas, including southern Spokane, Whitman, Lincoln and Adams counties and, reports of moose within the Spokane urban area are frequent.

Results from the 2003-2004 surveys of the Mt. Spokane and Hangman units showed a reduction of the

number of moose observed (Table 3.). Survey conditions during winter 2003 were suboptimal and may have resulted in reduced moose observations. Snow depths may have influenced the distribution of moose across surveys quadrats in 2003, as we experienced a large reduction in observations in the Hangman Unit, and concurrent increased anecdotal observations of moose activity in adjacent Idaho habitats. The mean antler size for bulls harvested in 2003 in the Mt. Spokane unit is 32 inches, while the mean antler size for the Hangman unit is 39 inches (Figure 1). By contrast, mean antler size in the Colville District was 39 inches in 2003

Table 2. Moose numbers and density by survey quadrat from 1999, 2002 and 2003.

Survey	Number of Moose Observed			Density Moose/km^2		
Quadrat #	1999	2002	2003	1999	2002	2003
9	-	0	0	-	0	0
10	-	5	0	-	0.14	0
11	1	-	-	0.02	-	-
12	7	6	9	0.13	0.11	0.17
13	7	7	8	0.08	0.08	0.09
14	20	17	23	0.73	0.62	0.84
15	6	10	3	0.13	0.22	0.07
16*	27	-	-	0.24	-	-
17*	7	-	-	0.17	-	-
18*	5	-	-	0.11	-	-
19*	8	-	-	0.08	-	-
100	-	25	7	-	0.76	0.21
101	-	21	10	-	0.55	0.26

* Survey quadrats primarily in Idaho

Hunter density was at a functional maximum in the Mt. Spokane Unit in 2002 with hunters commenting that they are competing for hunting locations and opportunities. Given the once in a lifetime opportunity of a moose permit, any additional permits would likely decrease the quality of the hunt in the unit unless there is an significant increase in the number of moose and percentage of bulls in the population. Permit numbers were reduced to 38 in 2003 to address this problem. While moose are apparently expanding their distribution in the district, and the number of nuisance complaints has increased, the greatest increases appear to occurring on private lands where hunter assess in limited.

Habitat condition and trend

Moose prefer 15-25 year old clear-cuts or thinned stands on mesic sites. Generally, in both the Mt. Spokane and Hangman units, it appears conditions for moose production will be optimal for the next few decades. These units are made up of private timberlands and management practices from the past 15 years are providing excellent forage areas for moose. The Mt Spokane unit is largely composed of large landowner private timberlands in some stage of succession that is of benefit to moose, especially winter range. Lands owned by Washington State Parks provide ample security habitats in the Mt Spokane unit. The clearcut logged habitats with abundant high quality forage and good hiding cover are thought to be important to moose in all seasons. Forested cover is important during summer heat and deep winter snow (Costain 1989).

Table 3. Moose observations and herd composition during aerial surveys from 1990 through 2003.

Survey Area	Year	Bull	Cow	Calf	Total	Bulls:CowsCallf
Mt. Spokane Unit	1990	-	-	-	7	39:100:61
Mt. Spokane Unit	1992	-	-	-	7	50:100:25
Mt. Spokane Unit	1999	8	22	11	41	36:100:50
Idaho-Unit*	1999	6	27	14	47	22:100:52
Mt. Spokane Unit	2002	11	23	8	45	48:100:35
Hangman Unit	2002	5	33	16	46	15:100:48
Mt. Spokane Unit	2003	9	22	12	43	40:100:55
Hangman Unit	2003	4	9	4	17	44:100:44

* Survey unit primarily in Idaho

The Hangman Unit is mostly agricultural land with moose range largely limited to the north end of the area. The limited forage areas for moose in the Hangman Unit tend to restrict the opportunity for moose to expand greatly in that unit. However, where moose do occur in the Hangman unit, habitat quality appears to be high and moose occur at the high observed density.

Human safety and nuisance problems

Individual moose can cause human safety or nuisance concerns within the metropolitan area of Spokane. The procedure for addressing moose within the urban/suburban area is addressed in the WDFW Dangerous Wildlife Policy

Management conclusions

There is tremendous interest in moose hunting in Washington and populations appear to be expanding their distribution. The results of recent surveys indicate that numbers may have stabilized in the Mt. Spokane Unit and that the reduction of any-moose permits was warranted. Permittee satisfaction with the quality of the hunt will continue to be monitored in the unit, and until hunter access to new areas increases, permit numbers should remain the same.

Significant concentrations of moose in the Hangman unit are limited to the northern end of the units (GMUs 127 and 130); however, moose density in some of these areas is high. Though moose have been observed wandering in other areas of these GMUs, the

population does not seem to be increasing as quickly as the herd in GMU 124 did during the 1990s. The number of moose on the Turnbull National Wildlife Refuge appears to be increasing. Future surveys of the refuge will help confirm a population increase, however, the current no-hunting management status of the refuge, and the lack of quality habitat may preclude additional hunting opportunities.

Literature cited

Costain, B. 1989. Habitat Use Patterns and Population Trends Among Shiras Moose, MS degree, U. of Montana. 1989

Myers, W. 2000. Personal communication.

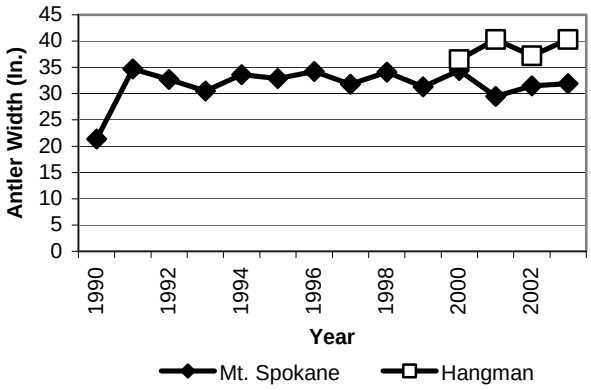

Figure 1. Average antler width (in.) for bulls harvested in the Mt. Spokane and Hangman Units.

Black Bear

BLACK BEAR STATUS AND TREND REPORT
Statewide

DONALD A. MARTORELLO, Carnivore, Furbearer, and Special Species Section Manager

Population objectives and guidelines

The goals for black bear management in Washington are: 1) maintain sustainable, healthy populations of black bears through all bear habitats, 2) maximizing recreational hunting opportunities consistent with the status of bear populations, 3) minimizing black bear nuisance and damage activity.

Sex ratio and median ages of harvest bears are used as indicators of the overall bear health and vigor, and reflect the impact of harvest levels on bear populations (Table 1).

Table 1. Black bear harvest guidelines (Game Management Plan 2002).

Parameter	Liberalize	Harvest Acceptable	Restrict
% Females in harvest	< 35%	35-39%	> 39%
Median age of harvested females	> 6 years	5-6 years	< 5 years
Median age of harvested males	> 4 years	2-4 years	< 2 years

Hunting seasons and harvest trends

Hunting seasons and harvest information are set and analyzed on a Black Bear Management Unit (BBMU) level, respectively. In terms of season dates, black bear hunting seasons have remained fairly stable since 1998. Minor adjustments in season length were done in a few BBMUs to maintain acceptable harvest characteristics (Table 1). All seasons are in the fall, with the exception of a spring bear hunt in the Blue Mountains. The objective of the spring season was to reduce the proportion of females in the harvest and better distribute harvest throughout the Blue Mountains; the spring season has been successful in these regards. Bears are also harvested by the commercial forest industry in western Washington to mitigate damage to timber, where bears peel the bark from trees during spring months.

Average harvest for the past three years was 1,574 bears statewide (Table 2, Figure 1). The percent female in the harvest and median ages for males and females has been within acceptable limits in most BBMUs.

Population status and trend analysis

Based on a model using population reconstruction methods and harvest age data, the statewide black bear population in Washington likely ranges between 25,000-30,000 animals. At the Black Bear Management Unit (BBMU) level, bear populations are generally healthy. To maintain these stable populations, modifications to harvest levels are made (on a 3-year basis) as indicated by recent trends in female harvest and median ages (Figure 2).

Surveys

Because female and cub survival are so influential on population growth, bear populations are assessed through a long-term monitoring survey of adult female survival and recruitment. To achieve this bears are capture, collared, and monitored in two areas of the state, Okanogan and Thurston counties.

Table 2. Statewide black bear harvest, hunter effort and median age information, 1990 - 2002.

								Median Age		
Year	Male	Female	Total	# of hunters	% Success	Hunter Days	Days per kill	Males	Females	% females
1990	NA	NA	NA	NA	NA	NA	NA	2.5	4.5	NA
1991	876	503	1,379	10,839	13%	84,771	61	3.5	4.5	36%
1992	921	521	1,442	13,642	11%	98,434	68	4.5	4.5	36%
1993	986	521	1,507	12,179	12%	102,558	68	3.5	5.5	35%
1994	654	419	1,073	11,530	9%	110,872	103	3.5	4.5	39%
1995	850	368	1,218	11,985	10%	102,859	84	3.5	4.5	30%
1996	951	359	1,310	12,868	10%	104,431	80	4.5	5.5	27%
1997	546	298	844	11,060	8%	97,426	115	4.5	5.5	35%
1998	1,157	645	1,802	20,891	9%	216,456	120	4.5	5.5	36%
1999	757	349	1,106	37,033	3%	481,319	435	4.5	5.5	32%
2000	777	371	1,148	37,401	3%	296,849	259	4.0	6.0	32%
2001	919	512	1,431	25,141	6%	230,431	161	3.5	4.5	36%
2002	1,133	592	1,725	24,844	7%	219,482	127	3.5	5.5	34%
2003	983	583	1,566	22,510	7%	192,544	123	3.5	4.5	37%

Management conclusions

Because Washington contains a sizable area of forested land with generally secure forage and escape cover, the long-term outlook for black bears in Washington is good. The biggest challenges that face current bear management are minimizing human-bear conflict and address damage done to timber by bears.

BLACK BEAR STATUS AND TREND REPORT: REGION 4
North Cascades Black Bear Management Unit (BBMU 3)

RUTH MILNER, District Wildlife Biologist

Population Objectives and Guidelines

Bear Management Unit (BMU) 3 is comprised of Game Management Units 418,426,437, 448, 450, and 460. The population objective for Black Bear in the North Cascades BMU is to maintain healthy bear populations, which are capable of sustaining a recreational hunt, while minimizing damage complaints from timber owners and nuisance complaints from suburban homeowners.

Hunting Seasons And Harvest Trends

The 2003 general season for the North Cascades BMU ran from August 1 through November 15, with a limit of 2 bears. Hunting conditions and access were generally favorable throughout the early season. However, a major flood event in mid-October washed out several roads, trails and bridges in the Cascade lowlands, which could have influenced hunter access and success.

The number of bear hunters hunting in BMU 3 was the lowest in 2003 since 1997; however hunter success was higher than the previous 5 years (Table 1).

The statewide harvest objectives for Black Bear include: maintain a female harvest of 40% or less of the total harvest, with median age at harvest for males at 2.5 years or older, and for females at 5 years or older. 2003 median ages and female percentage of total harvest are given in Table 1. Median age for males was above the minimum age targeted for the statewide objective. However, median age for females was below the targeted age for females. Percentage of females taken during the harvest was below 40% for the first time in 4 years.

Nuisance and Damage

Thirty depredation permits were issued to industrial timberland owners concerned about tree damage from March-July, 2003, with 18 males and 3 females killed.

Bear sightings and complaints by citizens living along the urban-rural interface continued in all three counties contained within BMU 3. However, these reports rarely resulted in lethal removal of the bear.

Habitat Condition and Trend

Continued conversion of open space and timberland to houses and supporting infrastructure results in a steady loss of lowland forest habitat for Black Bears. As development proceeds, we expect to see more negative interactions between people and bears.

Access to hunting areas may have been more restricted in 2003 due to a major flood, which occurred in mid-October. This flood washed out several main roads and bridges on US Forest Service lands, and may have discourage some hunters from bear hunting during the last half of the season.

Management Conclusions

Black Bear harvest in BMU 3 was closer to the state-wide target, with less than 40% females harvested and median age of males taken above the target (Table 1).

Table 1. Harvest data for BMU 3, North Cascades, 1995-2003.

Year	male	female	total harvest	days/kill	# hunters	% hunter success	median age male age	median age female age	% female harvested
1995	107	46	153	60	1,658	8	4.5	5.5	30
1996	130	55	185	63	1,733	11	5.5	4.5	30
1997	78	38	116	54	1,117	11	6.5	4.5	33
1998	192	91	283	69	2,948	10	6.5	3	32
1999	95	62	157	210	3,273	5	6.5	8.5	39
2000	118	51	169	108	3,065	6	5	7	43
2001	102	47	149	125	2,147	6.9	5.5	5	46
2002	119	68	187	95	2,083	9	7.5	7.5	57
2003	105	64	169	81	1,660	10.2	3.5	3.5	38

BLACK BEAR STATUS AND TREND REPORT: REGION 5
South Cascades Black Bear Management Unit (BBMU 4)

DAVID P. ANDERSON, District Wildlife Biologist

Population Objectives and Guidelines

Black bears are managed in western Washington to provide recreational opportunities without detrimentally affecting black bear populations. Black bear population levels are monitored through harvest statistics (median harvest age for each sex and percentage of females in the harvest). Acceptable harvest parameters for black bears in the South Cascade Bear Management Unit (BBMU 4) are: <40% females in the harvest, with a median female harvest age of 5, and a median male harvest age of 2. Bear harvest is also managed in an attempt to reduce timber damage, property damage, and black bear/human interactions.

Hunting Seasons And Harvest Trends

In 2003, hunter success for the general black bear season in the BBMU 4 was (0.04%). This similar to the 2002 season and considered a moderate level of success for bear hunting. The reported 2003 general season black bear harvest in the BBMU 4 was similar to last year (2002), but still at higher than average levels over the past ten year period. (Table 1). Bear hunter numbers remained similar to 2003 but were lower than the peak years of 1999 and 2000. Total 2003 black bear harvest in BBMU 4 decreased slightly from 2002 (Table 1).

Depredation Season

In addition to general season hunting, black bear depredation permits continued to be issued to landowners during the spring of 2002 to mitigate timber damage. A total of 64 bears (35 males, 22 females, 7 unknown) were taken during the 2003 season. The overall effect of the spring depredation permit harvest on bear populations and the benefit these hunts have in the reduction of timber damage is uncertain.

Population Status And Trend Analysis

Harvest data from general season take indicate that current bear harvest levels in the BBMU 4 are not within black bear management guidelines. In 2003, the percentage of females in the harvest was 42% and exceeds the target level of less than 40% female harvest in the population. Median ages of the female harvest was 4.5 which was also did not meet management goals for BBMU 4 (>5). Statewide guidelines suggest a restriction in bear harvest under these conditions (Game Mgt. Plan 2002).

Surveys

No bear surveys were conducted in BBMU 4 in 2002-2003. Bear surveys are difficult and costly and did not rank high in our prioritization of activities for Region 5 in 2003.

Nuisance and Damage

During the time period 1 January to 31 December 2003, enforcement officers responded to a total of 48 black bear complaints, up from 42 in 2002. The majority of these complaints were resolved by working with landowners to reduce bear attractants (ie. garbage). No nuisance bears were removed by lethal means in 2003.

As urbanization continues to encroach on bear habitat in BBMU 4 the bear/human interactions will continue to be a problem, especially in Clark County. Many reports from the public are of bear sightings and do not warrant further investigation.

Damage to certain industrial and private timberlands continues to be addressed through the issuance of depredation permits (see Hunting Seasons and Harvest Trends). Many industrial timber companies, however, continue to administer feeding programs to reduce spring bear damage to young trees. Little information exists on the impact of bear feeding and the impacts to local bear populations. This issue needs further evaluation to determine the effectiveness of bear feeding stations.

Habitat Condition and Trend

Black bear habitat is affected by a variety of land use practices. Timber harvest in BBMU 4 has remained relatively constant on private timberlands. Timber harvest on USFS and Washington State Department of Natural Resources lands within BBMU 4 will continue to be moderate, while industrial timber harvest will continue to be high. Bear damage will continue to be an issue on industrial timberlands. Encroaching residential development, however, poses the greatest threat to black bear habitat in BBMU 4. Since 1990, the human population in the unit has increased significantly and further bear/human interactions are expected.

Management Conclusions

Black bear harvest numbers in 2003 remained similar to 2002 (Table 1). Acceptable harvest parameters for female black bears in the South Cascade Bear Management Unit (BBMU 4) were not achieved in 2003. Female bear harvest will need to be monitored to evaluate harvest trends and determine if season restrictions are necessary.

To better evaluate black bear harvest, WDFW plans to increase the number of tooth samples returned from the

bear harvest, particularly from bears taken during the spring depredation permit hunt. This information should help evaluate sex/age data for bear harvest management.

Habitat management trends in large-scale forest landscapes will continue to provide habitat for black bear populations in the South Cascades. Continued long-term habitat changes (i.e. human development) in the suburban/forest interface will be one negative factor that will impact future bear populations.

Table 1. General season black bear harvest in the South Cascades Black Bear Management Unit, 1991-2003.

Year	Male	Female	Total	Success	Hunters	Days Hunted	Days/Kill
2003	111	81	192	0.04	4132	36335	189
2002	134	61	195	0.04	4563	38997	198
2001	156	77	233	0.05	4690	41916	179
2000	127	44	171	0.02	7206	57733	338
1999	71	15	86	0.01	7669	74857	870
1998	95	67	162	0.03	5112	45061	278
1997	36	30	66	0.02	2707	17778	269
1996	127	70	197	0.08	2447	13629	69
1995	70	26	96	0.04	2368	16307	170
1994	97	44	141	0.05	2710	19503	138
1993	97	44	141	0.06	2405	16663	118
1992	84	46	130	0.05	2407	15698	121
1991	92	53	145	0.07	2070	13055	90

Table 2. Median age of black bear harvested in the South Cascades Black Bear Management Unit, 1991-2003.

Year	Male	Sample	Female	Sample	Sexes Combined	Sample
2003	3.5	49	4.5	29	4.0	78
2002	3.5	39	5.5	14	4.5	53
2001	3.5	45	5.5	29	4.5	74
2000	4.5	27	5.5	17	4.5	44
1999	4.5	32	5.0	8	4.5	40
1998	4.5	28	3.0	16	4.0	44
1997	2.5	7	5.0	14	3.5	21
1996	3.5	21	7.0	18	5.5	39
1995	3.5	32	5.5	8	4.0	40
1994	5.5	13	6.5	5	5.5	18
1993	4.5	31	3.5	23	4.5	54
1992	4.5	26	3.5	14	3.5	40
1991	3.5	33	8.5	23	3.5	56

BLACK BEAR STATUS AND TREND REPORT: REGION 2
East Cascades Black Bear Management Unit (BBMU 6)

BEAU PATTERSON, District Wildlife Biologist
TOM McCAll, Wildlife Biologist

Population objectives and guidelines

The management objective for black bears in the East Cascades Black Bear Management Unit (BBMU 6) is to provide maximum hunting opportunity without negatively affecting the black bear population. Harvest objectives are based on criteria associated with percent females in the harvest and median ages of harvested bears (Table 1).

Table 1. Guidelines for black bear harves management.

Criteria	Over	Harvest Acceptable	Desirable
%Females in harvest	≥40%	≤36%-39%	≤35%
Median harvest age	≤3 Years	≥4 Years	≥5 Years
Median age of males in harvest	≤2 Years	>2 Years	≥4 Years
Median age of females in harvest	≤4 Years	≥5 Years	≥6 Years

Hunting seasons and harvest trends

In 1999, three big game packages that included a black bear tag were offered. These packages allowed hunters to purchase a bear tag for a nominal fee, which more than tripled the number of bear hunters in 1999 (11,050) compared to the average between 1989-1998 (3,394) (Table 2). Because there were more hunters relative to the number of bears, success decreased from 6.0 percent in 1998 to 1.0 percent in 1999 and 2000. Since the increase in 1999, bear hunter numbers declined to around 5,300 in 2001 and 2002, with further decline to 4,768 in 2003. In 2003, hunter success was 3.9 percent, identical to the previous year.

The harvest of black bears in BBMU 6 ranged between 120 and 339 from 1989 to 2003. In 2003, 187 black bears were harvested, near the average from 1989-2003 (181). In 2003, the median age of males (3.5 years) and females (6.5 years) and the percent females in the harvest (31%) were within the acceptable and desirable categories (Table 1).

Population status and trend analysis

Harvest statistics indicate the bear population in BBMU 6 is not over-harvested. The percentage of females in the harvest has averaged 31% since 1989, while the median age of male bears harvested has remained stable and female age has increased. Population models on the statewide scale suggest the bear population is growing slowly. Although median male age reached its lowest point in 2001, 2.5 years, median age of harvested males in 2002 increased to 5.5. Median male age in 2003 was 3.5, with a mean age of 4.7. Female median age has remained high (6+)

Table 2. Black bear harvest information and median age of black bears for Black Bear Management Unit 6, 1989-2003.

Year	No. males	No. females	Total	No. hunters	% success	Hunter days	Median age Males	Median age Females	% females in harvest
1989	112	65	175	2,392	7.4	9,550	4.0	4.5	37
1990[a]									
1991	126	101	227	2,886	7.8	13,615	3.5	4.0	44
1992	129	84	213	2,847	7.4	13,125	4.5	4.5	39
1993	117	42	159	3,758	4.3	20,780	3.5	5.5	26
1994	93	48	141	2,620	6.0	15,709	4.5	6.5	34
1995	86	35	121	2,724	4.3	12,291	3.5	4.5	29
1996	130	16	146	3,429	4.3	15,317	4.5	7.5	11
1997	102	44	146	4,229	3.5	20,271	4.5	4.5	30
1998	230	109	339	5,661	6.0	38,557	4.5	5.0	32
1999	108	34	142	11,050	1.0	106,157	5.5	4.5	24
2000	87	33	120	9,379	1.0	54,846	4.0	8.5	28
2001	138	73	211	5,283	4.0	42,408	2.5	6.5	35
2002	142	67	209	5,356	3.9	41,302	5.5	8.5	32
2003	129	58	187	4,768	3.9	36,686	3.5	6.5	31
Avg.	124	58	181	4742	5	31472	4	6	31

[a] No harvest data available.

for the past 4 years. Female median age in 2003 was 6.5, with a mean age of 6.4.

Nuisance and damage activity

In general, bear nuisance and damage complaints increased from 1994 to 1998, following fires that burned large areas in 1994. However, fewer damage complaints were received 1999 to 2003, despite dry summer conditions.

Habitat condition and trend

In 1994, fires in Chelan County reduced the amount of forage and cover for black bear. Since the fires the amount of forbs and soft mast appears to have increased, which should benefit bears. Mast is not surveyed in BBMU 6, but casual observations and reports indicate that 2003 was an average year for huckleberries and other mast.

Large sections of BBMU 6 are in remote or wilderness areas where no habitat alterations occur. Forest management has not changed significantly in recent years. Localized fringe areas have seen an increase in recreational development and orchards. The orchards provide abundant soft mast but create damage situations.

Management conclusions

The black bear population in BBMU 6 appears to be healthy. Trend in age and sex composition of harvested bears will continue to be monitored closely.

BLACK BEAR STATUS AND TREND REPORT: REGION 1
Northeastern Black Bear Management Unit (BBMU 7)

STEVE ZENDER, District Wildlife Biologist

Population objectives and guidelines

The objective for BBMU 7 is to minimize threats to public safety and property damage from black bears, while at the same time maintaining a sustainable and viable bear population. Hunting opportunity is maximized consistent with statewide bear harvest guidelines and trends in depredation and nuisance complaints. Harvest guidelines are based on median ages of males and females, and percentage of females in the bear harvest. The acceptable median age parameters for harvested males and females are 2-4 years and 5-6 years, respectfully. The acceptable percentage of females in the harvest is 35-39%.

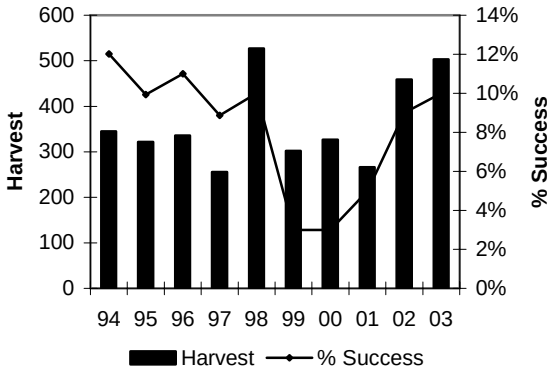

Figure 1. Total harvest and % hunter success, BBMU 7, 1994-2003.

Hunting seasons and harvest trends

Black bear season in the primary bear harvest units (GMUs 101-117) of BBMU 7 was again shorter than the general eastern Washington season with the opening delayed until September 2, the day after Labor Day. While the number of bear hunters remained the same the harvest in 2003 increased by 10 percent from 2002. (Table 1, Figure 1). The 503 black bears harvested in 2003 also exceeded the previous 5-year average harvest

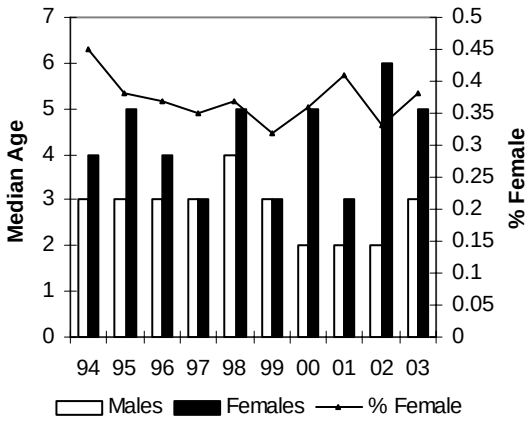

Figure 2. Median ages of harvested bears and % female in the harvest, BBMU 7, 1994-2003.

of 376 bears. Another poor berry crop contributed to bears being dispersed at lower elevations and vulnerable to hunters as the bears raided backyard orchards and other human related sources of food. Summers with poor berry production increase the sightings and nuisance encounters people have with black bears so the perception is that the bear population has somehow exploded. Actually the bear population likely has not changed much but the resulting fall harvest is usually exceptionally high, e.g., 1998, 2002, 2003, which can ultimately cause an over-harvest of bears.

Population status and trend analysis

In BBMU 7, the median age of harvested female black bears in 2003 was 5 (Table 1, Figure 2); so this unit met the minimum harvest guidelines on females ($\geq$5) two out of the last three years. The median male age increased to 3 years, which is within the acceptable range of 2-4 years. The percentage of female black bears in the 2003 harvest was 38%; this falls within the acceptable 36%-39% range.

Nuisance and damage activity

Table 1. Black bear harvest, hunter effort, and median age, Northeastern Black Bear Management Unit, 1994-2003.

								Median Age		Hunter Rept
Year	Male	Female	Total	# of hunters	Success	Hunter Days	Days per kill	Males	Females	% Females
1994	183	162	345	2,870	12%	15,391	45	3	4	45
1995	215	107	322	3,240	10%	18,884	59	3	5	38
1996	214	122	336	3,055	11%	17,400	52	3	4	37
1997	166	90	256	2,889	9%	16,171	63	3	4	35
1998	347	180	527	5,301	10%	40,687	77	4	5	34
1999	228	74	302	9,292	3%	92,813	307	3	3	25
2000	210	117	327	9,538	3%	60,127	184	2	5	36
2001	158	108	266	4,967	5%	33,667	127	2	3	41
2002	308	151	459	5,000	9%	34,739	76	2	6	33
2003	310	193	503	4,943	10%	32,961	66	3	5	38

Fish and Wildlife Officers recorded 144 black bear complaints in the Northeast BBMU in 2003. This is down from the 175 tallied in 2002 but up from 107 in 2001 and 72 in 2000. The highest number of complaints continued to come from GMU 117 with 28, GMU 124 with 24, GMU 121 with 23, and GMUs 101 and 204, each with 19. GMU 109 dropped to 7 from 30 in 2002. Generally three quarters of the black bear complaints will occur in the spring and are fairly consistent from year to year. When natural berry production, especially huckleberries, fail bears seek food where they can find it and that often is in conflict with humans. In 2003 many complaints continued into the fall as bears raided fruit trees and gardens to supplement the poor natural fruit and berry production. Complaints may not be a good indicator of bear populations and thus should not be the sole source of information to base hunting season recommendations on. The public is well served by providing information on how to avoid interaction with bears, and aggressive management of high risk bears.

Habitat condition and trend

In the short-term, summer huckleberry production during the last several summers, and especially 2003, has been poor and may result in reduced cub production or survival. The long-term bear habitat condition and trend appears relatively stable. While humans are increasingly moving into bear habitat, people today tend to make more of an effort to learn to avoid conflicts rather than just eliminate the bear. Conflicts with bears escalate during specific years when huckleberry production fails. Otherwise bears and humans can generally co-exist in the same habitats with help from WDFW providing educational materials, advice and intervention when necessary.

Management conclusions

The unusually dry spring and summers of 2002 and 2003 resulted in poor natural berry production and foraging conditions for bears. The bears did not disperse into the mountains and the result was more bear nuisance complaints than local residents and Wildlife Officers could tolerate. There were many suggestions for increasing the harvest to alleviate the problem. As has been our experience in the past, the harvest is high when these conditions prevail and that was the case again in 2003. Bear nuisance complaints appear to have dropped considerably thus far in 2004, with a much improved berry crop.

The percentage of females in the harvest remains within management guidelines. Median ages for females and males just meet the minimum management guideline. The current bear seasons in BBMU 7 apparently impact the bear population enough so that only minimum harvest management guidelines are met. Changes in the hunting season would only be appropriate if the expected result was less human – bear conflict but not necessarily a greater annual harvest.

A portion of the Selkirk Grizzly Bear Recovery Zone (SGBRZ) is located in the extreme northeast area of BBMU 7 in GMU 113. The primary factor impeding grizzly recovery in the SGBRZ is mortality due to shooting. Anyone in the area that is armed and observes or comes in contact with a grizzly could be the cause of a grizzly mortality. But, black bear hunters present the greatest risk since they are attempting to kill bears and must be correct in their species identification 100% of the time. For this reason WDFW maintains conservative bear hunts in this area. WDFW and USFS continue to provide a proactive approach to maintaining black bear hunting in

the SGBRZ through information and education to hunters via contacts with hunters in the field and presentations at Hunter Education classes and other community gatherings. Signs that provide information on species identification, bear awareness, and do's and don'ts in Bear Country are posted liberally throughout much of northeastern Washington to remind hunters and campers grizzlies may be present.

BLACK BEAR STATUS AND TREND REPORT: REGION 1
Blue Mountains Black Bear Management Unit (BBMU 8)

PAT FOWLER, District Wildlife Biologist
PAUL WIK, Wildlife Biologist

Population objectives and guidelines

The black bear population in the Blue Mtns. BBMU is managed to provide optimal recreational opportunity, while maintaining a healthy bear population and minimizing conflicts with the public and other management objectives.

Hunting seasons and harvest trends

Two bear hunting opportunities are offered in the Blue Mtns. BBMU. The general season ran for 75 days in 2003 (Sept. 2 - Nov. 15). A permit controlled spring bear season runs from April 15 to May31, with 105 permits distributed between 7 game management units

Hunters harvested at total of 113 bears during the 2003 hunting seasons (Table 1 and 2); 70 males, 43 females. The general season harvest totaled 98 bears; 57 males, 41 females. The permit controlled spring season produced a harvest of 15 bears; 13 males, 2 females.

The 2003 general season bear harvest was still considerably above the 1992-02 average of 76 bears/year.

The composition of the general season harvest consisted of 58% males, a slight decrease compared to 2002. The percentage of males in the harvest in 2001 and 2002 was 55% and 64%, respectively.

A permit controlled, spring hunting season was implemented in 1999 to improve harvest distribution and composition. Over the last five years, 489 permits have been issued, with 309 hunters participating in the hunt (Table 2), and 77 bears have been harvested. Hunter success from 1999 to 2003 averaged 25%. Harvest composition for the spring season has ranged from 60% to 87% males, and averaged 71%.

The median age of males harvested in 2003 was 5.5 years (N=20), with a range of 0.5-19.5. For females, the median age was 4.5 years (N = 7), with a range of 1.5 to 18.5 years.

Nuisance and damage

The number of bear complaints received has remained fairly stable over the last few years. However, complaints in 2003 may have increased slightly.

Habitat condition and trend

The U.S. Forest Service has implemented a prescribed fire program on the Pomeroy Ranger District. Several prescribed burns have been completed. This program will help improve habitat conditions on the Forest, which will eventually benefit the bear population by increasing the forage base (i.e., huckleberry fields).

Management conclusions

The black bear population in the Blue Mountains remains at fairly high level. The Wenaha-Tucannon Wilderness and Mill Creek Watershed are remote areas that contain healthy bear populations. These areas supplement bear populations in adjacent units through emmigration.

During the 2004 spring season, hunters in GMU's 154 and 162 reported observing numerous sows with multiple cubs. Several hunters reported seeing a sow

Table 1. Black Bear General Season Harvest Summary 1992-2003, Blue Mtns., Washington.

	Bear Harvest			# of	% Success	Hunter Days	Days per	Median Age	
Year	Male	Female	Total	hunters			kill	Male	Female
1992	30	16	46	494	9%	2740	69	1.5	2.5
1993	25	32	57	491	12%	1988	35	6.5	2.5
1994	71	38	109	903	6%	5450	50	2.5	5.5
1995	88	46	134	1024	13%	7363	55	3.5	5.5
1996	43	18	61	1325	5%	8543	140	3.0	4.5
1997	14	14	28	1486	2%	11567	413	10.5	5.5
1998	40	42	82	1566	5%	1567	130	3.0	5.5
1999	83	13	96	3057	3%	25212	263	NA	NA
2000	16	17	33	2782	1%	16224	492	5.0	3.5
2001	31	25	56	1323	4%	7855	140	3.0	2.5
2002	86	49	135	1478	9%	9026	67	5.0	5.5
2003	57	41	98	1312	7.5%	8582	88	5.5	4.5

with five cubs. A sow with four cubs was also reported along with several sows with 2 and 3 cubs. It appears the Blue Mtns. bear population was quite productive in 2004.

Combining the general bear season with a permit controlled spring bear season enhances our ability to provide a well-balanced harvest by game management unit.

Table 2. Spring Bear Hunt Statistics. 1999-2003

			Bear Harvest			Spring Season	General Season
Year	Permits	Hunters	Males	Females	Hunter Success	% Male in Hv.	% Males in Hv.
1999	70	51	5	2	14%	71%	86%
2000	100	82	14	3	21%	82%	48%
2001	108	47	5	3	17%	63%	55%
2002	106	72	18	12	42%	60%	64%
2003	105	57	13	2	26%	87%	58%
Total	489	309	55	22	25%	71%	65%

Cougar

COUGAR STATUS AND TREND REPORT
Statewide

DONALD A. MARTORELLO, Carnivore, Furbearer, and Special Species Section Manager

Population objectives and guidelines

The statewide cougar management goal is to maintain healthy, self-sustaining cougar populations within each cougar management unit (except CMU 9), while minimizing the number of negative human-cougar interactions. In the past, harvest characteristics were used as guidelines for managing statewide cougar populations; as population management was primarily achieved through recreational hunting. Human-cougar interactions are managed through education, capture-removal, depredation permits, and public safety cougar removals. Given current level human-cougar interactions, increasing harvest opportunities in high complaint areas is a priority.

Hunting seasons and harvest trends

Cougar seasons have changed significantly over the last several years (Figure 1). During the November 1996 general election, Washington voters passed initiative 655 which banned the use of hounds for hunting cougar and bobcat, and the use of bait and hounds for hunting black bear. Initiatives become effective 30 days after passing in Washington, therefore, the use of hounds for hunting cougar became prohibited 8 days into the 1996 cougar permit season. In an effort to mitigate the anticipated decrease in cougar harvest (i.e., post I-655), permit-only seasons were replaced with general seasons, cougar seasons were lengthened from approximately 6 weeks to 7 and one-half months, and bag limit was increased from 1 to 2 cougar/year. Legislation was also passed that provided the authority to the Fish and Wildlife Commission to establish reduced costs for cougar and black bear transport tags. With these efforts, annual cougar harvest during post I-655 years has ranged within similar levels as pre I-655 years (Figure 1).

Population status and trend analysis

Due to the elusive nature of cougars and their relatively low densities, no statewide survey is conducted to determine cougar population status. Rather, the status of selected cougar populations are estimated using survival of radio collared cougar, DNA capture-recapture models, and computer population models. This information is then used to estimate the status of cougar populations in other areas of the state.

Twelve radio collared cougar currently are monitored for survival data in portions of Okanogan and Ferry counties. A capture-recapture experiment using DNA was also conducted in portions of Okanogan and Ferry counties. Using the DNA technique, 30 initial "DNA" captures and 14 second "DNA" captures were obtained; 4 of the 14 capture in the second period were recaptures from the original 30 samples.

Nuisance and damage activity

With a history if high human-cougar interactions, the Department developed a special cougar removal process to address cougar densities in areas with high levels of human-cougar interactions. Under rules adopted by the Fish and Wildlife Commission, public safety cougar removals occurred in 18 Game Management Units during the Dec 15, 2003–Mar. 15, 2004 removal period. Sixty-one cougar were identified for removal and licensed hunters removed 50 animals (82% success rate).

Management conclusions

Some cougar populations appear to be declining at this time due to efforts to address public safety and protection of property, while the status of other cougar populations is simply unknown. Given the distribution of cougars in Washington and the projected growth of human populations, interactions between humans and cougars will likely continue. As such, the long-term future of cougar in Washington ultimately rests in our ability to co-exist. Therefore, management efforts should also continue to look for ways to minimize human-cougar interactions, particularly at the local population level.

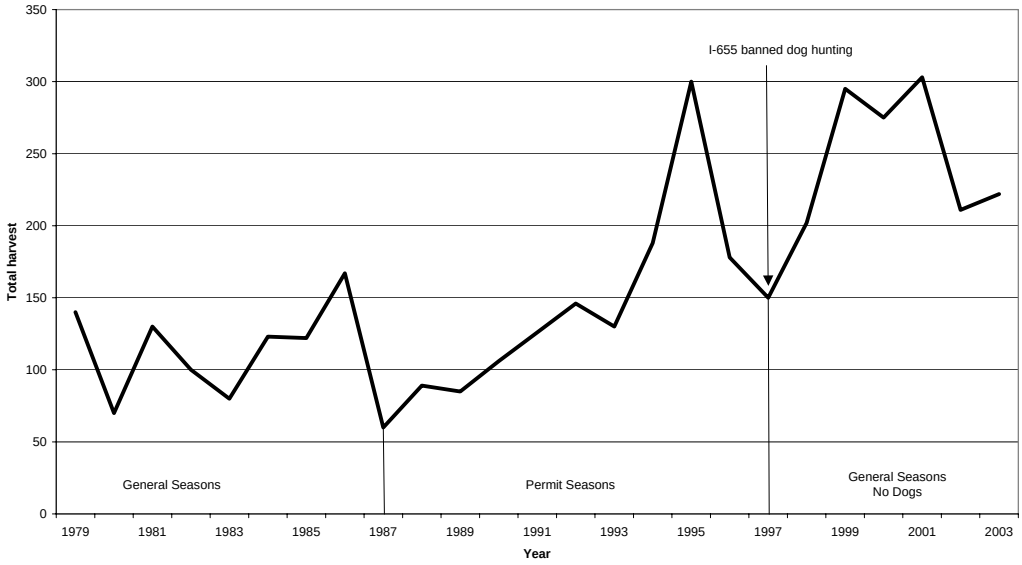

Figure 1. Trends in cougar season structure and harvest in Washington, 1935-2003.

COUGAR STATUS AND TREND REPORT: REGION 6
Coastal Cougar Management Unit (CMU 1)

H. M. ZAHN, District Wildlife Biologist

Population objectives and guidelines

The goal for cougar management in the Coastal Unit (CMU 1) is to maintain cougar populations at a level that is both self-sustaining and consistent with human safety concerns.

Hunting seasons and harvest trends

The 2003 cougar season extended from August 1, 2003 through March 15, 2004. There were no permit or pursuit-only seasons. Since the passage of Initiative 655 the use of hounds in cougar hunting is prohibited.

A total of 18 cougars were taken during the 2003-2004 cougar season in the Coastal Management Unit. Thirty-nine percent of the harvest was females. Teeth from 18 harvested cougars (11males, 7females) were submitted for aging. The 7 females ranged in age from 1.5 to 3.5 years (median 2.5 years). The 11 males ranged in age from 1.5 to 7.5 years (median 2.5 years). The relatively large yearly fluctuations in age and sex ratio parameters are likely the result of small sample sizes. Cougar harvests for CMU 1 for the period 1996 - 2003 are listed in Table 1.

Table 1. Cougar hunting harvest and percent females in harvest for 1996-2003.

Year	Hunt Type	Harvest	% Females
1996	Permit Hunts	14	57
1997	Permit Hunts	11	45
1998	General Season	15	60
1999	General Season	24	75
2000	General Season	14	38
2001	General Season	23	48
2002	General Season	15	53
2003	General Season	18	39

Population status and trend analysis

No estimate of cougar numbers is available for this unit. However indirect indications, such as human-cougar interactions, suggest that cougar numbers are still increasing. Most encounters are harmless in that observers have a chance encounter with a cougar in its natural habitat. There are some cases however were cougars are perceived as nuisance (repeated sightings in residential areas) or they may represent a potential threat to humans (close approach without fear). They may also cause depredation to livestock or pets. In addition to the reported harvest of 18 cougars an additional 6 cougars were taken in CMU 1 during the 2003 – 2004 period for reasons of depredation or public safety.

Management conclusions

Harvest has not increased with apparent increases in cougar populations. Increasingly cougars are being killed by Fish and Wildlife Officers or by landowners in damage situations. Seasons may need to be further liberalized to increase harvest efficiency and achieve a stable cougar population.

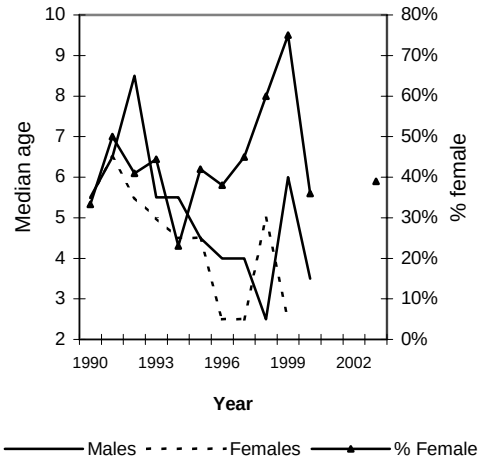

Figure 1. Median ages and percent females of cougar harvest, 1990-2003.

COUGAR STATUS AND TREND REPORT: REGION 4
Puget Sound Cougar Management Unit (CMU 2)
North Cascade Cougar Management Unit (CMU 3)

LEE KANTAR, District Wildlife Biologist

Population objectives and guidelines

The population objectives for the Puget Sound Cougar Management Unit (CMU) are to reduce cougar populations to enhance public safety and protect property. The North Cascades Cougar Management Unit objectives are to maintain a stable cougar population (WDFW 2003).

Hunting seasons and harvest trends

The general cougar hunting season was from August 1, 2003- March 15, 2004. A valid big game hunting license that included cougar as a species option was required to hunt.

Cougar harvest can fluctuate depending on snowfall, hunter access and hunter participation. Harvest level and trends for the Puget Sound and North Cascades CMUs are presented in table 1.

The passage of Initiative 655 in 1996 restricted the use of hounds to hunt lions. Since then "boot" hunters traditionally after deer or elk constitute the majority of hunters taking cougar. One added effect of this restriction in hunting methods (ban of hound use) has been a loss in the ability to selectively harvest a cougar (i.e., differentiate sex or age). This in turn may affect the proportion of sub-adults (dispersing animals) and females killed that in turn has profound implications for the regional population structure.

Hunting conditions and cougar take over the last 7 years have not only been affected by the change in hunting methodology and environmental conditions, but by the apparent decrease in major prey populations (elk and deer). Changes in forestry practices, reductions in logging and effects of hair-slip syndrome in black-tailed deer all potentially play a role in depressed deer numbers that in turn effect the productivity of cougars.

In the Puget Sound and North Cascades CMU, 5 cougars were killed (all sources combined) during the 2003 season; a decrease of about 80% from 2002 (Table 1). In these CMUs, the average percent female cougars in the harvest for the 7-year period 1990-96 were about 39%, compared to 60% for 1997-2003. Excessive harvest levels are characterized by a high proportion of females in the harvest (WDFW 1997), and should be carefully assessed to evaluate potential impacts to the cougar population structure in these CMUs.

Population status and trend analysis

Cougar population status and trend analysis for CMUs 2 and 3 are evaluated using 1) habitat availability and cougar numbers based on density of 2.9 lion/100 km^2 and 2) sex and age ratios, cohort reconstruction, and public cougar complaints. Past cougar population projections at the CMU level are difficult and less precise to estimate, but these CMUs likely have between 275-450 cougars (Spencer, unpublished data).

Cougar populations remain strong even during a period of notable habitat alteration and loss, primarily due to development. While this may appear contradictory, it is likely the result of cougar adaptability and re-colonization of previously unoccupied habitats. Preliminary data suggests cougar adaptability provides them the ability to effectively use vacant rural, suburban, and limited urban and other marginal forested patches (Spencer, unpublished data). These areas are often classified as designated open space, watershed preserves and riparian corridors. These sites can provide ample interim and potentially long-term alternative prey species, such as raccoon, opossum, coyote, with some areas supporting traditional prey such as deer (Spencer, unpublished data).

Nuisance and damage activity

Cougar damage to private property primarily involves killing and injuring pets and livestock. Little information is available to quantify livestock and pet depredation activities.

The incidents of nuisance cougars reported to the WDFW has decreased from a high point in 2000. Cougar complaints for these units initially dropped in 2001 but have remained fairly constant (Figure 1). The department has worked hard to address issues surrounding cougars through active management and education. The Puget Sound Unit continues to have many challenges. Limited hunter access, increased development, and a public with divergent opinions on how cougars should be managed will continue to raise issues. In addition the suburban-rural interface presents difficulties in assessing cougar numbers and the variables that affect these populations.

Habitat condition and trend

There are currently about 8,849,668 ha of habitat available to cougars in Washington; the Puget Sound CMU covers 12% of this range (1,061,960 ha). Habitat loss and alteration, coupled with human population growth, can have significant long-term negative impacts to wide-ranging carnivores such as cougars. These impacts will likely be most significant in the rapidly urbanizing western counties in the Puget Sound CMU. Although growth in King County has subsided somewhat, continued growth will have an effect on cougar habitat availability, juvenile and adult survival, and population levels.

Management conclusions

There are currently about 8,849,032 ha (21,857,109 acres) of cougar habitat within the overall range of cougars in Washington State; these CMUs cover about 23% of this range, or about 2,035,277 ha. Much of the western portion of this cougar habitat is adjacent to major metropolitan areas (e.g., Seattle, Tacoma, and Everett) and within dispersal range of sub-adult cougars. Currently, more than 42% (2,240,700 people) of Washington's State's 5,335,000 total populations live within the Puget Sound CMU. These rapidly urbanizing areas pose unique circumstances that affect cougar survival including: 1) reduced capacity of the landscape to support cougars, 2) increased potential for human-cougar encounters, 3) increased intra-specific cougar interactions and mortality, and 4) increased likelihood for non-hunting human-related cougar mortality (hit by vehicle, depredation kills etc).

It is unclear at this point the reasons behind the large drop in total harvest for the 2002-2003 season. The large proportion of females in the kill over the last 7 years raises concerns regarding the population structure of cougars in the combined CMUs and implications for sustainability. While cougar complaints have remained at a stable level over the last three years, continued public pressure to remove depredating cougars and public safety removals combined with the liberal cougar season could pose a threat to cougar numbers in this region. Balancing the need to respond to public issues surrounding cougars while maintaining a cougar population at stable levels remains a significant challenge.

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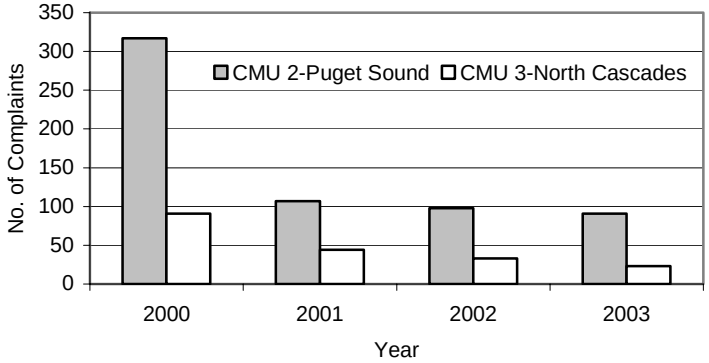

Figure 1. Total public cougar complaints (levels A and B combined) for CMU 2 and 3 from 2000-2003.

Table 1. Harvest, depredation, public safety removal, and other mortality sources for cougars-combined for CMU's 2 (Puget Sound), and 3 (North Cascades), 1997-2003.

	Hunting Harvest				Depredation (other) Take				Public Safety Removals				Combined
Year	Female	Male	Unknown	Total	Female	Male	Unknown	Total	Female	Male	Unknown	Total	Total
1997	14	7	0	21	1	0	1	2	na	na	na		23
1998	20	13	0	33	1	4	0	5	na	na	na		38
1999	24	10	0	34	1	1	0	2	na	na	na		36
2000	10	11	0	21	1	2	0	3	4	1	0	5	29
2001	11	7	0	18	0	0	0	0	7	3	0	10	28
2002	7	6	1	14	1	0	0	1	6	2	0	8	23
2003	2	1	1	4	0	0	0	0	0	1	0	1	5
Total	88	55	2	145	5	7	1	13	17	7	0	24	182

COUGAR STATUS AND TREND REPORT: REGION 5
South Cascades Cougar Management Unit (CMU 4)

PATRICK J. MILLER, District Wildlife Biologist
ROBIN S. WOODIN, Wildlife Biologist

Population objectives and guidelines

Management goals for cougar populations in the South Cascades Cougar Management Unit (CMU 4) are to maximize recreational opportunities and attempt to minimize potentially dangerous cougar-human conflicts.

Hunting seasons and harvest trends

The cougar-hunting season was from 1 August 2003 to 15 March 2004. The bag limit was one cougar. The suspected reduction in cougar harvest after the passage of Initiative 655, which banned the use of hounds, has not been manifest in the South Cascades Cougar Management Unit (Table 1). Harvest report cards and pelt sealing records indicate that cougar harvest in CMU 4 has increased since passage of the Initiative. Harvest in 2003 increased in comparison to the recent past and is still higher than historical records. The reduced fee structure and combination license structure may be encouraging more hunters to pursue cougar.

Surveys

Because cougars are difficult to survey and budgets are limited, no surveys for cougar were conducted in the CMU 4.

Population status and trend

Based upon harvest and complaint data, the cougar population in CMU 4 is stable to increasing. The prey base and habitat in the unit are well distributed and cougar are probably utilizing most, if not all, available habitat. Nuisance complaints involving cougar are increasing, but no public safety or depredation removals took place in CMU 4. WDFW officers are spending an increasing amount of time responding to cougar sightings and complaints. In the 2002-2003 report period, 3 cougars were killed in depredation hunts in the South Cascades Cougar management unit (Table 2)

Habitat condition and trend

The major problem facing cougar in CMU 4 is the encroachment of human civilization. In the six counties that roughly comprise the Unit, human populations have increased 37% since 1987 (WA Office Financial Management 1998). This trend is likely to continue, as the Region's economic prosperity continues to draw new residents. Encroaching human habitation will lead to increased human-cougar conflicts, as cougars follow the prey base into an increasingly urban environment.

Management conclusions

WDFW is likely meeting the management goal of maximizing recreation on cougar, but we are unable to measure the goal of minimizing human conflict.

The recent high level of cougar harvest may have reached a plateau in CMU 4, indicating the modification in lawful hunting methods is having the desired effect of increasing harvest. Increasing urbanization will force cougar to utilize areas frequented by humans, leading to increased risk for public safety. Often these areas of human/cougar conflict are not suitable for hunting with traditional means. Recent legislation that allows for hound hunting in selected areas may prove a useful tool in dealing with human-cougar conflicts, if complaint levels increase.

COUGAR STATUS AND TREND REPORT: REGION 2
East Cascades North Cougar Management Unit (CMU 5)
Columbia Basin Cougar Management Unit (CMU 9)

BEAU PATTERSON, District Wildlife Biologist
TOM McCALL, Wildlife Biologist

Population objectives and guidelines

The East Cascades North Cougar Management Unit (CMU 5) includes the mountainous habitats within Okanogan, Chelan, and Kittitas counties. The Columbia Basin CMU (9) includes most of the drier lowlands of the Columbia Basin. Management objectives for CMUs 5 and 9 are to maintain cougar populations in areas of suitable habitat, and to minimize depredation and threats to human safety by responding to cougar complaints and encouraging recreational cougar hunting.

Hunting seasons and harvest trends

Until 1996, about 70 percent of the cougar harvested in Washington were taken by hunters using hounds. Approximately 70 percent of Washington's cougar harvest comes from eastern Washington.

During the last 60 years, cougar management in Washington has progressively become more conservative. Cougar were classified as a predator and were bountied prior to 1961. Although cougar were still classified as a predator, they were not bountied from 1961 to 1965. In 1966, cougar were reclassified as a game animal, but no bag limit was imposed. In 1973, the yearly bag limit for cougar was reduced to one animal. In 1982, a special tag was required (in addition to a hunting license) to hunt for cougar. Beginning in 1987, cougar were managed as a trophy big game animal with hunting restricted to those persons drawing a limited numbers of tags. On December 5, 1996 the use of hounds to hunt for cougar was banned by public initiative.

Cougar hunting season is long, extending from August 1 to March 15. The cost of a black bear and cougar tag is $21.90.

Cougar harvest in Unit 5 1999-2003 was considerably higher than in the previous eight years (42-64 per year 1999-2003, compared with 12-34 per year 1991-1998; 13 year average is 34). There is no apparent trend in Unit 9 cougar harvest, although the past 3 years are the lowest harvest years during the 13 year period; harvest has ranged from 1 (2002) to 25 (1994, 1995), averaging 12 annually. The 2003 cougar harvest of 46 in Unit 5 is 35% above the average annual harvest during 1991-2003 (34), and is typical of the past 5 years harvest (1999-2003 average = 51, range = 42-64); this total includes 26 hunting harvests, 12 depredation takes, and 8 public safety removals. Hunting harvest increased 30% from 2002, while depredation take increased 100% and public safety removals decreased 50%. All of the public safety and depredation removals occurred within the Okanogan County portion of the CMU. In 2003, 4 cougar were killed in Unit 9. During 1991-2003, harvest in the Columbia Basin has averaged 12, and ranged from 1 to 25 annually. Since 1991, cougar harvest in units 5 and 9 combined has averaged 45 animals annually.

Total harvest over the past 13 years has been slightly skewed toward females in CMU 5, and even in CMU 9. The 2003 harvest was strongly skewed toward females, with 39 of 49 known sex harvests females (80%). Since 1991, median age of cougar killed by unit and sex has varied from 2.5 to 6.5 years old. In 2003, the median age of tooth-aged cougar harvested was 2.5 in CMU 5 (n=34) and 1.5 in CMU 9 (n=2).

Population status and trend analysis

We have no population estimates for cougar in CMUs 5 and 9. Based on anecdotal reports from the public and perceptions of field personnel, cougar numbers in CMU 5 have been at a relatively high level for several years.

Habitat condition and trend

Loss of mule deer due to wild fire and severe winters indirectly affected cougars in CMU 5 from 1994-1997, due to reduced prey base. Since 1997, mule deer populations have increased following winter range recovery and a series of mild winters. Expanding human population is a more serious long-term threat to cougar. Increased human population results in more cougar encounters and reduced prey base.

Management conclusions

Washington's human population continues to grow, reducing wildlife habitat. More people and increasing development of the rural-urban interface result in increased cougar conflicts. Managing cougar populations is likely to become increasingly more challenging into the foreseeable future.

Table 1. Cougar harvest for Cougar Management Unit 5 (East Cascades North) and Unit 9 (Columbia Basin), 1991-2003.

	Unit 5				Unit 9				
Year	M[a]	F	Unknown	Total	M	F	Unknown	Total	Combined total
1991	9	4		13	9	4		13	26
1992	8	4		12	5	1		6	18
1993	7	11		18	7	7		14	32
1994	15	7		22	13	12		25	47
1995	18	16		34	10	15		25	59
1996	10	20		30	5	9		14	44
1997	11	14		25	5	4		9	34
1998	12	22		34	4	4		8	42
1999	24	38		62	7	2		9	71
2000	15	24	3	42	5	8	1	14	56
2001	30	33	1	64	2	2	0	4	68
2002	18	21	3	42	0	1	0	1	43
2003	9	36	1	46	1	3	0	4	50
Average	14	19	2	34	6	6	0	12	45

[a]M = male, F = female

COUGAR STATUS AND TREND REPORT: REGION 3
East Cascades South Cougar Management Unit (CMU 6)

JEFFREY A. BERNATOWICZ, District Wildlife Biologist

Population objectives and guidelines

Management objective for East Cascades Cougar Management Unit (CMU 6) is to maintain a cougar population at a socially acceptable level while providing recreational opportunity.

Hunting seasons and harvest trends

Twenty cougar were taken during the 2003-04 season (Table 1). The harvest has increased since 1997 when the use of dogs was prohibited. The increase in female take is of concern. The average annual harvest is now 10 cougar.

Population status and trend analysis

Prior to the 1970s cougar were rare in Yakima County and no cats were reported in Klickitat County. The limited harvest and anecdotal information suggests the population has grown. In 20003-04, 7 cougar were harvested in Klickitat County.

Nuisance and damage activity

Nuisance and damage activity in CMU 6 was low. No cougar have been moved or harvested for depredation or threats to public safety.

Habitat condition and trend

Cougar populations in CMU 6 were probably limited more by prey base (especially deer) than habitat. The deer population reached historic lows after the winter of 1996-97, especially in the northern portion of CMU 6. The deer herd is now recovering and is especially healthy in Klickitat County. Elk populations remain healthy.

Management conclusions

Data is limited on cougar in CMU 6, but suggests the population is growing. There are few nuisance or damage complaints. Harvest has increased since the ban on hounds for cougar hunting. The increase in percent females needs to be monitored.

Table 1. Cougar harvest in CMU 6.

Year	Hunt Type	Harvest	% Females
1995	Permit only	8	37
1996	Permit/General	0	NA
1997	General Season	3	100
1998	General Season	8	25
1999	General Season	9	22
2000	General Season	14	61
2001	General Season	16	53
2002	General Season	14	44
2003	General Season	20	50

COUGAR STATUS AND TREND REPORT: REGION 1
Northeastern Cougar Management Unit (CMU 7)

STEVE ZENDER, District Wildlife Biologist

Population objectives and guidelines

Long-term objectives are to maintain healthy cougar populations within the Northeast Cougar Management Unit (CMU 7) while limiting numbers compatible with public safety and property protection. Current cougar population objectives for CMU 7 are to reduce cougar populations to enhance public safety and protection of property. Opportunity for recreational hunting is provided at levels consistent with achieving these objectives. Current cougar populations threaten public safety and property thus special permits to hunt with hounds (Public Safety Cougar Removal permits) were issued for specific areas within some Game Management Units.

Hunting seasons and harvest trends

Hunting season in the Northeast CMU was consistent with the statewide season of August 1, 2003 - March 15, 2004. The season limit on cougar remained at 2 per hunter during the 2003 – 2004 season.

A total of 42 Public Safety Cougar Removal (PSCR) permits were issued in CMU 7 in 2003 vs. 38 in 2002.

The 2003-2004 harvest in CMU 7 totaled 86 cougar, which is slightly less than the 2002 kill (Figure 1). Recreational hunters took 48% (41) of the total harvested cats. Depredation hunts and other mortalities accounted for 8% (7), and special PSCR hound hunts accounted for 44% (38). While the number of cougar killed has declined the percentage taken by PSCR has increased and those taken by recreational hunters, depredation, or other mortality has declined.

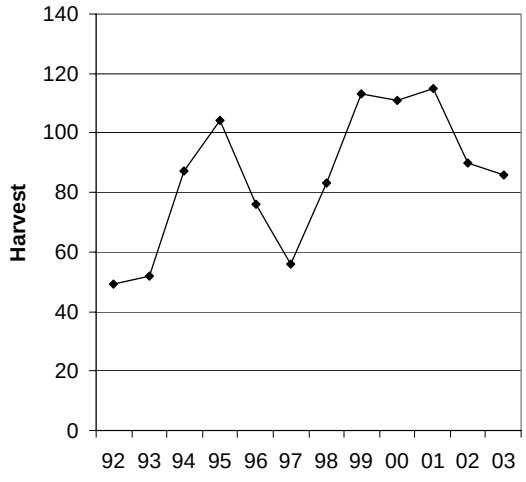

Figure 1. Cougar taken by hunters, depredation, and other means, CMU 7, 1992-2003.

The greatest harvest occurred in GMU 117, with 20 cats taken. Only 8 of these 20 were the result of PSCR permits. Recreational hunters accounted for 10, and 2 were taken on depredation permits. The other relatively high harvests came in GMU 101, Sherman with 16 cougar taken, and followed closely by the neighboring unit to the west, GMU 204, Okanogan East with 15 taken. PSCR harvest accounted for just over half of the harvest in these two units.

Human safety and wildlife damage

Wildlife Officers received 94 public contacts regarding complaints or encounters with cougar in the Northeastern CMU during the 2003 calendar year. Most of these are sightings and nuisance complaints from a reliable witness; others were depredation on livestock or attacks on pets. This is down from 188 in 2002 and 159 in 2001. The highest number of reports and problems were reported from GMUs 101 and 204, which registered 23 each, an increase from a total of 28 for the two units in 2002. The primary reduction in reported encounters with cougars came from GMU 109 where they dropped from 35 in 2002 to 1 in 2003; in GMU 124 where they dropped from 36 to 12; and GMU 117 where they dropped from 24 to 4.

Population status and trend analysis

We can only make some general observations from trends in hunter success and possibly age/sex ratios of harvested cougar to address the status and trend of the population.

Problem encounters with cougar in the Northeastern CMU declined over-all in the unit. Several GMUs that had high numbers of problems in 2002 saw dramatic reductions in reported incidents for 2003. While Ferry and eastern Okanogan Counties continued to report relatively high incidents the dramatic decline in most other units suggests declining cougar for much of the CMU. The general hunting season and bag limit has been the same for cougar from 2002-2003. The kill declined slightly from 47 to 41 (13%) from 2002 to 2003. PSCR permits target GMUs that have high problem cougar encounters so focus on areas that likely have the highest cougar populations. Success rates for these hound hunts remained high at 86% in 2003.

The percentage of females in the harvest exceeded males again in 2003 but dropped to 52% from 64% in

2002 (Table 1). In the past 5 years the total percent female harvest has been 59% (N=501). The mean age of harvested cougars in the Northeastern Unit increased to 3.4 in 2003 but remains far below the mean ages in the early 1990's (Figure 2).

Habitat condition and trend

Deer populations remain at moderate population levels with the highest densities, especially white-tailed deer, in the lower elevations and agricultural areas. Foothills and mountain whitetail population are at moderate levels. Mule deer and elk populations continue to improve. Mule deer are especially important prey for cougar in GMUs 101 and 204 but occur in the higher elevations in nearly all the GMUs within CMU 7.

Management conclusions

The cougar harvest declined slightly in 2003 to 86 cats taken in CMU 7 relative to the previous 3-year average of 105. The hunting seasons and bag limits for recreational cougar hunters has been the same since 1999. During this time the harvest by recreational hunters has steadily declined from a high in 1999 of 97 cougar to a low in 2003 of 41, a 58% decline (Table 1). Since recreational hunter success continues to decline, it would appear, at least at the CMU 7 level the management objective to reduce cougar populations has been successful. The reduced number of reported incidents and human encounters with cougar over many of the GMUs in CMU 7 also suggests total cougar numbers have declined. Of course the PSCR hound hunt permits have been the primary management tool to accomplish the needed harvest. While cougar populations may have declined the numbers are still such that the PSCR hunt success is high. The use of hounds will likely continue to be an important management tool for the future in CMU 7.

Figure 2. Mean age of harvested cougar (sample size range from 30 - 92, CMU 7, 1992-2003.

Table 1. Cougar harvest, depredation, public safety removal and other mortality, CMU 7, 1994-2003 (*Other Take includes Public Safety Removal Harvest beginning in year 2000).

	Female			Male			Combined Harvest (Includes Unknown sex)			
Year	Hunter Harvest	Other Take	Female Total	Hunter Harvest	Other Take	Male Total	Hunter Harvest	Other Take	Total Harvest	Percent Female
1994	38	3	41	41	5	46	79	8	87	47%
1995	39	6	45	53	6	59	98	12	110	46%
1996	32	0	32	36	0	36	36	8	76	47%
1997	22	4	26	20	10	30	42	14	56	46%
1998	42	10	52	22	9	31	64	19	83	63%
1999	54	10	64	42	4	46	97	16	113	58%
2000	59	16	75	22	10	32	83	28	111	70%
2001	34	25	59	28	26	54	64	51	115	52%
2002	31	25	56	14	18	32	47	43	90	64%
2003	17	26	43	21	19	40	41	45	86	52%

COUGAR STATUS AND TREND REPORT: REGION 1
Blue Mountains Cougar Management Unit (CMU 8)

PAT FOWLER, District Wildlife Biologist
PAUL WIK, Wildlife Biologist

Population objectives and guidelines

The cougar population in the Blue Mtns. CMU is managed to provide recreational opportunity, while maintaining a healthy cougar population and minimizing conflicts with public safety and other management objectives.

The cougar population in the Blue Mountains has expanded significantly compared to the 1970's and 1980's. Mountain lions have moved into the farmland areas and Snake River breaks where they have not been observed for 40+ years.

Hunting seasons and harvest trends

The cougar hunting season in CMU-8 is consistent with the statewide season; Aug. 1 – March 15. The bag limit for cougar remains at two per season.

The cougar harvest in CMU-8 was minimal from 1974-1986, averaging 2.3 cougar/year. Permit controlled cougar hunting was implemented in 1987, and ran through 1997, with the cougar harvest averaging 16 cougar/year during this period. Since Initiative 655, the cougar harvest has averaged 17 cougar/year. Expanded hunting opportunity and a healthy cougar population have resulted in harvest levels remaining similar to the period when cougar were harvested with hounds, and under permit control.

The 2003 hunting season produced a harvest of 18 cougars for the Blue Mountains (Figure 1), compared to 13 in 2002, an increase of 38%. It appears Initiative 655 had little impact on the number of cougar harvested in the Blue Mountains.

The biggest change in the harvest since Initiative 655 has been the percentage of males vs. females in the harvest. Prior to the Initiative (1980-1996), the harvest averaged 38% females. Since the Initiative (1997-2003) the harvest has averaged 65% females.

The age of males harvested in 2003 ranged from 1.5 to 7.5 years (N = 9), with a median age of 3.5 years. The age of females harvested ranged from 1.5 to 3.5, with a median age of 1.5 years (N = 7).

The 2003 cougar harvest was evenly split between the east and west Blue Mountains; west-9 cougar, east-9 cougar.

Population status and trend analysis

The cougar population in CMU-8 increased significantly during the 1990's and remains at a high level compared to the 1970's and 1980's. Cougar are well distributed throughout the Blue Mountains and are being observed throughout the district, even near the Snake River where cougar have not been observed for many years.

Nuisance and damage complaints

Reports of cougar near homes in rural areas and even in neighborhoods of towns are common. The number of complaints is still higher than levels that occurred 10-15 years ago. Prior to 1990, cougar complaints and sightings were rare in southeast Washington.

Management conclusions

The cougar population in CMU-8 remains at a high level, but appears to have stabilized. Prey populations are healthy and the cougar population has expanded into areas where they have not been observed for many years. The cougar hunting season should remain fairly liberal in order to maximize recreation and minimize conflicts with public safety and other management objectives.

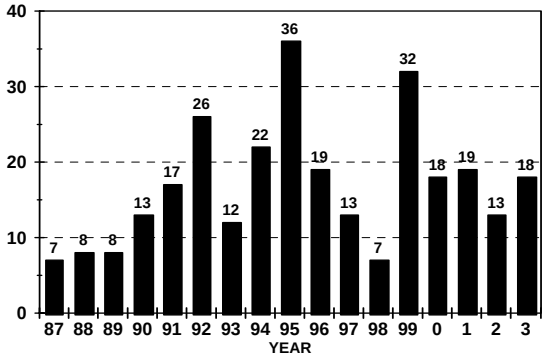

Figure 1. Cougar Harvest 1987-2003. Blue Mtns.

Table 1. Cougar Harvest Trend 1992-2003, Blue Mtns. Wash.

Year	Hunt Type	Males	Females	Unk.	Total	% Females
1992	Permit Hunts	14	12		26	46%
1993	Permit Hunts	7	5		12	42%
1994	Permit Hunts	14	9		23	45%
1995	Permit Hunts	19	11		30	37%
1996	Permit\General	9	10		19	53%
1997	General Season	4	10		13	71%
1998	General Season	2	5		7	71%
1999	General Season	12	19	1	32	59%
2000	General/Damage	4	14		18	78%
2001	General/Damage	4	14	1	19	78%
2002	General/Damage	7	4	2	13	36%
2003	General/Damage	9	7	2	8	44%

Mourning Dove
and
Band–tailed Pigeon

BAND-TAILED PIGEON AND MOURNING DOVE
Statewide

DON KRAEGE, Waterfowl Section Manager

Population objectives and guidelines

Pacific Coast band-tailed pigeons and mourning doves are managed cooperatively with the U.S. Fish and Wildlife Service (USFWS) and western states through the Pacific Flyway Council (PFC). The PFC has developed management plans for these populations, and has established a population objective for band-tailed pigeons in Washington as the five-year average call-count survey index for 1980-84. This objective is based on a population level capable of sustaining recreational harvest. The current three-year average call-count index must be above this level to provide a hunting season. PFC is currently working to develop a population objective for mourning doves.

Hunting seasons and harvest trends

The band-tailed pigeon season was closed in Washington from 1991-2001. A limited season was reopened in 2002 and continued in 2003, with season dates of September 15-23 and bag/possession limits of 2/4. The mourning dove season has run September 1-15 since 1980, with bag/possession limits of 10/20.

Surveys

The call-count survey was initiated in 1975, and was patterned after the mourning dove survey. WDFW also participates in the annual mourning dove survey coordinated by USFWS. This report describes the results of band-tailed pigeon call-count surveys completed in the summer of 2003 and mourning dove surveys completed in the late spring of 2004.

Methods

Band-tailed pigeon call-count survey. The band-tailed pigeon call-count surveys are similar to mourning dove call-count routes. A total of 50 routes, 5.7 miles in length comprise the survey, conducted in western Washington below 1,000 ft. elevation. Surveys are completed during a 16-day period beginning the Saturday closest to June 21. Routes are distributed fairly uniformly throughout western Washington, and are selected based on logistics concerns in known or likely band-tail habitat. Routes are started exactly 10 minutes before sunrise and are made up of 20 listening stations along roads. At each stop observers record the time at the stop, the number of individual band-tails heard calling, the number of band-tails seen, the disturbance level, and any comments related to conditions at the stop. Additional details on survey design can be found in Jeffrey (1989).

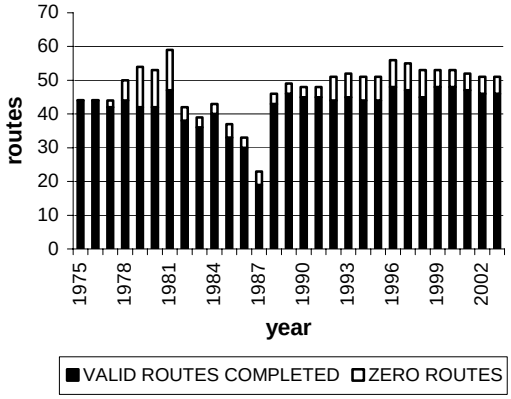

Figure 1. Call-count survey routes, 1975-2003.

Routes that have band-tails present and subsequently are without band-tails for a three-year period are relocated in the vicinity of the existing route, and are added to the database as an automatic zero (without additional survey) for use in the data analysis. New routes without band-tails present are relocated without further consideration. Routes were evaluated in 1988, 1992, 1996, and 2000 to determine which were to be relocated, dropped, or converted to automatic zeros.

Data are entered into the WDFW mainframe computer by data entry staff and then are evaluated to ensure that routes were conducted within allowable survey dates and start/stop times. Beginning in 1992, data from acceptable routes completed and zero routes have been sent to USGS in Laurel, MD (Bill Kendall) for analysis using route regression programs developed for the mourning dove survey (Sauer *et al.*, 2004). The number of acceptable routes completed and zero routes are shown in Figure 1.

Mourning dove call-count survey. The mourning dove survey was completed between May 20-31, following methods in Dolton and Smith (2003). Cooperators from WDFW, USFWS, Yakama and Colville Tribes, and Chelan P.U.D completed routes. Data were sent to USFWS in Laurel, MD.

Band-tailed pigeon harvest. Band-tailed pigeon hunters were required to obtain a special hunting authorization and submit a harvest report following the season. Harvest was estimated using a two-wave sampling design to account for non-response bias.

Mourning dove harvest. Mourning dove harvest was estimated as part of the statewide hunter survey conducted by WDFW (WDFW 2004).

Results

Band-tailed pigeon call-count survey. The Washington call-count survey results are presented in Table 1 and Figures 1-2. The three-year average index of 2.84 was above the 1980-84 population objective index (this index varies each year because of route-regression analysis methods, but was 2.09 for the 2003 analysis).

Mourning dove call-count survey. The mourning dove analysis and report were completed by Dolton and Smith (2003).

Mourning dove harvest. Harvest in 2003 was estimated at 73,374 doves, up 7% from 2002. Hunter numbers were estimated at 6,153 up 9% from 2002. Number of days hunted was 16,421, up 3% from 2001.

Band-tailed pigeon harvest. Harvest and hunter activity for the 2002 and 2003 seasons are summarized in Table 2.

Table 2. Hunter and harvest activity.

Year	Permits	Hunters	Harvest*	Days*
2002	522	187	273	357
2003	657	177	574	337

*successful hunters only

Population status and trend analysis

Table 1 and Figure 2 show that based on the call-count survey, the band-tailed pigeon population has stabilized since 1975, and has generally increased recently. The route regression method is not as precise in determining short-term trends, as evidenced by the large confidence intervals for the two-year trends in Table 1. The large spans of these intervals are caused by low sample size due to changing observers from year to year. However, the confidence intervals for the long-term trends are much narrower, pointing to the utility of the survey in monitoring the population. Regardless, in 2003 PFC adopted a new mineral site survey as the annual population index method, and the call-count survey was discontinued after 2003.

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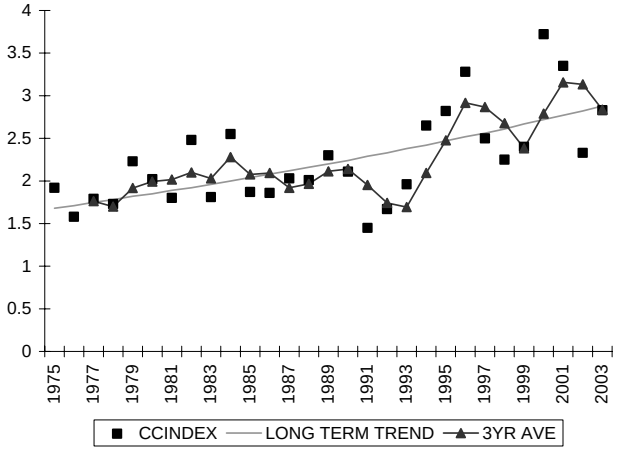


Figure 3. Band-tailed pigeon call-count survey trends

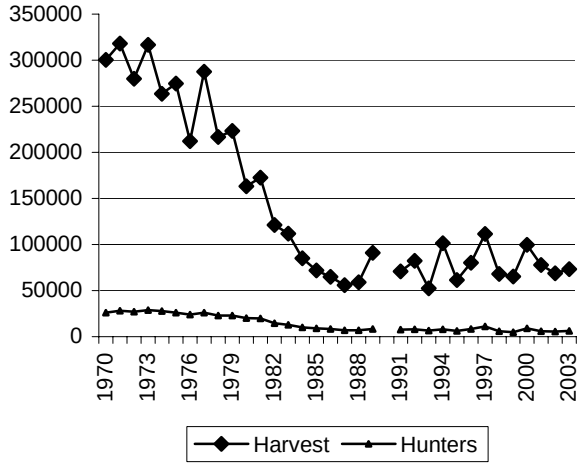


Figure 4. Dove harvest and hunter trends.

Table 1. Call-count survey results - route regression method.

Start Year	End Year	Change	Lower 90% CI	Upper 90% CI	Routes Used	Sign. level
1975	1992	-7.8%	-14.0%	-2.0%	63	p<0.05
1991	1992	10.1%	-50.0%	75.0%	11	n.s.
1975	1993	-6.0%	-11.0%	-1.0%	65	p<0.05
1992	1993	44.0%	-49.0%	152.0%	13	n.s.
1975	1994	-3.4%	-8.2%	1.4%	69	n.s.
1993	1994	71.0%	1.4%	141.0%	24	p<0.05
1975	1995	-2.7%	-9.8%	4.5%	70	n.s.
1994	1995	12.1%	-31.3%	55.3%	12	n.s.
1975	1996	-0.8%	-6.5%	4.9%	59	n.s.
1992	1996	24.3%	10.4%	38.2%	30	p<0.01
1995	1996	36.4%	-35.9%	108.7%	18	n.s.
1975	1997	-0.8%	-6.0%	4.3%	62	n.s
1993	1997	8.9%	0.2%	17.6%	32	p<0.10
1996	1997	-14.3%	-35.4%	6.7%	18	n.s.
1975	1998	-1.5%	-5.5%	2.4%	65	n.s.
1994	1998	2.1%	-8.7%	13.0%	34	n.s.
1997	1998	-11.0%	-45.8%	23.9%	11	n.s.
1975	1999	-0.1%	-4.1%	3.8%	67	n.s.
1995	1999	-3.3%	-11.5%	4.9%	38	n.s.
1998	1999	26.7%	-19.7%	73.1%	14	n.s.
1975	2000	-0.3%	-6.2%	5.5%	70	n.s.
1996	2000	5.9%	-2.3%	14.1%	41	n.s.
1999	2000	21.1%	-12.5%	54.8%	24	n.s.
1975	2001	1.7%	-2.3%	5.7%	70	n.s.
1997	2001	15.8%	8.0%	23.6%	44	p<0.01
2000	2001	1.8%	-16.6%	20.2%	36	n.s.
1975	2002	0.7%	-3.7%	5.0%	71	n.s.
1998	2002	9.4%	2.6%	16.2%	45	P<0.05
2001	2002	0.9%	-27.5%	25.8%	32	n.s.
1975	2003	1.8%	-1.7%	5.4%	71	n.s.
1999	2003	0.6%	-4.8%	5.9%	48	n.s.
2002	2003	5.2%	-30.5%	40.8%	25	n.s.

Waterfowl

WATERFOWL STATUS AND TREND REPORT
Breeding Populations and Production

RON FRIESZ, Waterfowl Specialist

Introduction

This report summarizes data collected during 2004 for breeding waterfowl populations, duck broods, pond index, and goose nest surveys for the state of Washington. Washington Department of Fish and Wildlife, U.S. Army Corps of Engineers, Yakama Indian Nation, Colville Confederated Tribes, Washington Waterfowl Association, and Chelan County Public Utility District collected data.

Duck Breeding Population Survey

Methods

Surveys are conducted annually within the seven strata in eastern Washington: West Okanogan Potholes, Omak-Douglas Potholes, Far East Potholes, Northeast, and Palouse Streams, Columbia Basin Irrigated, and Yakima Irrigated (Fig. 1).

Surveys were conducted on historical transects and sampling quadrats (sections or 1/4-sections)(Fig. 1). Samples are multiplied by weighting factors to provide an index to the total number of breeding ducks and coots within the defined areas (Table 1). Weighting factors are determined from the proportion of areas within the strata that are sampled. Observations are treated as complete counts within sampling units (transects or quadrats) with no corrections for visibility bias. Surveys are conducted by ground counts, except helicopter counts are used for the 1/4-sections in the Desert Wildlife Area within the Columbia Basin Irrigated strata.

In 1997, breeding duck surveys were initiated in western Washington using a stratified random quadrat design. Survey plots are defined by section lines, or square mile areas, selected at random from strata delineated based on knowledge of breeding duck densities. Most areas are surveyed by helicopter.

Methods for estimating total number of breeding ducks follow the Standard Operating Procedures of Aerial Waterfowl Breeding Ground Population and Habitat Surveys in North America (USFWS & CWS 1987). Breeding populations are estimated by multiplying the number of pairs, lone drakes, and flocked drakes (<5 male birds) by 2, and grouped birds (mixed or >5 males) by 1. Lone hens are multiplied by 1 for redhead, scaup, ring-necked duck, and ruddy duck only. These diver species are known to be late nesters and males significantly outnumber females.

Results: Eastern Washington

The 2004 index of breeding duck populations in eastern Washington was 114,883 (Table 2, Fig. 2), down 10% from 2003 and 28% from the long-term average. This represents the fifth straight year of population decline with an average of 8.6% per year (Table 2, Fig. 2).

Mallard numbers were 39,958, up less than 1% from 2003, and remained 27% below the long-term average (Fig. 3, Table 2). The loss of total duck production occurred in all strata except in the Irrigated strata where production was up 5% from 2003 (Fig. 4, Table 3). Due to continued drought conditions and the resultant poor habitat quantity and quality, the largest losses of production were in the Potholes and Northeast strata where numbers were down 20 and 21 percent, respectively from 2003. Compared to the long-term average, production was down 39% for the Potholes and 13% for the Northeast strata. Loss of production in the Palouse strata was down 11% from 2003 and 69% from the long-term average likely from the combined impacts of extended drought and loss of wetland habitat.

Most of the long-term variability in our breeding duck index has come from surveys in the Potholes area (Fig. 4, Table 3). This area has inconsistent precipitation patterns and many semi-permanent and ephemeral wetlands. This year 34% of the breeding ducks in all strata were found in the Potholes strata, down from 39% of total ducks in 2003. As stated above, the number of ducks in the irrigated strata was up 5% from the 2003 count, possibly an indication of displacement from the Potholes strata. However, total ducks in the irrigated strata remains 20% below the long-term average. The reason for this decline remains unknown, but may be related to more efficient use of water by irrigators resulting in fewer seasonal wetlands within the irrigation blocks. Urban sprawl also likely contributes to the loss from increased human disturbance, particularly in the Yakima and Tri-Cities areas. Declines in waterfowl production in the wetlands associated with the wasteway systems (Fig. 5) within the Desert Wildlife Area are believed to be the result of advanced succession of wetland vegetation and the loss of open water habitats preferred by breeding ducks.

The rate of decrease for ducks that actually breed in the Columbia Basin is more substantial than total survey data indicates. This occurs by including non-breeding ducks in the survey. Along with the decline in common breeding species (Fig. 5), has come an increase in the number of non-breeding scaup. Scaup broods are uncommon, but scaup numbers from recent surveys are currently six times higher than they were in the early 1980s (Fig. 3.). Although, for some unknown reason, the total scaup counted in the Columbia Bain in 2004 were down 57% from 2003. Many of these scaup may be sub-adults, and may not breed until they are 2 or 3 years old.

Cinnamon and blue-winged teal have not been separated in the long-term database because of differences among observers in recording data. In 2004, it was estimated about 79% of these teal are cinnamon teal, up from 76% in 2003. Next to mallards, cinnamon/blue winged teal were the most common breeding duck in eastern Washington until 2002 when gadwalls surpassed them in total numbers. The combined total of cinnamon and blue-wing teal is up 29% from 2003 but remains 50% below the long-term average (Fig. 3, Table 2). This downward trend has occurred since 1985. In the mid-1980's we had about 4.5 times as many teal as we have currently.

The 2004 gadwall numbers were nearly the same or down 2% from 2003, and remained 26% above the long-term average. (Fig. 3, Table 2). The population growth of gadwalls seems to have occurred over the past three decades. Between the 1970's and the 1990's the average number of gadwall has increased by 3.5 times with the most noticeable increases during the early 1980's. There may be some correlation of the increased numbers and hunters avoiding the harvest of gadwalls due to misidentification of the similar appearing mallard hens and pintails which have had restrictive bag limits beginning in the mid-1980's.

After three straight years of decline (2001-2003), redhead numbers stabilized with a slight increase of 3% in 2004, although population numbers remain 53% below the long-term average. This is likely the combined result of the continued drought conditions in the pothole tract areas and loss of suitable open water habitat in the wasteway complexes associated with the irrigation projects.

Results: Western Washington

The western Washington surveys estimated the breeding population index of mallards at 9163, a 27% increase from 2003, but remained 7% below the seven-year average. The wood duck breeding index was 779 or 70% below the 2003 survey and 73% below the long-term average (Table 4, Fig. 6).

Pond Survey

Ponds are counted on 8 transects within the Potholes Area (Fig. 1) during the breeding-duck survey to index water conditions and to monitor the availability of breeding habitat (Fig. 7, Table 5). The 1997 index of 15,665 ponds was the highest ever recorded. This year (2004) the pond index was 4,264 or 36% below 2003 and 35% below the long-term average. This was the lowest estimated pond numbers since 1994 when 4,167 ponds were estimated (Fig. 7, Table 5). The loss of the pothole habitat occurred across all pothole strata except for the Fareast Potholes that had a 6% increase of pond numbers although numbers there remained 39% below the long-term average. The largest losses occurred in Douglas and Lincoln County strata where pond numbers were down 59% and 41%, respectively.

Duck Production Survey (Brood Survey)

Methods

The same sampling transects used for breeding duck surveys are used for brood surveys in the Potholes, Palouse, and Northeast strata (Fig. 1). These surveys are conducted in late June to early July. All broods observed are recorded by species. The numbers of broods observed are multiplied by the weighting factors for each stratum to provide an index to duck production (Table 1). Average brood size is very difficult to estimate. Historic surveys in the Irrigated areas were designed to estimate average brood size. As a result the survey effort varied somewhat among years. To provide more consistency, the surveys in the Columbia Basin were redesigned in 1995 by using six sample sites to provide an index to production.

Broods for most species are highly secretive and difficult to observe. The current year's growth of emergent vegetation is more developed than during breeding population surveys in May. Production surveys should be viewed as a rough estimate of production with greater value for long-term trends than for year-to-year changes.

Results

The 2004 duck production survey data for the Potholes, Palouse, and Northeast strata indicated a slight increase (1%) in total number of broods observed from 2003 (Table 6), but remained 36% below the long-term average. Brood production varied greatly across the strata. Dramatic increases in brood numbers were recorded in the Okanogan (+238%) tracts where habitat condition was less impacted by drought, while

brood production was greatly reduced in the Channeled Scablands (-59%) where severe drought conditions greatly reduced the quantity and quality of the brood habitat. The increased brood production on the Okanogan was primarily from mallards and Barrow's goldeneye.. The brood index for the Columbia Basin was 10% below the 2003 and 21% below the long-term average (Table 7).

Canada Goose Breeding Population Survey

Methods

Canada goose breeding populations are indexed by nest searches conducted within four major geographic areas (Table 8), mainly along the Snake and Columbia rivers. Surveys are conducted annually, biennially, or periodically. Total number of goose nests found is used to index the goose breeding population. Geese are also recorded on the breeding duck surveys (see above). Geese observed during the breeding duck surveys (Fig. 1) are weighted (Table 1) and provide an index to the goose population. Our nest surveys are conducted on areas with high densities of nesting geese. The breeding duck surveys cover a much larger area with low densities of nesting geese. Data from both nest surveys and breeding-duck routes are interpreted together to index Washington's breeding-goose population. Areas with relatively recent goose population expansions, particularly north of Spokane are not surveyed. Geese are counted in the western Washington breeding duck survey.

Results

The 2004 index for the goose-nest surveys showed slight decrease (2%) from 2003 and remained 3% below the long-term average (Table 9, Fig. 9). This index increased between 1982 and 1987, and has remained relatively stable since (Figs. 9 and 10, Table 9).

The surveys in the Upper Columbia were 8% below the 2003 nesting effort and 6% below the long-term average (Table 9, Fig. 10). This reduction occurred primarily on Wells Pool where 40 nests were documented destroyed on Bridgeport Bar Island by raccoons. This follows the second highest nest count at Wells Pool in 2003 when 168 nests were recorded. The total number of nests found on the Lower Columbia appears to have remained stable since about 1988 (Table 9, Fig. 10). However, incomplete surveys between 2000-2004 due to changes in personnel and management priorities makes population comparisons difficult. The sub-area with the most consistent survey is below the I-5 Bridge to Puget Island. For this area, 401 nests were recorded in 2004, an 8% increase from 2003 and 17% above the long-term average. The most recent complete count for the Snake River was in 2002 when 199 nesting attempts were recorded. This was the lowest since 1999 when 187 nests were counted. It is anticipated the numbers will continue to decline from the removal of artificial nesting structures by the U.S. Army Corps of Engineers in their effort to control the urban Canada geese population in the Clarkston area.

The total number of nests found in the Columbia Basin decreased 6% from 2003 and remained 39% below the long-term the long-term average (Table 9). It is believed the loss of nesting attempts is related to increased human disturbance in the Potholes Reservoir and Moses Lake that comprise the primary nesting areas.

The weighted number of geese observed during the breeding duck survey was included in this report since 1995 (Table 9, Fig. 11). This index provides information about the expansion of Canada geese in areas of eastern Washington outside of our traditional goose nest index areas, and provides parallel results to the information obtained from the goose nest index. The 2004 index increased by 9% over 2003 and was 94% above the long-term average.

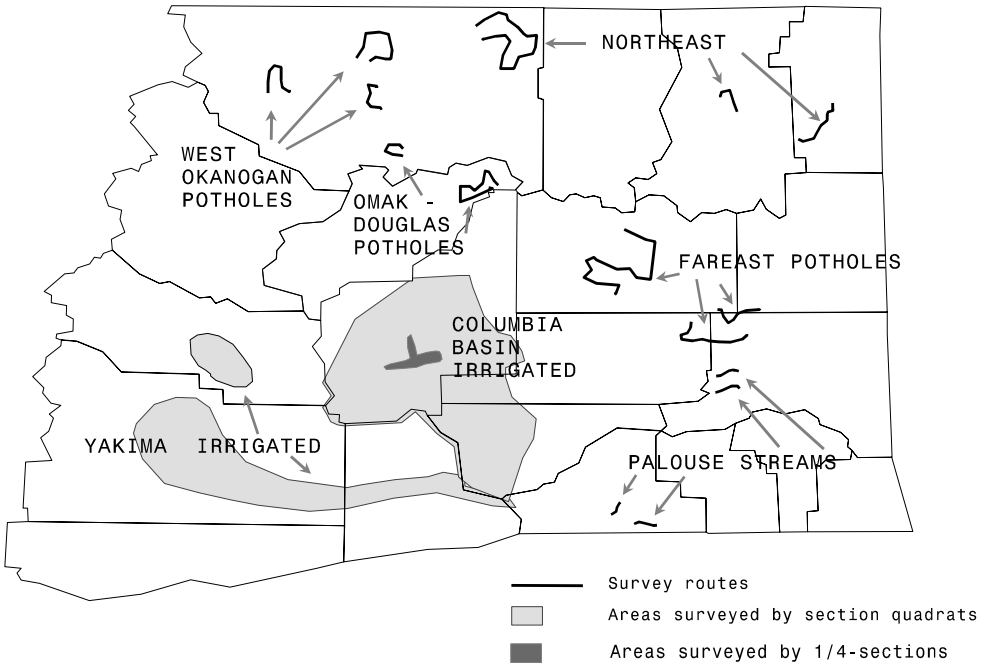
For western Washington, the population estimate for Canada geese was 2,104, an increase of 11% from 2003, but remained 29% below the seven-year average of the survey (Table 4, Fig. 12).

Potential Improvements to Waterfowl Breeding and Production Surveys

Breeding Duck Survey

- Expand this report to better cover western Washington
- Expand databases to include older data.
- Explore the possibilities of including data from National Wildlife Refuges and National Forests.
- Clearly delineate strata and check accuracy of weighting factors and sample size.
- Evaluate the goose nest survey areas for accuracy of frequency and completeness of surveys.

Fig. 1. Breeding duck surveys in eastern Washington.



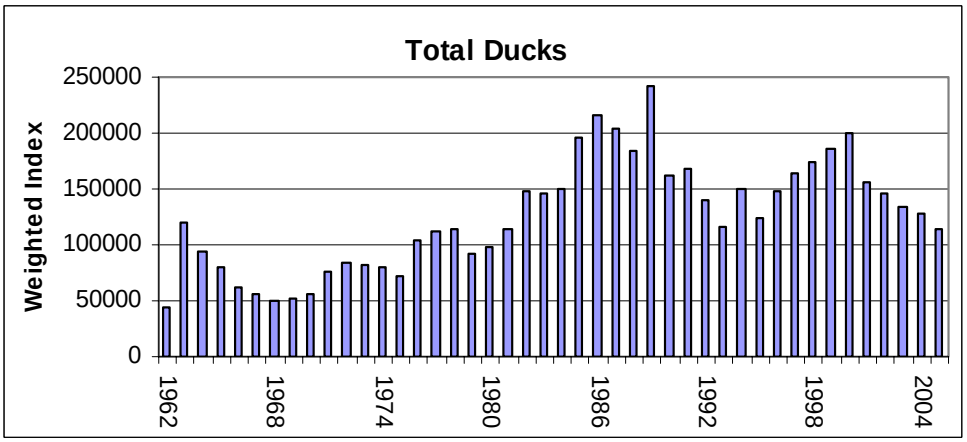


Figure 2. Breeding duck population index for Eastern Washington (1961-2004)

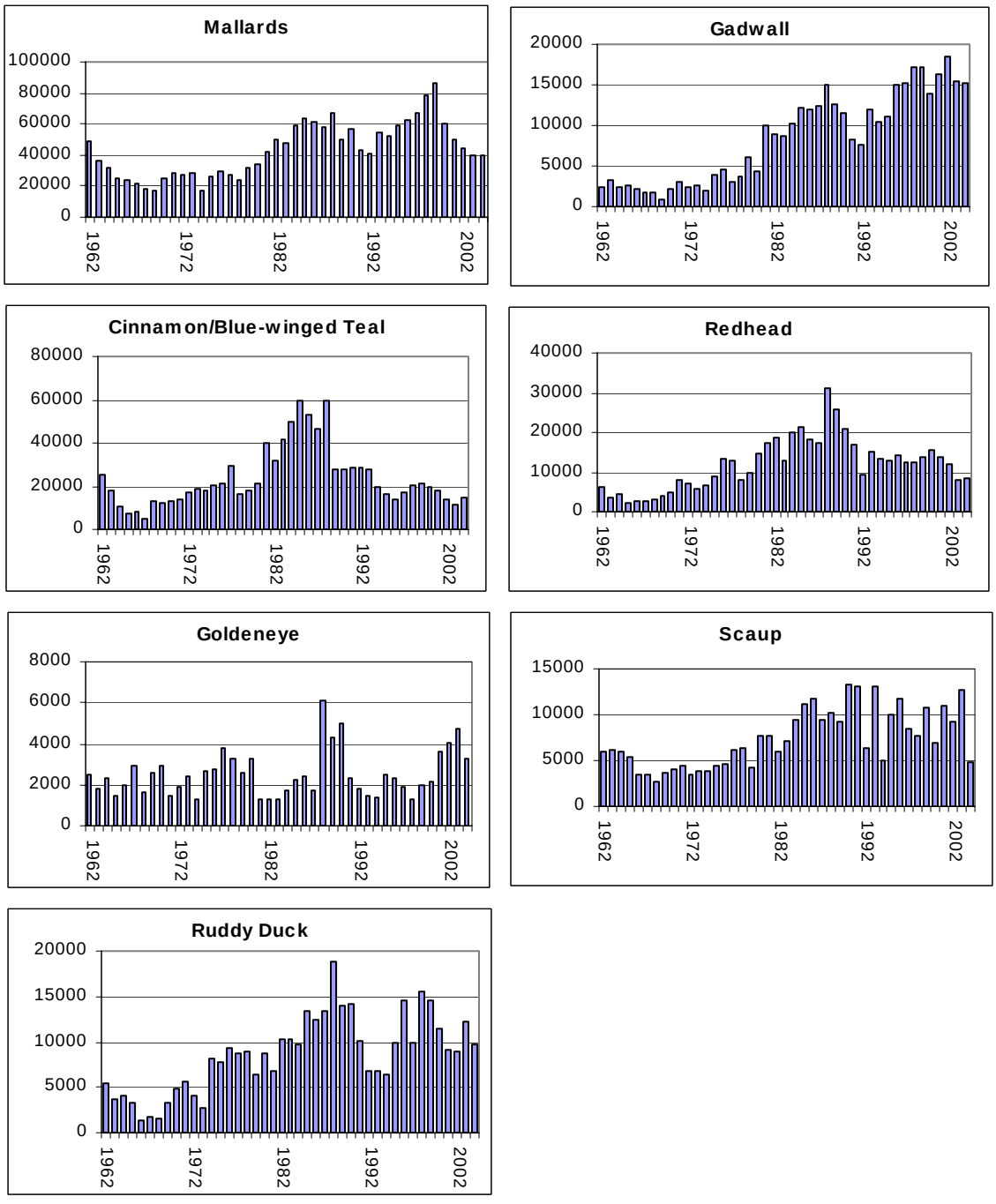


Figure 3. Indices of common breeding ducks in eastern Washington, (1962-2004)

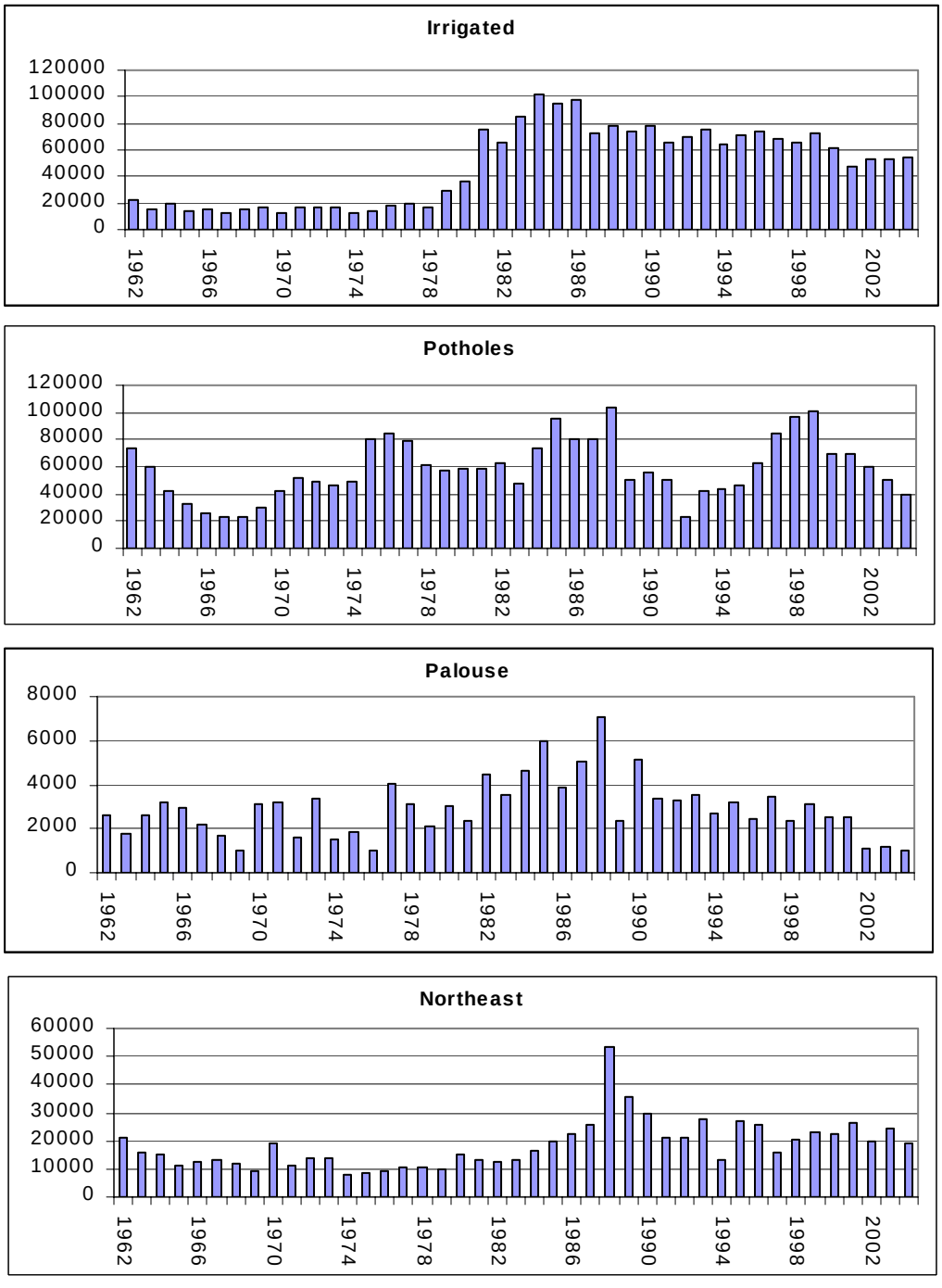


Figure 4. Weighted duck breeding population indexes by eastern Washington strata (1962-2004).

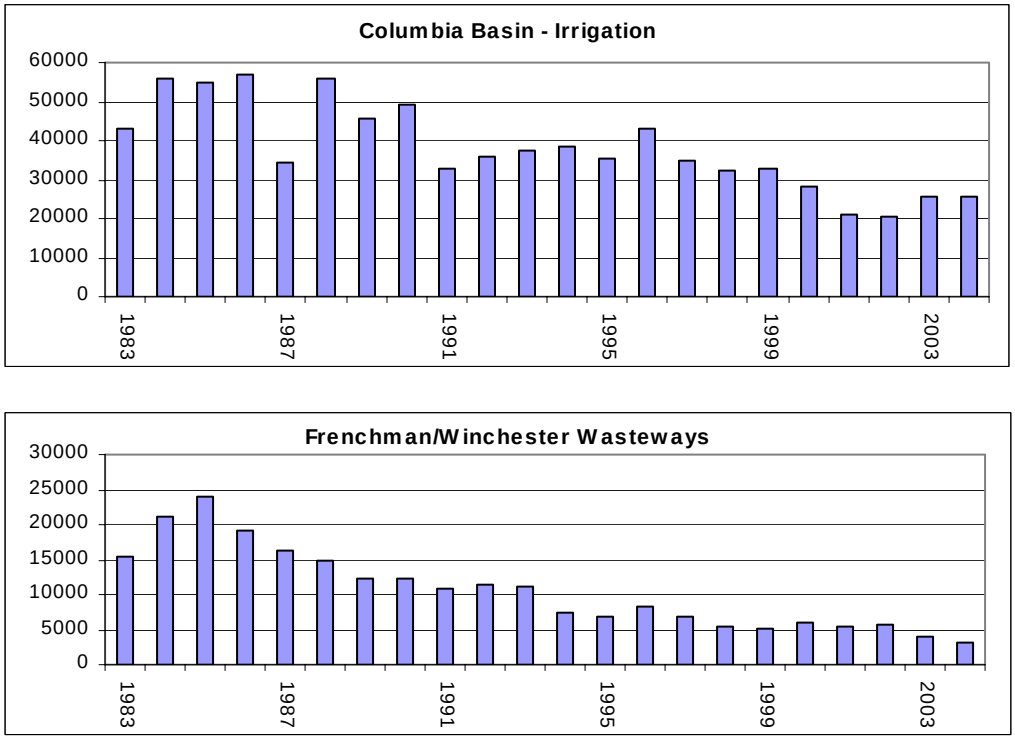


Figure 5. Weighted duck breeding populations in the Columbia Basin (1983-2004)

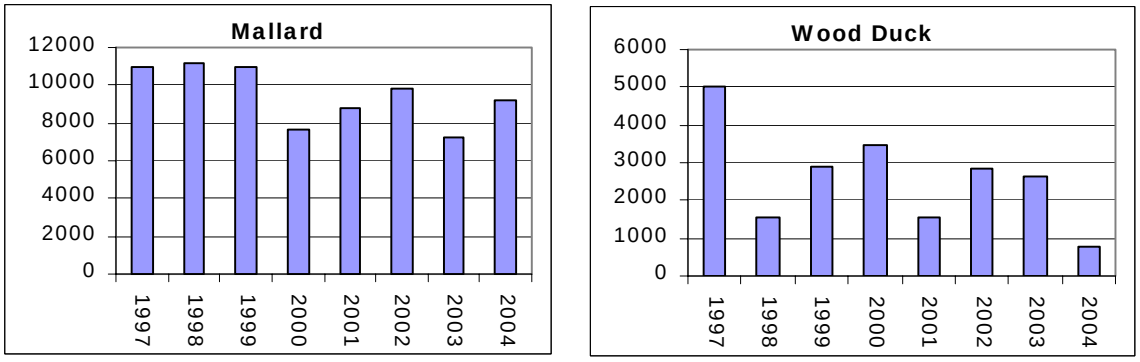


Figure 6. Western Washington total population indices for breeding ducks (1997-2004).

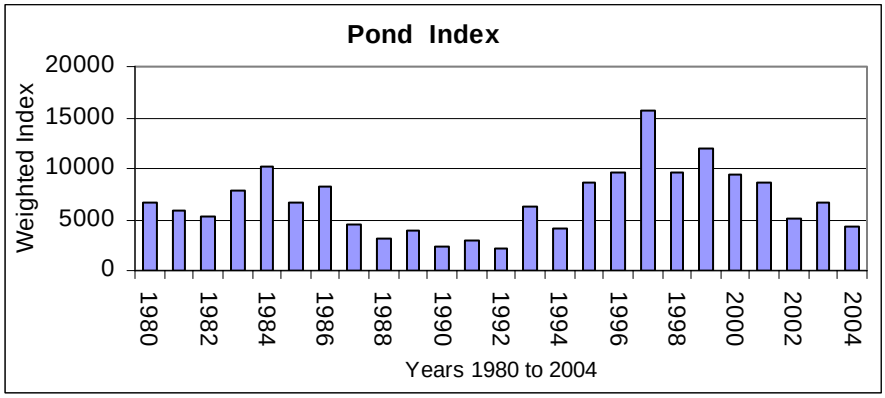


Figure 7. Index to pond numbers in the potholes strata (1980-2004).

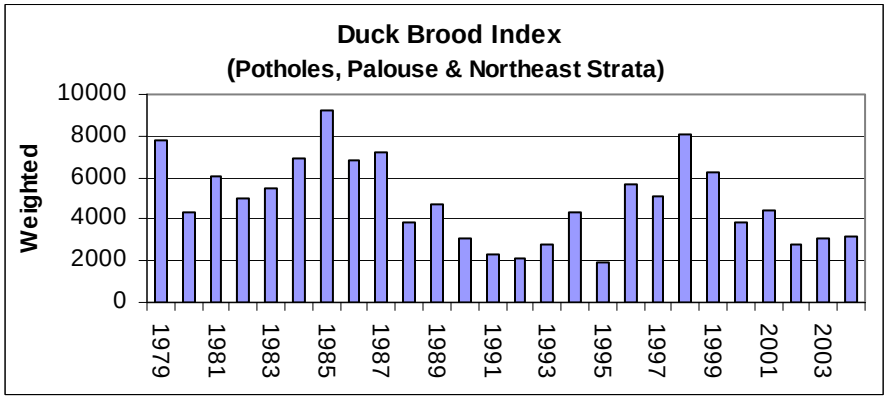


Figure 8. Weighted Duck Brood Index (1997-2004).

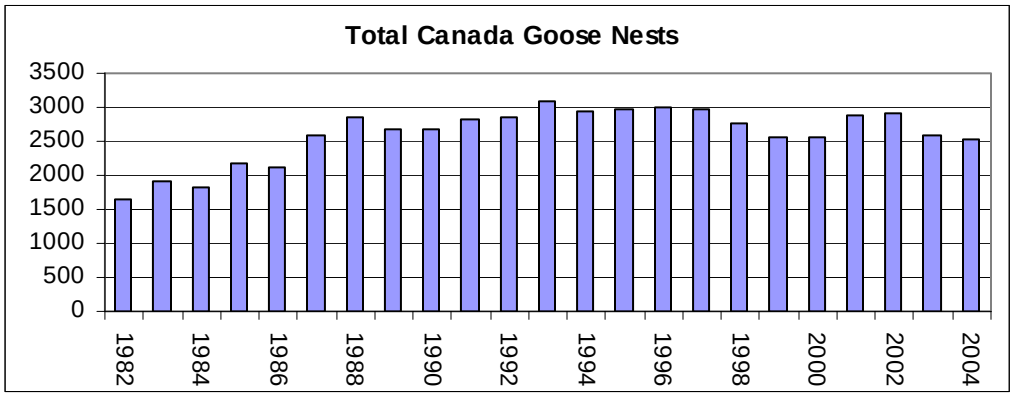


Figure 9. Total goose nests found on Columbia and Snake Rivers and in Columbia Basin (1982-2004).

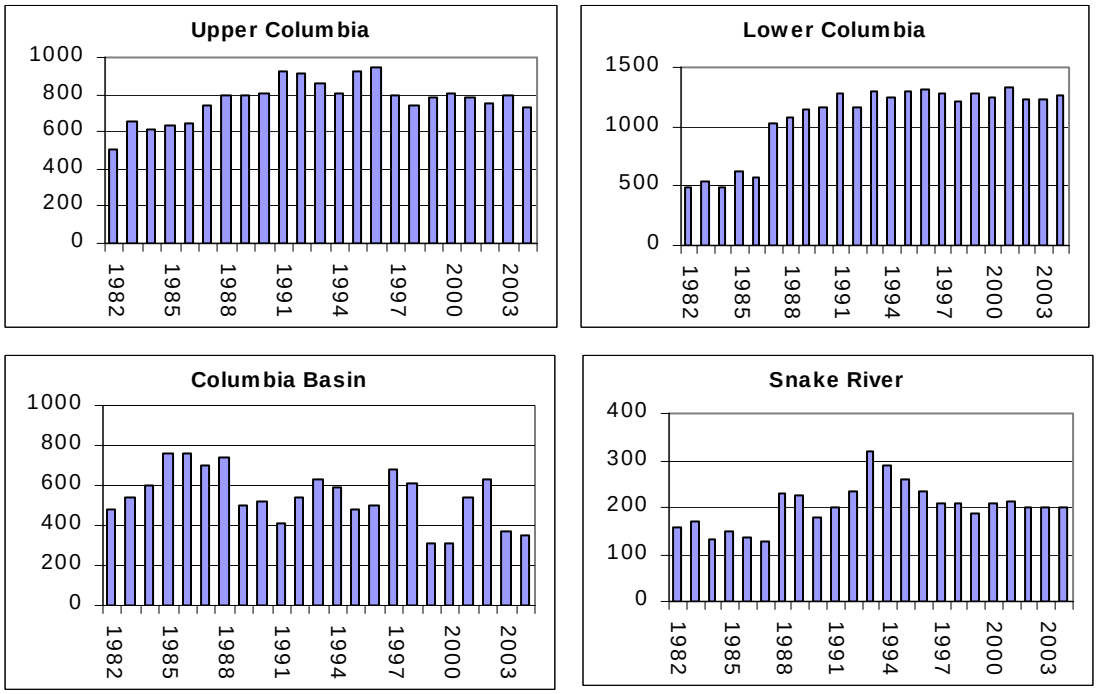


Figure 10. Canada goose nest surveys by strata (numbers of nests).

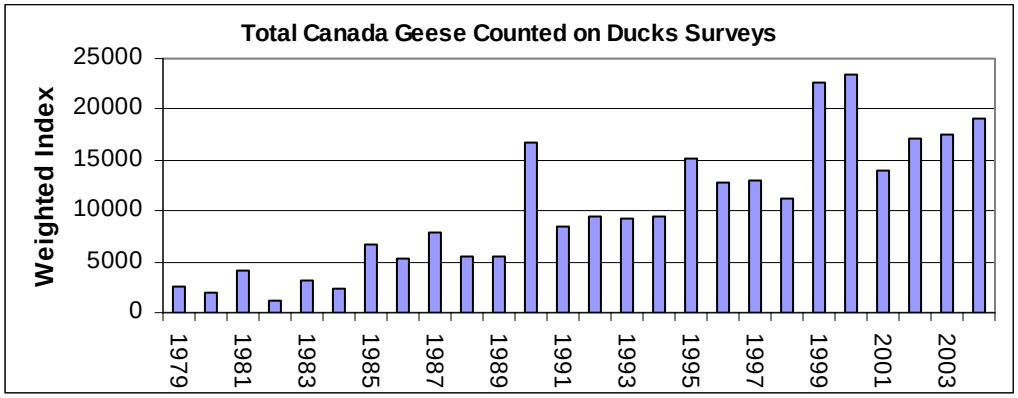


Figure 11. Canada geese counted on eastern Washington duck surveys (1979-2004).

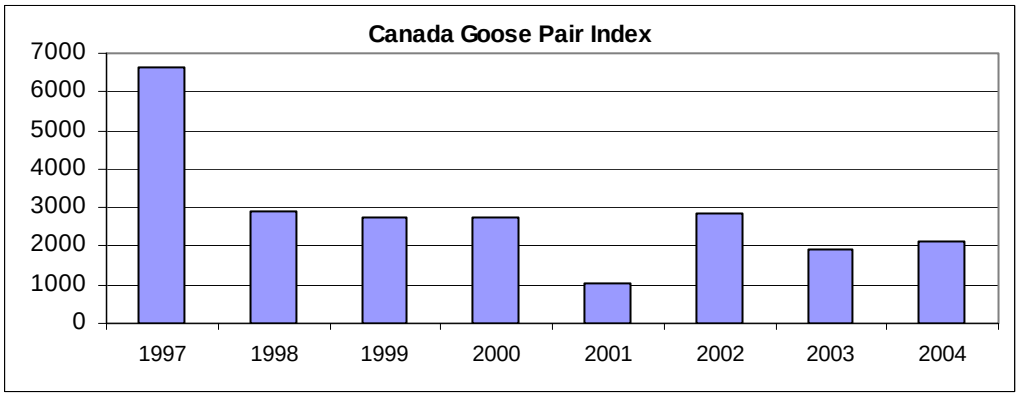


Figure 12. Canada goose pairs counted on western Washington duck surveys (1997-2004).

Table 1. Breeding duck routes, weighting factors and percent of area surveyed for areas and subareas surveyed for weighting breeding duck, goose, and ponds indices in Washington.

Area	Subarea	Survey	Weighting Factor	% of Total Area Sampled
Potholes	West Okanogan		14.06	7.1
		Methow Valley		
		Salmon Creek		
		Sinlahekin		
	Omak Lake		9.83	10.2
	Douglas County		15.26	6.5
	Far East Potholes		18.69	5.3
		Ewan-Revere		
		Sprague-Lamont		
	Lincoln County		47.59	2.1
Highland				
	Northeast		25.53	3.9
		Colville		
		Cusick		
		Molson-Sidley		
	Palouse Streams		32.52	3.1
		Union Flat		
		Palouse River		
		Walla Walla River		
		Touchet River		
Irrigated				
	Columbia Basin - 65 sections		37.25	2.7
	Wasteways[a] - 19 ¼ -sections		10.05	9.9
	Yakima - 35 sections		24.49	3.9

[a]Surveyed by helicopter beginning in 1994

Table 2. Weighted breeding duck population indices by species for eastern Washington, 1997-2004

Species	1997	1998	1999	2000	2001	2002	2003	2004	1979-2003 Average	% Change From 2003	% Change From Average
mallard	66666	78962	86243	60434	50464	44676	39843	39958	55500	<1	-27
gadwall	15306	17077	17130	13908	16261	18527	15353	15185	12074	-1	+26
wigeon	8392	7039	5721	4523	3593	6501	5028	5442	6081	+8	-11
green-winged teal	7040	3983	3665	3320	3037	2673	1749	1477	3134	-16	-53
bwt+cinn teal	16903	20228	20916	19848	17931	13717	11274	14619	29300	+29	-50
northern shoveler	11770	12580	14926	9100	8000	5968	7794	6292	6908	-19	-9
northern pintail	2802	2110	2145	970	1018	395	608	1096	1916	+80	-43
wood duck	1584	1836	2496	1841	2223	1863	616	1068	1693	+74	-47
redhead	12363	12399	13568	15584	13915	11831	8117	8365	15911	+3	-47
canvasback	1362	619	1032	603	1073	1507	919	618	790	-33	-22
scaup	8433	7674	10697	6982	10976	9289	12722	4806	9317	-62	-49
ring-necked duck	2490	2490	3835	5100	3931	1405	3063	850	2868	-73	-70
goldeneye	1877	1308	1993	2126	3643	4036	4713	3255	2589	-31	+26
bufflehead	5355	805	1094	410	826	1606	3034	1280	1284	-68	-1
ruddy duck	9837	15474	14566	11419	9156	9023	12175	9624	10996	-21	-13
merganser	270	668	182	161	356	327	757	463	400	-39	+16
TOTAL	**172451**	**185251**	**200210**	**156328**	**146401**	**133343**	**127764**	**114883**	**159773**	**-10**	**-28**
coot	62074	49629	43832	25945	40172	18171	19328	19085	32783	-1	-42
Canada goose	13019	11199	22598	23449	13890	17179	17596	19137	9850	+9	+94

Table 3. Weighted breeding duck population indices by area for eastern Washington 1979-2004.

Year	Irrigated	Potholes	Palouse	Northeast	Total
1979	28948	57784	1951	9960	98643
1980	36870	58752	3057	15063	113742
1981	74711	58026	2341	13173	148252
1982	66161	63150	4455	12663	146429
1983	84969	48044	3545	12969	149527
1984	101486	73478	4618	16697	196278
1985	94789	95463	5984	19990	216226
1986	97901	79899	3837	22135	203771
1987	72503	80100	5073	25887	183564
1988	78137	103452	7068	53143	241799
1989	73411	50663	2341	35908	162323
1990	77838	56462	5138	29474	168912
1991	65698	50293	3382	21420	140793
1992	69547	22581	3252	20884	116264
1993	75969	42335	3577	27955	149836
1994	64537	43502	2699	13173	123912
1995	71513	46068	2472	26934	146987
1996	73364	62221	1691	25658	162933
1997	68589	85137	2667	16058	172451
1998	65503	96982	2341	20424	185251
1999	72697	101140	3089	23283	200210
2000	61126	70072	2537	22594	156328
2001	47438	70106	2537	26321	146402
2002	52341	59958	1106	19939	133342
2003	52648	49794	1170	24151	127764
2004	**55098**	**39393**	**1041**	**19351**	**114883**
1979-03 AVG	69148	65019	3373	22234	159774
% change					
from 2003	+5	-21	-11	-20	-10
from AVG	-20	-39	--69	-13	-28

Table 4. Breeding Waterfowl Population Indices for Western Washington (1997-2004).

Species	1997	1998	1999	2000	2001	2002	2003	2004	97-03 Ave	% Change from 2003	% Change from Average
Mallard	11012	11127	10979	7608	8766	9874	7232	9163	9895	+27	-7
Wood Duck	5036	1535	2922	3490	1571	2828	2631	779	2859	-70	-73
Canada Goose	6637	2889	2741	2762	1042	2844	1903	2104	2974	+11	-29

Table 5. Weighted pond index from transects within the Pothole Areas of Washington, 1979-2004.

Year	Douglas	Okanogan	Omak	Lincoln	Far East	Total
1979	443	576	236	2475	1065	4795
1980	641	633	167	4378	935	6754
1981	809	675	344	3189	785	5801
1982	717	661	236	2808	935	5356
1983	1312	492	452	4283	1252	7792
1984	1312	815	482	5996	1514	10120
1985	1251	581	403	3046	1327	6608
1986	1099	591	334	4664	1458	8145
1987	824	478	315	2380	579	4576
1988	717	544	256	1142	449	3107
1989	794	520	216	1713	729	3972
1990	626	422	226	666	486	2426
1991	504	534	233	1047	673	2990
1992	275	394	157	904	430	2160
1993	855	366	157	3998	822	6197
1994	717	492	182	2046	729	4167
1995	1022	548	521	4902	1551	8545
1996	1236	633	442	5663	1645	9619
1997	1938	1125	678	9232	2691	15665
1998	1495	900	619	4949	1663	9627
1999	1389	998	550	7234	1757	11928
2000	1267	773	550	5330	1420	9341
2001	946	619	305	5330[1]	1420[1]	8620
2002	1022	520	246	2665	654	5108
2003	1541	675	216	3617	635	6685
2004	**629**	**647**	**177**	**2147**	**673**	**4264**
1979-2003 Average	990	623	341	3746	1104	6534
% change						
From 2003	-59	-4	-18	-41	6	-36
From AVG	-37	+4	-48	-43	-39	-35

Table 6. Weighted duck brood indices by species for the Potholes, Palouse and Northeast areas of Washington, 1996-2004.

Species	1997	1998	1999	2000	2001	2002	2003	2004	96-03 Average	% change from 2003	% change from Average
mallard	2316	2978	3226	1864	1762	1123	1328	1634	1820	+23	-10
gadwall	433	842	332	281	740	383	230	230	435	0	-47
wigeon	96	93	153	102	153	102	179	204	303	+14	-33
green-winged teal	104	641	306	255	204	77	102	26	147	-75	-83
blue-winged teal	340	466	357	281	281	230	179	153	670	-14	-77
cinnamon teal	131	699	153	51	281	51	26	51	106	+100	-52
northern shoveler	41	406	255	230	357	179	204	51	194	-75	-74
northern pintail	77	342	77	230	128	153	102	51	140	-50	-64
wood duck	128	70	0	51	51	0	26	77	38	+200	+101
redhead	227	684	536	230	128	179	255	51	490	-80	-90
canvasback	0	26	51	26	51	77	128	26	33	-80	-22
Scaup	228	127	102	26	0	0	102	0	57	-100	-100
ring-necked duck	26	31	77	0	0	0	26	128	51	+400	+152
goldeneye	192	282	332	77	230	26	26	357	133	1300	+169
bufflehead	0	0	0	0	0	179	26	0	8	-100	-100
ruddy duck	530	411	255	102	51	0	179	102	247	-43	-59
merganser	29	14	26	26	0	0	26	26	0	-40	-100
TOTAL BROODS	**5334**	**8112**	**6239**	**3830**	**4417**	**2757**	**3089**	**3166**	**4923**	**+1**	**-36**

Table 7. Weighted duck brood indices by area for eastern Washington, 1979-2004.

Year	Channeled Scabland	Okanogan	Northeast	Palouse	TOTAL	Columbia Basin
1979	6274	420	868	195	7757	---
1980	2598	936	715	33	4281	---
1981	4435	1041	485	98	6059	---
1982	2296	1131	1123	423	4973	---
1983	3349	1080	715	293	5437	---
1984	4806	1123	791	195	6915	---
1985	6133	1614	1123	325	9196	---
1986	4743	965	842	293	6843	---
1987	4574	1206	1072	325	7177	---
1988	1557	1112	749	434	3851	---
1989	2395	1023	894	358	4669	---
1990	1099	946	894	130	3068	---
1991	246	472	1506	130	2355	---
1992	317	434	1021	390	2163	---
1993	1232	590	613	390	2825	---
1994	2587	672	928	130	4316	---
1995	555	504	689	195	1943	160
1996	3922	554	945	228	5649	218
1997	1703	1584	1864	184	5334	179
1998	5193	1837	919	163	8112	279
1999	2681	2681	715	163	6239	170
2000	2732	434	536	128	3830	192
2001	2706	945	715	51	4417	167
2002	1940	306	460	51	2757	137
2003	1634	536	919	51	3140	164
2004	**460**	**956**	**791**	**102**	**3166**	**147**
1979-03 Avg.	2868	974	884	214	4923	185
% change from	--	--	--	--	--	--
2003	-72	+238	-14	+100	+1	-10
Average	-84	+90	-10	-52	-36	-21

Table 8. Goose nest surveys conducted in Washington.

Survey Area	Year Survey Initiated	Agency Conducting Survey	Frequency of Survey	Annual Rate of Change (% nesting attempts) 84-88	89-93	94-99	00-04
UPPER COLUMBIA				5%/yr	5%/yr	-3%/yr	-2%/yr
Hanford	<1974	WDFW	Biennial				
Priest Rapids	<1974	WDFW	Biennial				
Wanapum	<1974	WDFW	Periodic				
Rocky Reach	1975	Chelan Co. PUD	Annual				
Rock Island	<1974	Chelan Co. PUD	Annual				
Wells	1980	WDFW	Annual				
F.D.R.	1981	WDFW	Periodic				
Rufus Woods	1981	Army Corps	Annual				
Mouth of Yakima	<1974	WDFW	Biennial				
SNAKE RIVER				10	8	-5	-1
Snake River	1975	Army Corps	Annual				
Snake River Cliff	1979	Army Corps	Periodic				
LOWER COLUMBIA				21	4	-4	+3
McNary	<1974						
John Day	<1974	Umatilla NWR	Biennial				
Dalles	<1974	Army Corps	Periodic				
Bonneville	1982	Army Corps	Periodic				
Tri-Cities	1982	WDFW	Biennial				
I-5 to Bonneville	1981	Army Corps	Periodic				
I-5 to Puget Island	1981	WDFW	Annual				
COLUMBIA BASIN				5	-12	9	-2
Moses Lake	1981	WDFW	Biennial				
Potholes Res.	1981	WDFW	Biennial				
Lenore, Alkali, Park	1981	WDFW	Periodic				
TOTAL				11	2	-3	-1
Geese Counted on Duck Surveys		WDFW	Annual	28	8	6	-4

Table 9. Canada goose nest surveys in important areas of Washington, (1974-2004) and weighted number of geese observed during duck population surveys (1979-2004).

	Number of Nests					Geese observed during breeding duck Surveys
Year	Upper Columbia	Snake River	Lower Columbia	Columbia Basin	TOTAL	
1974	279	0	363	0	642	
1975	297	50	344	0	691	
1976	310	51	345	0	706	
1977	358	51	384	0	793	
1978	329	51	330	0	710	
1979	303	87	292	0	682	2570
1980	393	112	339	0	844	1925
1981	500	145	332	249	1226	4053
1982	509	160	495	484	1648	1203
1983	656	171	535	541	1902	3225
1984	618	132	481	601	1831	2305
1985	630	150	631	757	2168	6674
1986	641	136	580	765	2122	5225
1987	745	130	1024	702	2601	7938
1988	794	229	1076	742	2841	5426
1989	799	227	1154	500	2680	5605
1990	808	180	1161	518	2667	16695
1991	923	199	1282	414	2818	8483
1992	916	236	1164	538	2854	9483
1993	858	319	1293	628	3098	9190
1994	806	290	1251	595	2942	9396
1995	929	261	1302	477	2969	15017
1996	944	236	1321	501	3002	12758
1997	798	210	1286	676	2970	13019
1998	744	210	1215	610	2779	11199
1999	783	187	1273	315	2558	22598
2000	797	207	1235	313	2565	23449
2001	790	214	1331	539	2874	13307
2002	751	199	1321	629	2915	17179
2003	793	199	1232	374	2598	17596
2004	728	199	1260	350	2537	19137
1984-02 AVE	775	204	1075	572	2625	9550
% Change from	--	--	--	--	--	--
2003	-8	0	+2	-6	-2	+9
AVG	-6	-2	+17	-39	-3	+94

WATERFOWL STATUS AND TREND REPORT
Winter Waterfowl Populations and Harvest

RON FRIESZ, Waterfowl Specialist

Introduction

This report summarizes the 2003-04 waterfowl hunting season regulations, winter waterfowl surveys, and waterfowl harvest. This report compares current data with data collected over the past 25 years. These data are archived and part of a long-term database for Washington Department of Fish and Wildlife's (WDFW) Waterfowl Section. Several of the data sets extend back to the late 1940's.

Population surveys

Methods

The primary survey to determine status of wintering waterfowl in the flyway is the Midwinter Waterfowl Inventory, completed throughout the Pacific Flyway in January. This is a coordinated, comprehensive survey of all-important wintering areas, using a combination of standardized surveys from fixed-winged aircraft and ground observation locations. Waterfowl surveys are combined effort among several agencies, including WDFW, U.S. Fish and Wildlife Service, and Canadian Wildlife Service. However, this survey does not capture migration peaks and full habitat use patterns during other times of the fall/winter period. Because of these limitations, additional surveys are completed from October through March in key wintering areas of Washington, using fixed-wing aircraft and ground survey techniques. Specific age structure surveys are also completed in the north Puget Sound area for snow geese, brant, and swans, along standard ground observation routes.

Midwinter Waterfowl Inventory Results

WDFW and U.S. Fish and Wildlife Service (USFWS) personnel completed the 2003-04 midwinter waterfowl inventory in January 2004. Washington's data for total waterfowl show increases of 9% from last year and 4% above the 10-year average (1994-2003) (Table 1). The Pacific Flyway midwinter indices for total waterfowl was slightly below 5.3 million waterfowl for a 5.4% decrease from 2003, and remained 13.4% below the 10-year average (1993-2003) and 19.9% below the long-term average (1955-2003).

The 2003-04 midwinter indices for total ducks in the 11 Pacific Flyway states was 4,316,512 (Fig.2) for less than 1% decrease from the 2002-03 count of 4,328,531 and remained 11.7% below the 10-year average. In Washington, the total duck population was 780,273, an increase of 18% above last year's population of 662,302 (Fig. 3). The Washington total duck count represents 18.1% of the flyway population, and 2.5% above the state's 10-year average of 15.6% of the flyway population (Fig. 4).

The mallard total for the flyway was 828,034 for a 13.6% decrease from 2003, and remained 37.2% below the 10-year average (1993-2002). The total number of mallards counted in Washington was 432,570 an increase of 33% from last year, and slightly below (2%) the 10-year average. Washington continued to hold a high percentage of the flyway mallards at 52.3%, up from 33.9% in 2003 (Fig. 5) and holds a 10-year average of 34.7.8% of the

Pacific Flyway population.

Canada geese are not well represented in midwinter surveys due to their behavior of foraging in widespread agricultural areas, making them difficult to locate during aerial surveys. The highest counts of Canada geese within the Pacific Flyway's Midwinter Survey have occurred within the last 8 years with the highest count on record coming during 1999-00 survey when 498,026 geese were recorded. In 2004, the flyway count of 228,560 was 45.1% below last year's count and 48.4% below the 10-year average, likely indicative of incomplete counts in Oregon and other flyway states. The number of Canada geese wintering in Washington has been variable over the past 20 years. This variability continued in 2004 with a total 39,301 geese counted for a decrease of 42% from 2003 indices and 48% below the 10-year average (Table 1, Fig. 6). No explanation can be provided for the population fluctuation, but may be related to survey conditions or indicative of shifting wintering sites of geese within the flyway. Survey conditions in 2003-04 were particularly difficult with persistent fog.

The northern population of snow geese from Wrangel Island, Russia that over-winter in Skagit, Snohomish, and Island counties of N.W. Washington and the Fraser River Delta, British Columbia have had good reproductive success in recent years. Favorable weather conditions and low predation levels on Wrangel Island during the nesting season are contributing to an increasing population. Midwinter snow goose numbers from aerial photo counts by Canadian Wildlife Service in January, 2004 in northwest Washington were 66,801, a decline of 9.1% from 2003, but remains 47% above the 10-year average. (Table 1. Fig. 7). The Skagit/Fraser snow goose population increased from 45,200 in 1996-97 to 70,488 in 2002-03, an overall 36% increase. For the past seven years snow goose populations migrating to the Skagit valley wintering grounds are averaging 21.5% juveniles per year. However, limited age survey data during the 2003 pre-season indicated 12.8% juveniles in the population possibly indicating reduced reproduction success during 2003.

The number of brant counted in Washington during the 2004 midwinter survey was 14,544. This represents a 27% increase from 2003 and 16% above the long-term average (Table 1, Fig. 8). The number of brant counted during the North Puget Sound mid-winter aerial survey on January 10, 2004, mainly in Padilla and Samish bays, was 9,720.

In the 1994-95 winter season, it was first observed that gray-bellied or Western High Arctic (WHA) brant arrived in December at Padilla and Samish bays. Since that time, the Skagit county wintering population in December and January has been predominately gray-bellied (WHA) brant. In the early 1990s, Pacific black brant traditionally arrived on the wintering grounds of Padilla and Samish bays by mid-November.

The trend of fewer black brant wintering in Skagit County bays has continued from 1996-97 to 2002-03, except for 1998-99 when equal numbers of black and gray birds, total 9,345, wintered in Padilla and Samish bays. On January 22, 2004, 96% of 950 brant counted at Swinomish Spit (Skagit Co.) were gray birds. Several reasons for this phenomenon are possible: (1) the majority of black brant are stopping briefly or bypassing Padilla and Samish bays before continuing south through Puget Sound; or (2) black brant are wintering further north along coastal areas of British Columbia and Alaska, including Izembek NWR. Additional color tarsal band analysis and satellite telemetry may reveal

information regarding this trend.

The northern Puget Sound (Skagit, Whatcom, and Snohomish counties) mid-winter survey of trumpeter swans for 2004 totaled 3,382 birds (see Table 2), which is 12.3% below the 2003 count. However, not all areas were surveyed and this may represent an undercount. The 2003 count of 3,856 was 11% below the 2001-02 count of 4,343 which was the highest total count ever recorded. Juveniles accounted for 12.7% of the 2004 population (Table 2), down from the 15.2% average of the last eight years.

The northern Puget Sound tundra swan mid-winter survey results from 1996-97 to 2003-04 have remained stable, averaging about 1,850 birds per year. Juvenile tundra swans during the seven-year period averaged about 12-13% of the total population each year (Table 2).

Lead shot poisoning in wintering trumpeter swans continued to occur in 2003-04, with 246 swan mortalities in north Whatcom County. Swans ingest lead shot as they forage for food and grit in benthic substrates of north Whatcom County or the lower British Columbia mainland. Swan necropsies were conducted on trumpeter swan carcasses. Lead shot ingestion does not appear to be a major factor in the tundra swan mortalities that occasionally occur in Whatcom, Skagit or Snohomish counties.

Periodic Aerial Survey Results

Aerial waterfowl surveys in northern Puget Sound were accomplished by WDFW (Table 2), and surveys in the Columbia Basin were conducted cooperatively between USFWS and WDFW. (From a combination of budget constraints and poor weather, not all scheduled counts were completed). The highest count in the North Columbia Basin during 2003-04 occurred during December with 271,644 total waterfowl; for the South Columbia Basin the highest count was also in December with 142,587 total waterfowl; and the highest count in Northeastern Puget Sound occurred during the early December survey with 546,260 total dabbling ducks (Table 2). This count represented a 50.1% increase from a comparison flight of early December, 2002.

Hunting Season Regulations

The 2003-04 waterfowl harvest was conducted under Washington State regulations (Table 3). Large waterfowl populations in the flyway over the last 7 years has allowed for longer seasons and larger bag limits (Table 4). Under the federal framework, we were allowed the maximum number of days allowed under the Migratory Bird Treaty, 107 days. Our season length was 105 days statewide and two additional days were given for the statewide Youth Hunt on Sept.20-21. The season for northern pintails and canvasback was restricted to 65 days. (Tables 3 & 4). The bag-limit was 7 ducks to include not more than with 2 hen mallards, 1 pintail, 4 scaup, 1 canvasback, 2 redheads, 1 harlequin, 4 scoters, and 4 long-tailed ducks (Table 3).

The season length between 1988-89 and 1993-94 were the most restrictive in the State's history. Current regulations are among the most liberal ever offered in Washington. Only in 1964-65 and 1970-71 were seasons as long at 107 days on the east side (Table 4).

WDFW instituted a new license format for the 1999-00 hunting season. A small game license and big game license replaced a general hunting license. For people who hunted a variety of small game species, there was little change in total costs. For people who hunted waterfowl exclusively, the new

format resulted in an increase in cost. For the 2002-03 hunting season, the Washington Migratory Bird Stamp increased from $6.00 to $10.00. The federal migratory bird stamp remained at $15.00. (Table 4).

Goose hunting regulations have been dynamic in recent years. Changes have resulted from efforts to protect declining populations of particular Canada goose subspecies, increase recreational opportunities on expanding populations of Canada geese, simplify regulations, and address damage/nuisance complaints. The number of goose management areas remained at 5 for 2003-04 (Fig. 1).

Harvest surveys

Methods

Harvest estimates were based on the Game Harvest Questionnaire sent to 10% of the hunting license buyers. Hunters were asked to report the numbers of ducks and geese they harvested by counties. The species composition of the waterfowl harvest was derived from a Daily Waterfowl Harvest Report Card Survey. In this survey, cards were sent to waterfowl hunters prior to the start of the season to record the species of the birds they bagged. These data were used to tabulate the species composition of the waterfowl harvest (Table 5).

The brant and snow goose harvest is estimated annually using a mandatory harvest report card for each species. Written authorization and harvest reports have been required of brant hunters in all hunt areas since 1990 and snow goose hunters in the primary harvest area (Skagit, Island, Snohomish counties) since 1993. Hunters must return a harvest report card in order to be included in the permit mailing the following year. Harvest reports returned by the deadline are included in the analysis as the 'first wave' of respondents, and reminder postcards are sent out to those not returning reports by the deadline. Responses from the postcard reminder are included as the 'second wave' and then the harvest estimates are computed accounting for the non-response bias.

The harvest of Dusky Canada geese is determined at mandatory hunter check stations, summarized in a separate report.

Harvest Survey Results

The 2003-04 Washington duck harvest of 376,987 was 8.8% lower than the 2002-2003 harvest of 413,145 and was the lowest harvest since the 1993-94 season when 242,516 ducks were harvested (Fig.10). The duck harvest in Washington had declined steadily from over 1,000,000 in the late 1960's, to the low of 242,517 in 1993-94. Since that time there was a slow and gradual increase until the 2001-02 season. The harvest has then declined an average of 9.6% over the past three years.

Mallards made up 56.7% of the harvest followed by American wigeon and American green-winged teal with harvest numbers at 15.0% and 7.1%, respectively (Table 5).

The total Canada goose harvest for 2003-04 was 35,952 for a 22.6% reduction from the previous year's harvest of 46,448 (Fig. 11). Furthermore, the 2003-04 harvest and represents the lowest harvest of Canada geese on record starting with the 1963-64 season. The previous low harvest was during the 1993-94 season when 41,255 geese were harvested. In recent years, local production of large Canada geese has increased in Washington and has contributed to the increased harvest during the period from 1987 to 2001. The recent downward trend in the harvest of large Canada geese (Fig. 11) may indicate the production of large geese within the state has peaked and coincides with efforts to reduce populations of Canada geese in urban areas. The harvest of small Canada geese declined from a record high of

47,270 in 1979-80 to a low of 8,880 in 2003-04. In recent years there has been a minor recovery in the harvest of small Canada geese (Fig. 10), but this year's harvest is the lowest on record and 48% below the 2002-03 of 14,284. (Fig. 11). The reasons for the decline in small goose harvest are uncertain. A shift in wintering areas may be occurring from central Washington to the mouth of the Columbia and Willamette Valley. Unfortunately, declines in Washington's small Canada geese have not been well documented. Banding information is minimal and aerial surveys are logistically difficult.

The waterfowl harvest is summarized by WDFW administrative regions (Table 6, and Fig. 9). Region Two's long-running dominance of the harvest changed to equal portions (23%) of the harvest among Regions Two, Three and Four, followed by Regions One (13%), Region Six (12%) and Region Five (6%).

The 2003-04 pre-season count of brant in Padilla/Samish/Fidalgo Bays was above the threshold of 6,000 allowing the hunting season to remain open in Skagit County. This resulted in a state harvest of 334 brant, and compares to a low state harvest of 60 during 2002-03 when the Skagit County was closed when brant numbers were below the allowable hunting season threshold (Fig. 12, Table 7). Between 1993 and 2002 the brant harvest ranged from a high of 1,534 in 1996 to a low of 60 brant in 2002 (Table 7) or for a 10-year average harvest of 727 (1993-02). (The season was closed from 1983 to 1986).

The snow goose harvest in Washington is highly variable (Table 8, Fig. 13). It had been on a negative trend since the mid 1980's. However, the harvest of snow geese increased significantly over the past five years from 969 in 1998 to 2,522 in 2002 (Fig. 13). The harvest in 2003 was reduced slightly (6%) to 2,374. The snow goose harvest in Washington remains low, at 3.5% of the population. The harvest of snow geese in northern Puget Sound is weather dependent. Cold and windy weather forces geese from estuaries to forage inland where they are more vulnerable to hunters. This factor may be of greater importance than annual recruitment, because the erratic annual harvest (Fig. 13) does not follow the number of geese counted in Washington during the midwinter count (Fig.7).

Hunter Numbers

The Washington hunter survey is used to estimate the number of waterfowl hunters in the state. During the 2003-04 season, an estimated 24,277 hunters participated for the lowest estimate of Washington waterfowl hunters on record (Fig. 14). This is the third consecutive year waterfowl hunter numbers have dropped for an average of 14.3% per year. This three-year decline in waterfowl hunters follows a slight increase of hunters through the 1990's. Prior to that there was a steady decline in hunters through the 1980's (Fig. 14).

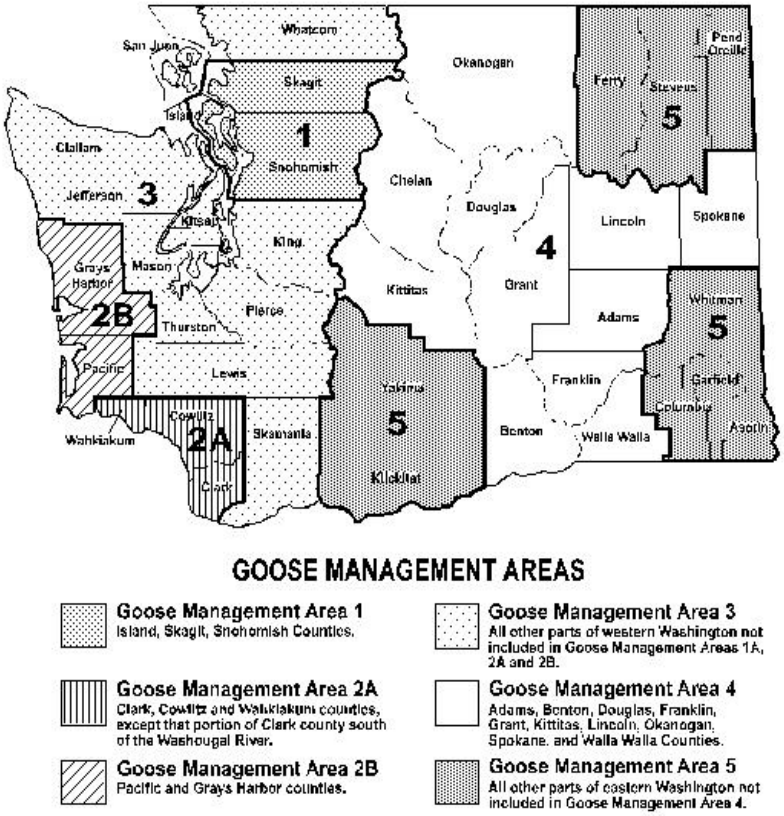
The estimated average number of ducks harvested per hunter in 2003-04 was 15.5, which was nearly identical to the 15.6 average during 2002-03 (Fig. 15). Hunter success, based on ducks harvested per hunter per year, has been stable if not on an upward trend for the past 20 years (Fig. 15). Therefore, it appears the downward trend in duck harvest (Fig. 10) is largely a result of hunter numbers (Fig. 14) and not decreased annual hunter success (Fig. 15). The high success rate may indicate that we have retained the most avid and successful waterfowl hunters.

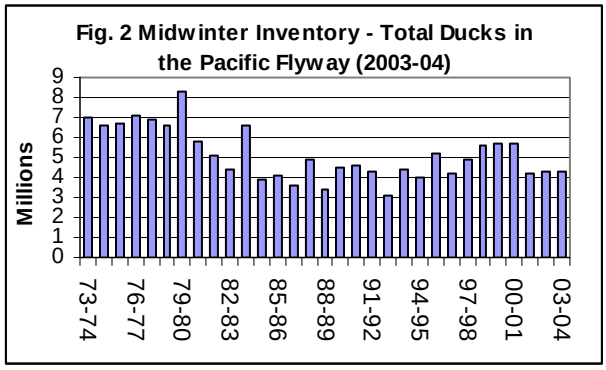
Members of the hunting public often believe the decline in hunter numbers is a result of the restrictive regulations that began in the mid-1980's (Table 4). This may have contributed to the reduced hunter

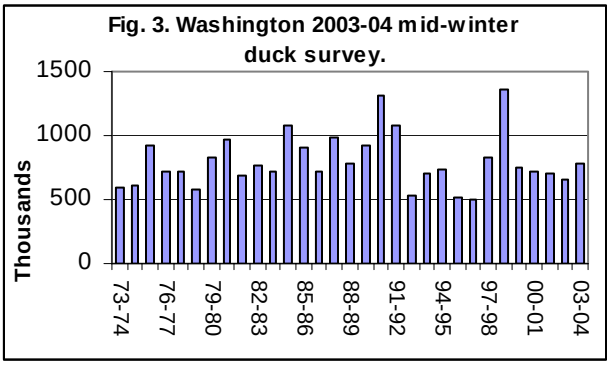
participation (Fig. 14), but the downward trend in hunter numbers began in the early 1980's when there was a 7 duck daily bag limit, no special restrictions on mallards and pintails, and season lengths were 93 west and 100 east (Table 4). The downward decline in hunter numbers is likely a result of changes in social views on hunting and lack of recruitment of new hunters.

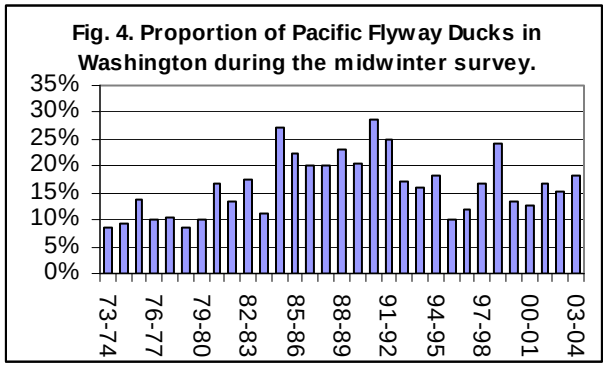
The quality of waterfowl hunting opportunities in Washington has been exceptional. Decreased hunter numbers results in lower hunter densities in the field and success has remained stable. In addition, the State is holding a large percentage of the Flyway's ducks. Canada goose regulations have been liberalized and until the last two seasons, the harvest had been increasing since the 1987-88 season. More large Canada geese were harvested in recent years than the previous 20 years. However, based on significant declines in goose harvest the past 2-3 years, goose hunting opportunities in Washington may be on the decline. Regardless, the value of Washington's waterfowl resources remains high and provides quality-hunting recreation for the state's hunting population. We have recognized a decline of quality hunting opportunities found on public hunting areas, and for the first time, starting with the 2003-04 season, have implemented a pilot Quality Hunt Area on the Desert Wildlife area in Grant County. It is designed to limit hunter density and hunting intensity with restrictions on number of hunting parties, hunting days (Wed. Sat. & Sun) and hunting hours (a.m. shooting hours until noon).

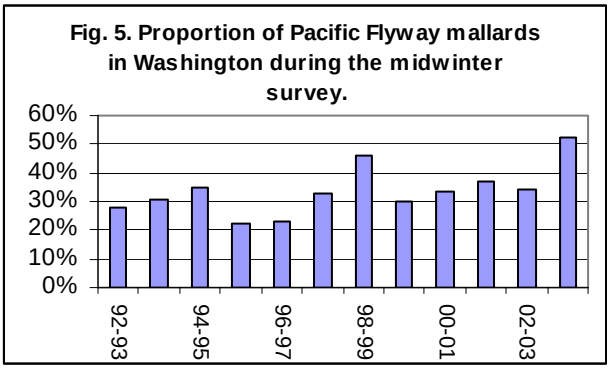
Fig. 1. Washington Goose Management Areas.











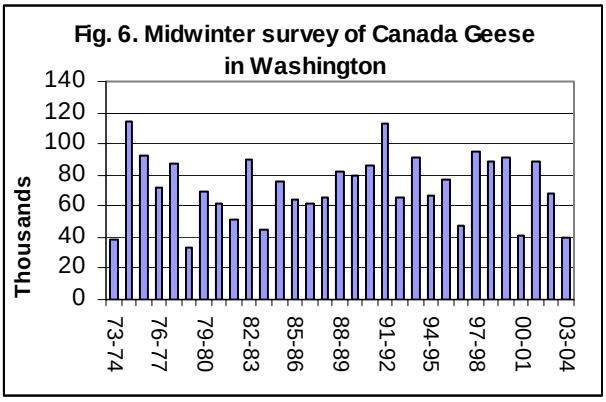


Fig. 6. Midwinter survey of Canada Geese in Washington
Thousands
140
120
100
80
60
40
20
0
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04

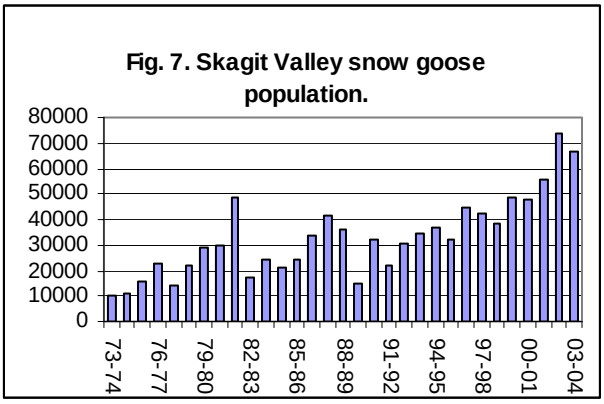


Fig. 7. Skagit Valley snow goose population.
80000
70000
60000
50000
40000
30000
20000
10000
0
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04

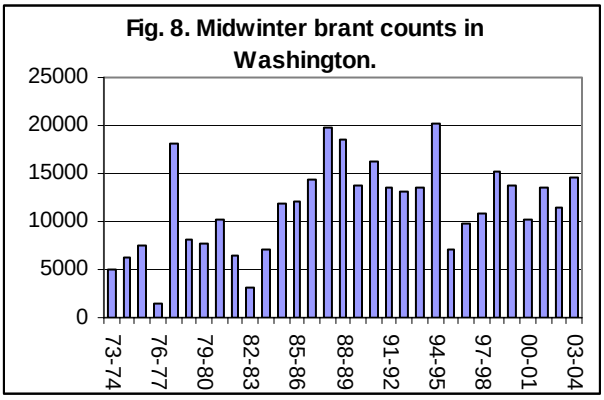


Fig. 8. Midwinter brant counts in Washington.
25000
20000
15000
10000
5000
0
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04

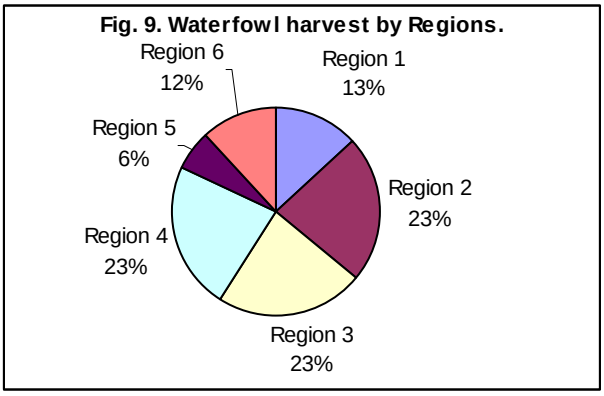


Fig. 9. Waterfowl harvest by Regions.
Region 6
12%
Region 1
13%
Region 5
6%
Region 2
23%
Region 4
23%
Region 3
23%

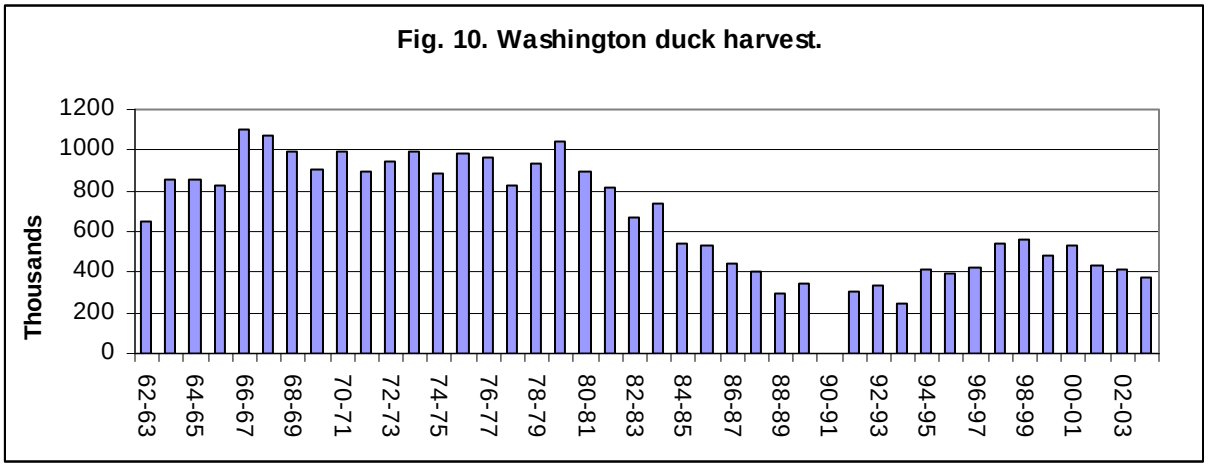
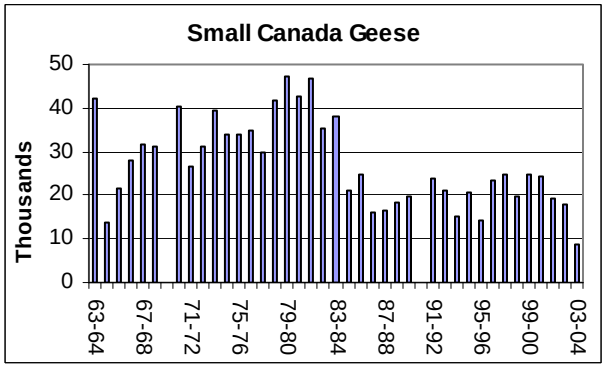
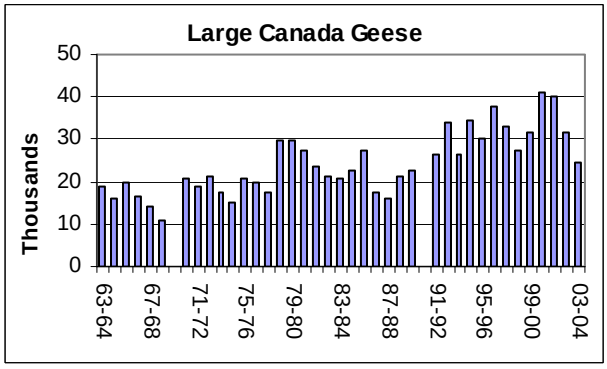
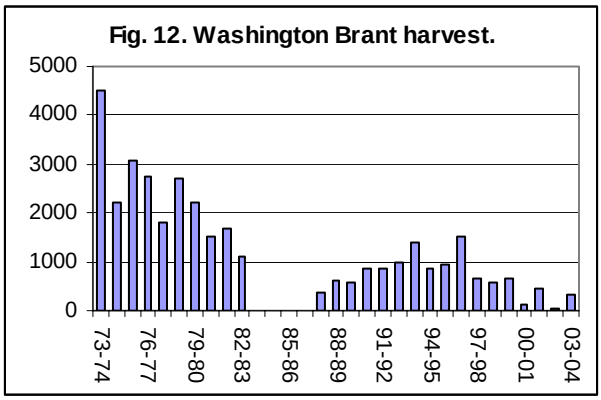


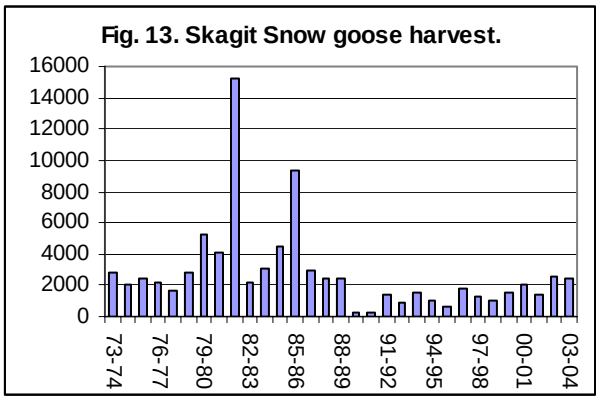
Fig. 10. Washington duck harvest.
Thousands
1200
1000
800
600
400
200
0
62-63
64-65
66-67
68-69
70-71
72-73
74-75
76-77
78-79
80-81
82-83
84-85
86-87
88-89
90-91
92-93
94-95
96-97
98-99
00-01
02-03

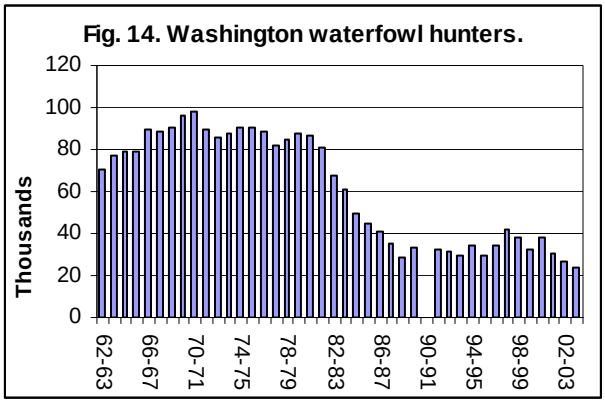
Fig. 11. Washington Canada Goose Harvest











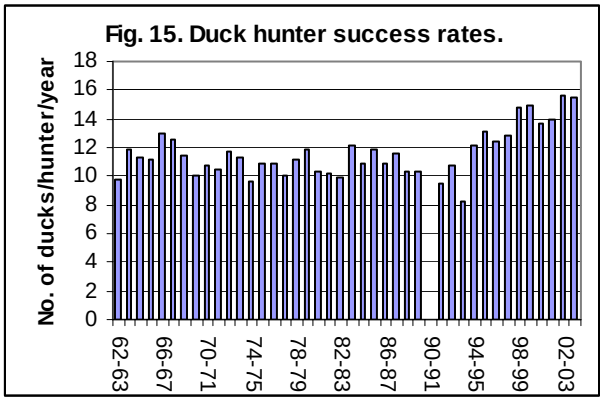


Table 1. Washington Department of Fish and Wildlife Annual Waterfowl inventory- January 2004.

SPECIES	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	04 vs. 03	94-03 ave.	04 vs. ave.
Mallard	421864	419005	310724	240838	547134	979679	442811	356830	348841	325459	432570	33%	439319	-2%
Gadwall	4556	2565	3165	6304	7482	5243	8043	10571	10595	11391	9252	-19%	6992	32%
Wigeon	95801	116748	73771	68478	117536	172049	112926	133465	124301	113838	151981	34%	112891	35%
Green-winged Teal	11834	18247	10993	7121	6729	12486	11089	6098	13695	8083	14565	80%	10638	37%
B.W. & Cinn. Teal	54	425	0	0	0	2	0	0	484	57	11	-81%	102	-89%
Shoveler	1060	1305	2310	1313	3100	2890	3036	1358	1852	5801	3445	-41%	2403	43%
Pintail	35896	56808	48227	39156	43763	81653	70040	75597	72106	57465	49567	-14%	58071	-15%
Wood Duck	381	454	162	30	72	329	84	206	356	59	132	124%	213	-38%
Redhead	3744	6779	1517	6782	2495	2335	1505	27918	11353	6867	2621	-62%	7130	-63%
Canvasback	1401	2941	4673	6115	6261	4841	2898	6020	3272	2131	3350	57%	4055	-17%
Scaup	26590	40644	32261	36545	28684	28274	26933	28833	31970	41832	40744	-3%	32257	26%
Ringneck	1419	5456	4314	3782	3327	3240	7488	6386	7306	6457	4583	-29%	4918	-7%
Goldeneye	16910	22360	19663	16951	12894	10851	13157	17177	15711	20098	14035	-30%	16577	-15%
Bufflehead	21317	26724	19441	20818	14780	17185	18017	20647	20266	26426	20009	-24%	20562	-3%
Ruddy Duck	3588	3372	4248	3417	2712	2476	3819	3075	3457	4966	2936	-41%	3513	-16%
Eider	0	0	0	0	0	0	4	0	0	0	0	0%	0	-100%
Scoter	23952	35437	26059	26939	21386	21507	20326	15932	16597	14125	15876	12%	22226	-29%
Oldsquaw	356	1550	636	1046	575	645	450	559	423	573	478	-17%	681	-30%
Harlequin	750	884	1077	909	791	696	843	603	653	797	963	21%	800	20%
Merganser	11212	10971	9830	7039	5750	6653	7762	9535	10564	12325	10495	-15%	9164	15%
Unidentified Ducks	16336	8338	8064	4304	7364	3527	2577	1539	1606	3552	2660	-25%	5721	-54%
Snow Goose*	34867	36681	32340	44441	42666	38185	48843	47743	55480	73363	66801	-9%	45461	47%
White-fronted Goose	2	2	25	20	1	0	3	34	21	2	5	150%	11	-55%
Canada Goose	90780	67383	76884	47901	95444	88698	91229	41351	88092	67941	39301	-42%	75570	-48%
Brant	13595	20308	7082	9753	10881	15252	13859	10197	13478	11455	14544	27%	12586	16%
Tundra Swan**	2616	1332	4118	3211	3424	2802	4342	4597	2521	6393	1447	-77%	3536	-59%
Trumpeter Swan**	171	75	3017	2817	2352	3215	3896	4047	4562	4263	3996	-6%	2842	41%
Unknown Swan**	129	251	85	103	371	11	402	49	254	168	2432	1348%	182	1234%
Coot	33378	52746	59652	64956	58199	104706	62387	74250	80631	91284	91387	0%	68219	34%
TOTAL	841181	959791	764338	671089	1046173	1609430	978769	904617	940447	917171	1000786	9%	963301	4%
*B.C. Snow Geese	12371	5179	7206	806	1418	7759	879	8679	1770	0	0	-100%	4606	-100%
Skagit/B.C. Total	47238	41860	39546	45247	44084	45944	49722	56418	57250	73363	66801	-9%	50067	33%

** Comprehensive western Washington swan surveys in 1989, 1991, 1996, 2001.

Table 2. 2003-04 waterfowl surveys conducted in the Columbia Basin; waterfowl surveys, snow goose photo counts, aerial brant surveys, age-ratio counts conducted in Northeastern Puget Sound.

North Columbia Basin	Oct. 23	Nov. 12-13	Dec. 16 & 18	Jan.
Mallards	28,064	95,790	186,919	No Survey
Total Ducks	118,024	225,047	265,730	
Total Geese	9,826	45,848	5,735	
Total Swans	14	436	129	
TOTAL WATERFOWL	127,864	254,497	271,644	

South Columbia Basin	Oct.	Nov. 12	Dec. 15	Jan.
Mallards	No Survey	55,045	93,364	No Survey
Total Ducks		70,984	112,517	
Total Geese		30,311	30,012	
Total Swans		66	58	
TOTAL WATERFOWL		101,361	142,587	

Northeastern Puget Sound	Oct.	Nov. 7	Dec. 3	Jan. 24
Mallards	No Survey	96,583	251,680	85,558
Northern pintail		65,509	125,043	45,936
American wigeon		58,650	148,032	59,357
Green-winged teal		11,893	21,505	3,586
Brant				
TOTAL DABBLERS		232,635	546,260	189,745

Snow Goose Aerial Photo Counts	Date	Skagit/Snohomish	Fraser	Total	% Young
	Jan. 15	64,274	0	64,274	no data
	Feb. 3	66,071	727	66,798	no data

Brant Aerial Surveys	Date	Skagit Co.	Whatcom Co.	Total
	12-11-03	7,323	1,252	8,575
	1-10-04	8,030	1,690	9,720

Age-ratios obtained from field observations - Northern Puget Sound

	Date	Sample size	Juveniles
Brant	Jan. 22	801	48 (6%)
Snow Geese (pre-season)	Dec. 11		12.8%
" " (post-season)			
Trumpeter Swan	Jan. 27-29	3,385	432 (12.7%)
Tundra Swan	Jan. 27-28	1,260	151 (11.9%)

Table 3. Waterfowl hunting season regulation summary 2003-04.

	Area	SEASON DATES (inclusive)	Daily Bag Limit	Possession Limit
DUCKS	Statewide	Sept. 20-21, 2003(Youth hunting only)(a)	7 (b)	14 (c)
		Oct. 11-15 and Oct. 18, 2003 – Jan. 25, 2004, *except pintail and canvasback closed Oct. 18-Dec. 2, 2003.*	7 (b)	14 (c)
Coots	Statewide	Same as duck seasons (including youth hunt) (a)	25	25
Snipe	Statewide	Same as duck seasons (except youth hunt)	8	16
GEESE (except Brant and Aleutian Canada Geese) (see Fig. 1 for Goose Mgt. Areas)	Goose Mgt. Areas 1 and 3	Sept. 6-11, 2003	5 Canada G	10 Canada G
	Goose Mgt. Area 2A	Sept. 6-11, 2003	3 Canada G	6 Canada G.
	Goose Mgt. Area 2B	Sept. 1-15, 2003	5 Canada G	10 Canada G.
	Goose Mgt Areas 4 & 5	Sept. 6-7, 2003	3 Canada G	6 Canada G.
	Statewide, except in Goose Mgt. Areas 2A & 2B	Sept. 20-21 (Youth hunting only)	4 Canada G	8 Canada G.
	Goose Mgt. Area 1	Oct. 11-23 & Nov. 1, 2003 - Jan. 25, 2004, except snow, Ross, or blue geese may only be taken Oct. 11, 2003-Jan. 4, 2004.	4 (d)	8 (e)
	Goose Mgt. Area 2A	8. a.m. – 4 p.m. Tues, Thurs. and Sat., only, Dec. 9, 2003-Jan. 24, 2004, except closed Dec. 25, 2003 and Jan. 1, 2004; Ridgefield NWR - Sat., Mon., Wed. only, Dec. 13, 2003 and Jan. 24, 2004	4 (f)	8 (f)
	Goose Mgt. Area 2B	8 a.m. – 4 p.m. Sat. & Wed. only Nov. 15, 2003-Jan. 4, 2004	4 (f)	8 (f)
	Goose Mgt. Area 3	Oct. 11-23 & Nov. 1, 2003-Jan. 25, 2004	4 (d)	8 (e)
	Goose Mgt. Area 4	Sat., Sun., Wed., only Oct. 11-13 & Oct. 18, 2003-Jan. 18, 2004; Nov. 11, 27, 28, Dec. 25,26,29,30, 2003; Jan 1, 2004 & everyday Jan. 19-25, 2004	4 (d)	8 (e)
	Goose Mgt. Area 5	Oct. 11-13, & Oct. 18, 2003- Jan. 25, 2004	4 (d)	8 (e)
Brant	Skagit & Pacific Co.s	Nov. 22, 23, 25, 27, & 28 & Jan . 17, 18, 21, 24 &25, 2004 (g)	2	4
Aleutian Canada Geese, Swans	Statewide	Closed		

a) Special youth hunting season open to hunters under 16 years of age (must be with adult 18 year old who is not hunting).
b) Daily bag limit: 7 ducks – to include not more than 2 hen mallards, 1 pintail, 4 scaup, 1 canvasback, 2 redhead, 1 harlequin, 4 scoters, and 4 long-tailed ducks (see limited season for pintails and canvasbacks).
c) Possession limit: 14 ducks—to include not more than 4 hen mallards, 2 pintails, 8 scaup, 2 canvasback 4 redheads, 1 harlequin, 8 scoters and 8 long-tailed ducks.
d) Daily bag limit: 4 geese – to include not more than 3 snow, Ross' or blue geese.
e) Possession limit: 8 geese – not to include more than 6 snow, Ross' or blue geese.
f) Daily bag limit – 4 geese -- to include not more than 1 dusky Canada goose, and not more than 3 snow, Ross' or blue geese; Possession limit: 8 geese - to include not more than 1 dusky Canada goose, and not more than 6 snow, Ross' or blue geese; Season Limit: 1 dusky Canada goose (a dusky Canada goose is defined as a dark-breasted goose (Munsell 10YR, 5 or less) Canada goose with a culmen (bill) length if 40-50 mm).
g) Brant Season: If the pre-season wintering population in Padilla/Samish/Fidalgo Bays is below 6,000 (as determined by the winter survey in late December/early January) the brant season in Skagit County will be canceled.

Table 4. Significant historical changes in duck hunting regulations.

	Season		Bag Limit		Special Limits		Stamp Fees		Hunting License	Steel shot Regulation
Year	East	West	East	West	Mallard	Pintail	State	Federal		
73-74	100	93	6	5	-	2 extra	-	$5.00	$6.50	-
74-75	100	93	6	5	-	-	-	5.00	6.50	-
75-76	100	93	7	7	-	-	-	5.00	6.50	-
76-77	100	93	7	7	-	-	-	5.00	7.50	-
77-78	100	93	7	7	-	-	-	5.00	7.50	3 zones[1]
78-79	100	93	7	7	-	-	-	5.00	7.50	" "
79-80	100	93	7	7	-	-	-	7.50	7.50	" "
80-81	100	93	7	7	-	-	-	7.50	7.50	1 zone[2]
81-82	100	93	7	7	-	-	-	7.50	7.50	" "
82-83	100	93	7	7	-	-	-	7.50	10.50	" "
83-84	100	93	7	7	-	-	-	7.50	10.50	" "
84-85	100	93	7	7	-	4	-	7.50	10.50	" "
85-86	84	79	5	5	1	1	-	7.50	12.00	" "
86-87	86	79	5	5	4 (1)	4 (1)	5.00	7.50	12.00	Large zones[3]
87-88	86	79	5	5	4 (1)	1	5.00	12.00	12.00	" "
88-89	66	59	4	4	3 (1)	1	5.00	12.00	12.00	" "
89-80	66	59	4	4	3 (1)	1	5.00	12.00	12.00	" "
90-91	66	59	4	4	3 (1)	1	5.00	12.00	12.00	" "
91-92	66	59	4	4	3 (1)	1	6.00	15.00	15.00	Steel statewide
92-93	66	59	4	4	3 (1)	1	6.00	15.00	15.00	" "
93-94	66	59	4	4	3 (1)	1	6.00	15.00	15.00	" "
94-95	76	69	4	4	3 (1)	1	6.00	15.00	15.00	" "
95-96	100	93	6	6	1	2	6.00	15.00	15.00	Bismuth added
96-97	100	93	7	7	7 (1)	2	6.00	15.00	15.00	" "
97-98	106[5]	106[5]	7	7	7 (2)	3	6.00	15.00	15.00	Tungsten-iron added
98-99	106[5]	106[5]	7	7	7 (2)	1	6.00	15.00	15.00	Tungsten-polymer added
99-00	106[5]	106[5]	7	7	7 (2)	1	6.00	15.00	30.00[4]	Tungsten-matrix added
00-01	105[6]	105[6]	7	7	7 (2)	1	6.00	15.00	30.00	Tungsten-nickel-tin added
01-02	105[6]	105[6]	7	7	7 (2)	1	6.00	15.00	30.00	Same as previous year
02-03	105[6]	105[6]	7	7	7 (2)	1[7]	10.00	15.00	30.00	TINT[8] added
03-04	105[6]	105[6]	7	7	7 (2)	1[9]	10.00	15.00	30.00	Same as previous year

1Non-toxic shot zones were established at Barney Lake, Skagit Bay, and the Columbia River flood plain.
2Only Barney Lake was retained as a non-toxic shot zone.
3Steel shot in progressively larger zones from 86-87 through 91-92 when steel shot was required statewide.
4New small game license format.
5Youth hunt one additional day
6 Youth hunt two additional days
7pintail season limited to 62 days (Sept. 21-22; Oct.5-11; Oct 26-Dec. 17)
8tungsten-iron-nickel-tin shot
[9] pintail season limited to 62 days (Sept. 20-21; Oct. 11-15, Dec. 2-Jan. 25)

Table 5. Waterfowl harvest by species in Washington (2003-04)[1]

Species	No. Harvested	% of total
Mallard	214,085	56.7%
Northern pintail	7,359	1.9%
American wigeon	56,491	15.0%
Green-winged teal	31,187	7.1%
Other ducks	72,011	19.2%
Total ducks	376,987	100%
Large Canada	24,617	68.0%
Small Canada	8,880	24.5%
White-fronted	- -	- -
Snow	2,374	6.6%
Brant	334	0.9%
Total geese	36,205	100%
Total waterfowl	413,192	

[1]The number of each species harvested is estimated from the Daily Waterfowl Harvest Report Card Survey. The total number of ducks and geese harvested is estimated from the more extensive Game Harvest Questionnaire.

Table 6. Waterfowl harvest by region (2003-04)

Regions	Ducks and Geese Harvested	% of State Total
Region 1	53,893	13.0%
Region 2	94,787	22..9%
Region 3	95,637	23.1%
Region 4	96,117	23.2%
Region 5	25,236	6.1%
Region 6	47,603	11.5%
Total	413,192	100%

Table 7. Brant harvest report summary*.

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Permit Issued	1194	1069	1207	1445	1331	1348	1336	1295	1436	1387	1187
Hunters	496	287	343	254	197	243	218	39	187	27	152
Days (successful)	765	484	552	549	326	350	386	59	277	277	200
Season Days	11	6	11	11	5	5	9	5	10	10	10
Harvest											
Skagit	1347	825	918	1493	597	570	581	0	403	18	257
Whatcom	7	0	0	0	0	0	0	0	0	0	0
Pacific	53	23	44	41	59	18	86	108	37	42	77
Total	1407	848	962	1534	656	588	667	108	440	60	334

Table 8. Snow goose harvest report summary*.

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Permits Issued	2298	2588	2313	2363	2795	3086	3061	3076	3144	3196	3013
Hunters	572	433	221	427	424	341	445	460	407	442	530
Days (Successful)	1096	664	373	996	812	585	777	1039	953	1217	1155
Harvest											
Island	58	60	57	39	38	29	71	18	4	18	20
Skagit	677	496	99	381	545	678	815	1058	753	1,419	1465
Snohomish	1124	522	331	1400	749	262	598	919	696	1,084	889
Total	1859	1078	487	1820	1332	969	1487	1995	1453	2522	2374

*These figures are based on analysis of mandatory report returns, corrected for non-response bias.

Wild Turkey

WILD TURKEY STATUS AND TREND REPORT
Statewide

MICK COPE, Upland Game Section Manager
DANA L. BASE, Associate Wildlife Biologist
TOM MCCALL, Wildlife Biologist
DAVID P ANDERSON, District Wildlife Biologist

Population objectives and guidelines

Turkeys have been released in Washington over a period of 70 years. The primary objective of these releases was to provide additional hunting recreation. From 1985 to 2002, the Department of Fish and Wildlife (WDFW) conducted several release projects. Since wild turkeys were not native to Washington, three subspecies of turkeys were chosen based on the habitats they would be occupying.

Merriam's turkeys were released in Ferry, Klickitat, Lincoln, Okanogan, and Stevens counties; Rio Grande turkeys were released in Chelan, Kittitas, Yakima, Walla Walla, Garfield, Columbia, Asotin, Lincoln, Whitman, and Okanogan counties; and the eastern subspecies was introduced in Pacific, Cowlitz, Thurston, Lewis, and Grays Harbor counties.

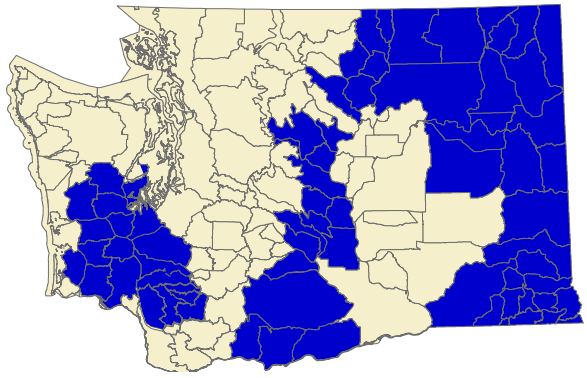


Figure 1. Current distribution of wild turkeys in Washington.

Hunting seasons and harvest trends

Estimated harvest of wild turkeys is based on analysis of mandatory hunter reports. Successful hunters are required to submit a harvest report card with date, location, sex, and age of harvested birds.

Hunting seasons for wild turkeys have varied from a 2-day, fall season in 1965 to the current 31-day spring season statewide and 5-day fall, permit-only seasons in selected counties (which began in 2000). The statewide, April 15 to May 15, spring season was established in 1994. A short, fall season has existed since 1965. The fall season was held in late November in 1990 and was changed from a general season to a permit-only hunt in 2000. In 2000, the fall hunt dates were moved from late November to early October to avoid overlapping other hunting seasons.

Beginning in 1995 and ending in 2000, hunters could kill one bearded turkey per day from each of three subspecies for a total of three per year. County of kill defined subspecies. Multiple tags could only be purchased prior to the spring hunting season. After the spring season started, only one turkey tag could be purchased. Since the 2001 spring season, hunters have been able to harvest 2 bearded turkeys in most eastern Washington counties and purchase tags throughout the season.

Turkey hunting is open to shotgun and archery hunting only. The use of dogs is not allowed, decoys are legal, and hunting hours are one-half hour before sunrise to sunset.

Current regulations are considered relatively conservative. Spring season timing results in harvest of gobblers after peak breeding. The season ends before most nests hatch, so disturbance is minimized.

In 2003, 15,783 people hunted turkeys, taking a total of 5,095 turkeys. Prior to turkey augmentation activity in the late 1980s, hunter numbers fell to a low of 428 (1987) and turkey harvests averaged 65-birds per year (1983-1987).

Beginning in 2001, turkey hunters were required to report their hunting activity. Hunter reports were

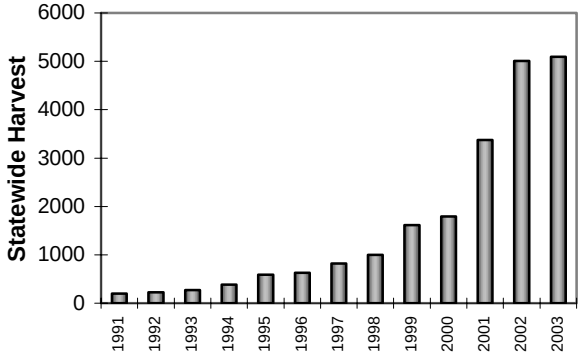


Figure 2. Trend in turkey harvest in Washington, 1991-2003.

collected by Game Management Unit (GMU), a geographic area also used for reporting deer and elk harvest. This mandatory reporting system has produced more accurate estimates of harvest and hunter participation than those estimates made in the past.

To make management of turkey populations more effective, GMUs are grouped into Population Management Units (PMUs). Washington State was divided into 7 PMUs: Northeast (P10), Southeast (P15), North Central (P20), South Central (P30), Klickitat (P35), Northwest (P40), and Southwest (P50). Table 1 shows which GMUs are part of each PMU. Overall harvest has gone up over the past 6 years, however, the rate of increase has been dramatically higher in PMU P10 (Figure 3).

Table 1. Game Management Units included in each Population Management Unit.

PMU	GMU's Included
P10	101-136
P15	139-186
P20	All 200 GMUs
P30	All 300 GMUs EXCEPT GMU 382
P35	GMUs 382,588,578,574,572,568
P40	All 400 GMUs PLUS GMUs 601-627
P50	All 500 GMUs EXCEPT 568-588 PLUS GMUs 633-681

In 2003, 4392 wild turkeys were harvested in Region 1 (PMUs P10 and P15) during the spring general and fall permit seasons combined (Tables 2 and 3). Last year was the first since 1991 that turkey harvest within Region 1 did not increase from the previous year. Nevertheless, the harvest in Region 1 accounted for 86 % of the statewide turkey harvest (Table 2). The spring season is extremely popular with hunters, and some hunting areas have become so popular that hunter crowding and safety are becoming a concern on opening day and weekends.

In Region 2 (PMU P20), annual turkey harvest from 1992 to 1999 fluctuated between 10 and 22 birds. Since 1999, there has been an eight-fold increase in harvest (21-176) in PMU P20 (Table 2). From 2002 to 2003 harvest increased approximately 48% (119-176). This increase can be attributed to the release of nearly 800 turkeys during 2001-2002 in Chelan and Okanogan counties. Mild winters and favorable spring weather have translated into good over-winter survival, good poult production, and to natural population expansion. While harvest increased nearly 50%, hunter numbers also increased within Region 2 about 32% overall from 633 to 833.

Turkey harvest in Region 3 (PMU P30) jumped from 10 birds in 2000, to 105 birds in 2002 (Table 2). Harvest was distributed throughout the Region. Mild winters, the release of 574 birds from 1999-2001, and increased hunter awareness undoubtedly contributed to the increased harvest.

Turkey harvest started slowly in Klickitat County in the 1960s but increased to 98 turkeys in 1970. Harvest was relatively stable through the 1970s and early 1980s. But, by 1986, harvest had dropped to <50 turkeys. Harvest reported for PMU P35 has increased substantially since supplemental releases in 1988-89 and has leveled off at 300 birds during each of the 2002 and 2003 seasons. Turkey hunting has improved in Klickitat County as winters have been mild, turkey distribution has increased, as well as hunter effort.

Turkey harvest in the Westside habitats of Regions 5 and 6 (PMU P50) has increased over the last 6 years as a result of the recent releases and increasing hunter effort, although overall harvest is low (54 in PMU P50) (Table 2). Harvest remains low in Lewis, Cowlitz, Skamania, and Wahkiakum counties.

Population status and trend analysis

Turkey releases were documented historically in Asotin and Walla Walla counties in 1929 and 1919. These were likely the eastern subspecies raised on game farms. Turkeys were released again during the 1960s by the Department of Game in Walla Walla and Columbia counties. A total of 18 Merriam's turkeys were released in Walla Walla County on Coppei Creek and 16 were released on W.T. Wooten Wildlife Area. These releases did not result in long-term population establishment.

From 1988 to 1990 Rio Grande turkeys were brought in from Texas and released at several locations in Asotin, Columbia, and Garfield counties. In all, 87 turkeys were released in Asotin County, 40 were released in Columbia County, and 49 in Garfield County. Additional Rio Grande turkeys were trapped in these counties and translocated to other parts of the Blue Mountain foothills including Walla Walla County (34 birds) and along the Palouse River in Whitman County (56 birds). Harvest of Rio Grande turkeys in southeast Washington was 236 in 2000.

Based on harvest trends (Table 2), the Blue Mountains population has expanded significantly. The Blue Mountain foothills seem to provide excellent habitat conditions for Rio Grande turkeys as does the northern half of Lincoln County.

Wild turkeys of the eastern subspecies were released in Stevens County in 1919, but a sustainable

population did not develop. In 1961, 15 Merriam's turkeys were released in the Rice area of Stevens County and a population became established. Birds were subsequently trapped from this population and released throughout the state. Fourteen were released in Ferry County over a 3-year period and 12 birds were released in Spokane County. Initially, turkeys did very well in Stevens County with a fall harvest of 120 birds in 1965. Harvest declined and stabilized near 20/year. By the mid-1980s harvest had declined to about 10 birds/year.

In 1988 and 1989, 170 Merriam's turkeys from South Dakota were released throughout Stevens County. Spring harvest in Stevens County has climbed each year with a record harvest of 761 turkeys in 2000.

During the 1988-89 time period, 32 Merriam's turkeys were also released in Ferry County. Harvest in Ferry County has generally increased from 12 birds in 1992 to 339 turkeys in 2003. Stevens, Pend Orielle and Ferry counties contain good habitat for the Merriam's subspecies.

While the only release records for Pend Oreille County were 60 Merriam's turkeys released in 1996, a few turkeys have been harvested each year since 1993. Fifty-seven turkeys were harvested in Pend Oreille County in 2000. This harvest is attributed to a combination of 1996 releases and birds moving in from adjacent release sites in Idaho and Washington.

Harvest records suggest that populations in Ferry and Stevens counties are maintaining densities. This population should continue be very productive depending on winter conditions and pine seed production. While severe winter conditions have limited turkey populations in other parts of the United States, the harsh winter of 1996-97 did not appear to significantly impact the northeast Washington population.

Turkey populations in Region 1 continue to expand and should provide high harvests. Winters have generally been very mild so there has been excellent carryover from year to year. Turkeys in Region 1 are often associated with wheat stubble fields during winters and winter mortality may be low unless snow is unusually deep for long periods.

Wild turkeys in Region 1 continue to occupy new areas as numbers increase and as trap and translocation projects have removed excess turkeys from areas of concentration. The general trend over the past 10 years has been a steady increase in localized areas in spite of periodic severe winter conditions.

Rio Grande turkeys released in Whitman County within PMU P15 are expanding into available habitat in that heavily agricultural county. The Palouse River drainage contains the highest quality feeding and roosting areas for birds in the area.

Eight turkeys were released in Douglas County (Region 2) from the Stevens County population in 1965. Up to 12 turkeys were harvested from Douglas County per year from 1966 to 1973.

The earliest records of turkey releases in Okanogan County occurred in 1931. Merriam's turkeys were trapped in Stevens County and released in Okanogan County in the early 1960s. Four were released on the Sinlahekin Wildlife Area in 1960, six more in 1963, and 10 more in 1966. A total of 9 birds were released on the Methow Wildlife Area in 1967. A few birds were harvested in Okanogan County in 1968 and 1969, but no harvest was reported after that until additional releases were made in the late 1980s and early-1990s.

Thirty Merriam's turkeys were released in eastern Okanogan County in 1989. Records do not indicate any harvest in eastern Okanogan County after these releases. However, Rio Grande turkeys released in western Okanogan County on Chiliwist Wildlife Area have resulted in sustained harvests in this area indicating that the population is probably stable or increasing slowly. The population likely declined as a result of the 1996-97 winter; however, the mild weather of the next five winters is fostering a population rebound. In 2001, 93 Merriam's turkeys from Ferry and Stevens counties were released in Okanogan County, 135 in 2002, and 120 in 2003.

No population estimate has been made for the Okanogan County turkey population. In 2003, the turkey population in Okanogan County is thought to be continuing to increase and expand their range, due to the mild winter last year and seemingly good chick survival this summer. Turkeys are expanding into drainages west and south of traditionally inhabited areas of the Chiliwist watershed. The lack of grain farming in the area may eventually limit population growth.

Turkeys are also colonizing tributary streams of the lower Methow. At least some of these birds likely originated from releases by private individuals. The subspecies of these birds is unknown. Turkeys also appear to be expanding from Canada onto private land near the border just west of Oroville.

In the mid-1960s, 6 Merriams turkeys from the Ellensburg Game Farm and 2 from Stevens County were released in Chelan County. During this same period, 8 Merriams turkeys from Stevens County were released on Badger Mountain in Douglas County. A total of 80 Rio Grande turkeys were then released in Chelan County in 1986 and 1988,

followed by 28 Merriams turkeys in 1990. These releases proved unsuccessful, probably due to the small number of turkeys released and the lack of winter-feeding during harsh winters.

The turkey population in Chelan County is increasing. In 2000, 156 Merriams turkeys were released in Chelan and northeastern Kittitas counties, augmenting existing turkeys and releases of 220 in 2001, and 76 in 2002. For summer 2003, poult production by radioed hens was average (2.1 poults per hen, n=4), compared to the average of 2.2 poults per hen for 2000-2002. Poult counts were not available for 2003 because most of the transmitters had expired. Turkey distribution is expanding and broods have appeared as much as 10 miles from release sites in 2002 and 27 miles in 2003. In 2002, survival of radioed hens was greater (79%, 19 of 24) than in 2001 (54%). The radioed birds that died were either killed and/or fed upon by bobcat, cougar, or coyote.

Between 2000-2002, 21% (5 of 24) of the radioed hens have been poached. Poaching appears to be opportunistic with birds being taken at both accessible and less accessible areas. Groups of wintering birds have been as large as 200 turkeys. Based on counts of wintering concentrations of birds, the Chelan and northeastern Kittitas counties' turkey population is estimated at over 1,000 birds.

In Region 3, attempts to establish wild populations of turkeys in Yakima County between 1913 and 1931 were unsuccessful. In all, 94 turkeys were released. These early releases relied on game farm-reared birds of the eastern subspecies.

Oak Creek Wildlife Area was the target of some early releases of wild-trapped turkeys in the early 1960s. Twenty Merriam's turkeys were released, but no significant population was established. In the mid-1960s 4 Merriam's turkeys were trapped from Stevens and Spokane counties and released on Colockum Wildlife Area in Kittitas County. This release did not result in population establishment.

More recent releases in Region 3 began in 1984. Thirty-eight Rio Grande turkeys were released in Yakima County in 1984 and 1985. Harvest and observations concluded that the introduction was not successful.

Although pockets of Rio Grande habitat occur throughout Region 3, the overall habitat is probably better suited for the Merriam's subspecies. From 1999-2001, 574 wild-trapped Merriam's turkeys from Stevens County were released in PMU P30 (Yakima and Kittitas Counties). Harvest rates indicate the transplant was successful.

In south-central Washington (PMU P35), Klickitat County was one of the first areas in Washington where several early attempts were made to establish wild turkeys. Between 1930 and 1946, 93 turkeys were released in 4 different attempts to establish a population. These releases did not result in population establishment. Then in 1960, 12 wild-trapped Merriam's turkeys were released. This release resulted in establishment of Washington's largest, most stable turkey population from 1960 through 1990. After suspected population declines by the mid 1980s, approximately 125 Merriam's turkeys were released in 1988 and 1989 in hopes of rejuvenating the population. An additional 92 Merriam's turkeys were released in PMU P35 in 1997 and 1999. No releases occurred in PMU P35 or the other counties of Region 5 since 1999.

The south-central turkey population appears to be relatively stable. Recent increases in harvest may be tied to improved weather conditions in combination with additional birds released in the late 1980s and late 1990s. Recent reports by hunters and local biologists indicate that the population may be expanding its range and increasing in number as previously unoccupied habitats become colonized, especially in Klickitat and Skamania counties.

Turkey harvest for 2003 in GMU 578 (West Klickitat) and GMU 588 (Grayback) were nearly equal (152 and 148 respectively). This is only a slight increase from 2002. These two units provide the best habitat in southwest Washington and make up the majority of turkey harvest in Region 5.

From 1925 and 1931 several documented turkey releases were made throughout western Washington. Most releases were limited in number and widely scattered. Releases were more numerous in San Juan County with over 35 birds in 3 different releases (over 6 years) and Clark County with 50 birds released in 2 years. In the early 1960s, turkeys were also released on Protection Island in Jefferson county.

The Department of Game trapped Merriam's turkeys in Klickitat and Stevens Counties and released 4 on San Juan Island, 6 in Lewis County, and 12 on Scatter Creek Wildlife Area. In addition, several turkeys were taken from Northwest Trek Wildlife Park and released on Bangor Naval Base property. Most of these releases did not result in population establishment.

In 1987 the Department of Wildlife began releasing wild-trapped eastern wild turkeys in Lewis and Pacific counties. Thirty-one eastern turkeys were released in Lewis County from 1989 to 1992, and 39 in Cowlitz County. In 1993 and 1994 a few additional (<10) turkeys were trapped in Pacific

County and some were moved to Cowlitz County. From 1997 to 2000, Wahkiakum County received 88 eastern turkeys from Iowa and 8 from Pacific and Cowlitz counties. Twelve eastern turkeys from Iowa were released in Cowlitz County in 2000.

Determining population trends for the wild turkey population in PMU P50 is difficult. Sightings of wild turkey continue to increase over the years and sightings in locations away from release sites are also occurring. In addition, turkeys continue to be harvested throughout the season. These factors, considered together, suggest wild turkeys may be reproducing at low levels and perhaps maintaining a viable population in PMU P50.

Habitat condition and trend

Most of the turkey range in Region 1 is in close proximity to agricultural lands that provide abundant food in the form of waste grain as well as some berries and fruits through winter months. The Blue Mountains area provides excellent habitat for the Rio Grande subspecies. Stevens, Pend Oreille, and Ferry counties contain good habitat for the Merriam's subspecies.

Ponderosa pine nuts are probably the number one winter food source of turkeys in eastern Washington. In Chelan, Kittitas, and Okanogan counties, the density and distribution of ponderosa pines is less than in Ferry and Stevens counties where the largest population of turkeys is found in the State.

In general, occupied turkey habitat in Okanogan County is less productive than some other areas of the state, due to a lack of extensive mast or berry crops. Much of the habitat is intensively grazed, and turkeys may compete with livestock for certain plant foods. In addition, the lack of grain farming in the area may be hampering population expansion.

Most of Region 3 is probably marginal turkey habitat. The forested zone is on the edge of higher elevations and receives significant snowfall. Deep snows in 1992-93 and 1996-97 may have impacted turkey survival in the region. Mild winters the past 3 years have probably benefited turkeys.

Habitat in the lower Yakima Valley around Sunnyside is probably suitable for Rio Grande turkeys. The area rarely receives significant snow and food is abundant. However, conflicts with agriculture (e.g., vineyards, orchards) in the area are likely.

Winter conditions in Klickitat County (PMU P35) can sometimes be severe. As an example, winter 1996-97 may have caused some mortality in resident turkeys that in turn may have triggered the small decline in turkey harvest in 1997. Harvest in 1998 harvest was also low (82 birds) in Klickitat County, but harvest more than doubled from 1998 to 1999 when 178 turkeys were harvested. This increase in harvest suggests the Klickitat County population recovered from the harsh winter of 1996-97.

Although we do not specifically survey habitat conditions related to turkeys in Region 6, conditions should continue to be favorable, as there were no significant changes in habitat management or weather conditions that would have affected turkey survival.

Augmentation and habitat enhancement

Over 800 turkeys were released in PMU P20 (Region 2) during 2000-2003. In 2001, 93 turkeys were released in Okanogan County, 135 in 2002, and 120 in 2003. One hundred fifty-six Merriam's turkeys were released in Chelan and northeastern Kittitas counties in 2000, 220 in 2001, and 76 in 2002. In Chelan County, turkeys were released on WDFW, Department of Natural Resources, and private land between the Colockum Wildlife Area and the Chelan Butte Wildlife Area. Flocks were established every 2-6 miles. Landowners were contacted prior to releases and were enthusiastic about release efforts. No birds were released near populations of sharp-tailed grouse or western gray squirrels, state listed species. This concludes the 2000-2003 program to release turkeys in Okanogan and Chelan counties.

Okanogan County had its first damage complaint in 2003. The landowner had fed birds up until 2 years ago. When the feeding stopped the birds began eating everything they could in the yard. There were 2 additional complaints in the Twisp area, but these involved domestic turkeys. In 2003, Chelan County also experienced its first damage complaint. The landowner was opposed to the release of a nonnative species and was concerned about the birds scratching under his pine trees.

No releases were made 2001-02 in PMU P30. Some winter-feeding occurred either through WDFW, NWTF, local sportsmen, or interested landowners.

During late winter and early spring 2000, 268 eastern wild turkeys from Iowa were released at sites in Thurston, Pacific, Grays Harbor, and Mason counties. There were no new releases in 2003.

Management conclusions

Harvest and hunter numbers continue to increase. In 1994 the regulations were changed to allow the harvest of up to three turkeys per year (one from each subspecies). As turkey populations continue to expand in PMUs P10, P15, and P20 (northeast, southeast, and north-central Washington), additional

opportunity may be provided. One example of this is expanded fall hunting opportunities in northwestern Washington where permit numbers have increased from 425 in 2001 to 1900 in 2003. For 2004, GMUs 105-124 are proposed to have a week-long general open fall season instead of permit-based hunting. Permit-only fall hunting is proposed to continued, however, for the Sherman and Roosevelt Units (GMUs 101 and 133) and is PMU 15 (southeastern WA).

Habitat enhancement activities for wild turkeys should focus on winter food enhancements, likely increasing available grain, clovers, fruiting shrubs, and mast producing trees. These types of plantings would be most helpful in the northern portions of Washington's turkey range and other forested areas where food sources may be limited, especially after winter snowstorms.

Spokane County is seeing an increase of turkeys despite the urban nature of the area. Other areas are currently experiencing expansion of naturally increasing wild populations. Turkey damage complaints are being received from areas of PMU P10 as well as a few reports in north-central and western Washington. Some hunting areas in PMU P10 are becoming so popular that hunter crowding and safety are becoming a concern on opening day and weekends. Fall hunting opportunity has been increased in PMU P10 to provide additional recreation as well as to help address population concerns.

The population of turkeys in south-central Okanogan County appears to be stable or increasing following several mild winters. No changes in the harvest are recommended at this time. The turkey population in Chelan County is expected to continue to increase through natural production. Telemetry work on Chelan County birds has slowed because most of the radios on birds have expired.

Even though deleterious competition between turkeys and other game birds in Washington has not been identified, any augmentation that could potentially put turkeys in existing sharp-tailed grouse or western gray squirrel habitat should be avoided as a precautionary measure.

Releases of Merriam's turkeys in Yakima and Kittitas counties have increased harvest and hunter particpation. Radiotracking and observations indicate the birds have become widespread. Recruitment has been best in Kittitas County. Winter feeding will probably be needed to sustain a huntable Merriam's population over the long-term.

In 1994, regulations were changed to allow the harvest of up to 3 turkeys/year. Harvest and hunter participation projections are now based on reports received from hunters who are reporting their hunting activity in compliance with the mandatory hunter reporting requirement. Future estimates will also be made using these data.

Following releases of over 600 eastern wild turkeys in PMU P50 (southwestern Washington) since 1998, there have been no plans drafted for further translocations in the near future. Observations and analysis of data (e.g., percent young males in spring harvest) collected over the next several years should determine whether eastern wild turkeys will achieve viable population status.

Experimental releases along the east slope of the Cascades are being monitored to estimate habitat use, productivity, and limiting factors. These releases may eventually lead to successful population establishment. There are currently 2 areas where forested habitat occurs in Washington that are not occupied by turkeys: parts of north Puget Sound and the Olympic Peninsula.

The completion of a wild turkey population management plan is identified in the recently completed Game Management Plan. The timeline on completion of this plan has been extended to April 2005. This plan will help guide future population expansion as well as population monitoring, and harvest management.

Figure 3. Estimated spring turkey harvest in each turkey Population Management Unit (PMU), 1996-2003.

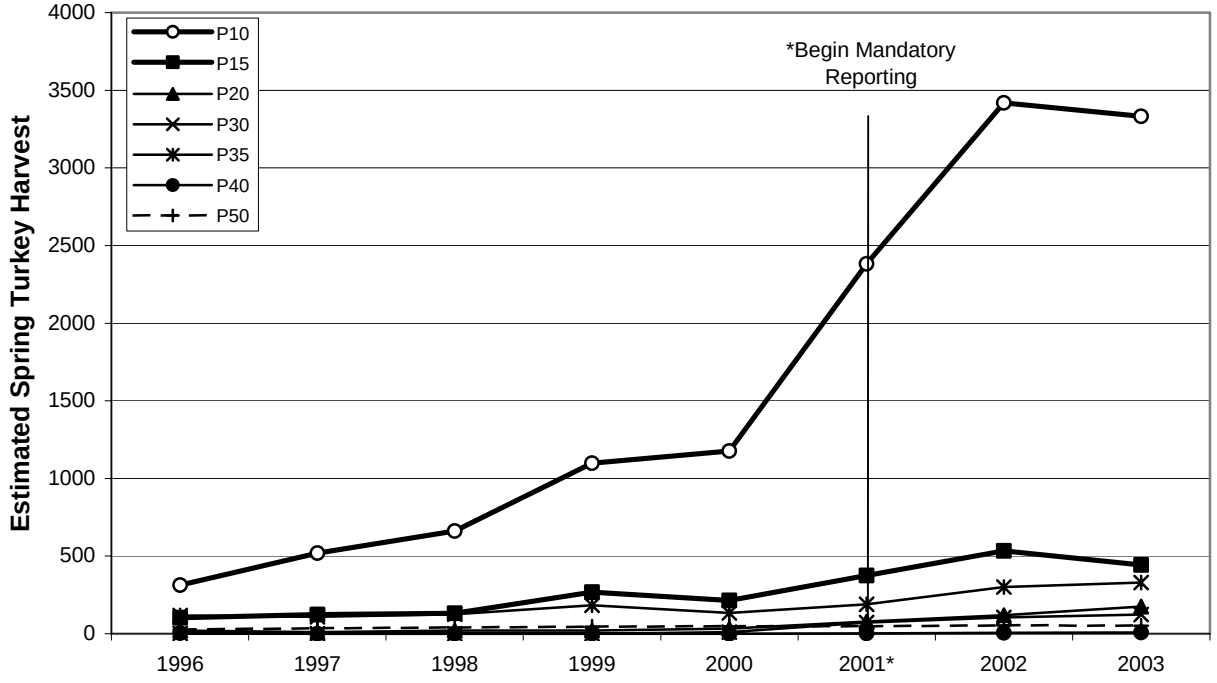


Table 2. Estimated spring turkey harvest in each turkey Population Management Unit (PMU) 1996-2003.

PMU	1996	1997	1998	1999	2000	2001*	2002	2003
P10	313	519	662	1098	1176	2382	3418	3333
P15	104	123	132	267	214	376	533	443
P20	21	11	20	21	32	78	119	176
P30	2	1	0	1	10	73	105	123
P35	118	109	125	183	134	190	300	329
P40	4	1	1	0	1	2	7	9
P50	26	36	40	46	48	47	54	52
Total	588	800	980	1616	1615	3148	4536	4465

* = first year of mandatory reporting system

Table 3. Estimated fall permit harvest of wild turkeys in each turkey population management unit (PMU) from 2000 through 2003.

PMU	2000		2001*		2002		2003	
	No. of Permits	Fall Harvest	No. of Permits	Fall Harvest	No. of Permits	Fall Harvest	No. of Permits	Fall Harvest
P 10	280	134	451	195	1300	433	1992	599
P 15	50	26	50	17	50	20	50	17
P 20	-	-	-	-	-	-	-	-
P 30	-	-	-	-	-	-	-	-
P 35	75	16	76	17	75	20	75	14
P 40	-	-	-	-	-	-	-	-
P 50	-	-	-	-	-	-	-	-
Total :	**405**	**176**	**577**	**229**	**1425**	**473**	**2117**	**630**

* = first year of mandatory reporting system.

Pheasant

PHEASANT STATUS AND TREND REPORT
Statewide

MICK COPE, Upland Game Section Manager

Population Status

Surveys (crowing count and brood index) conducted between 1982 and 1998 indicate a decrease in pheasant numbers in eastern Washington during that time (Rice 2003). There has been a wide variation in pheasant harvest over the past 50 years. Harvest was at its highest during the mid-to-late 1960's with another peak in the late 1970's when over 500,000 pheasants were harvested statewide. Since that time, pheasant harvest has been steadily declining. By using harvest as an index to population status, pheasant populations in Washington are currently much lower than they were in the 1960's and 1970's (Figure 1).

Over time, harvest estimation techniques have changed due to efforts to increase the precision of the estimates. Harvest estimation techniques did not change between 1984 and 2000, so estimates made during that time should be comparable. Figure 2 indicates a decline in pheasant numbers during that time which is supported by the surveys previously mentioned.

The cause of the increase in pheasant harvest from 1995 to 1997 may be the Eastern Washington Pheasant Enhancement Program. Rooster pheasants have been released in the fall since 1997 and harvest estimates may be higher due to increased participation and harvest when compared to estimates between 1992 and 1996 when no pheasants were released in eastern Washington. Considering these facts, the current population status of wild pheasants may be lower than indicated in Figure 2.

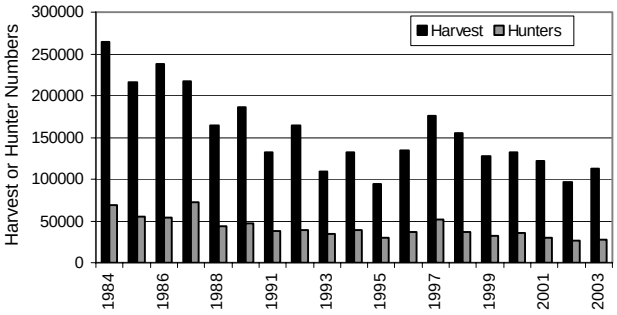


Figure 2. Estimated annual pheasant harvest and hunter participation in Washington 1984-2003.

While indicators show statewide declines (Figures 1 and 2), pheasant populations may not be decreasing in all major river basins in eastern Washington. Harvest estimates for the Snake, Yakima, and Columbia river basins do not reflect the same trends in populations from 1991 to 2001 (Figure 3). While this data has not been statistically tested at this time, differences in pheasant harvest are apparent. For this report, the "Yakima River Basin" consists of Yakima and Benton counties, the "Snake River Basin" is made up of Asotin, Garfield, Columbia, Walla Walla, and Whitman counties, and

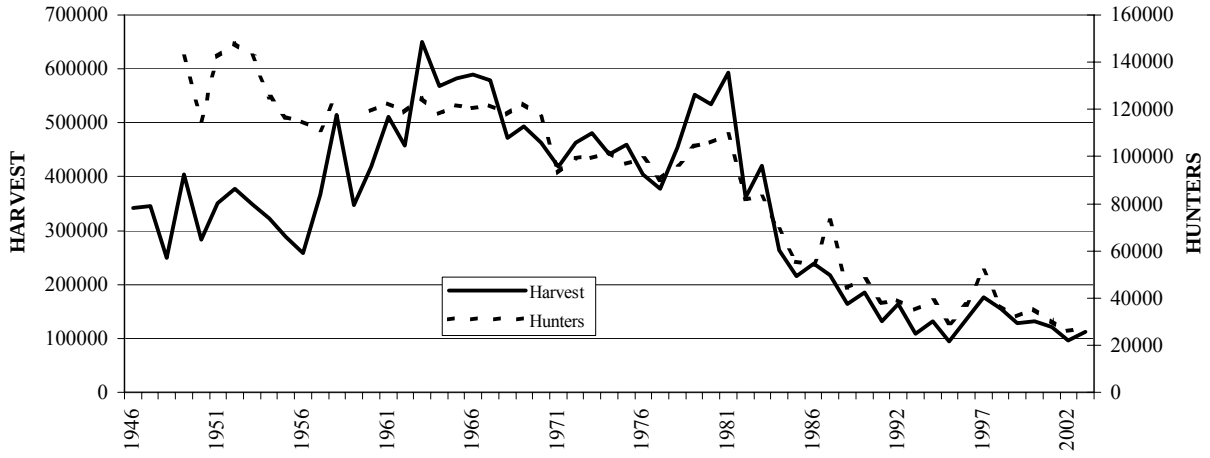


Figure 1. Estimated annual pheasant harvest and hunter participation in Washington 1946-2003.

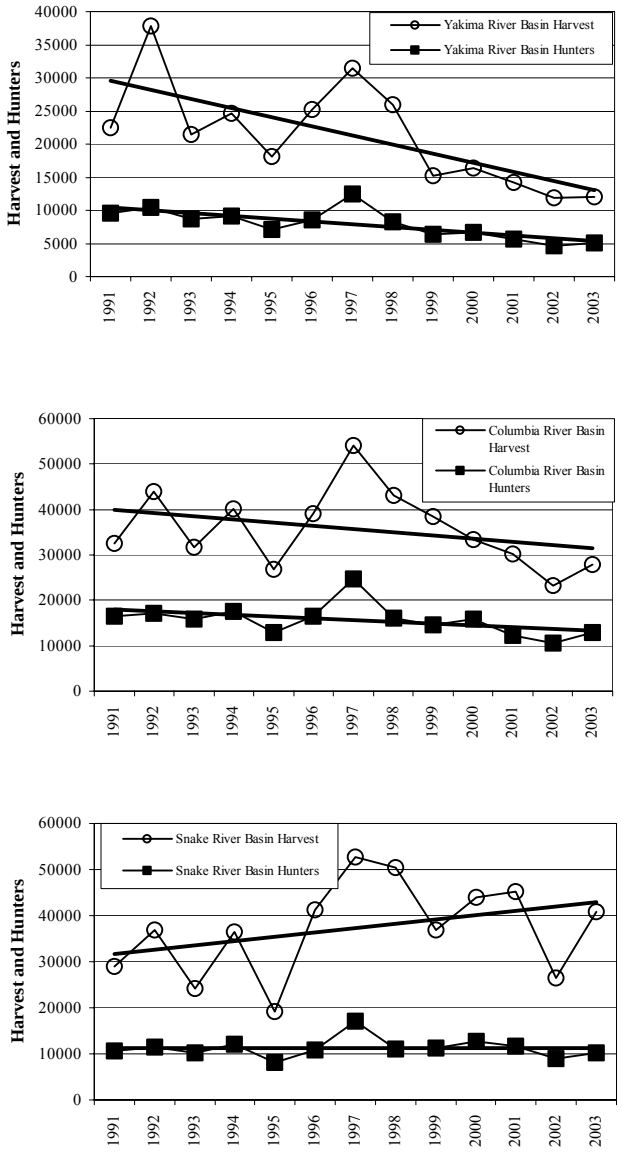


Figure 3. Estimated harvest and hunter participation for the Yakima River, Columbia River, and Snake River basins from 1991-2003.

the "Columbia River Basin" includes Lincoln, Adams, Grant, Douglas, and Franklin counties.

Hunters

Hunter numbers have also dropped dramatically since the late 1960's (Figure 1). A commonly held upland game philosophy is that hunters will participate in relation to the abundance of the targeted species. In the case of pheasant hunting in Washington, variations in harvest closely mirror hunter participation (Figures 1 and 2).

Cause of Decline

The cause of the decline in pheasant populations in Washington is not definitively known, however, it is likely that several factors are working together to influence the result. Pheasant research in many parts of the United States indicates that loss of habitat is the primary reason pheasant populations decline. Of particular importance are breeding habitat (including nesting and brood rearing habitat), habitat for wintering and habitat that provides escape cover from predators.

According to Washington Department of Fish and Wildlife biologists, alfalfa acreage has increased and has replaced more beneficial agricultural crops. Orchards and vineyards have also replaced potentially beneficial crops in some areas. In addition, wheat stubble (and its associated waste grain) is now tilled under in summer shortly after the wheat is harvested. Farming practices appear to be constantly evolving and most changes have a negative impact on pheasants.

To some degree, upland game bird fall population densities, and related harvest, are also dependent on spring weather conditions. Chicks have a difficult time thermoregulating in cold, wet weather, and they need high protein diets (usually from insects) in the spring. Cold, wet springtime weather increases the likelihood of chicks dying of exposure and it often decreases insect availability. In times when pheasant populations are not high, increased mortality due to weather may have an even greater influence on future population densities.

In addition to the factors listed above, pesticide and herbicide use and urban sprawl are also likely contributors to the decline in pheasant populations. The use of pesticides results in the removal of important food resources (e.g. insects). Some pesticides may also have a direct effect on individual pheasants. Herbicides impact plant diversity, which is an important component to quality pheasant habitat. Houses now occupy many of the areas that have pheasants utilized in the past. In some areas of the Columbia Basin, field corners (associated with circle irrigation) now have private residences placed on them, resulting in a reduction in the amount of pheasant habitat available.

Pheasant Management Workshop

A pheasant management workshop was conducted in March 2003. This workshop was developed to collect information that would help identify at least five key pheasant management strategies that would give the greatest chance of successfully increasing naturally occurring pheasant

populations in Washington. Experts in the field of pheasant management were brought in to discuss management strategies in areas where pheasant populations historically have been high and to discuss research findings and management programs that may help address population declines in Washington. Approximately 75 people attended the meeting, including general public and state agency personnel.

- *Pheasant populations have been declining in many areas of the country.*
- *Changes in farming practices have reduced the quality and quantity of pheasant habitat.*
- *Although loss of habitat may not be the only factor currently affecting populations, expert opinion is that population trends cannot be reversed until proper habitat is in place.*
- *Select areas to focus your efforts. It is better to identify a focus area and be successful there, than spreading human resources, or available funding, too thinly.*
- *Pheasant management needs to take place on a large enough scale to impact populations over the long term. To focus on small, isolated parcels of habitat would be counter-productive.*
- *Within the focus area, determine bottlenecks (limiting factors) and identify the most effective distribution and composition of habitat improvements.*
- *In many places the most limiting habitat type is "production cover" which includes nesting and brood-rearing habitat as well as escape cover. Specifically, pheasants require adequate nesting cover and sufficient insect abundance during brood rearing. Insects often are associated with diverse plant communities with a substantial forb component.*
- *At least 15% of the landscape must be in relatively undisturbed grass or grass-like vegetation (with a significant forb component) to resolve nest success and brood survival problems. Agricultural landscapes with 25% grassland have been shown to provide the optimum production cover. In addition, nesting and brood-rearing habitat should have few if any trees greater than 15-feet in height to reduce the impact of avian harassment and predation.*
- *Evaluate what you need and then determine if you can get the funds to accomplish those tasks. If you cannot get the funding, then scale back the size of the area you wish to impact without sacrificing any of the habitat objectives.*
- *Studies have shown that releasing pen-raised pheasants (both chicks in late summer and hens in the spring) for population establishment is expensive and ineffective.*
- *Rather than focusing on predator control, emphasis should be placed on controlling predation through providing adequate habitat. Studies in Iowa showed that the highest predator populations occurred on the same landscape that supported the highest pheasant populations, both due to excellent habitat.*
- *The 2002 Farm Bill has many programs that can help landowners improve habitat conditions for pheasants and other upland wildlife. While these programs are available, it is important for the State of Washington to work closely with the U.S. Department of Agriculture to make sure local and regional wildlife issues are addressed and to help landowners become involved in the programs that are applicable to their property.*
- *Based on hen survival and nest success, researchers in Iowa have concluded that increasing permanent grass stand acreage increases hen survival and that CRP in large blocks (over 40 acres) is even more beneficial to pheasants than CRP buffer strips.*
- *Improving pheasant habitat on working lands is an important component to the overall picture. If habitat enhancement is not compatible with a farmer's operation, then there is little incentive for the landowner to participate.*
- *Research has shown that retaining at least 12 inches, and preferably 15 inches or more, of wheat stubble after harvesting can result in higher pheasant densities. This is due primarily to an increase in the broad-leaf, weedy habitat that occupies the field after harvest.*
- *Increased wheat stubble height also can help farmers produce more grain per acre due to increased moisture retention in the soil.*
- *Direct seeding (no-till drilling) can increase soil quality, reduce erosion and increase value of the property for wildlife.*

Invited speakers from Kansas Department of Wildlife and Parks, South Dakota Game Fish and Parks, Iowa Department of Natural Resources, and the Wildlife Management Institute provided information about pheasant management in their states as well as the following recommendations to increase pheasant populations in Washington.

In California, research is showing that improving brood rearing habitat results in increased densities of pheasants in the fall and subsequent spring (C. Hart, California Department of Fish and Wildlife,

Unpublished Data) Techniques being developed in California involve mechanically disturbing an area in the fall and flooding it during the winter to encourage broad leaf, weedy plants. This type of habitat produces the invertebrate prey base that is critical to pheasant chick development and survival.

Management conclusions

Pheasant populations declined dramatically in in the 1980's and currently remain at low levels. Causes of the decline are not definitively known, however, habitat loss and or alteration is thought to be the primary cause of the decline. In order to address this situation, the following recommendations are made based on the results of the pheasant management meeting held in March 2003:

- Dedicated WDFW staff is needed to focus on pheasant management and enhancement within identified focus areas of the state.
- Work with USDA programs on a statewide basis and work with NRCS staff within the state. Co-locate WDFW staff in NRCS offices to maximize interagency interaction and develop and maintain landowner relationships.
- Pheasant management should be done on a large-scale (i.e., over 60 mi^2) and should be focused in areas where meeting desired habitat conditions is most attainable.
    - Focus pheasant management efforts in southeastern Washington, specifically Columbia, Garfield, Walla Walla, and Whitman counties and other areas where adequate rainfall (i.e., over 14 inches) is conducive to supporting desirable, appropriate plant communities.
        - Farm Bill implementation:
            - Work with NRCS local working groups.
            - Work closely with landowners. Help provide technical assistance for all USDA Farm Bill programs as well as other federal and state funding sources (e.g., Salmon Recovery Funding Board and Eastern Washington Pheasant Enhancement Program).
    - Integrate as many fund sources as possible (including state, non-government organization (e.g., Pheasants Forever) and Federal funds (Farm bill and others (e.g., salmon recovery)) to accomplish habitat improvement goals.
    - Emphasize the development of adequate pheasant "production cover", including stressing the importance of quality brood rearing habitat.
    - Small habitat projects need to integrate with the overall habitat needs for a larger area.
    - Develop pheasant population monitoring protocols in areas of emphasis. Where applicable, monitor to determine the benefits pheasant habitat management has on other wildlife species (e.g., threatened and endangered species).
    - Target hunter access improvement opportunities within the focus area.
- Efforts to increase pheasant populations on irrigated lands of eastern Washington should focus on working with the NRCS to identify ways for landowners to participate in Farm Bill Programs.
    - Options may be limited to establishing Continuous CRP (CCRP) buffers, wetland enhancement projects, and other projects focusing on upland areas associated with some type of open water or wetland.
    - Work with NRCS local working groups and local Conservation Districts.
- Releasing pen-raised pheasants in eastern Washington is important to some hunters. WDFW will continue to release pen-raised pheasants, however, these releases will not be part of focused pheasant population management for the state.
- Work with Washington State University (WSU) and the Extension Agent Program to help develop and promote farming practices that are beneficial to pheasants and retain or improve profitability for the landowner. This would include, but not be limited to, field preparation, seeding, and harvesting.
    - Discuss Kansas State University and Kansas Wildlife and Parks research findings and see how they may apply to Washington.
    - Work together with WSU and the Pacific Northwest Direct Seed Association to help identify additional locations for direct seeding.
- Pheasant habitat on WDFW owned or managed lands may be targeted as habitat improvement demonstration areas.
    - Focus on developing quality pheasant habitat that does not require intensive, ongoing maintenance.

Literature Cited

Rice, C.G. 2003. Utility of Pheasant Call and Brood Counts for Monitoring Population Density and Predicting Harvest. Western North American Naturalist.63(2):178-188.

PHEASANT STATUS AND TREND REPORT: REGION 1
Snake River Basin

HOWARD FERGUSON, District Wildlife Biologist
DAVID P. VOLSEN, Wildlife Biologist

Population objectives and guidelines

Pheasant management objectives are outlined in the Game Management Plan (WDFW 2003). The overall objectives are to manage pheasants for a variety of purposes including healthy populations and a sustained harvest.

Hunting seasons and harvest trends

The eastern Washington general pheasant season ran from October 18 to December 31, 2003. In addition, a two-day youth only hunting season was run in late September. The bag limit was 3 cocks per day, with a 15-cock possession limit. The opening day of the pheasant season was changed from October 5th in 2002 to October 18th in 2003 in an attempt to reduce pressure on private landowners and reduce conflicts with deer hunters.

The pheasant harvest in Region One was at its peak from 1946 to 69, with an average harvest of 107,100 pheasants per year. The harvest has continued on a downward trend for the last 30 years. Compared to the previous 24-year average, the harvest during the 1970s declined 23% to 82,687 pheasants\year, 26% in the 1980s to 79,639 pheasants\year, and 63% in the 1990's to 40,074 pheasants\year (Figure 1.). Following a decline in harvest in 2002, the regional harvest increased 28.5% in 2003 to 49,424.

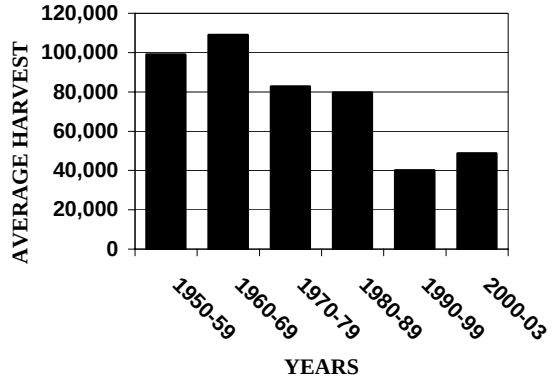


Figure 1. Region 1 pheasant harvest trend.

Although hunter trend information is limited, from 1986-1997 the number of pheasant hunters in Region One has cycled from a high of 20,000 in 1986, to a low of 9,500 in 1995, to 19,172 hunters in 1997, and back down to 13,109 in 2001, 12,615 in 2002, and 11,329 in 2003 (Fig. 2). Hunter participation is probably influenced by several factors, including pheasant abundance.

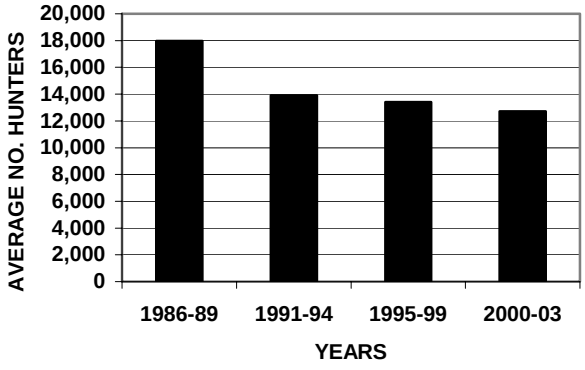


Figure 2. Region 1 pheasant hunter trend.

Hunter success in Region One varies from year to year. During the period 1986-89 and 1991-95, pheasant hunters averaged 2.9 and 2.7 birds/hunter., respectively. From 1996-2000, pheasant hunters enjoyed increasing success with an average of 4.0 birds/hunter. In the period from 2001-2003 the hunter success rate was 4.3 birds/hunter (Figure 3).

Surveys

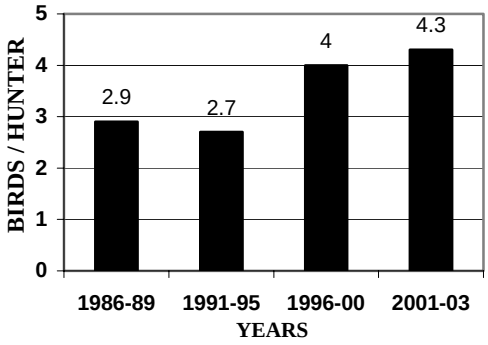


Figure 3. Region 1 pheasant hunter sucess reported as birds harvested per hunter.

Three types of pheasant surveys were conducted up until 1995; 1) Sex ratio counts in February and March, 2) Crow counts in late April and early May, 3) Production counts in late July and August. Spring surveys to determine sex ratios and broodstock carryover were discontinued in 1996. Time constraints, lack of personnel, and questionable value of the data have resulted in pheasant surveys being discontinued in Region One. In the past, pheasant crowing counts were conducted in late April and early May if weather conditions and time allow. Pheasant production surveys were conducted in late July and August. All surveys were conducted on established routes.

Although crowing counts were conducted for many years, changes in habitat conditions and other variables along most of the routes may have biased the data. Production surveys along established routes have provided information on the number of pheasants observed per survey (obs.-day), and the level of production for the year, but analysis of the data indicated the statistical reliability of the data was highly suspect.

Population status and trend analysis

Based on past surveys and harvest trends, pheasant populations have declined significantly over the last 30 years. The primary factor for the decline in pheasant populations is loss of habitat due to development and agricultural practices. In areas where alfalfa is a major crop, the first cutting usually occurs during the peak of nesting (mid-May) and results in a heavy loss of nests and young. Another factor that may have a significant impact on the pheasant population is the dramatic increase in predator populations, both numbers and species. Predation combined with fragmented habitat may be focusing negative factors on the pheasant population, which prevents a long-term increase. Agricultural chemicals may have an as yet undetermined influence on the health of upland bird populations.

Weather conditions during the nesting season are also a significant factor that impacts the annual pheasant population. Cold, wet conditions during the peak of hatch can result in very high mortality of young pheasants, decimating annual production. Production can be down in one area and up considerably in another area due to variations in weather patterns during the nesting season.

The increase in pheasant numbers and the resulting increased harvest in 2003 are partially due to favorable nesting conditions. The pheasant population increased in 2003, and field indices indicate good over-winter survival into 2004.

Habitat condition and trend

Habitat conditions over the past 30 years have declined due to land development, changing agricultural practices, and noxious weed invasion. However, habitat for upland birds has improved in recent years with the advent of the Conservation Reserve Program (CRP). After the first CRP acreage expired, farmers had to reapply for CRP acreage in 1997 and many requests were rejected. The second sign-up period resulted in a significant amount of acreage being accepted into the program. In Region One, approximately 580,000 acres of agricultural lands have been converted to CRP. In addition, the increased requirement of shrub and forb species in the new CRP seed mixes greatly benefit upland birds. This program will provide large areas of suitable habitat near agricultural croplands, enhancing habitat conditions for pheasant, nongame and other species over the next 8-10 years.

Augmentation and habitat enhancement

The Upland Habitat Restoration Program has developed over 8000 acres of upland bird habitat in the southeast and central districts. The Conservation Reserve Program has made an enormous contribution to improving wildlife habitat in Region One.

Management conclusions

Pheasant populations in Region One are affected by numerous factors that hold the population below management objectives. Land development, changing agricultural practices, pesticides, noxious weed invasions, fragmentation of habitat, and conflicts with other species may prevent significant increases in the pheasant population in the foreseeable future.

PHEASANT STATUS AND TREND REPORT: REGION 2
Columbia Basin

JIM TABOR, District Wildlife Biologist

Population objectives and guidelines

Population objectives for pheasants in Columbia Basin include:

1. Maintain a viable population that will provide hunting opportunity and harvest.
2. Increase population size above that of the past 5 years.

Hunting seasons and harvest trends

In 2003, the hunting season for pheasant opened on Oct. 18 and closed Dec. 31. The daily bag limit was 3 cocks and the possession limit was 15. The opening date was approximately one week later than previous years. Daily bag and possession limits remained unchanged.

In Grant and Adams counties, the number of pheasant hunters declined 35% in the 8-year period from 1988 to 1995, increased slightly in 1996, and increased substantially in 1997 (Table 1). The number of hunters in the two counties combined decreased 4.5% from 2002 to 2003.

Table 1. Number of pheasant hunters in Grant and Adams counties, Washington, 1988-03.

Year	Grant	Adams	Total
1988	9,052	2,793	11,849
1989	10,615	2,688	13,303
1990	--	--	--
1991	7,630	2,337	9,967
1992	8,321	2,644	10,965
1993	7,655	2,151	9,806
1994	8,439	2,443	10,882
1995	5,947	1,749	7,696
1996	7,482	2,486	9,968
1997	12,207	4,392	16,559
1998	7,560	2,536	10,096
1999	6,748	2,262	9,010
2000	7,745	2,507	10,252
2001	5,817	1,765	7,582
2002	5,645	1,314	6,959
2003	5,181	1,464	6,645

Table 2. Pheasant harvest in Grant and Adams counties, Washington, 1985-03.

Year	Grant	Adams	Total
1985	36,225	10,299	46,524
1986	35,932	11,804	47,736
1987	37,631	11,222	48,853
1988	22,928	7,111	30,039
1989	27,322	7,622	34,944
1990	--	--	--
1991	15,116	4,206	19,322
1992	20,819	7,267	28,086
1993	14,046	4,422	18,468
1994	18,117	5,001	23,118
1995	11,029	3,798	14,827
1996	15,667	7,790	23,457
1997	27,034	9,769	36,803
1998	22,391	5,602	27,993
1999	17,083	6,462	23,545
2000	17,686	4,948	22,634
2001	14,028	4,848	18,876
2002	12,798	2,397	15,195
2003	14,504	4,244	18,748

Most pheasant hunting in the Columbia Basin occurs on private farmland. The long-term trend indicates a decrease in amount of effective pheasant hunting cover in the irrigated farmland.

An unknown, but likely significant, amount of pheasant hunting occurs on the Columbia Basin Wildlife Areas (CBWA) and private lands under agreement in WDFW's hunter access program. The CBWA contains several hundred acres that provide excellent pheasant hunting opportunity. The hunter access program in Grant and Adams counties included 194 cooperators with a total of 376,870 acres of hunting access in 2003. Approximately 14,000 acres of private land in the irrigated part of the Basin offered the best opportunity to hunters seeking pheasants. Although a large percentage of the acres in the access program was non-irrigated arid land, pheasants were available to hunters in much of it.

During the 19-year period from 1985 to 2003, harvest declined 60% (Table 2). In 2003, harvest increased over 75% from that of 2002 in Adams Co. and over 13% in Grant Co., resulting in a combined increase of over 23%.

Pheasant hunter success (number of pheasants harvested/hunter day), in both counties combined, ranged from a high of 0.67 in 1996 to a low of 0.40 in 1991 with an average success rate of 0.49 from 1988 to 2002**.** In 2003, the success rate was 0.59 pheasants/hunter day, a 37% increase from that of 2002 and a 13% increase from the previous 15-year average (Table 3).

Table 3. Pheasant hunter success rate (number of pheasants harvested/hunter day), in Grant and Adams counties,WA 1987-03.

Year	Grant	Adams	Total
1987	--	--	--
1988	0.57	0.66	0.62
1989	0.53	0.69	0.61
1990	--	--	--
1991	0.38	0.41	0.40
1992	0.53	0.58	0.56
1993	0.42	0.62	0.52
1994	0.46	0.52	0.49
1995	0.46	0.51	0.47
1996	0.53	0.87	0.67
1997	0.41	0.53	0.43
1998	0.64	0.62	0.63
1999	0.46	0.59	0.53
2000	0.46	0.53	0.47
2001	0.47	0.61	0.50
2002	0.44	0.41	0.43
2003	0.56	0.70	0.59

Surveys

Data are obtained annually in irrigated farmland portions of Grant and Adams counties to provide indices to breeding population size and production of chicks. The population index is useful in determining long-term trends in population size and major short-term population changes. The production index is used primarily as a predictor of hunting prospects and may provide information useful in identifying reasons for annual changes in population size.

Until 1997, 6 permanently established crowing count routes along farm roads and highways in irrigated farmland of Grant and Adams Counties were surveyed twice annually (≥1 week between surveys) between April 25 and May 15. Only 1 route (Warden) was surveyed 1997-2003. In 2004, four of the traditional routes were surveyed. The index to population size presented is the mean number of crows per stop and is assumed to represent the number of roosters present.

Pheasant sex ratio surveys (counts) were made in farmland areas adjacent to all established crowing routes annually through 1999. Data from all survey sessions in an area were totaled for an estimate of number of hens/rooster. Only 1 area was surveyed for sex ratio counts from 2000 through 2004. This area was adjacent to the Warden crowing route. There were 2.6 hens/rooster in 2004.

Table 4. Pheasant breeding population indices for The Columbia Basin Irrigation Project, Washingt 1997-2004.

Year	Crows/Stop	Hens/Rooster	Broodstock (Hen) Index*
1997	13.9	3.1	40.5
1998	8.5	3.0	25.8
1999	13.4	4.0	53.6
2000	3.9	--	--
2001	5.5	2.5	13.8
2002	5.9	3.4	20.1
2003	5.1	3.3	16.5
2004	5.9	2.6	15.5

* Crows/Stop x Hens/Rooster. Assuming calls from roosters could be heard if the rooster was within 0.5 miles, the hen index is an estimate of the number of hens/502 acres.

The production index was derived from surveys of 6 permanently established pheasant brood routes located in the same general areas as crowing count routes through 2002. In 2003, brood routes were not surveyed. In 2004, only two routes were surveyed. The production index presented is the number of broods or chicks seen per observation day. The pheasant production index for 2004, as measured by the number of chicks observed /day on the 2 brood routes, decreased 17% from that of 2002 (Table 5). The pheasant production index for 2004 was 41% below the 1992-2002 average.

Table 5. Pheasant production index for the Columbia Basin Irrigation Project, 1992-2004.

Year	Broods/ Obs.Day	Chicks/ Obs./Day	Tot.Ph./ Obs/Day	Percent Juvenile	% hens w/ Brood
1992	2.5	11.3	14.9	77	81
1993	1.8	7.9	10.5	75	94
1994	3.0	13.3	16.9	79	94
1995	1.4	6.4	9.6	66	71
1996	2.8	13.6	16.6	82	89
1997	1.2	6.3	8.5	74	62
1998	3.8	21.8	25.4	86	95
1999	1.4	4.4	6.7	66	73
2000	1.5	6.9	9.2	75	84
2001	1.5	4.8	6.4	75	89
2002	1.7	6.6	8.1	79	87
2003	No	survey			
2004	1.3	5.5	7.0	79	100

Population status and trend analysis

The number of pheasants in the Columbia Basin Irrigation Project has plummeted since the early 1980's. The decline has been dramatic with little

indication of recovery. In the early 1980's, the hen population at the beginning of nesting season was estimated to be in excess of 100/section. The mean hen index for 1983 and 1984 was 141hens/502 acres (area within a 0.5 mile radius) or 181 hens/section (640 acres). In the spring of 1996, hen density was estimated to be 14/section, an all-time low. Spring hen numbers increased to 52/section and 68/section in 1997 and 1999, respectively. Hen numbers declined to a much lower level in 2003 and 2004 (Table 4). Breeding season rooster density declined concurrently with hen density, but not as dramatically. Density of roosters in the early 1980's was approximately 20/section. In 2004, rooster density was approximately 7.5/section.

Habitat condition and trend

The winter of 2003-04 was moderate and the duration of snow cover was short. Pheasant survival over-winter was likely good. Weather during May and June 2003, although cooler than optimum, was conducive to successful pheasant reproduction.

Loss of permanent cover (untilled land) in the irrigated part of the Basin continues. Conversion of small fields with fence rows, ditches, and other adjacent cover to large circle irrigated fields is a major loss of habitat. Another major loss of pheasant habitat, one that has accelerated in recent years, is from the construction of homes and farm buildings at locations that previously provided resources, including permanent cover, for survival of pheasants.

Acreage of cropland for production of alfalfa hay has increased in recent years and has often replaced crops that were beneficial to pheasants. Management practices associated with production of alfalfa hay cause high mortality for pheasants, especially hens, chicks, and nests. Orchards and vineyards have also replaced potentially beneficial crops. Wheat stubble (and its associated waste grain) is now commonly tilled under by many farmers in summer shortly after the wheat is harvested. In addition, many Columbia Basin farmers have reduced the acreage planted to small grain crops in recent years. Farming practices are constantly evolving and most changes appear to have a negative impact on pheasants.

Augmentation and habitat enhancement

In 2003, the Upland Wildlife Restoration Program (UWRP) in WDFW's Region 2 worked strictly on private land, as a result of changes in program focus. The program continued to work closely with the Natural Resources Conservation Service (NRCS) and the Farm Service Agency (FSA) on various USDA farm programs (e.g., WHIP, EQIP) as well as other government agencies, Conservation Districts, Bureau of Reclamation, Irrigation Districts, and organizations such as Pheasants Forever to develop and maintain pheasant and other upland game bird habitat.

From 1998 through 2002, one of UWRP's management activities was installing guzzlers in conjunction with CRP. A total of 413 guzzlers were installed on private land in Grant and Adams Co.'s from 1998 to 2002. The UWRP planted 1200 shrubs, seeded four acres of native grass, and planted /maintained 15 acres of food plots for pheasants and other upland game birds in 2003.

In 2003, approximately 4,800 game farm rooster pheasants were released at 18 locations during autumn (4 release dates) in Grant and Adams Co.'s. The intent of these releases was to provide increased opportunity for pheasant hunters.

Management conclusions

Pheasant populations in the Columbia Basin have declined dramatically in recent years and remain at very low levels compared to the pre-1990's. Documented causes of the decline do not exist. The lay public and wildlife managers alike frequently voice opinion as to reasons for the decline. While very little objective information specific to identification of potential causes of the decline is available, the most commonly held theory on population declines is the loss of a variety of habitats associated with historic agricultural practices.

PHEASANT STATUS AND TREND REPORT: REGION 3
Yakima and Lower Mid-Columbia Basins

MIKE LIVINGSTON, District Wildlife Biologist

Population objectives and guidelines

Pheasant management objectives are outlined in the Game Management Plan (WDFW 2003). The overall objectives are to manage pheasants for a variety of purposes including a sustained harvest.

Hunting seasons and harvest trends

Hunter participation was the second lowest reported during the 17-year period 1986-2003 (Figure 1). Participation was up 9% from 2002, but down 39% from the 10-year average. Effort of 36,475 recreation days was 13% below last year and 69% below the objective. Harvest decreased 1% from 2002 and was 82% below the goal of 100,000.

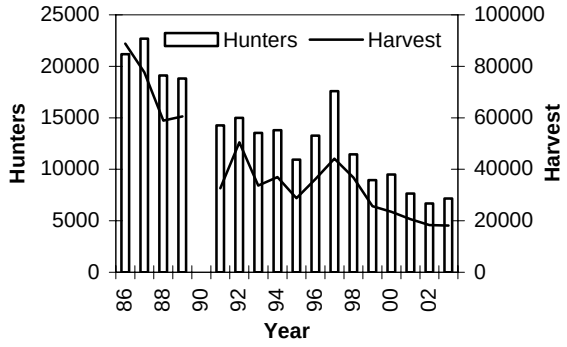


Figure 1. Pheasant hunters and harvest, 1986 - 2003

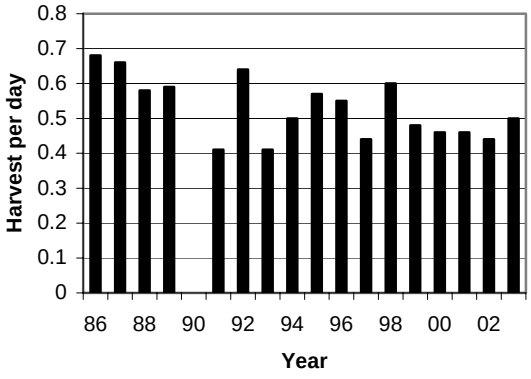


Figure 2. Pheasant harvest per day, 1986-2003.

Hunter success, as measured in pheasants harvested per hunter, has ranged from a high of 0.68 in 1986 to a low of 0.41 in 1991 and 1993 (Figure 2). Hunter success increased by 6% between 2002 and 2003, but was 1% below the 10-year average.

Surveys

Brood count surveys were discontinued in Region 3 in 1999. The post-hunting season questionnaire used to estimate harvest currently provides the best estimate of population status. Since the Pheasant Enhancement Program began in 1997**,** pen-raised roosters have been released and subsequently reported in the hunters' bag. By including pen-raised pheasants in the harvest, inferences made about population status are likely biased high and should be made with caution.

Population status and trend analysis

Harvest data indicate the population has declined dramatically since the 1980s (Figure 1). For the fifth straight year, total pheasant harvest was the lowest on record in 2003. The reason for the decline is likely habitat loss due to changing agricultural practices and urban sprawl. The downward population trend is likely to continue along with the expected decline in habitat availability.

Habitat condition and trend

Pheasant habitat has declined for decades and continues to do so. Changes in farming practices, particularly in irrigated agriculture, has been the main cause of habitat degradation. Grain, pasture, and alfalfa fields have been converted to high-value crops such as orchard, vineyard, and hops. Cleaner farming practices have removed cover bordering fields, riparian areas, and irrigation canals. Forbs, weed seeds, and insects promote pheasant survival, but herbicides and pesticides are heavily used to keep crops free of weeds and insects. Agricultural crops do not provide enough year-round food or cover. Vineyards and hop fields are typically kept free of ground cover, and grass cover within orchards is usually mowed.

Urban development has also negatively affected the pheasant population in Region 3. Homes have been built in areas that historically provided pheasant nesting and hunting opportunity. This trend is expected to continue as the state's human population continues to increase.

The federal Conservation Reserve Program (CRP)

has not benefited pheasant habitat in the Yakima Basin as it has in other areas of the state. In Washington State, the CRP has paid farmers to convert over 1 million acres of highly erodible dryland wheat fields to permanent grass, forbs, and shrub cover. Because most agriculture in the Yakima Basin is irrigated, few acres have been enrolled in CRP and few benefits to pheasant habitat have been realized.

One of the last strongholds for pheasant in Region 3 is the lower Yakima Valley, primarily the Yakama Reservation. Here the irrigation system is antiquated with numerous unlined, open canals. These earthen canals are often surrounded by riparian vegetation and wetlands sustained by water leaks. Many canals will likely be lined and piped in the future in an effort to conserve water. If canal piping and lining results in less weedy, riparian vegetation, and idle land, the pheasant population decline will continue.

Augmentation and habitat enhancement

The number of harvestable birds was augmented in 2003 with the releasing of approximately 4650 pen-raised roosters through the Pheasant Enhancement Program. While these releases did not enhance the wild population, it might have helped maintain some hunters' interest.

WDFW has acquired several parcels in Region 3 in recent years. The acquired lands contain pheasant habitat and/or the opportunity to enhance populations. The Upland Wildlife Restoration Program and Pheasants Forever have also been actively working to enhance habitat for pheasants. Tree, shrub, food, and nesting cover plots are being established throughout the Region. These activities have helped maintain or increase pheasant populations and hunter opportunity in localized areas. Acquired and enhanced lands, however, are not presently keeping pace with large-scale habitat loss.

Management conclusions

The pheasant population decline in Region 3 will likely continue. Current enhancements on state and private lands through the Upland Restoration Program, CRP, and other programs are not likely to offset habitat degradation throughout the Region. Goals set in 1988 are not likely to be reached given current efforts.

The highest priority for habitat enhancement efforts should be the establishment of permanent herbaceous cover, preferably grasses and forbs. Food plots and non-irrigated shrub cover should be of second priority. The establishment of tree and shrub plots that require continual irrigation to survive should be discouraged due to their relatively high cost and on-going maintenance requirements. These practices will only improve conditions at a very small scale.

A large-scale approach that considers habitat connectivity between restoration areas must be implemented. Small, piecemeal efforts that are isolated from one another will only act as habitat sinks. These areas may attract gamebirds during the fall and winter because surrounding farm fields are bare or provide only minimal cover. Hunter success will be relatively high in these areas, but so will predation on hens. Many areas in the intensely irrigated farmland of Region 3 are not conducive to large-scale management, and should be eliminated from restoration efforts.

As part of the Eastern Washington Pheasant Enhancement Program, several thousand pen-raised rooster pheasants will be released. While stocking rooster pheasants might help maintain an interest in pheasant hunting for some people, it can also shift some hunters' focus away from habitat and erode their enthusiasm and advocacy for habitat protection. In addition, after several years of repeated pheasant releases some wildlife areas may be showing the impacts. Concentrated hunter numbers at release sites negatively impact other species such as California quail. To meet desires of various factions of the hunting public, birds should not be stocked where there is quality habitat and good wild production.

Chukar

CHUKAR STATUS AND TREND REPORT: REGION 1
Snake River Basin

PAT FOWLER, District Wildlife Biologist
PAUL WIK, Wildlife Biologist

Population objectives and guidelines

The chukar population in Region One reached an all time high in between 1979-81, but crashed in 1982. The long-term objective will be to increase chukar populations within Region One to historic levels that occurred in the late 1970's. Although this will be difficult to accomplish due to habitat loss from noxious weeds in the Snake River basin.

Hunting seasons and harvest trends

The hunting season for chukar has varied in length over the years, from a split early and late season in the 1960's and 1970's, to the implementation of one, standardized season in 1997. The current season runs from early October to mid-January, with a limit of six birds/day.

Chukar hunting was a major recreational pursuit in southeast Washington during the 1970's when chukar populations peaked. During this period, the chukar harvest averaged over 66,000 birds per year in Region One. Most of this harvest occurred within the Snake River basin portion of Whitman, Garfield, and Asotin counties. The average harvest in Region One declined to 28,872 birds per year during the 1980's, and declined to only 12,020 birds per year in the 1990's.

The Region One harvest remained low in 2002 and 2003 at 3,871 and 6,673, respectively (Table1). Although harvest numbers were nearly double the previous year, 2003 harvest levels are still greatly below the late 1970's. The increased harvest in 2003 was likely a result of the favorable nesting conditions seen in the spring of 2003, a period of time following the peak of hatch with minimal precipitation.

Hunter participation peaked in the late 1970's and early 1980's, but has declined significantly since then. Today, only 1,000-2,000 hunters pursue chukars in Region One.

Surveys

Chukar populations were surveyed by helicopter from 1987 through 1997 (Figure 1), but aerial surveys were terminated due to budget constraints. Presently, no surveys are conducted to monitor population status and trends. Field personnel do note the abundance of broods during regular field operations, but this usually does not provide data useful in population monitoring.

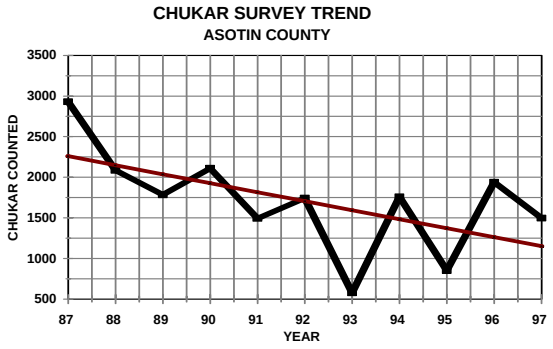


Figure 1. Aerial Chukar Survey Trend 1987-97, Asotin County.

Population status and trend analysis

The chukar population crashed in the early 1980's, and has not increased to the levels experienced in the late 1970's. The reason for the sudden, population crash is unknown. Although, some of the best chukar habitat has been inundated with yellow star-thistle over the last 15 years. This loss of habitat has likely hindered population recovery, and will continue to do so. Also, poor nesting season weather during the 1980's and 90's has hindered population growth.

The annual chukar population is highly dependent on the current years' production. Production in 2003 appeared to be excellent, and possibly the best in over 20 years.

Habitat condition and trend

Noxious weeds, especially yellow-star thistle, have expanded over thousands of acres of prime chukar habitat in southeast Washington. The problem is so wide spread, that several counties have halted control programs, leaving it to private landowners. Chukar partridge thrive on lands that tend to be infested with cheatgrass (*Bromus tectorum*, Ware and Tirhi 1999), and prefer areas without yellow star-thistle.

Cheatgrass is a major component of the chukar diet in spring and fall, and the availability of cheatgrass can have a significant impact on the

chukar population (Ware and Tirhi 1999). As the acreage of yellow star-thistle increases in the Snake River Basin, the availability of cheatgrass is declining significantly. This may be one of the reasons chukar populations have failed to reach historic levels since 1981.

Augmentation and habitat enhancement

Weed control programs appear to be faltering because of the huge costs involved in the aerial application of herbicides. Aerial spraying is the most effective method if followed by good land management practices. Unfortunately, landowners tend to put livestock back out on acreage that has been sprayed, which only exacerbates the weed problem. Biological control agents are also used, but appear to be most effective in newer, smaller stands, and have little impact on large areas of yellow star thistle.

Management conclusions

Chukar populations in Region One are still below the peak levels of he 1970's and early 1980's. Habitat deterioration and land management practices that do not favor chukars will result in the loss of more habitat. Although nesting conditions were good in 2003, one good year will only create short term benefits.

Chukar populations will not return to historic levels until the spread of noxious weeds is reversed, and several years of optimal nesting conditions allow for high productivity and survival.

Literature Cited

Ware, D. A., and M. Tirhi. 1999. Chukar (*Alectoris chukar*). *In* E. M. Larsen and N. Nordstrom, editors. Management Recommendations for Washington's Priority Species, Volume IV: Birds [Online]. Available www.wa.gov/wdfw/hab/phs/vol4/chukar.htm

Table 1. Region One Chukar Harvest Summary 1993-2003.

County	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Asotin	3,734	4,742	2,790	6,781	5,111	5,006	3,547	4,788	3,687	1,440	3,246
Columbia	227	439	374	695	561	273	111	155	179	147	163
Ferry	0	0	0	0	0	0	0	0	0	0	0
Garfield	470	1,387	187	864	2,057	2,648	1,337	724	769	673	676
Walla	64	670	0	112	155	0	0	55	429	384	410
Whitman	1,461	994	1,082	1,531	1,075	2,319	1,875	2,953	2,644	1,058	2,024
Lincoln	162	0	229	807	77	135	148	174	76	137	108
Spokane	178	0	145	17	405	154	55	146	111	32	46
Stevens	0	0	0	0	0	0	0	0	10	0	0
Pend Oreille	0	0	0	0	0	0	0	0	0	0	N/A
Total	8,289	10,226	6,802	12,803	11,438	12,533	9,072	10,995	7,905	3,871	6,673

CHUKAR STATUS AND TREND REPORT: REGION 2
Upper Columbia River Basin

TOM McCALL, Wildlife Biologist
BEAU PATTERSON, District Wildlife Biologist

Population objectives and guidelines

Management objectives for chukar are to maintain healthy chukar populations in all suitable habitats within Region 2 and provide maximum recreational opportunities consistent with population management objectives.

Hunting seasons and harvest trends

From 1999 - 2002, Chukar season opened October 1 and continued through the third weekend in January. In 2003, the season opener was moved to the first weekend in October. Bag and possession limits for chukar are 6 and 18, respectively. These season and limit regulations allow more recreation for chukar hunters than previously available.

Approximately 40 percent of Washington's chukar harvest comes from Region 2. Chukar harvest in the region reached a low of 6,915 in 1994, increased to 13,042 in 1997, and fluctuated between 9,373 and 15,506 from 1998 to 2003 with no apparent trend (Figure 1).

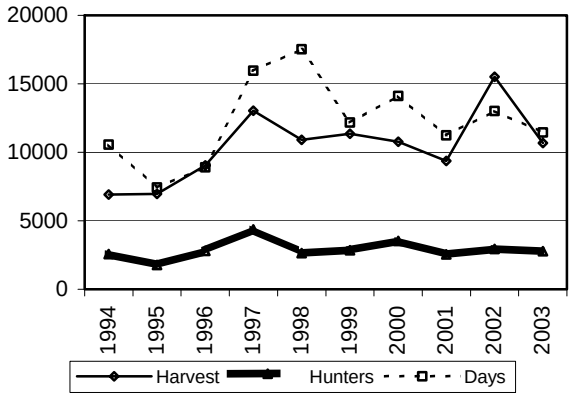


Figure 1. Hunter, harvest and Hunter effort, 1994-2003 in Region 2

From 1994 to 2003, chukar harvest in Region 2 averaged 10,454 birds per year (range 6,915 to 15,506). In 2003, chukar harvest was estimated at 10,675 birds, which was 2% greater than average. There were 2,773 hunters in 2003, which is 4% less than the 10-year average (2,879).

Surveys

In Region 2, we drive 3 routes (Colockum-Tarpiscan, Swakane-Nahahum, and Chelan Butte) in early August to monitor chukar populations. Each route is approximately 20 miles long. Volunteers count total chukar seen while driving these routes. In 2004, the 3 survey routes were each driven 3 times. An average of 4.0 chukar were seen on each route compared to an average of 4.9 per route from 2000 to 2002. Incidental reports of broods and initial harvest information indicate strong chukar populations.

Population status and trend analysis

In summer 2004, incidental observations of chukar and early harvest information suggest above average production of chukar throughout Region 2.

Habitat condition and trend

Chukar habitat is relatively stable in Region 2. Because of the precipitous habitat that chukar use, few areas have been influenced by human development.

Management conclusions

Chukar habitat appears stable. Populations and harvest of chukar will continue to fluctuate as a function of annual weather conditions.

CHUKAR STATUS AND TREND REPORT: REGION 3
Yakima and Lower Mid-Columbia Basins

MIKE LIVINGSTON, District Wildlife Biologist

Population objectives and guidelines

The objective of chukar management is to increase the population to or beyond historic levels. Harvest management is designed to provide maximum recreational opportunity without negatively impacting populations.

Hunting seasons and harvest trends

The 1990-1997 hunting season for Chukar in Region 3 began the third Saturday in October and ended the second Sunday in January. In 1997 the opener was moved to October 1, and in 2003 the opener was shifted to the first Saturday in October. The season was extended to mid- January in 2000. The bag limit has remained at 6 birds per day.

A mailed hunter questionnaire indicated number of hunters remained close to 2002 levels; meanwhile, harvest increased by 31% and success increased 26% (Table 1). Hunter numbers were 20% below the 10-year average. Harvest per day was up 19% from the 10-year average.

Table 1. Chukar hunting statistics for Region 3.

Year	Harvest	Hunters	Harvest Per Hunter Day
86	4,554	2,947	0.65
87	13,821	4,439	0.60
88	9,040	2,958	0.60
89	10,034	3,164	0.43
91	9,498	3,302	0.47
92	8,675	3,101	0.47
93	3,976	2,731	0.55
94	7,402	2,349	0.54
95	6,433	1,905	--
96	15,421	3,152	--
97	7,572	3,316	--
98	10,050	2,135	0.99
99	5,514	2,132	0.58
00	6,162	2,168	0.84
01	5,374	1,836	0.73
02	5,323	1,766	0.62
03	6,674	1,891	0.83
10-year avg.	7,324	2,363	0.70

Population status and trend analysis

Population surveys have not been conducted for 6 years. A post-season survey of hunters is used to estimate harvest and hunter effort. Opportunistic observational information is collected during surveys for other species.

Harvest and opportunistic information indicate the chukar population has been below the 10-year average the past 5 years. Chukar population cycles appear to be related to weather and insect populations. Persistent snow cover during the winters of 1992-93 and 1996-97 led to rapid declines, presumably through direct winter mortality. Populations rebounded rapidly following these rough years with favorable nesting and brood rearing conditions. In 1999, the spring was cold and dry. As a result, insect production was likely low, which could have negatively influenced brood success and overall bird numbers. Apparently, conditions improved in spring 2003, yielding the highest harvest and success since 1998.

Augmentation

The Kittitas Field and Stream Club (KFSC) has been purchasing and releasing 500 chukar annually since 2000. Historically, the club raised approximately 1000 birds for release.

Habitat condition and trend

Chukar inhabit arid areas with steep slopes, deep valleys, and rocky outcrops. The topography, combined with shallow soils, has prohibited extensive agriculture and/or development. In Region 3, WDFW and Department of Defense (DOD) manage the majority of chukar habitat. WDFW lands have not changed significantly in the last decade. Since 1995, the DOD has excluded cattle grazing. Sections of both WDFW and DOD lands have burned in the last few years. The fires did not appear to have significantly impacted chukar habitat. A drought in recent years appears to have had a short-term negative impact. Increased hunter success in 2003 and precipitation rates in spring/summer 2004 may indicate that drought conditions are subsiding.

Management conclusions

Habitat quantity in Region 3 has remained fairly constant. Current land management trends indicate that the amount of chukar habitat will remain stable into the foreseeable future. On the other hand, habitat quality, including insect abundance, fluctuates with weather conditions. Several years of consecutive mild winters and high reproductive success will be needed to further increase chukar numbers.

Quail

QUAIL STATUS AND TREND REPORT: REGION 1
Snake River Basin

KEVIN W. ROBINETTE, Acting Regional Wildlife Program Manager

Population objectives and guidelines

Management objectives for California quail (*Callipepla californica*) are to maintain healthy populations in all suitable habitats within the region and provide recreational hunting opportunities consistent with population management objectives.

Hunting seasons and harvest trends

The 2003-2004 hunting season for California quail and Northern bobwhite (*Colinus virginianus*) in Eastern Washington extended from October 4, 2003 to January 19, 2003. In addition, a youth-hunting-only season occurred for two days, on September 20-21, 2003. As in past years, the bag limit for quail was 10/day, with 30 in possession. Mountain quail (*Oreortyx pictus*) season remained closed in Eastern Washington because of extremely low population levels.

California quail harvest continues to remain low compared to the 1960s and 1970s (Figure 1). Regional quail harvest averaged 90,956/year during the 1960's (1964-1969), declining 26% to 68,424/year during the 1970s. Declining harvest continued into the 1980's and 1990's when harvests averaged 31,503/year and 24,312/year respectively. The average harvest for the Region since the 2000 season is 38,368/year.

Despite the long-term decline in harvest since the 1960's, quail harvest in Region 1 may have stabilized at a lower level, based on relatively consistent harvest levels over the last 20 years (Figure 2). Harvest during 2003 increased dramatically to 49,320 from 29,270 in 2002. This is a 55% increase over the 1998 to 2002 average of 31,729 birds and a 81% increase over the 2002 quail harvest of 27,270 (Figure 2). Quail harvest was 38,000 in 2001, 38,252 in 2000, 27,861 in 1999, 27,263 in 1998 and 32,999 in 1997.

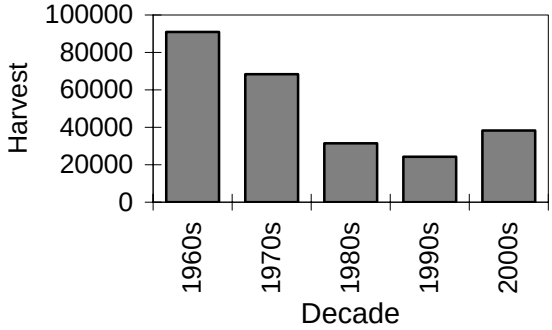


Figure 1. Mean annual quail harvest by decade, Region 1.

Population status and trend analysis

California quail populations have declined significantly based on harvest data (Figure 2). However, recent harvest levels may indicate stabilization at a lower level than that of the 1960s and 1970s (Figure 1).

Quail production data has not been tabulated for approximately 10 years due to lack of sight frequency data and the relatively low priority of establishing new survey routes. However, incidental observations indicate that quail production in 2003 was well above the past four years, perhaps due to favorable weather conditions during the nesting season.

Habitat condition and trend

Land development and agricultural practices have reduced habitat for upland game. The spread of noxious weeds also threatens existing habitat in some areas.

The Conservation Reserve Program (CRP) has benefited wildlife habitat since its inception. After previous CRP contracts expired, farmers had to reapply for CRP acreage in 1997 and many requests were rejected. CRP acreage was limited to existing contracts and extensions during 2001. Within Region 1, roughly 580,000 acres are currently enrolled under CRP. This program provides large amounts of suitable habitat near agricultural croplands, and will enhance habitat conditions for upland birds over the set aside period.

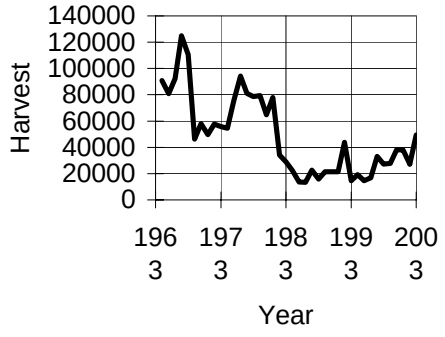


Figure 2. Harvest trend, 1963-2003.

Augmentation and habitat enhancement

The Upland Wildlife Restoration Program (UWRP) has developed over 8,000 acres of upland bird habitat in Region 1. Habitat development and enhancement activities include: planting of grasses, forbs, trees and shrubs; and, installation of approximately 85 guzzlers.

New acreage signed up under the CRP program will be planted with seed mixtures developed to enhance habitat for wildlife. Farmers will be required to replant 50% of existing CRP acreage with new wildlife mixtures.

Management conclusions

Acreage set aside under CRP and habitat enhancement projects implemented by the Upland Restoration Program will benefit quail and other upland wildlife populations. Especially important to California quail is protection and enhancement of riparian habitat in all areas of Region 1. The Hunter Access Program in Region 1 may help offset losses of quail hunting areas to posting and leased hunting.

QUAIL STATUS AND TREND REPORT: REGION 2
Upper Columbia River Basin

JIM TABOR, District Wildlife Biologist

Population objectives and guidelines

Objectives for California quail are to maintain healthy quail populations in all suitable habitats within the Region, and provide maximum recreational opportunities consistent with population management objectives.

Hunting seasons and harvest trends

Quail hunting seasons and bag limits have remained relatively constant in recent years. The season ran from the first Saturday after October 10 to early-mid January with a daily bag limit of 10 quail through 1998. From 1999 through 2003, the season opened on October 4-9 and remained unchanged in other respects. There has been a slight difference (up to 8 days) in the closing date of the season annually. In 2003, there was a youth hunting season Sept. 20-21.

Region 2 is one of the state's most popular quail hunting regions as 37% of all quail hunters hunted there in 2003. There were 6,580 quail hunters in Region 2 in 2003 (Table 1). This was almost the same as that of 2002 and was 29% higher than the 1993-2002 average of 5,108.

Table 1. Number of quail hunters in Region 2, Washington, 1993-2003.

Year	Adams	Douglas	Chelan	Grant	Okanogan	Total
1993	517	893	851	1,583	986	4,830
1994	579	1,007	966	1,635	980	4,735
1995	556	838	654	1,256	761	3,391
1996	487	823	1,144	1,279	957	4,312
1997	887	1,542	1,736	2,063	1,043	7,271
1998	663	995	1,015	1,537	741	4,291
1999	665	1,092	1,152	1,568	781	4,454
2000	664	1,539	1,313	2,416	1,427	5,914
2001	675	1,028	1,320	1,869	1,099	5,295
2002	524	1,037	1,472	2,303	1,251	6,587
2003	566	1,346	1,383	2,496	1,575	6,580
Ave.	622	1,080	1,162	1,751	1,003	5,108

During the 2003 season, 40% of the statewide quail harvest occurred in Region 2. The number of quail harvested in Region 2 during the last 12 years ranged from a high of 75,272 in 2003 to a low of 14,292 in 1993 (Table 2). The 2003 harvest of 75,272 was 31% above that of 2002 and 113% above the 1993-2002 average of 35,341 birds. The 2003 harvest was the largest since 1993 in Douglas, Grant, and Okanogan Co.'s. Okanogan and Chelan counties have yielded the largest harvest during most years and Adams County the smallest. Chelan Co. has shown the largest annual variation in harvest.

Table 2. Quail harvested in Region 2, Washington, 1993-2003.

Year	Adams	Douglas	Chelan	Grant	Okanogan	Total
1993	839	2,348	2,142	3,856	5,107	14,292
1994	1,478	7,352	6,733	4,056	6,613	26,232
1995	1,261	4,025	4,433	4,359	6,585	20,663
1996	2,261	4,784	8,682	4,558	8,334	28,619
1997	2,285	7,353	13,872	4,603	8,297	41,706
1998	2,005	6,990	7,009	8,564	4,797	29,365
1999	2,542	5,685	12,632	6,190	8,538	35,587
2000	2,902	12,822	10,860	10,677	11,882	49,143
2001	3,771	9,881	15,940	7,421	13,479	50,492
2002	1,948	15,269	16,125	9,535	14,431	57,308
2003	2,567	16,724	14,078	15,677	26,226	75,272
Ave.	2,129	7,651	9,843	6,387	8,806	35,341

Surveys

Population/production surveys for quail have not been conducted since 1999.

Population status and trend analysis

Since 1993, Region two quail harvest estimates show an increasing trend in the quail population (Table 2). There have been annual declines, which are usually associated with severe winters with persistent snow cover. However, populations have rebounded after each of these events over the past 11 years.

Habitat condition and trend

The winter of 2003-04 was moderate in Region 2. Mild temperature and a moderate quantity and duration of snow cover were likely conducive to good over-winter survival. The adult quail population in summer of 2004 should be relatively large. Incidental observations indicate good production in 2003.

Most hunted populations of quail occur in shrub-steppe habitat near riparian zones. A significant percentage of the quail population in Region 2 occurs in cities and towns, however. Quail density in the irrigated farmland area of the Columbia Basin is low. In general, quail habitat in the region is relatively stable. Changes in habitat quality appear to result primarily from amount and timing of precipitation.

Augmentation and habitat enhancement

Upland Wildlife Restoration Program (UWRP) personnel often trap and transplant quail within Region 2. Quail are usually captured in urban and suburban areas of Okanogan County and released at WDFW-managed sites throughout the region. In 2003, no quail were trapped and relocated in Grant and Adams Co.'s.

Habitat enhancement for quail is conducted by UWRP staff on private land through cooperative agreements and by Wildlife Area managers on Wildlife Areas. In addition to vegetation management for food and cover, management activities usually include maintaining feeders for providing grain during winter and often include development of water sources including guzzlers.

Management conclusions

The California quail is a major upland game bird species in Region 2 and a species of significant interest to wildlife viewers. Management activities will continue to address the importance of quail by maintaining and developing habitat, relocating birds to vacant suitable habitat, and feeding during winter. Wildlife Area staff maintain feeders for quail during winter on Wildlife Areas. WDFW also provides wheat to the public for feeding quail in winter.

QUAIL STATUS AND TREND REPORT: REGION 3
Yakima River and Lower Mid-Columbia Basins

MIKE LIVINGSTON, District Wildlife Biologist

Population objectives and guidelines

Objectives for California quail are to maintain healthy populations in all suitable habitat within the region and maximize recreational opportunities consistent with population management objectives.

Hunting seasons and harvest trends

In 2003, harvest and effort (total hunter days) were 40% and 10% above 2002 levels (Fig. 1). These same metrics were 56% and 6% above the 10-year average, respectively. Hunter success, as measured in birds per hunter-day, increased 27% from 2002 and 45% above the 10-year average (Fig. 2).

Surveys

Brood count surveys were discontinued in Region 3 in 1999. The post-hunting season questionnaire is used to estimate harvest and currently provides the best index of population status.

Population status and trend

Surveys conducted from 1947-76 indicate Region 3's quail population declined dramatically during the 1960s and 70s. Perceptions of biologists and hunters support the survey data, despite the fact that harvest increased from 51,000 to 129,770 during the 1970s.

A modest increasing trend in hunter success has been observed for the last 6 years (Fig. 2). Total quail harvest indicates that 2003 was an above average year for quail production in Region 3. In fact, total harvest was the highest recorded during the 17-year monitoring period (Fig. 1).

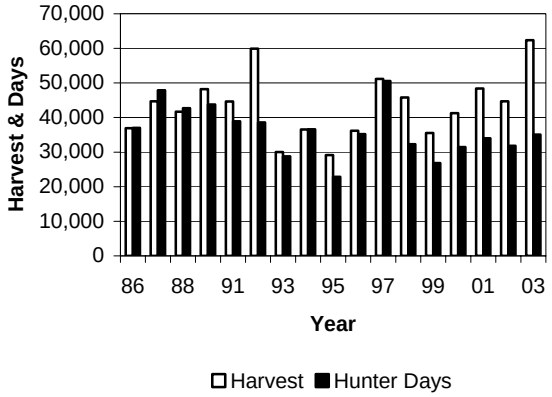


Figure 1. Quail harvest and hunter days, Region 3.

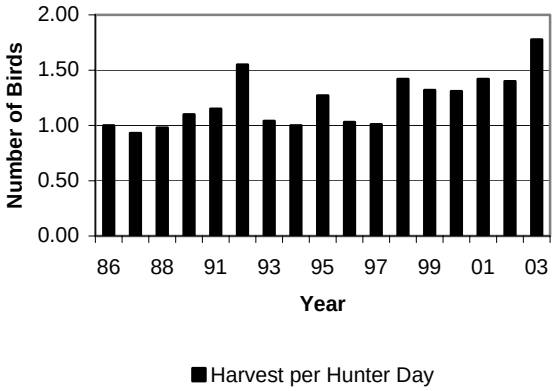


Figure 2. Quail hunter success for Region 3.

Habitat condition and trend

Similar to other agriculturally associated wildlife, quail habitat quantity and quality has declined for decades. The main culprit has been farming practices that remove cover bordering fields, riparian areas, and irrigation canals. Herbicides and pesticides are used to keep crops free of weeds and insects, with insects being critical for quail chick survival.

The highest quail densities are typically associated with brushy riparian habitat. While the spread of invasive Russian olive trees has negatively impacted some native wildlife species by displacing native riparian habitat, these trees appear to benefit quail populations. Some of the highest quail densities in Region 3 are associated with Russian olive trees. Russian olive trees can provide nearly impenetrable, thorny cover often in areas where dense, brushy cover for quail was lacking.

A relatively unknown impact has been urbanization. Quail can adapt well to irrigated and landscaped neighborhoods. Residents often enjoy feeding and watching quail year round. In some areas, urban quail populations with relatively high survival may act as population reservoirs by providing brood stock to adjacent non-urban areas where survival is lower.

Augmentation and habitat enhancement

In the past, efforts have been made to trap and translocate urban quail to augment populations in areas

where numbers appeared to be reduced. With the quail's high reproductive potential, relatively few birds are needed as brood stock for localized populations to recover on their own. Region 3 did not implement any translocation activities in 2003.

Management recommendations

In certain areas an emphasis could be placed on quail management on state-managed wildlife areas. If Russian olive trees are removed, the long-term goal should be to replace them with a diversity of native grasses, shrubs and trees such as Great Basin wild rye, rose, currant, sumac, and dogwood. Managers at the Sunnyside Wildlife Area are currently attempting to replace Russian olive with native grasses and shrubs.

In Region 3, quail management efforts should be focused on improving habitat. Given suitable habitat, species with high reproductive potential, such as quail, are usually capable of quickly rebuilding populations depressed by severe winter conditions without artificial augmentation. In areas where quail are not able to quickly rebuild populations after severe winter weather, quantity and/or quality of available habitat is probably lacking.

Forest Grouse

FOREST GROUSE STATUS AND TREND REPORT
Statewide

MICK COPE, Upland Game Section Manager
DANA L. BASE, Associate Wildlife Biologist
MIKE DAVISON, District Wildlife Biologist
DAVID ANDERSON, District Wildlife Biologist
H. M. ZAHN, District Wildlife Biologist

Population objectives and guidelines

Forest grouse in Washington include blue (*Dendragapus obscurus*) and ruffed grouse (*Bonasa umbellus*), which occur throughout the forested lands in Washington, and spruce grouse (*Falcipennis canadensis*), which are closely tied to higher elevation spruce/fir habitats. Management objectives are to sustain well-distributed populations and provide appropriate levels of recreational harvest. Harvest levels of forest grouse are generally tied to annual production and are closely dependent on weather and habitat conditions. Current population levels are considered healthy and sufficient to meet hunter demand.

Brewer (1980) stated that ruffed grouse could sustain harvest of up to 50% of the fall population without threat of decline and our objective would be to avoid a take that exceeds that number. Present harvest is thought to be well below 50% although exact population levels are not known.

Hunting seasons and harvest trends

A statewide harvest estimate (determined by using a hunter questionnaire) is the main indicator for long-term population trends. However, developing estimates of forest grouse hunter numbers and harvest are challenging because of a licensing structure that allows harvest with a big game license as well as a small game license. Forest grouse harvest survey methods were modified in 1998 and 1999 because of 1) difficulty in separating effort among the 3 grouse species, 2) inaccuracy in species identification by some hunters, and 3) changes in hunting license structure that impacted hunter sample stratification. Because of this change in survey technique, comparison of forest grouse harvest information before and after this time should be done with some caution.

The current Sep. 1 to Dec. 31 hunting season structure has been in place since 1987. The daily bag limit of 3 of any of the 3 species has not changed since 1952. Estimated hunter numbers slowly declined from the late 1980's through 1997, but then fell sharply in 1998 and 1999. Since reaching a low in 1999, hunter numbers increased to almost 50,000 in 2000 (Figure 1). Forest grouse harvest over the past 10 years has fluctuated yearly and is likely dependent on annual production and hunter participation (Figure 2).

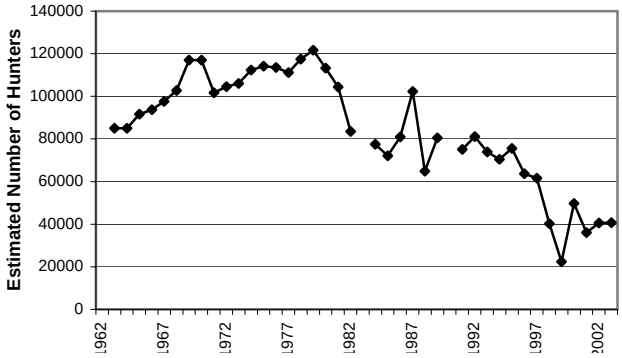


Figure 1. Long-term trend in grouse hunter numbers, 1963-2003.

Long-term harvest estimates indicate a decline from the 1960's and '70's to the 1990's (Figure 2). Some of that apparent decline may be attributed to a change in the method used to collect harvest data, beginning in 1984. Harvest estimates since 1996 have not exhibited a negative trend and harvest continues to

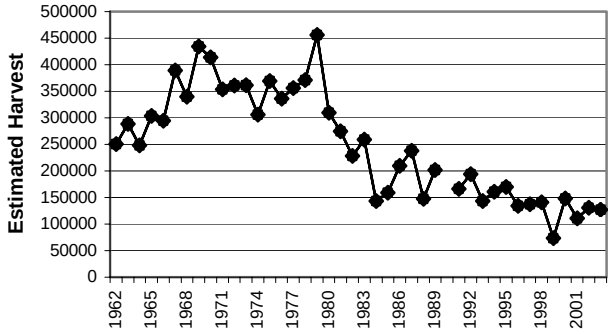


Figure 2. Long-term trend in grouse harvest, 1963-2003.

be closely tied to hunter participation (Figures 1 and 2). Increased restrictions in motorized travel, particularly in western Washington, may reduce hunter participation as well as grouse harvest.

Future harvest monitoring should provide comparable data. In addition, improvements in data collection and analysis should provide a better understanding of harvest both regionally and statewide.

Although grouse hunter and harvest estimates have varied substantially over time, annual estimates of harvest per hunter (an indicator of hunter success) since 1984 have been relatively stable with only 2 years changing more than 1 bird per hunter (1980 and 1998, Figure 3). Estimates of hunter success during recent years have actually been higher than the late 1980s and early 1990s.

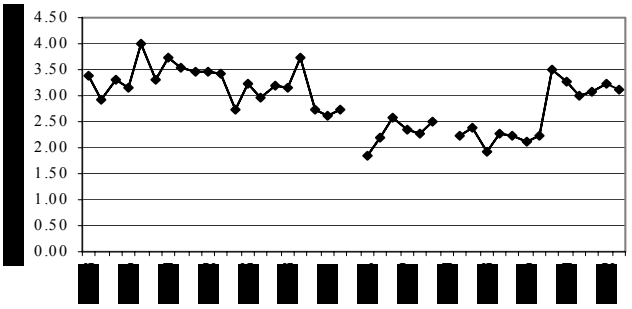


Figure 3. Grouse Harvested per hunter in WA, 1963-2003.

The estimated number of hunters annually pursuing forest grouse in Region One has ranged from approximately 9,000 to 23,000 between 1991 and 2003. Estimated harvest of forest grouse within Region One has varied between approximately 35,000 and 65,000 per year from 1991 through 2003. In 2003, the number of hunters pursuing grouse within Region One was 12,250 and a reported 39,690 forest grouse were harvested. In the past the Hunter Questionnaire reported the estimated Ruffed Grouse harvest to be roughly three to four times higher than Blue Grouse each year. Spruce Grouse harvest is consistently low as this species is the least common and range restricted forest grouse in the region.

Table 1 presents the number of hunters and reported 2003 harvest of forest grouse for each of the three Districts comprising Region One. The Colville District (Pend Oreille, Stevens, and Ferry Counties) has, by far, the highest number of forest grouse hunters and birds harvested.

Table 1. Number of forest grouse hunters and reported harvest by District within Region One in the 2003 Season.

District	Est. No. of Hunters	Estimated Harvest
Colville	10,195	32,290
Spokane	2,250	4,002
Walla Walla	1,996	3,398

Staff at the 40,198 acre Little Pend Oreille National Wildlife Refuge east of Colville have collected wings of forest grouse from hunters since 1997. Through the 2003 hunting season, a total of 734 grouse wings were collected including 653 identified as ruffed grouse, 30 blue grouse, and 51 spruce grouse. Ruffed Grouse have dominated the hunter harvest on the Little Pend Oreille NWR each season since 1997. Harvest of juvenile ruffed grouse has usually been higher than adult birds, occasionally by as much as six fold (J. Cline, pers. comm. 2004).

Hunters harvested 23,667 forest grouse in Region 2 in 2003, compared to 26,461 in 2002, an 11% decrease, but harvest was 8% higher than the average annual harvest from 1998 to 2002. Hunter numbers decreased 16% from 8,736 in 2002 to 7,384 in 2003, but were 10% higher than the 1998-2002 average. The average number of grouse harvested per day per hunter was 13% higher in 2003 (0.63) compared to 2002, and 4% higher than the average during 1998-2002. Despite higher harvest rates in 2003, participation declined in terms of both hunter numbers (-15%) and hunter days (-21%) compared to 2002; however both parameters exceeded the 1998-2002 averages.

In 2003, total grouse harvest in Region 3 (7384 birds) was 1% below the 5-year average and 25% below the 2002 harvest estimate. The number of grouse hunters and hunter days decreased 7% from last year. Hunter success, as measured in grouse harvest per day, decreased 20% from last year (0.33 grouse per day to 0.26).

Few data on effects of hunting on grouse populations are available in Region 3. Harvest success for forest grouse in Region 3 is among the lowest of any of the upland bird species. While large annual population fluctuations appear to have occurred, the annual harvest per hunter trend over the last 10 years appears to be relatively stable (Averaging 1.40 and ranging between 1.1 and 1.9 grouse per hunter). The number of grouse harvested per hunter in 2003 was 1.35, down from 1.68 birds per hunter in 2002.

Grouse harvest in Region 4 during the 2003 season (total = 11,242) was up 12% from the previous year and up 54% from the previous five year period (1998-2002). Increased road access and moderate winter

conditions are credited as the reasons for the increased harvest over the past five years. The 2003 harvest in Region 4 represents 8.9% of the total 126,978 grouse harvested statewide. North Region 4 counties (Whatcom and Skagit counties) account for approximately 51% of the total Region 4 grouse harvest for 2003. Grouse hunters report increased harvest success when hiking or mountain biking forest road systems behind locked gates.

Grouse wing collection stations were operated in GMU 418(Nooksack) during the 2002 grouse season. A total of 86 wings were turned in by local hunters. Of these, 73 were ruffed grouse(46 juveniles, 27 adults) and 13 were blue grouse(9 juveniles, 4 adults). The blue grouse wings were included in a statewide genetics study coordinated out of Region 2.

In 2003, total grouse harvest (18,429) in Region 5 increased from 2002 (15,463), an increase of 19%. The number of hunters did not change significantly from the previous 5-year trend. Hunter success, as measured in grouse harvested per day increased 25 % from the previous 5-year average. No surveys for forest grouse were conducted in Region 5 in 2003-2004.

Combined forest grouse harvest (ruffed and blue grouse) for Region 6 was estimated at 26,226 birds in 2003. This represents a less than 1% decline over the year 2002 season estimate and is 18% above the recent 5-year average (1998 - 2002). Estimated success rate (grouse per hunter-day) was 0.34 a 3% increase over 2002 and a 13% increase over the recent 5-year average. The three counties with the highest percentages of the Region 6 grouse harvest were: Clallam (23%), Grays Harbor (19%) and Jefferson (14%).

Surveys

No statewide population surveys for forest grouse were conducted in 2003; however, some surveys have been conducted in north-central Washington. Road transects, which were originally run from 1954-1974 were reinstituted in 1996. For these routes, the average distance driven per grouse has varied between 4.8 and 47.1 kilometers (Figure 4). While there is variability between years, fewer birds were seen per kilometer in 2002 and 2003 than in previous time periods.

In addition to driving transects, forest grouse wings have been collected in the same area by placing barrels in strategic locations where hunters voluntarily deposited one wing from each grouse killed. Wings were classified as to species, sex, and age. Analysis has shown harvest to be split between the three forest grouse species: 63% blue grouse, 18% spruce grouse, and 19% ruffed grouse. Species mix was similar to that seen on driving transects (72% blue grouse, 18% spruce grouse, and 10% ruffed grouse).

Statewide wing collections from 1993-95 provided several pieces of important information, such as, more than 70% of forest grouse harvest occurs in September and early October, before modern firearm deer seasons. Therefore, current seasons that extend through December probably have very little impact on grouse populations. In addition, there is a tendency for hunters to misidentify grouse species, which has resulted in forest grouse species being combined for current harvest estimation purposes.

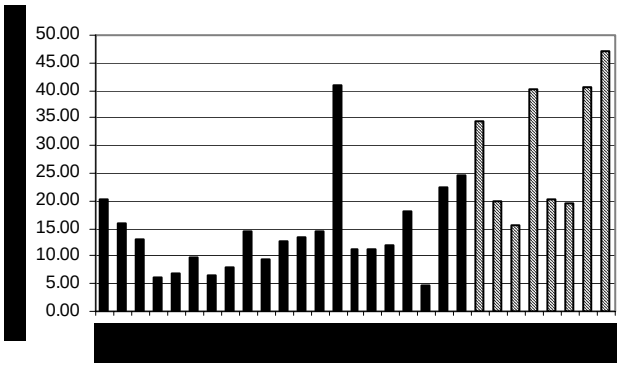


Figure 4. Kilometers driven per grouse observed during driving transects in north-central WA, 1954-2003.

Population status and trend analysis

Based on long-term harvest trends, it appears that forest grouse populations may be declining. However, it is difficult to draw concrete conclusions due to the fact that harvest estimating methods have changed over time. The fact that harvest per hunter has not varied much over time (Figure 3) may indicate that the number of grouse available to hunters has not changed dramatically. Since hunters are not able to consistently identify the species of forest grouse harvested, evaluating population trends for individual species is even more difficult.

Annual production is greatly influenced by weather conditions during the peak of hatching (late May early June). Wet and windy weather reduces chick survival due to over-exposure as well as reducing insect populations at the time when young grouse need a high protein diet. Weather patterns in the spring are often a good predictor of fall harvest and population.

Habitat condition and trend

Timber harvest is the most significant issue statewide for influencing habitat condition and forest grouse population trends. In general timber harvest activities are beneficial for most species of forest

grouse. Silvicultural techniques play a significant role in the degree to which timber harvest provides benefits. Future benefits from timber harvest will depend on the manner in which regenerating forests are managed.

The pace of timber harvest in western Washington during the 1980's has had a significant impact on forest grouse populations. Blue grouse tend to benefit in the first ten years and the greatest ruffed grouse benefits occur between 10 and 25 years after clear-cut timber harvest (Mike Schroeder, WDFW Pers. Comm.). Current conditions should result in higher blue grouse populations with a increased ruffed grouse populations over the next ten to twenty years.

Because the rate of timber harvest in western Washington slowed in the 1990's, forest grouse populations will likely be lower, but stable over the long term. Population levels will greatly depend on forest management practices. Regeneration techniques that include extensive broad leaf tree and shrub control, reduced stocking rates and cover density through thinning and pruning, and replanting with tree species that provide fewer habitat benefits may negatively impact grouse populations.

Conditions are similar in eastern Washington, however recent timber market changes have resulted in some timber stands becoming more valuable than they were ten or twenty years ago. Specifically, lodgepole pine forests have increased in value so there is increased interest in harvesting the timber. In addition, mature lodgepole pine forests have become infested by pine beetles, killing the trees. Forest managers want to harvest those trees before they decay or burn in wild fires.

Wild fires are an important factor influencing grouse habitat in eastern Washington. Several large fires have occurred in forested areas of Regions 1 and 2 since the late-1980s. These areas are currently in early successional shrub communities, which should be beneficial to grouse for several years to come.

There is significant potential to reduce spruce grouse habitat if regeneration techniques are intensive. From a habitat standpoint the better lodgepole and spruce/fir sites may be converted to more merchantable species of trees and harvested stands may end up at much lower stocking rates than are currently present. Both of these outcomes could reduce value of the habitat for spruce grouse.

Augmentation and habitat enhancement

Supplementation of forest grouse populations is generally considered unnecessary in Washington State. No large-scale efforts have been made to enhance habitat for forest grouse. WDFW Habitat Program staff, however, frequently respond to Forest Practice Applications with recommendations to mitigate forest management impacts on grouse. These recommendations commonly include the following: leaving large down logs in timber harvest areas as drumming logs for ruffed grouse; retaining large, "wolf-tree" Douglas-fir trees on ridge tops for blue grouse winter foraging and roosting, and seeding skid roads and log landings with clover and other grouse forage plants.

Management conclusions

Past strategic plans often identified goals of increasing interest in hunting forest grouse. The rationale was that forest grouse, especially ruffed grouse were harvested at a very low rate and could withstand higher levels of harvest. Much of that rationale was based on previous ruffed grouse research in which proportions of forest grouse species harvested, as estimated by the harvest questionnaire, were assumed to be within ten percent. Recent wing collections have cast doubt on that assumption.

Management direction for forest grouse will include the following:

1. Improving harvest estimation, especially on lands managed for wildlife.
2. Development of population monitoring techniques for each species of grouse.
3. Developing forest grouse habitat guidelines for public distribution.

Until monitoring of harvest can be refined and a better determination of proportion of the population harvested can be developed, no change in recreational opportunity appears necessary.

Furbearers and Unclassified Species

FURBEARER AND UNCLASSIFIED SPECIES STATUS AND TREND REPORT Statewide

DONALD A. MARTORELLO, Carnivore, Furbearer, and Special Species Section Manager

Population objectives and guidelines

The statewide goals for furbearers are:

1. Preserve, protect, perpetuate, and manage species and their habitats to ensure healthy, productive populations.
2. Manage wildlife species for a variety of recreational, educational and aesthetic purposes, including hunting, trapping, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing and photography.
3. Manage statewide populations for a sustained yield.

Currently, harvest impacts on furbearer population as assessed from three-year trends in total harvest, catch-per-unit-effort, or nuisance activity**.**

Trapping seasons and harvest trends

Trapping seasons and harvest information are set and analyzed on two large geographical areas, eastern and western Washington. In terms of season dates, trapping seasons have remained fairly stable over the last 6 years, and generally occur through the winter months when pelt conditions are good.

Furbearer management has come under increased public scrutiny, particularly as social values surrounding the traditional utilization of wildlife resources change. In Washington, Initiative 713 was passed by Washington voters in 2000. The initiative banned the use of the most common types of trapping devices used to capture furbearers by licensed trappers, prohibited the sale of commercially valuable furbearer pelts and directed that a permit system be utilized to capture only animals that were involved in nuisance or damage activity on private land. Thus, the majority of furbearers trapped during general seasons are now caught using cage or box type traps. As a result, total furbearer trap harvest has declined by approximately 80%.

Population status and trend analysis

The abundance of individual furbearer populations are largely unknown. However, because these animals typically have high population growth rates and often experience compensatory mortality, the risk of over-exploitation is low. Nonetheless, because biological data on individual species populations are limited, harvest levels are generally managed at conservative levels. The status of furbearer populations are assessed every three years using total harvest and catch-per-unit-effort analyses. Given the significant reduction in total harvest, some furbearer populations appear to be increasing, particularly on the local scale.

Surveys

No quantitative surveys are conducted for furbearer populations.

Management conclusions

Due primarily to reduced trapper effort and reduced trap effectiveness, changes from Initiative 713 have resulted in a non-biologically based system for dealing with furbearer management. The system is inefficient and ineffective at dealing with private property issues and completely negates the opportunity for managing furbearer damage and population issues on public land. As a result, improvements in furbearer management likely hinge on statutory change. Nevertheless, future efforts should focus on a comprehensive furbearer management program that includes:

- Incorporating the International Association of Fish and Wildlife Agencies recommendations on trapping best management practices and humane trapping standards.
- Implementing furbearer population surveys to quantitatively assess local furbearer populations.
- Revising trapper education programs to specifically include increased social sensitivity awareness, humane trapping standards and trapping methodology and rural versus urban trapping programs.
- Developing outreach and education efforts and partnerships informing the public on how to avoid furbearer damage and nuisance activity.

Classification	Species	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000 [a]	2001	2002	2003
Furbearers	Bobcat	218	257	245	262	485	691	365	180	296	59	62	98	253
	Raccoon	1,172	833	950	1,105	810	1,273	1,307	832	571	250	196	281	375
	Red fox	9	0	0	0	0	0	0	0	0	0	0	0	0
	Badger	30	20	17	40	6	11	14	2	13	7	3	0	2
	Beaver	5,036	3,785	5,968	7,347	5,163	7,456	8,116	4,558	4,819	642	1,150	1,703	1,414
	Mink	732	624	640	720	375	596	607	424	462	101	33	62	45
	Marten	246	140	67	176	52	74	80	14	140	18	28	19	0
	Muskrat	9,275	4,420	6,005	6,056	5,335	11,028	10,924	4,117	3,572	1,159	453	683	452
	River otter	482	597	564	798	1,368	2,070	772	656	727	83	138	315	331
	Weasels	66	78	2	78	49	49	49	47	87	44	8	26	59
Unclassified	Coyote	1,875	1,610	2,341	2,288	1,770	1,864	1,606	922	838	503	116	32	129
	Mole	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mtn. beaver	0	0	0	0	0	0	0	0	0	0	0	0	0
	Nutria	0	0	289	365	320	923	1,116	486	712	267	687	239	351
	Porcupine	0	0	0	0	0	0	0	0	0	0	0	0	0
	Skunks	0	0	146	204	79	225	127	164	175	16	17	78	179
Total		19,141	12,364	17,234	19,439	15,812	26,260	25,083	12,402	12,412	3,149	2,891	3,536	3,590
Number of trappers		492	445	435	537	451	562	601	488	473	261	169	150	153

[a] Body-gripping traps banned by voter initiative 713